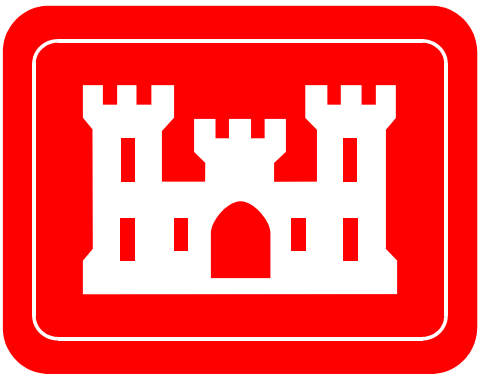


MARCH 2007

US Army Corps
of Engineers
Mobile District

Design Manual

T A B L E O F C O N T E N T S

REVISIONS SUMMARY

1. Design Manual is prescriptive for both in-house and A-E use.

2. Added new Chapters:

22 Design-Build Request for Proposal Development
23 Charrettes
24 MILCON Transformation
25 Acronyms

3. Incorporated A-E TO SOW requirements in Chapter 1.

4. Suspended use of previous Mobile District Lessons Learned procedures in Chapter 21.

5. Added the Design Analysis as a submittal requirement at RTA.

6. Added requirements for new chapters VI-1 Antiterrorism/Force Protection, XIII-1 Sustainable Design, and XIV-1 Notes to the Resident Engineer as part of Design Analysis. Moved Foundation Conditions to II-1.

7. Require redlined marked up specifications at Interim design submittal with final edited specs at Final submittal, or redlined marked up specifications at Final submittal if an Interim submittal was not made with final edited specs at the RTA submittal.

8. Added requirements in Chapter 21 for in-house Quality Control Plan and A-E Quality Assurance Plan in accordance with ER 1110-1-12.

9. Updated technical chapters.

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, Support For Others Projects, and, in as far as is 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, both In-House (I-H) and Architect-Engineer (A-E) consultants, 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 (D-B-B) or a Performance-Price-Trade-Off (PPTO) construction contract acquisition; and Design-Build (D-B) Request for Proposal (RFP) construction contract acquisition including subsequent D-B Contractor design after award. A D-B RFP may include performance and or/prescriptive specifications which allow/require technical criteria that do not follow the specific requirements of this manual. Chapter 22 DESIGN-BUILD REQUEST FOR PROPOSAL DEVELOPMENT addresses D-B requirements.

1.1.2 Proponent

The Chief, Design 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: John Higby, john.d.higby.jr@sam.usace.army.mil, 251-694-4465.

1.1.3 Military Construction (MILCON) Transformation

Designated Army MILCON and Army Base Realignment and Closure (BRAC) 2005 Act projects are subject to Army Transformation and supporting U.S. Army Corps of Engineers (USACE) MILCON Transformation (MT) procedures. These designated projects will be completed in cooperation with USACE Centers of Standardization (CoS). CoS roles, responsibilities and duties, and geographic district (GD) roles, responsibilities and duties in MT designated projects are described in Chapter 24 MILCON TRANSFORMATION.

1.1.4 A-E Task Order (TO) Statement of Work (SOW)

(a) For A-E professional and technical services under A-E Indefinite Delivery contracts with Mobile District or through capacity provided by other organizations, the A-E Task Order (TO) Statement of Work (SOW) will provide project specific execution criteria in conformance with

the current version of the Mobile District Design Manual. See **Exhibit 1-1.**

(b) A preliminary TO SOW will be issued to the A-E prior to conduct of the pre-design conference. While not mandatory, A-E attendance at the pre-design conference is considered essential in ensuring an understanding by the A-E of project, user and installation requirements. See paragraph 1.3.1(b) for additional instructions.

(c) As issued, the TO SOW will take precedence over the standard procedures and instructions in this Manual. The A-E shall document any conflicts between this Manual and the TO SOW in writing and bring them to the immediate attention of the Mobile District Project Manager (PM) or Project Architect Engineer (PAE) for projects in the design phases and to the Resident Engineer for D-B projects that have been awarded.

(d) The A-E shall furnish sufficient technical, supervisory, and administrative personnel to insure satisfactory accomplishment of the work specified in the SOW including accomplishment of work by agreed milestone dates and progress schedule. Additionally, the A-E shall furnish all services, materials, supplies, equipment, investigations, studies, and travel required in connection with the SOW.

(e) The A-E shall accept directions only from the Mobile District Contracting Officer (CO) or the Authorized Representative of the Contracting Officer (ARCO). Requests or desires of the users or using agency made directly to the A-E will be immediately brought to the attention of the PM or PAE, and CO. Any changes to the project scope or other provisions of the SOW must be authorized in writing by the CO.

(f) A-E Actions Required Prior to TO SOW Approval

(1) The A-E shall submit a proposal detailing anticipated costs for conduct of the SOW. The A-E shall follow the "Fee Proposal Guide for Task Orders" issued by EN-DW.

(2) The A-E shall prepare and submit to the COR for approval a progress chart showing the various items included in the work as a percentage of the total fee, the order in which the work will be carried out, and the dates on which the items of work will be started and completed. Significant milestones such as review submittals will be shown. The schedule will provide for completion of all work within the time specified in the SOW. This progress chart may incorporate the requirements of paragraph 21.3.2(c).

(g) A-E Negotiation. Negotiations shall be held to insure a mutual understanding of the SOW and to reach an agreement on a fair and reasonable fee. During negotiations, the SOW shall be thoroughly reviewed and revised as necessary; and the designer's fee proposal shall be examined and discussed in detail.

(h) A-E Actions Required During Conduct of the TO SOW

(1) Updated Progress Chart. An updated progress chart will be submitted with each payment estimate.

(2) Payment Estimate. ENG Form 93 will be used, and may be

found on the Internet at:

http://www.usace.army.mil/inet/usace-docs/forms/

All ENG Forms 93 shall be submitted for payment processing to: US Army Corps of Engineers, Mobile District, ATTN: CESAM-EN-DW (Mary Breland), PO Box 2288, Mobile, AL 36628.

(3) Final Payment. When submitting for final payment include a Release of Claims Statement on the ENG 93. The following statement is acceptable:

"The work under the above numbered task order having been completed and finally accepted, I hereby release the United States of America, it's officers and agents from all claims whatsoever arising under or by virtue of this contract upon payment of a balance due of $_____."

(4) The A-E will use those individuals designated in their SF 330 submission. If any of these individuals are changed, Mobile District will be immediately notified in writing. The SF 330 will be resubmitted with these personnel changes and those person's individual qualifications. Government approval for these changes will be required.

(5) Needs List. Throughout the life of the TO SOW the A-E shall furnish the PAE a "needs" list every two weeks until all open issues are resolved. The needs list will also be included in each formal submittal. The needs list will be an itemized list of design data required by the A-E to advance the design in a timely manner. This list will be maintained on a continuous basis with satisfied action items checked off and new action items added as required. Action items in the needs list will include a sequence number, description of action item, name of the individual or agency responsible for satisfying the action item, and remarks.

(6) Site investigations must be sufficiently thorough to ensure that design details are compatible with the project site. Siting will not be changed without approval of Mobile District. At the Final Design submittal stage the A-E shall make a plan-in-hand site inspection to ensure that the final design accurately reflects existing site conditions. Any changes in site conditions that were made by the Government during the design period shall be annotated and brought to the attention of the Contracting Officer for direction.

(7) Should the project cost estimate exceed the funding limitation, the A-E shall make recommendations for reducing the project scope and/or identifying optional bid items of work. Upon receiving written approval from the COR, the A-E shall modify the contract drawings and specifications to incorporate all changes necessary to reduce the base bid cost estimate below the funding limitation. If any criteria provided to the A-E during design prevents him from meeting the cost limitations, the AE shall notify the COR immediately. The A-E shall list the specific criteria and explain the negative impact on the design cost.

(8) Construction Schedule.

a. The A-E will develop and submit for review a schedule for construction, as a part of each design submittal phase. The schedule shall be task oriented, indicating the number of calendar days, after Notice to Proceed, by which milestones are to be achieved. The critical path Method (CPM) of network calculation shall be used to generate the construction schedule. The schedule will be either the Precedence Diagram Method (PDM) or the Arrow Diagram Method (ADM). The schedule will be a network analysis and will be based on the technical and contractual requirements of the contract and estimated construction durations of the project. The schedule will clearly show the critical path for the overall completion of construction. All activities shall have an estimate of the average number of workers per day that are expected to be used during the execution of that activity. Schedules for construction of buildings shall contain, as a minimum, the milestones shown in the table below at each design submittal phase. Schedules for construction projects which do not contain buildings shall include milestones detailed enough to allow analysis of the proposed durations and critical path of the work required to complete the contract.

b. The schedule will clearly identify procurement and Government activities (submittals, approvals, fabrication, delivery, installation, start-up, testing, balancing, commissioning, inspections, utility tie-ins and Government furnished equipment). Also constraints (materials availability, weather, permits, access/work restrictions at the construction site, etc.) shall be clearly identified on the schedule. The network analysis will include major milestones, activities, durations, phased construction, and partial turnovers which describe the construction schedule.

c. The Government will review the schedule and provide comments, at each scheduled design or BCOE review. The A-E will address the comments, make revisions to the schedule and provide the revised schedule to the Government. Services and pricing for preparation of the construction schedule will be a separate line item in the A-E's proposal.

DESIGN SUBMITTAL PHASE
A Phase I - Project Definition
B Phase II - Concept
C Phase III - Interim
D Phase IV - Final
E Phase V - Ready-To-Advertise

MILESTONES FOR BUILDINGS

No.		A	B	C	D	E
1	NTP		X	X	X	X
2	Grade site –bldg pad				X	X
3	Foundation	X	X	X	X	X
4	Under slab utilities				X	X
5	Slab on Grade				X	X
6	Structural fame	X	X	X	X	X
7	Roof framing-deck				X	X
8	Roofing		X	X	X	X
9	Exterior walls-windows			X	X	X
10	Bldg dry-in	X	X	X	X	X

11	Interior walls-framing				X	X
12	Permanent power				X	X
13	Wall finish			X	X	X
14	Prime paint				X	X
15	Mech/elect RI		X	X	X	X
16	Plumbing				X	X
17	Mech/elect above ceiling				X	X
18	Flooring (VCT-ceramic)				X	X
19	Doors-hardware				X	X
20	HVAC -ductwork-controls			X	X	X
21	Ceiling finish				X	X
22	Finish paint				X	X
23	Mech/Elect systems		X	X	X	X
24	Site work-utilities - paving				X	X
25	Carpet				X	X
26	QC system test (debugging)		X	X	X	X
27	QA system test (acceptance)			X	X	X
28	CQC inspection		X	X	X	X
29	HVAC Test and Balance			X	X	X
30	Landscaping-grassing				X	X
31	Prefinal Inspection	X	X	X	X	X
32	Commissioning-HVAC	X	X	X	X	X
33	Final/acceptance inspection BOD	X	X	X	X	X

d. Construction Duration Targets. The following are construction duration targets from acknowledgement of the Notice to Proceed (NTP) by the Construction Contractor to Beneficial Occupancy Date (BOD) of the project. The A-E will address these targets in the Construction Schedule and the Construction Cost Estimate. The schedule activities and logic used, that extends construction durations in excess of these targets, will be discussed and provided in a narrative with each design submittal.

CONSTRUCTION DURATION TARGETS

PROGRAMMED AMOUNT	CONUS PROJECTS	OCONUS PROJECTS
Less than $5M	365 Calendar Days	455 Calendar Days
PA > $5M and PA < $20M	540 Calendar Days	630 Calendar Days
Greater than $20M	730 Calendar Days	820 Calendar Days

(9) The A-E shall not correspond either in writing or verbally, with any prospective bidder during the advertisement period. All requests for information from a prospective bidder shall be submitted to the person specifically identified in the solicitation.

(10) Design Errors/Deficiencies: The provisions of the contract clause entitled "RESPONSIBILITY OF THE ARCHITECT-ENGINEER CONTRACTOR" will be fully enforced by the Government. Of particular note are the A-E responsibilities noted below:

a. The A-E is completely responsible for the professional quality, technical accuracy, and coordination of all designs, drawings, specifications, and other work or materials produced and furnished by his own staff and that of consultants, and will be required to correct or revise any errors or deficiencies in his work, notwithstanding any review, approval, acceptance, or payment by the Government. Thus the

responsibility continues after final payment is made to the A-E. Corrections and changes resulting from review of the A-E's completed work will not be made by the Government but will be returned to the A-E for correction. Further, the A-E shall be liable to the Government for damages to the Government caused by negligent performance by the A-E. These responsibilities apply equally to any consultant used by the A-E and in no way relieve the consultant from a similar responsibility and accountability to the A-E.

b. During the construction period, the A-E shall provide an evaluation of any problem resulting from what the Government considers to be a design error or deficiency. The evaluation will be provided within 10 days of notification by the Government and will be in the following format:

Problem: Provide a brief description of the problem and the status of the construction at the time of its discovery.

Analysis: Provide a complete and detailed analysis of the problem. Background facts such as circumstances, conditions, dates, personnel involved, and cost data should be included if pertinent. Design conflicts, errors, omissions, and/or ambiguities contributing to the problem should be identified. Describe recommended corrective actions. Attach sketches or drawings if appropriate.

A-E Evaluation: Provide the rationale and justification for whether or not the problem should be considered a design deficiency. The determination of A-E liability in connection with this problem will be made by the Mobile District A-E Liability Review Board. Any evidence or information the A-E wishes the Board to consider should be addressed here.

(11) During the construction period the A-E shall furnish advice as may be requested. During the construction period, limited construction phase services may be required. If construction phase services are required, appropriate modifications to the contract will be made.

1.1.5 Acronyms and Abbreviations

Acronyms and abbreviations are generally written out on first use in each chapter. Chapter 25 ACRONYMS AND ABBREVIATIONS provides a summary listing.

1.1.6 Discipline Coordination

(a) Individual design team members are responsible for coordinating their efforts with those of other design team disciplines.

(b) The A-E shall prepare a written record of each site visit, meeting, or conference, either telephonic or in person, and shall furnish this record within five working days to the COR with copies to all parties involved. The written record will include the subject, the names of participants, an outline of discussion, and the recommendations or conclusions reached.

(c) Chapter 2, PRESENTATION OF DATA includes new requirements for Antiterrorism/Force Protection, Sustainable Design and Development, and Notes to the Resident Engineer chapters in Project Definition narratives and Design Analyses. These require cross discipline coordination for which no primary discipline is designated. For in-house designs, the Project Architect-Engineer will initiate these chapters and ensure input by appropriate discipline members.

1.2 APPLICABLE PUBLICATIONS

Applicable publications are listed in various chapters of this Manual. The most recent editions of the cited publications at the start of Concept Design (30-35%) for D-B-B or Interim Design (50%) for D-B will be referenced and incorporated (as appropriate) in work prescribed by this manual. The publications cited in individual chapters, but referred to thereafter by basic designation only, form a part of this manual. These publications are supplemented by the Unified Facilities Guide Specifications (UFGS) to form design criteria. Unless specifically stated otherwise in this Manual or the SOW, the designer shall be 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 Construction Criteria Base (CCB) which contains USACE Technical Manuals (TM), Unified Facilities Criteria (UFC), Engineering Regulations (ER), Engineering Technical Letters (ETL), and industry and other government standards. The CCB is at the following web site:

http://www.wbdg.org/ccb.

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

1.3 INSTRUCTIONS

1.3.1 Pre-design Conference

The PM shall request that designers attend a pre-design conference 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 shall affect the designer's effort, will be addressed.

(a) I-H Design. The PM or PAE will be responsible for recording minutes from the pre-design conference.

(b) A-E Design. The A-E will be responsible for recording the minutes from the pre-design conference. Upon submission, review and approval by the PM, these minutes will be incorporated as part of the TO SOW. The A-E designer shall be furnished a draft SOW which will contain project specific design criteria and instructions. Subsequent to the predesign conference, the A-E designer shall receive a request to furnish a fee proposal for accomplishing the work agreed upon during the conference. The PAE in coordination with EN-DW will develop a

government estimate for anticipated A-E costs to assist EN-DW in negotiations.

1.3.2 Quality Management

An I-H Quality Control Plan (QCP) or A-E Quality Assurance Plan (QAP) is required for all projects. See Chapter 21 QUALITY MANAGEMENT for specific requirements.

1.3.3 Studies, Renderings and Models

(a) 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 TO SOW.

(b) Models and interior/exterior color renderings necessary for a visual presentation to the customer shall be furnished only as determined during the pre-design meeting, funded, and as directed in the SOW for A-E projects.

(1) 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.

(2) 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.

1.3.4 Charrette

Charrette conduct will be determined during the pre-design meeting. The requirements for a charrette will be as specified in the SOW. Chapter 23 CHARRETTES provides additional information.

1.3.5 Life, Health and Safety Standards

The most recent version of the International Building Code (IBC) will be used as the basis of design of facilities unless specifically exempted by the customer and documented. In addition, the most recent version of NFPA 101 Life Safety Code and other NFPA Codes shall be incorporated into the design as appropriate. UFC 1-200-01 will be used by all designers as the basis for determination of code requirements. (Changes mandated in use of codes in UFC 1-200-01 will be adjusted based on use of the most recent IBC and NFPA codes until UFC 1-200-01 is updated.) 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, shall 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 shall be promptly submitted to the PAE for resolution.

1.3.6 Design for the Physically Handicapped

Unless specifically stated otherwise in the SOW, all facilities shall be designed to be accessible to and usable by handicapped persons in accordance with the Americans With Disabilities Act (ADA) Accessibility Guidelines (ADAAG) and the Uniform Federal Accessibility Standards (UFAS). Consolidated ADA - Architectural Barriers Act (ADA-ABA) guidelines were published in 2004 but have not been adopted by USACE. A draft UFC 1-200-01, General Requirements dated 4 August 2006 will provide final guidance when adopted.

1.3.7 Topographic Surveys, Easements, and Utilities

Unless otherwise specified during the pre-design conference, topographic, hydrographic, and utility surveying and mapping data will be funded and obtained. Chapter 5 SURVEYING AND MAPPING 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.

1.3.8 Foundation Investigation

Unless otherwise determined during the pre-design conference, foundation investigations shall be funded and completed (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 detension ponds. Chapter 6 GEOTECHNICAL provides specific instructions. Specific requirements for A-E designs will be included in the SOW.

1.3.9 Environmental Regulatory Permits

Responsibilities for environmental permits include:

(a) The designer shall 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 shall be prepared and furnished within five working days to the Project Manager with copies to all parties involved.

(b) Where formal documents are required to be submitted to obtain permits, the designer shall 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 COE and comment incorporation, the corrected documents will be forwarded by the COE to the installation for signature by the appropriate official and submission to the appropriate agency. Permit requirements shall be

ascertained and documented by the designer during the Concept Design stage.

(c) The designer shall provide the following information and data for each required permit with the Concept submittal:

(1) Permitting authority (State, local, etc.).

(2) Type of permit required (construction, operation, etc.).

(3) Procedure and time necessary to complete the permit application.

(4) Fees required.

(5) 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 shall be provided. If a permit is not required, reasons and supporting justification (i.e., cite State, local, and/or other regulations) shall be furnished.

(6) An evaluation of all State and/or local regulations to determine if monitoring devices are needed. Where required, monitoring devices shall be included in the project design.

(d) The designer shall provide the completed permit applications not later than the Interim submittal or 60 days prior to the Final submittal, whichever is earlier. Permit applications shall be ready for signature by the appropriate official and submission to the approving authority.

(e) With the Final submittal, the designer shall provide all supporting documents, plans, and specifications. The designer shall also have accomplished the necessary coordination to obtain permit application approvals.

1.3.10 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 provide resource efficient, environmentally friendly and healthy facilities with emphasis on renewable energy and recycled materials. The project specific criteria and rating level will be determined during the pre-design meeting. The SOW will identify requirements for A-E projects. See Chapter 20 SUSTAINABLE DESIGN for specific requirements.

1.3.11 Anti-Terrorism/Force Protection

Anti-Terrorism/Force Protection is an inherent part of all projects. See Chapter 19 ANTI-TERRORISM/FORCE PROTECTION for specific requirements.

1.3.12 Lessons Learned

See Chapter 21 QUALITY MANAGEMENT for specific requirements.

1.4 DEFINITIONS

1.4.1 Design Analysis

(a) The design analysis shall be provided with each submittal including RTA (unless it is determined during the pre-design conference that it is not required at a specific design submittal phase).

(b) At RTA, the design analysis is not a contract document, but rather a final 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, items of particular customer interest revealed in design meetings, shop drawings of particular interest or criticality, anticipated difficult construction features

(c) The design analysis is a written explanation of the project design and is expanded and revised for each submission. The design analysis shall 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 shall be clearly stated. Design calculations, computerized and manual, shall be included in the design analysis in digital format. Narrative descriptions of design solutions shall 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 shall be included with each submission of the design analysis. A separate section with pertinent notes to the Resident Engineer shall also be included. Specific requirements for the design analysis are provided in other chapters of this manual.

1.4.2 Drawings

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

1.4.3 Specifications

The Construction Specifications Institute (CSI) 48 division format is mandatory. The specifications shall be developed in accordance with guidance provided below and in other chapters of this Manual.

1.5 SUBMITTAL REQUIREMENTS

1.5.1 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. Covers for all submittals shall 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.)

1.5.2 Project Definition (10-15%)

This submittal represents approximately 10 to 15% of the design effort, and shall be used to document and validate projects requirements and the construction cost. The submittal shall include preliminary schematic plans, a narrative describing each aspect of the project including a sustainable design points assessment checklist and narrative, and a parametric cost estimates. This level of design effort equates to the final report prepared to document charrette completion (see Chapter 23 CHARRETTES).

1.5.3 Concept Design (30-35%)

This submittal represents approximately 30 to 35% of the design effort and shall 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:

(a) Design Analysis:

(1) Design narrative, notes to the Resident Engineer, and design calculations for all disciplines.

(2) Intended (outline) specifications list.

(3) Environmental permitting memorandums

(b) Concept drawings.

(c) Bidding schedule with Bid Options identified when applicable.

(d) Concept cost estimate.

(e) Required information and data for each required permit.

(f) Annotated Project Definition review comments.

1.5.4 Value Engineering

(a) Shortly after or in conjunction with the Concept Design submittal, the designer shall 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.

(b) VE Study. This effort shall include study of design memorandum documents, cost data, and other information furnished as the basis of the design. The VE study shall 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.

(c) The VE Team. The VE Team Leader shall be headed by an architect with no prior input/knowledge of the design. Other disciplines required for participation are civil, structural, mechanical, electrical, and cost engineering. Similarly, VE team members shall have no prior input to, or knowledge of the design. Selected team members will be different from the design team. All members should have past experience performing VE analysis.

(d) VE Report. The results of the study shall be prepared and submitted on 8 1/2" x 11" bond paper. Back-up data and detailed estimates shall be included. Sketches may be 8 1/2" x 11" or 11" x 17" fold-outs. Pages must be sequentially numbered in the lower right-hand corner for assembly purposes. Report will include as a minimum:

(1) Transmittal letter.

(2) Cover Sheet.

(3) Table of Contents.

(4) Summary of existing and proposed design.

(5) Study Methodology.

(6) Tabulation of proposed changes with first cost savings, operations and maintenance costs, and energy savings displayed separately. Life cycle coat analysis shall be included. Present worth and annualized cost shall be computed using ten percent (10%) per annum.

(7) Advantages and disadvantages of proposed changes.

(8) Appropriate drawings for each proposed change showing the existing conditions and proposed alternatives.

(9) Estimates comparing the existing design with all proposed changes.

(10) Results and conclusions.

(11) Recommendations shall 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 of major with recommendations concerning the most efficient way to accomplish each change.

(12) List of possible design conflicts.

(13) Summary of VE Actions.

(e) VE Report Distribution. The report summarizing the VE proposals shall be submitted to those listed in the TO SOW Design Submittal Distribution List, or as determined by the PM and PAE in prepared in-house.

(f) Presentation of VE Study Results. The VE team leader shall attend a ½ day meeting at the start of the Concept Design (30%) Review Conference at the project site to present the VE proposals. The presentation shall be scheduled with the Corps of Engineers Project Manager at least 14 days prior to the proposed presentation date.

(g) 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.

(i) 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.

1.5.5 Interim Design (50-65%)

This submittal, if required, is intended to insure 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 shall consist of:

(a) Design Analysis developed to approximately 60% completion.

(b) Approximately 60% complete drawings including those addressing construction phasing.

(c) Detailed cost estimate developed to approximately 60% completion including Bid Options where applicable.

(d) Redlined marked up specifications.

(e) Annotated Concept review comments.

(f) Completed permit applications (if an Interim submittal was not required, the completed permit applications are required 60 days prior to the Final submittal).

1.5.6 Final Design (Unreviewed 100%)

This submittal represents a 100% complete design with the exception of the incorporation of any review comments resulting from the review of the submittal. The Final Design shall consist of:

(a) Design Analysis with all items 100% complete. It shall 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.

(b) 100% complete drawings including those addressing project construction phasing.

(c) 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 Project Support Section (EN-DW) and forwarded to the AE for inclusion in the Final Design Submittal.

(d) Bidding schedule and an Explanation of Bid Items. Identify Bid Options where applicable.

(e) Detailed 100% complete cost estimate.

(f) Annotated Interim review comments.

(g) All supporting documentation required for permit application approvals.

1.5.7 Ready-To-Advertise (RTA) (Reviewed 100%)

This submittal represents a complete design (design analysis, specifications, and drawings) including annotated design submittal review comments that answer and/or incorporate review comments resulting from the review of the Final design submittal.

Sample D-B-B and D-B A-E TO SOW

Notes:
{ } indicates guidance to the preparer
[ ] indicates data to be added or selected by preparer

Appendix "A"
Contract Number [??????-??-D-????], Task Order Number [???]
{Determine Contract Number and Task Order Number from EN-DW}

Task Order Statement of Work

1. Project Description:

[Design-Bid-Build (D-B-B) description of project/effort, i.e.: The A-E is responsible for Design of a Tactical Operations Center for the 20th Special Forces Group at Camp Swampy, FL including [one story structure, administrative areas, SCIF, etc.}[, Project Number (PN)] [, other project specific designator].

[Design-Build (D-B) description of project/effort, i.e.: The A-E is responsible for preparation of Design-Build Solicitation (Request for Proposal) for a Tactical Operations Center for the 20th Special Forces Group at Camp Swampy, FL [, Project Number (PN)] [, other project specific designator]. The solicitation will result in the award of a construction contract for design and construction. The A-E will prepare technical requirements, cost estimates, [technical specifications,] [design drawings to an approximate [10% - preliminary site and floor plans] [35% - preliminary site and floor plans, elevations, roof plan] [other site information {see para. 22.6.4 of the Design Manual] [other] level of design.] [Specifications will [not] be prepared for this RFP [in SpecsIntact format] [in nationally recognized commercial specifications format {recommend gaining concurrence on specification use and format}.] The project will be advertised as a [one-step][two-step] solicitation. [The A-E in cooperation with the Government will conduct reviews of the D-B Contractor's Design After Award submittals at [Project Definition (10-15%)] [Concept Design (30-35%)] [Interim Design (50-65%)] and [Final Design (100%)] [submittals on a fast track schedule including [list {PAE should coordinate anticipated use of fast track submittals with the PDT}].

[MILCON Transformation Design-Build description of project/effort, i.e.: The A-E is responsible for preparation of Design-Build Solicitation (Request for Proposal) for a Tactical Operations Center for the 20th Special Forces Group at Camp Swampy, FL [, Project Number (PN)] [, other project specific designator]. The solicitation will result in the award of a construction contract for design and construction. The A-E will prepare technical requirements in accordance with the MT Model RFP Implementation Guide and MT Model RFP Field Execution Guide using the USACE Model RFP Wizard, and cost estimates. Please note: the requirements in the two Model RFP Guides conflict with certain technical provisions in the Design Manual.] The project will be advertised as a [one-step][two-step] solicitation.

EXHIBIT 1-1 (Continued)

2. Mobile District Points of Contact: The Mobile District Project Manager (PM) for this work is [name, office symbol, telephone number, fax number, E-mail address]. The Mobile District technical point of contact, Project Architect-Engineer (PAE) for this work is [name, office symbol, telephone number, fax number, E-mail address]. [The Resident Engineer to contact for access to work described in this TO SOW is: name, office symbol, telephone number, fax number, E-mail address.]

3. Scope and Cost Limitations. The completed design will not exceed [the scope limitation (e.g., 39,000 square feet)] and [the construction cost limit or percentage thereof {verify percentage with PM}] in accordance with the enclosed [DD Form 1391, or design directive]. Bid options [will] [may] be required to ensure that the project is within the cost limitation. The base bid plus all options should not exceed 110% of the construction cost limitation.

4. The CADD Code for this project [MXXXXX] [or] [will be provided by the PAE]. The PAE will provide the official project CADD title blocks and drawing border format [if required]. The PAE will provide the A-E with the project solicitation number and advertising date to be shown on each drawing following final submittal and before the RTA submittal. [The PAE will provide the amendment number for two-step Design-Build solicitations.]

5. At the Ready-to-Advertise (RTA) submittal, the A-E shall submit all drawing files using only [MicroStation 5.0] [AutoCad 14/2000]. One complete set of CADD files and one complete set of CAL files shall be submitted on a CD, or via the Mobile District FTP site.

6. Drawing/Specification Units

[English Units: This project shall be accomplished using English units.]

[Metric Units: This project shall be accomplished using metric units.]

7. Conferences: The A-E shall attend a [Pre-design Conference] [Concept Design review meeting] [Interim Design review meeting] [Interim Design 50% D-B review meeting] [Final Design review meeting]. Conference/s shall be held at [provide location].

8. Work performed by the A-E will conform to the additional criteria and data listed below. {The PAE should list below any user, installation, or command information relevant to the project not already identified in the Design Manual, and sources for that information. If none, indicate none.}

9. Topographic Survey

[The Government will furnish the A-E with the topographic survey for use in preparation of the [design] [RFP].

[The A-E shall obtain all topographic surveys required to design the project. The area to be mapped is approximately [??] acres (hectares). The area shall be mapped at a scale of 1"= [??]'. The subsurface utilities investigation shall be performed to a Quality Level [A] [B] [C] [D].] {PAE shall coordinate with EN-DA (Civil/Site) and the survey section to determine survey requirements, utility investigation quality level required, and subsurface exploration methods.}

EXHIBIT 1-1 (Continued)

10. Foundation Investigation

[Design-Bid-Build: The Government will furnish the A-E with the appropriate subsurface data and a written report with foundation parameters to be used in the design.]

[Design-Build: The Government will furnish the A-E with the appropriate subsurface data and a written report with foundation parameters to be used in the design. In the RFP it should be made explicitly clear that the D-B Contractor is fully responsible for an acceptable foundation.]

[Design-Bid-Build: It is the AE's responsibility to obtain all subsurface information and associated test data required for preparation of the Geotechnical Report, the design and construction of the project in accordance with the Design Manual. The AE shall be responsible for obtaining all required drilling permits.]

[Design-Build: The A-E shall obtain all subsurface and associated test data required for design of the project. The scope of the investigation will include as a minimum the following [provide scope details] {PAE to coordinate with EN-GG for requirements}. In the RFP it should be made explicitly clear that the D-B Contractor is fully responsible for an acceptable foundation.]

11. Sustainable Design and Development

[The certifiable Sustainable Design and Development rating to be achieved with this project is:
[ ] None Required
[ ] LEED Silver
[ ] SPiRiT Gold.]

[The project [ ] will [ ] will not be registered with the USGBC. {PAE to determine in cooperation with the PM.}]

[The project [ ] will [ ] will not be certified. {PAE to determine in cooperation with the PM.}]

12. Environmental Permit Fees

[The A-E is responsible for payment of all environmental permit fees up to an amount of [_____].] {PAE to determine dollar amount in coordination with EN-GE.}

13. The following schedule of Architect-Engineer services is required for this task order. Work performed by the A-E will be performed in accordance with the requirements (including applicable references and publications listed) in the Mobile District Design Manual, March 2007 available at the following web site. Design Manual references (for example paragraph 1.3.4 indicates Chapter 1, paragraph 1.3.4) shown in the table below provide essential but not all inclusive references. Refer to individual technical chapters in addition to those references shown. It is the A-E's responsibility to extract and ensure incorporation of requirements from the Design Manual in this effort.

http://www.sam.usace.army.mil/en/guides/DesMan/desman.htm

EXHIBIT 1-1 (Continued)

TO SOW Requirement {Indicate specific requirement/s}	Design Manual Paragraph and/or Chapter Requirement	Architect-Engineer Services
[X][1]	1.3.4, Chapter 23	Planning Charrette Submittal
[X][1]	Chapters 18 and 23	Parametric Cost Estimate
[X][1]	1.3.3(a)	Study Submittal
[X][1]	Chapters 1, 2, 22 and 23	Preparation of Design-Build Request for Proposal (Nominal Criteria)
[X][1]	Chapters 1, 2, 22 and 23	Preparation of Design-Build Request for Proposal (Partial Criteria)
[X][1]	Chapters 1, 2, 22 and 23	Preparation of Design-Build Request for Proposal (Full Criteria)
[X][1]	1.3.4, Chapter 23	Design Charrette Submittal
[X][1]	Chapters 1, 2, and 3	Project Definition (10-15%) Submittal
[X][1]	Chapters 1, 2, and 3	Concept Design (30-35%) Submittal [S-3]
[X][1]	Chapters 1, 2, and 3	Interim Design (50-65%) Submittal [S-4]
[X][1]	Chapters 1, 2, and 3	Final Design (Unreviewed 100%) Submittal [S-5]
[X][1]	Chapters 1, 2, and 3	Ready-To-Advertise (Reviewed 100%) Submittal [S-6]
[X][1]	Chapters 1 and 20	Sustainable Design and Development
[X][1]	1.5.4	Value Engineering Study
[X][1]	Chapter 10	Structural Interior Design Submittal
[X][1]	Chapter 10	Furniture, Fixtures and Equipment Submittal
[X][1]	1.3.3(b)(1)	Architectural Rendering/s
[X][1]	1.3.3(b)(2)	Architectural Model/s
[X][1]	1.3.7, Chapter 5	Topographic Survey
[X][1]	1.3.8, Chapter 6	Subsurface Investigation
[X][1]	Chapters 2 & 18	Cost Estimate
[X][1]	1.1.4(8)	Construction Schedule
[X][1]	[Reference]	[Other]

Note 1 above in TO SOW Requirement column. At any time prior to [enter period of time of up to one year] after completion and acceptance of the work to be submitted under this TO SOW, the Government, at its option, may direct by a written order from the Contracting Officer that the A-E perform additional work and services under additional phases of the TO SOW identified above. These items are not to be estimated, or negotiated as part of this statement of work, but are identified for potential modification purposes only.

EXHIBIT 1-1 (Continued)

14. The following actions or submittals are required from the A-E prior to completion of the TO SOW negotiation.

TO SOW Requirement {Indicate specific requirement/s}	Design Manual Paragraph Requirement	TO SOW Requirement
X	1.1.4(b)	Pre-design Conference
X	1.3.1(b)	Pre-design Conference Minutes
X	1.1.4(f)(2)	Initial Progress Chart
X	1.1.4(f)(1)	Proposal

15. The following routine submittals are required from the A-E during conduct of the TO SOW. Refer to the Design Manual for project specific submittal requirements.

TO SOW Requirement {Indicate specific requirement/s}	Design Manual Paragraph Requirement	TO SOW Requirement
X	1.1.4(h)(1)	Updated Progress Chart
X	1.1.4(h)(2)	Payment Request
X	1.1.4(h)(3)	Final Payment Request
X	1.1.4(h)(4)	Change in personnel and revised SF 330 for Government Approval
X	1.1.4(h)(5)	Needs List
X	21.3.2(c)	Quality Assurance Plan

16. Cost Estimating Requirements. {Contact EN-E for the following.}

[ ] No cost estimate required.

The Required Estimating Method will be:
[ ] MCACES GOLD
[ ] PACES (Parametric estimate only)
[ ] Spreadsheet (Parametric estimate only)
[ ] Other _____

The Estimate Hierarchy will be:
[ ] Partial (Level 3 Work Breakdown Structure)
[ ] Normal (Level 4 Work Breakdown Structure)
[ ] Full (Level 7 Work Breakdown Structure)

17. Submittal Requirements. Upon completion of the various design phases, the A-E shall furnish the required documents in accordance with the attached Submittal List. The A-E shall include a Submittal Evaluation Post Card with the documents sent to each addressee on the submittal list. A sufficient number of blank Submittal Evaluation Post Cards will be provided to the AE by the PAE. See paragraph Chapter 2, Exhibit 2-1.

EXHIBIT 1-1 (Continued)

18. Submittal Schedule. The following schedule shall be adhered to. The submittal dates specified below are delivery dates to all addressees. The A-E shall plan its work to permit mailing by routine mail service; however, one-day mail services shall be used whenever necessary to meet the submittal schedule.

Submittal Description	Duration
Design Quality Control Plan	10 calendar days after TO award
Project Definition Submittal	[xx] calendar days after TO award
Concept Design Submittal	[xx] calendar days after TO award
Interim Design Submittal	[xx] calendar days after TO award
Interim 50% D-B Design Submittal	[xx] calendar days after TO award
Final Design Submittal	[xx] calendar days after TO award
RTA Design Submittal	[xx] calendar days after TO award
RTA Design Cost Data Files	4 calendar days prior to bid or proposal opening
[Other]	[xx] calendar days after TO award

[The A-E shall provide its information to the Government, and the Government will coordinate and mail the Final submittal package for review.] [The Government will provide its information to the A-E, and the A-E shall coordinate and mail the Final submittal package for review.]

19. Period of Service. {Select and complete one of the following.}

[Since the A-E may be required to furnish advice during construction, all work and services to be performed under this Task Order will be completed by {enter date}.]

[All work including the submission of all required reports and data shall be completed no later than [XXX] {enter time period} days after award of this TO.]

20. Attachments:
[Design Submittal Mailing List]
[Submittal Evaluation Post Card]
[DD Form 1391]
[Other]

EXHIBIT 1-1 (Continued)

Design Submittal Mailing List

ITEM	A	B	C	D	E	F	G	H	I	J	AGENCY
											A. U.S. ARMY ENGINEER DISTRICT, MOBILE
DESIGN QUALITY CONTROL PLAN											ATTN: CESAM-[PAE]
											109 ST. JOSEPH STREET
PROJECT DEFINITION SUBMITTAL (10-15%)											MOBILE, ALABAMA 36628-0001
Design Narrative											
Concept Site Plan											**B.** USACE, MOBILE DISTRICT
Schematic Floor Plans											ATTN: CESAM-[PM]
Schematic Elevations											109 ST. JOSEPH STREET
Parametric Cost Estimate											MOBILE, ALABAMA 36628-0001
											C. USACE, MOBILE DISTRICT
											ATTN: CESAM-EN-DW
CHARRETTE											109 ST. JOSEPH STREET
Design Narrative											MOBILE, ALABAMA 36628-0001
Concept Site Plan											
Schematic Floor Plans											**D.** [RESIDENT ENGINEER]
Schematic Elevations											
Parametric Cost Estimate											**E.** [USER]
											F. [COMMAND]
CONCEPT DESIGN SUBMITTAL (30-35%)											**G.** [AREA ENGINEER]
Annotated Review Comments											
Design Analysis											**H**. [CONTRACTOR]
Concept Drawings											
Cost Data Files (See Chapter 18)											**I**. [CONTRACTING]
Permit Requirements Letter											
Value Engineering Study											**J**. [INSTALLER]
Structural Interior Design											
Furniture, Fixtures and Equipment											
INTERIM DESIGN SUBMITTAL (50-65%)											
Annotated Review Comments											
Design Analysis											
Marked up Redlined Specifications											
Partial Drawings											
Cost Data Files (See Chapter 18)											
Structural Interior Design											
Furniture, Fixtures and Equipment											
FINAL DESIGN SUBMITTAL (UNREVIEWED 100%)											
Annotated Review Comments Booklet											
											EXHIBIT 1-1 (Continued)

Design Analysis										
Drawings (1/2 - Size Prints)										
Cost Data Files (See Chapter 18)										
Marked up Redlined Specifications										
Final specifications										
Permit Applications										
Permit Documentation, P,S & DA Signed/sealed										
Structural Interior Design										
Furniture, Fixtures and Equipment										
READY TO ADVERTISE (REVIEWED 100%)										
Drawing Files – CADD										
Drawing Files – CALS										
Specification files – SpecsIntact files										
Cost Data Files (See Chapter 18)										
Design Analysis										
Appendices in individual pdf file format										
Structural Interior Design Submittal										
Furniture, Fixtures and Equipment Submittal										

EXHIBIT 1-1 (End)

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 shall 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 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.

2.2 APPLICABLE PUBLICATIONS

ERDC/ITL TR-01-6	Architect/Engineer/Contractor (A/E/C) Computer Aided Design and Drafting (CADD) Standards

2.2.1 Internet Addresses

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

http://www.sam.usace.army.mil/en/guides/DesMan/desman.htm

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

https://tsc.wes.army.mil/products/standards/aec/aecstd.asp

2.3 SUBMITTAL REQUIREMENTS

(a) This section covers format requirements for the deliverables for all submittals. All instructions shall be followed unless otherwise specified during the pre-design conference or in the SOW. The CADD Code, the official title of the project and the sheet size for the project will be established for I-H projects by the PAE through the Mobile District Project Support Section (EN-DW) prior to the start of work. This information shall be provided to the A-E within the SOW or before work begins by the PAE through EN-DW.

(b) Submittal Evaluation Post Card. Each submittal addressee will be provided a Submittal Evaluation Post Card (See **Exhibit 2-1.**) EN-DW in coordination with the PAE will prepare the cards for in-house work. The PAE will provide sufficient blank cards to the A-E for A-E designs. The "Project and Location", "Type of Submittal", and "CADD ID No" lines will be completed prior to including the cards with a submittal,

(c) Questions concerning drawing file deliverables should be addressed to EN-DW, Ms. Brenda McLaurin, telephone 251-690-2634 or to the PAE.

2.3.1 Project Definition, Concept, and Interim Submittal

The following guides apply for Project Definition Submittal (10-15%), Concept Submittal (30-35%), and Interim Submittal (50-65%). The Design Analysis, Bidding Schedule, Cost Estimate, etc. shall be 8 ½" x 11", copied on two sides, and bound. All drawings at these submittals shall be half size. A submittal report is required for these submittals and should be presented in the same format as an RTA report. See **Exhibit 2-2**. All drawing title block information must be as complete as possible for each submittal. Each drawing package submitted shall have an "Index of Drawings" completed to the extent possible.

2.3.2 Final Submittal (Unreviewed 100%)

The Design Analysis, Bidding Schedule, Cost Estimate, etc. shall be 8 ½" x 11", copied on two sides, and bound. A bound half size set of black line prints shall be submitted unless otherwise required. A submittal report is required for this submittal and should be presented in the same format as an RTA report. See **Exhibit 2-2**.

See Chapter 3, SPECIFICATIONS for the Specification requirements.

2.3.3 Ready-To-Advertise (RTA) (Reviewed 100%)

(a) The Design Analysis, Bidding Schedule, Cost Estimate, etc. shall be 8 ½" x 11", copied on two sides, and bound. Drawings shall include the solicitation number and advertising date which will be provided by the PAE with the final review comments. CADD files and a half size set of CAL files (paragraph 2.3.4) shall be delivered at this submittal and as described in the SOW. RTA submittal must be accompanied by a submittal report listing all design narrative chapters, drawings and specifications being delivered (See **Exhibit 2-2**).

(b) The Mobile District requires that a project be submitted in only one type of CADD system. The SOW will designate the submittal requirements of MicroStation or AutoCad files. Drawings developed using another CADD system or a mix of the two CADD systems is NOT acceptable.

(c) RTA Cadd Files will not contain the use of Reference or Xref files. Each drawing file must be free standing and independent.

(d) The PAE will furnish the A-E the Solicitation Number and advertising date to be shown on each drawing. The Solicitation number and advertising date shall be placed on each drawing after the Final Submittal has been made and prior to RTA. A-E contract numbers will not be shown on the drawings.

(e) See Chapter 3, SPECIFICATIONS, for the Ready-To-Advertise specifications submittal requirements.

2.3.4 Computer Aided Language (CAL) File Creation and Submittals

See the following website for CAL files creation and downloads:

http://www.sam.usace.army.mil/en/guides/cadd/cals/cals.html

CAL files shall be half size plots of originals and may need to be rotated 90 degrees. For assistance, points of contact are listed on the web page listed above.

2.3.5 Design-Build (D-B) Request for Proposal (RFP) Narrative

Sections 01 10 10 Design Requirements and 01 10 12 Design After Award narratives shall be prepared in the format shown in Chapter 22 DESIGN-BUILD (D-B) REQUEST FOR PROPOSAL (RFP) DEVELOPMENT .

2.4 DOCUMENT REVIEW AND COORDINATION

(a) The designer shall check and coordinate with each involved design discipline on each submittal for omissions, repetition, and resolution of all conflicts. The designer shall prepare the drawings and specifications with the expectation that the construction contractors shall 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.

(b) 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 shall coordinate these notes, drawings and other submittal data with the guide specifications and customer specific criteria.

2.5 DRAWINGS

2.5.1 Computer Aided Design and Drafting (CADD) Standards and Naming Convention

(a) All drawings shall be created using CADD methods in the version of MicroStation or AutoCAD currently in use by Mobile District and as specified in the SOW. All symbology for CADD files shall be in accordance with the latest version of the A/E/C CADD Standards. The Term "Symbology" means level/layer line weight and style, names, color, fonts. CADD features not addressed in the A/E/C CADD Standards or this Manual shall conform to normal drafting standards.

(b) The CADD standard file naming convention shall be as follows: The first four letters are the sheet references number and the last four are the cadd code. An example of Sheet Ref. S-101 for project CADD Code M004EA06 prepared in Microstation would be S101EA06.DGN. This shall insure 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 drawing.

2.5.2 Drawing Package Assemblage

Below is an example for a typical design package sequence.

Cover Sheet = Prepared by the Mobile District – EN-DW
General = Index of Drawings, Site Location, Haul Routes, etc.
Survey
Paving and Grading
Steam Distribution
Gas Distribution
Water and Sanitary

Geotechnical and Materials
Landscaping
Architectural
Interior Design
Structural
Fire Suppression
Plumbing
Heating Ventilation and Air Conditioning (HVAC)
Mechanical Special Equipment
Electrical
Electrical Systems
Communications
Hydraulic and Hydrology

2.5.3 Drawing Size, Title Blocks, Borders, and CADD Code

(a) The Mobile District standard drawing size is 22" x 34". Any deviation from the standard drawing size requires approval of the Chief, Design Branch.

(b) The PAE in cooperation with EN-DW shall provide the official CADD title blocks, CADD codes, and borders to I-H and A-E designers. This official title block will have the title and location of the project. The drawing's title assigned by the designer should clearly define the information contained on that sheet (See **Exhibits 2-3 and 2-4**). Designers shall not use title blocks from previous or other on-going projects.

2.5.4 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. All details shall be titled and numbered in accordance with **Exhibit 2-5**. 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 insure clarity and legibility when reduced to half size. Legends, symbols, and lists of abbreviations shall be placed on the drawings for clarification.

2.5.5 Drawing Fonts and Scales

Only standard fonts, described in the A/E/C CADD Standards, Chapter 3, Graphic Concepts, Table 11, are allowed in the creation of CADD files. Preferred text usage shall be font # 1 "Working" for MicroStation and "Romans" for AutoCAD. The preferred font width for "Romans" is 0.85. No fonts created by third parties or the designers are permitted. Monotext Font (AutoCAD) and Font #0 (MicroStation) are not permitted.

2.5.6 Drawing Standard Lines Styles and Widths

All CADD file graphic line weights and styles and colors, shall be standardized using the Tri-Service Manual A/E/C CADD Standards, Graphics Concepts Chapter 3, Tables 7, 8, 9 and 10.

2.5.7 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.

2.5.7.1 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

2.5.8 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 lower right corner of the drawings near above title block or as near thereto as practical. The original title blocks shall not be changed. The For Information Only drawings shall be contained as an Appendix placed at the end of the drawing assembly. The RTA Report shall include a list of the FIO drawings (See **Exhibits 2-3 and 2-4**).

2.5.9 Drawing Amendments and Change Orders Revisions

The designer may be involved in two types of drawing revisions - Amendments during advertisement and Change Orders after a contract is awarded. The PAE for each project will provide the Amendment or Change Order Number to be placed on the drawings. This number shall be placed in the lower right corner of the drawings. Example: AMENDMENT NO 0001 or CHANGE ORDER NO FM-001. All designers are responsible for preparing amendments and change orders as specified herein. It is essential that all revised drawing files be delivered to EN-DW for management and archiving purposes (See **Exhibit 2-4**). For I-H projects, each designer shall submit a report to the PAE listing each drawing that to be included in the Amendment or Change Order. For A-E projects, the A-E's Project Manager shall submit a report to the PAE listing each drawing to be included in the Amendment or Change Order. The A-E's report shall be submitted at the same time the Amendment or Change Order drawings are provided to the PAE.

2.5.9.1 Flagging Drawing Revisions

All Amendments and Change Order revisions shall be flagged by a “teardrop” symbol. The designer should use sound judgment concerning the location of the “teardrops”. The “teardrop” symbol should be positioned adjacent to the revision with the tip of the teardrop pointing towards the revision. The “teardrop” symbol shall be sequentially numbered with 1, 2, 3, etc. for each revision. The first time a drawing is revised, the teardrop shall be given a letter "A" within each "teardrop" symbol. The second time a drawing is revised, the letter “B” shall be used. The third revision to the same drawing would be flagged with "C" "teardrops" etc. The total number of teardrops for each revision and a short description shall be noted within the revision block (See **Exhibit 2-4**).

2.5.9.2 Deleted Drawings

When necessary to remove a drawing from an existing advertised/awarded contract package, the “Index of Drawings” sheet shall be flagged with a “teardrop” symbol on the line of that particular drawing. A line shall be drawn through the listing for that drawing with the word "Deleted" inserted at the end of the title. The "Revisions" block of the index sheet should also be flagged and the deletion noted (See **Exhibit 2-4**).

2.5.9.3 Added Drawings

When drawings are added to an existing advertised/awarded contract project, a "teardrop" shall be placed on the "Index of Drawings" sheet adjacent to the added drawing. The new drawings shall use the existing numbering convention. When the new drawing follows the last existing drawing in the package or at the end of a discipline the next sequential file number shall be used without a suffix.

2.5.9.4 Replaced Drawings

When drawings supersede originals, the Sheet References shall match exactly the Sheet Reference numbers of the originals, with one exception. A ".1" shall be added to the end of the numbers. A ".2" if replaced a second time, etc. The Index of Drawings shall be revised to reflect this change. The replaced drawings title block shall have the same information as the original drawing and include a teardrop symbol adjacent to the title block.

Example:	SHEET Ref. No.
Original Drawings	S-102
Replacement Drawings	S-102.1

2.5.9.5 Drawing Revisions on CADD

The designer should take special precaution to insure he is revising the latest drawing CADD files whether by amendment or change order.

2.5.10 Computer Aided Design Drafting (CADD) Submittals

All CADD files, RTA, Amendments and Change Orders, shall be submitted on one of the following medias:

(a) Compact Disc Read Only Memory CD-ROM, Using "Copy" commands.

(b) The Mobile District's FTP (File Transfer Process) site. Contact EN-DW at 251-690-2634 to transfer submittals via the District's FTP site.

2.6 NARRATIVES AND DESIGN ANALYSIS

Project Definition narratives and Design Analyses submitted at various design phases shall follow the following guidelines.

2.6.1 Media and Format

(a) The narrative and design analysis shall 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.

(b) Documents shall be prepared in Microsoft (MS) Word or MS Excel format. Hand calculations and other support documentation shall be scanned into an Adobe PDF format.

2.6.2 Organization

(a) The documents shall be in a sequential binding order and bound under a cover indicating the name of the facility. The cover shall carry the designation of the submittal.

(b) The official sections and section titles are as follows:

General

I-1 General
I-2 Needs List

Foundation Conditions
II-1 Foundation Conditions

Site Development
III-1 Siting
III-2 Pavements
III-3 Grading and Storm Drainage
III-4 Fencing
III-5 Railroads

Landscaping, Irrigation, Planting and Turfing
IV-1 Landscaping, Irrigation, Planting and Turfing

Utilities
V-1 Water
V-2 Sanitary/Wastewater
V-3 Gas
V-4 Steam Distribution
V-5 Environmental Protection
V-6 Special Considerations
V-7 Fire Protection

Anti-Terrorism/Force Protection
VI-1 Anti-Terrorism/Force Protection

Architectural
VII-1 Architectural
VII-2 Interior Design

Structural
VIII-1 Structural

Mechanical
IX-1 Heating, Ventilation and Air Conditioning
IX-2 Plumbing
IX-3 Fire Suppression
IX-4 Special Considerations
IX-5 Special Mechanical Systems and Equipment
IX-6 Boiler Plants
IX-7 Air Pollution Control and Equipment

Electrical
X-1 Electrical

Electronics
XI-1 Electronic Systems

Communications
XII-1 Communications

Sustainable Design Development
XIII-1 Sustainable Design Development

Construction Coordination
XIV-1 Notes to the Resident Engineer

Cost Estimate
XV-1-Cost Estimate

Appendix "A" – (Insert title here)
Appendix "B" - (Insert title here)
Appendix "C" - (Insert title here)

2.6.3 File Structure and File Naming Convention

Individual design narrative files shall be named as follows:

[CADD Code][PD, C, I, F or R][Chapter].doc (example: MB06F300RVII-1.doc for an architectural design narrative submitted at RTA)

2.6.4 Design Calculations

The design calculations shall be presented in a form incorporating a title page and index. When they are voluminous, they shall be bound separately from the narrative part of the design analysis. 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, sketches, supplementary graphs, formulas, and references shall be identified. Assumptions and conclusions shall be explained. Calculation sheets shall have dates and names of the persons making the calculations and checkers.

2.6.5 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. An index and a description of the computation performed shall precede each set of computer printouts. If several sets of computations are submitted, a general table of contents in addition to the individual indices shall accompany them. The description, for an ADPS printout, shall include the following:

(a) Explain the design method, 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 a check of the results.

2.6.6 Format

(a) Font: Courier New, Size 10, black for all text and page numbering.

(b) No underlining.

(c) No bold lettering.

(d) Section titles shall not be all capitals.

(e) Margins:

Left	1.25"
Right	0.75"
Top	1.0"
Bottom	1.0"

(f) Page numbering: bottom center. Note page numbering leads with section number.

(g) Two spaces behind a paragraph letter or number. Do not tab after a paragraph number or letter.

(h) Two spaces behind any period or colon.

(i) One space behind a comma.

(j) Tab settings at 0.5" increments.

(k) List specifications using a comma and a space after the specification number. The format follows:

"a. UFGS Section 03 30 04, Concrete for Minor Structures".

(l) Refer to the PAE for the official job title. Spell out the state name. Do not abbreviate.

(m) Example of "Parenthetical Hierarchy":

1. TITLE.

<tab> (a) Text.....

<tab> <tab> (1) Text.....

(o) A sample narrative format structure is provided in **Exhibit 2-1**.

HOW DID WE DO?

Our number one goal is to meet your expectations! We need to know how we did on this submittal. Please provide your feedback by completing this evaluation form and returning to me. **If you would like to discuss this with me personally please call me at 1-800-543-2021**.

Thank you! Michael H. Thompson, P.E. Chief, Engineering Division

Project and Location:

Type of Submittal: CADD ID No:

RATING	POOR (1) TO EXCELLENT (5) 1	2	3	4	5	N/A
1. How well did this submittal:						
a. incorporates your guidance/criteria and previous review comments?						
b. meets your functional requirements?						
c. represents an on time delivery?						
d. complies with construction cost and/or PA limitations?						
e. achieves the required degree of completeness?						
f. provides the level of technical quality for the architectural design?						
g. provides the level of technical quality for interior design?						
h. provides the level of technical quality for the structural design?						
i. provides the level of technical quality for the electrical design?						
j. provides the level of technical quality for the mechanical design?						
k. provides the level of technical quality for the civil/site design?						
l. provides the level of technical quality for the cost estimate?						
2. How successful were we in involving you in the design process?						
3. What is your overall evaluation of this submittal?						

YOUR

NAME_____**ORGANIZATION**_____**PHONE**_____

US Army Corps of Engineers
Mobile District

COMMENTS:

US Army Corps of Engineers,
Mobile District
P.O. Box 2288
Mobile AL 36628-0001
Attn: Michael H. Thompson, P.E./CESAM-EN

Should this project be nominated for a design quality award?

Service to the Nation-Customer Focused

The Standard of Excellence !

EXHIBIT 2-1

Example

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.

<tab> (a) Text or Subtitle as required.

<tab><tab> (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.

EXHIBIT 2-2

Example

RTA REPORT – DESIGN SUBMISSION LEVEL
PROJECT TITLE
INSTALLATION, STATE
CADD CODE
SOLICITATION NUMBER (When available)
ADVERTISEMENT DATE (When available)
Date:
Preparer/Phone:

(Drawings and Specification listed below are examples)

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

DESIGN ANALYSIS	TITLE
MB06E308FVII-1.doc	Architectural

EXHIBIT 2-3

PROJECT TITLE BLOCK

TITLE BLOCK KEY

NO.	ITEM	SOURCE
1.	PROJECT LOCATION	MDO
2.	PROJECT TITLE	MDO
3.	SHEET TITLE	DESIGNER
4.	SEQUENTIAL SHEET REFERENCE NO.	DESIGNER
5.	MONTH AND YEAR	DESIGNER
6.	FILE NUMBER (RTA ONLY)	MDO
7.	CADD FILE NAME	DESIGNER
8.	SOLICITATION NUMBER (RTA ONLY)	MDO
9.	CORP IDENTIFICATION LOGO	MDO
10.	A/E IDENTIFICATION LOGO	DESIGNER
11.	FIRST INITIAL AND FULL LAST NAME	DESIGNER

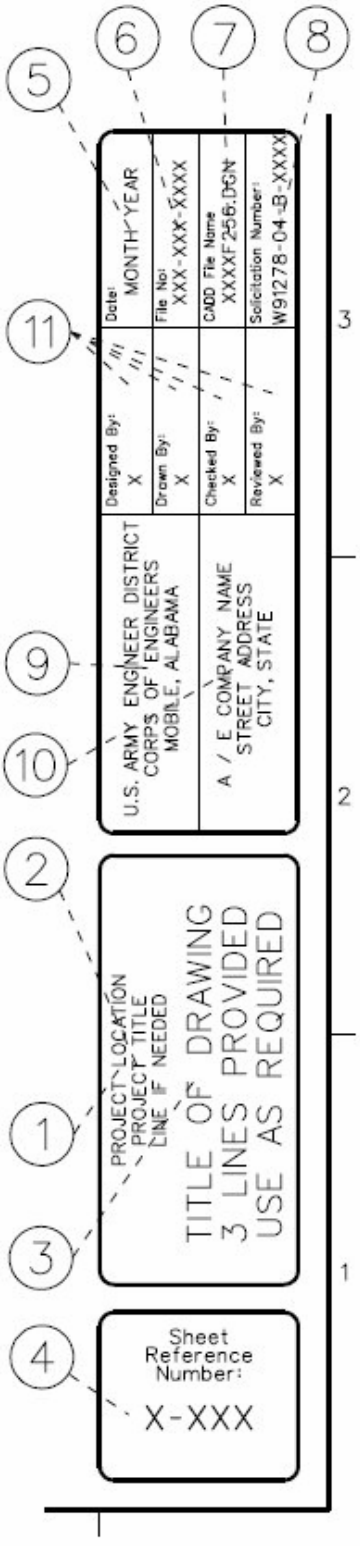
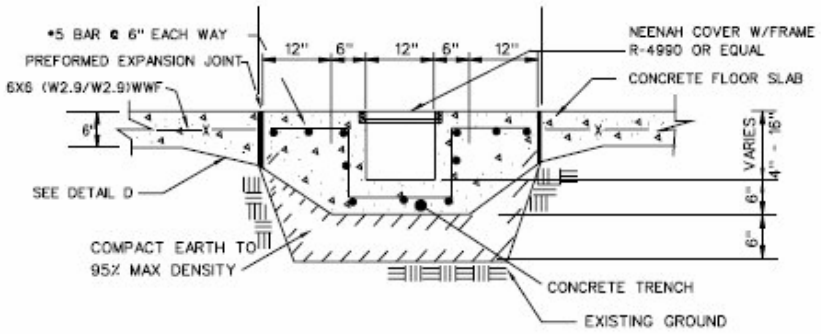


EXHIBIT 2-4

SAMPLE REVISION BLOCK

AMENDMENT AND CHANGE ORDER



1/A SECTION C

NOT TO SCALE S101 S309

SCALE 1" = 1'-0"

12" 0 1 2 3 4 5 FT.

"FOR INFORMATION ONLY"

US Army Corps of Engineers
Mobile District

Revisions

No.	Description	Date	Initial
1	ADDED CONCRETE CURBS SECTION	06/08/2005	E.H.

Sheet No.

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MOBILE, ALABAMA

Designed By: X
Drawn By: X
Checked By: X
Reviewed By: X

Date: JUNE 2004
File No.: XXX-XXX-XXXX
CADD File Name: XXXXF256.DGN
Solicitation Number: W91278-04-B-0000

A/E COMPANY NAMES
STREET ADDRESS
CITY, STATE

MACDILL AIR FORCE BASE, FLORIDA
RENOVATE COMMAND AND CONTROL FACILITY

TITLE OF DRAWING
3 LINES PROVIDED
USE AS REQUIRED

Sheet Reference Number:
S-309

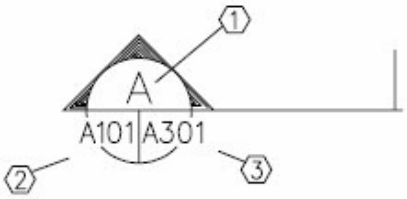
AMENDMENT NO. 0002

EXHIBIT 2-5

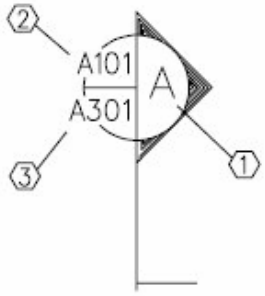
SECTION AND DETAIL CROSS REFERENCES

THE FOLLOWING SECTIONING AND DETAILING CONVENTIONS WILL BE USED ON ALL WORKING DRAWINGS:

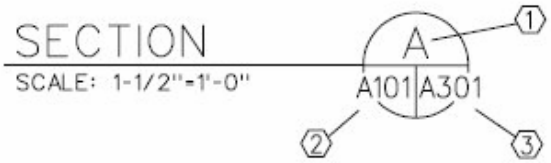
SECTION SYMBOLS:



OR

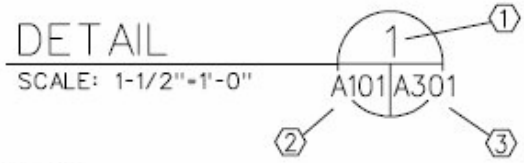


SUBTITLE FOR SECTION VIEW (TYPICAL SECTION LETTER AND SCALE).



DETAIL SYMBOL:

SUBTITLE FOR DETAIL (TYPICAL DETAIL NUMBER AND SCALE).



NOMENCLATURE:

(1) - SECTION OR DETAIL IDENTIFICATION (NUMBERS FOR DETAILS, LETTERS FOR SECTIONS).

(2) - SHEET NUMBER FROM WHICH SECTION OR DETAIL IS TAKEN.

(3) - SHEET NUMBER ON WHICH SECTION OR DETAIL IS DRAWN.

EXHIBIT 2-6

CHAPTER 3

SPECIFICATIONS

INDEX

CHAPTER 3

SPECIFICATIONS

3.1 GENERAL

3.1.1 Purpose

This chapter provides guidance for the preparation of contract specifications. In-House (I-H) and Architect-Engineer (A-E) designers shall 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-DW):

Ms. Karen Williams, P.E.
Fax No. (251)694-3626, Telephone No. (251)690-2713

Mailing address:
U. S. Army, Corps of Engineers, Mobile District
CESAM-EN-DW
P. O. Box 2288
Mobile, Alabama 36628-0001

3.1.2 Automated Specifications

(a) 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.

(b) The designer shall not mismatch or combine the old division 16 specifications with the new Masterformat 2004 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-DW point of contact listed herein above.

(c) 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.hnd.usace.army.mil/techinfo/info.htm

(d) Reference is made in Chapter 6 GEOTECHNICAL for use of Mobile District prepared specifications in preference to certain UFGS specifications.

Points of contact for access to these Mobile specifications are provided in that chapter.

(e) 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.

(f) Should there be any questions concerning the SPECSINTACT process, contact the Mobile District representative at (251) 690-2713, fax (251) 694-3626 or the SpecsIntact Support Unit at (321) 867-8800.

Or email your question to the Mobile District representative at: Karen.F.Williams@sam.usace.army.mil ;

or for software questions, contact the SPECSINTACT Tech Support at Jennifer.Horvath-1@ksc.nasa.gov

(g) 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.

3.1.3 Scope

The designer is responsible for the accurate preparation and coordination of the technical specifications. EN-DW will prepare the non-technical portion of the specifications (i.e., boiler plate or front-end) using input provided by the designer. Although EN-DW will prepare the Special Contract Requirements, the designer will be expected to furnish pertinent information that EN-DW might otherwise be unaware of for inclusion in the Special Contract Requirements. Examples of this information are listed in the paragraph 3.6 AIDS TO ADVERTISING.

3.1.4 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 shall be solely responsible for insuring the relevancy and accuracy of cross-references between technical sections of the specifications.

3.2 OUTLINE SPECIFICATIONS

The designer shall 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. **Exhibit 2-1** provides an example of typical outline specification integration into the design analysis.

3.3 TECHNICAL SPECIFICATIONS

3.3.1 Generating Original Specifications

(a) 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 shall 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

(b) 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 3.1.1 of this chapter.

(c) 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.

(d) 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 shall 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 shall 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.

(e) "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.

3.3.2 Tailoring and Coordination of Specifications

(a) 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 shall exercise care in making the choice or modification. Where blank spaces are provided for insertion of data or text, the designer shall 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 shall 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 shall review all notes attached at the beginning of the specification. Prior to submitting the Ready To Advertise (RTA) 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 RTA specifications.

(b) 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 Ready To Advertise (RTA) 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 RTA specifications. The designer shall insure 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.

3.3.3 Tailoring Specification Shop Drawing Submittals

(a) The Shop Drawings typically listed in each UFGS specification are intended to over 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 actually 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".

(b) 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 "CD" for "Construction Division" or "ED" for "Engineering Division." "ED" 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, ED". Note the ", " between the "G" and "ED" 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.

(1) Preconstruction submittals should be labeled "G, CD".

(2) Shop Drawings and Product Data Submittals for major pieces of equipment or systems requiring review by the designer should be labeled "G, ED".

(3) Submittals involving "Samples", or "Color" selection should be labeled "G, CD" for coordination with the local BCE, DPW, or other Installation office.

(4) Test Reports, Certificates, Operations and Maintenance Data and Closeout Submittals should be labeled "G, CD".

(5) "For Information Only (FIO)" Submittals: For Shop Drawing Submittals not requiring Government Approval, the "G" and "CD" or "ED" designations after the Shop Drawing Title shall not be included.

3.4 SPECIFICATION SUBMITTALS

3.4.1 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.

3.4.2 100% Unreviewed Submittal Specifications

(a) If an Interim submittal is not made, 100% Unreviewed Final Submittal specifications will be provided in redlined marked-up format in hardcopy. If an Interim submittal is made, the designer shall submit full edited specifications at the 100% Unreviewed Final Submittal Design review stage in hardcopy. The statement of work (SOW) will identify the recipients of the hardcopies.

(b) Boiler Plate (Front-end contract clauses) will be furnished, by the Government, to the A-E for inclusion in the 100% Unreviewed Final Submittal. The "boiler plate" will be provided by EN-DW through the PM or PAE identified in the SOW.

3.4.3 Ready-To-Advertise (RTA) Submittal Specifications

Following the 100% Unreviewed Final Submittal review, review comments will be provided to the designer. The designer shall incorporate the comments into the specifications and prepare the final specification utilizing the automated specification techniques of SpecsIntact. The Ready-To-Advertise specification shall be furnished in SpecsIntact standard generalized markup language (SGML) format.

3.5 INSTRUCTIONS FOR PREPARING RTA AUTOMATED SPECIFICATIONS

3.5.1 Standard Format

The designer shall utilize the SPECSINTACT UFGS MasterFormat 2004 files downloaded from the Internet (http://specsintact.ksc.nasa.gov/) to prepare the final specifications. The following must be used, when submitting hard copies.

(a) Top Margin: 1 inch
Bottom Margin: 1 inch
Left-hand Margin: 1 inch
Right-hand Margin: 1 inch

(b) Courier 10 pitch (small elite). (Large Oversize fonts will not be accepted.

(c) Specifications shall be presented in Letter quality.

(d) Left justification turned on.

(e) Right justification turned off.

(f) Widows and orphans protection turned on.

(g) 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.

(h) 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.

(i) Sketches, drawings, or other attachments to be inserted at the end of a specification section shall be scanned into and Adobe .PDF format.

(g) Appendices to be placed in the rear of the specification set should also be scanned into an Adobe .PDF format.

3.5.2 Automated Submittal Register

The Submittal Register will be produced using the automated generation procedures found in the SPECSINTACT software commands. **Exhibit 3-6** provides an example of a Submittal Register generated using the automated procedures.

3.6 AIDS TO ADVERTISING

3.6.1 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.

3.6.2 Aids Required with the 100% Unreviewed Final Design Submittal

(a) Resume' of Work:

The designer shall 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
over $10,000,000

Exhibit 3-2 is an example of an acceptable "Resume' of Work".

(b) Estimate of Construction Time:

The designer shall 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.

3.6.3 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.

(a) List of Drawings

An example of a "List of Drawings" is included as **Exhibit 3-3**. The list of drawings consists of file numbers, the latest date, and the drawing titles. Drawing Titles entered on the List of Drawings must match exactly the titles on the individual drawings.

(b) Bidding Schedule

An example of a typical "Bidding Schedule" is shown in **Exhibit 3-4**. Bid items will be "lump-sum job" items in preference to "unit price" items. Unit priced items shall 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 (point of contact Mr. George Brown, ph 251-694-3746) and with EN-DW. Payment paragraphs are no longer required. Bid items identified in the bidding schedule shall be supplemented by the

"Explanation of Bid Items". "Explanation of Bid Items" shall be submitted along with the bidding schedule at final and RTA design stages. An example of "Explanation of Bid Items" is located in **Exhibit 3-5**.

(c) Table of Contents

The designer shall prepare and submit a "Table of Contents". An example is included as **Exhibit 3-6**.

(d) List of Government-Furnished Equipment

The designer shall provide a description, weight, size, quantities, and approximate value, if applicable of Government Furnished Equipment.

(e) Information Concerning Salvageable Material, if applicable.

(f) 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-DW for resolution.

3.7 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 shall be structured in the format specified below:

3.7.1 Specification Revisions

(a) When specification revisions are necessary on a project, the designer shall electronically make revisions to each affected specification paragraph. Each affected specification paragraph shall be inserted into a MS Word document in the order of appearance in the original contract documents. Additions to paragraphs shall be shown in "bold", "underlined", and "italicized". (Ex: ***text***). Deletions shall be shown as "struck-thru". (Ex: ~~text~~). Each specification paragraph inserted in the Word document shall 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-DW. If an entire new section is to be added to the project, the designer shall include an instructional sentence in the location where the new specification will be inserted. The designer shall 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 3-7**.

(b) In-house designers will provide their amendment or change order reports to the PAE who will consolidate them and provide them to ENDW. A-E's will provide a consolidated amendment or change order report to ENDW.

Example

RESUME' OF WORK

The site of work is located in Okaloosa County, Florida, at Eglin Air Force Base, and includes the following principal features and approximate quantities:

(a) Construction of a gymnasium containing approximately 10,000 square feet of floor space, consisting of concrete floor slabs, concrete frame, 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.

(b) Gas line - 500 feet of 1-1/2 inch pipe.

(c) Water line - 400 feet of 3-inch pipe; 3-inch gate valve; connection to existing 10-inch line.

(d) Sanitary water - 285 feet of 6-inch pipe; 1 manhole.

(e) Sprigging - 1.6 acres.

(f) Landscaping for the gymnasium building.

(g) Exterior electrical work.

(h) Clearing and grubbing, including removal of portable wooden bleachers (16' X 74') - 2.9 acres.

(i) Unclassified excavation - 1,500 cubic yards.

(j) Unclassified borrow - 500 cubic yards.

(k) 1-1/2 inch flexible pavement, including tack and prime coats and 7-1/2 inch stabilized aggregate base course - 700 square feet.

(l) 4-inch concrete sidewalk - 500 square yards.

(m) 6-inch asphalt concrete curb - 50 linear feet.

(n) Precast concrete bumper curbs - 13 each.

(o) 4-inch painted stripes - 150 linear feet.

(p) Storm Drainage System - 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.

Exhibit 3-1

Sample

List of Drawings

CADD DWG. NO.	LATEST DATE	TITLE
A001YA20.DWG	February 2006	Index of Drawings
A101YA20.DWG	February 2006	Location/Vicinity Map
A301YA20.DWG	February 2006	Survey
A302YA20.DWG	February 2006	Site Plan
A303YA20.DWG	February 2006	Dike Details and Elevations
A304YA20.DWG	February 2006	Dike Drainage Plan
A305YA20.DWG	February 2006	Miscellaneous Details
A306YA20.DWG	February 2006	Miscellaneous Details
A307YA20.DWG	February 2006	Floor Plan
A308YA20.DWG	February 2006	Wall Sections
A309YA20.DWG	February 2006	Water Plan

Exhibit 3-2

Sample

Bidding Schedule

BIDDER'S NAME:_____

BIDDING SCHEDULE

Item No.	Description	Estimated Quantity	Unit	Unit Price	Estimated Amount
	Base Bid				
1.	Security Forces Facility	1	Job	XXX	_____
1a.	Security Forces Facility Prestressed Concrete Piles	7,900	LF	_____	_____
			Total Base Bid		_____
	Bid Option No. 1				
2.	Warehouse Addition	1	Job	XXX	_____
2a.	Warehouse Addition Prestressed Concrete Piles	850	LF	_____	_____
			Total Bid Option No. 1		_____
	Bid Option No. 2				
3.	Covered exterior parking and screen wall and gate around courtyard	1	Job	XXX	_____
3a.	Covered exterior parking prestressed concrete piles	300	LF	_____	_____
			Total Bid Option No. 2		_____
	Bid Option No. 3				
4.	Concrete pavement versus asphalt pavement in courtyard and turn around area	1	Job	XXX	_____
	Bid Option No. 4				
5.	Concrete patio and screen wall at break room	1	Job	XXX	_____

Exhibit 3-3 (Continued)

BIDDING SCHEDULE

Item No.	Estimated Description	Estimated Quantity	Unit	Unit Price	Amount
	Bid Option No. 5				
6.	Full landscaping and irrigation, including all plant beds, shrubs, etc	1	Job	XXX	_____
	Bid Option No. 6				
7.	Perimeter walks around site adjacent to South Boundary Blvd and Point Tampa Blvd	1	Job	XXX	_____
	Bid Option No. 7				
8.	Pedestrian bridge over canal	1	Job	XXX	_____
				Total Base Bid Plus Options 1 - 7	_____

OFFEROR ELECTS TO WAIVE THE PRICE EVALUATION PREFERENCE FOR HUBZONE SMALL BUSINESS CONCERNS: ( )NO ( )YES

(SEE BID SCHEDULE NOTE NOs. 5 & 6.)

Exhibit 3-3 (Continued)

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:

One contract only will be awarded on this Bid Schedule and award will be made on the Base Bid and selected Options, in accordance with the paragraph entitled Evaluation of Options (JUL 1990) in Section 00100: INSTRUCTIONS TO BIDDERS. Award will be made according to the "Best Value" approach as defined in Section 00110: PERFORMANCE-PRICE TRADE-OFF BEST VALUE.

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 the option(s) by written notice to the Contractor within 120 days of Notice to Proceed.

NOTE NO. 5. LIMITATION OF GOVERNMENT'S OBLIGATION:

For incremental funding requirements, the Bidders attention is directed to Section 00700, paragraph entitled “252.232-7007 LIMITATION OF GOVERNMENT'S OBLIGATION (AUG 1993)”.

NOTE NO. 6. All the extensions of the unit prices shown will be subject to verification by the Government. In case of variation between the unit price and the extension, the unit price will be considered to be the bid.

NOTE NO. 7. IMPORTANT NOTICE: Due to the suspension of the utilization of the price adjustment for small disadvantaged businesses (FAR Clause 52.219-23) by the Under Secretary of Defense on March 10, 2007 effective until March 9, 2008, said FAR Clause is not included in or made a part of this RFP. FAR Clause 52.219-4, relating to a 10% price evaluation preference for HUB ZONE small business concerns, is included in and made a part of this RFP. PLEASE NOTE HOWEVER, that paragraph (b) (3) of the preceding clause located in Section 00700, is inapplicable also due to the referenced suspension of FAR Clause 52.219-23."

Consequently, if you are a small business qualified as a HUB ZONE and as an SDB, you will only receive the HUB ZONE 10% price evaluation preference in the evaluation process of this RFP.

Exhibit 3-3 (Continued)

NOTE NO. 8. This procurement is not restricted to Hubzone Small Business Concerns. However, offerors certifying as a Hubzone Small Business Concern must be certified by the SBA on or prior to date set for receipt of offers.

END OF BID SCHEDULE

Exhibit 3-3 (End)

Sample

EXPLANATION OF BID ITEMS

GENERAL: This section comprises an explanation of the bid items identified in the bid 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 descriptions. 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. Some drawings are identified below to reference general locations and detail information for various bid items, however other drawings, details and specifications also apply. The Contractor shall bid each type of work under the applicable bid item. Measurement for unit price payment will be made as specified herein. 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

1. Payment under bid item no. 1 will constitute full compensation for furnishing all materials, equipment, plant, tools, and all labor costs and other associated incidentals necessary to complete the construction of the Design Security Forces Facility project, in accordance with all drawings and specifications, except as noted below. The entire courtyard area up to the building and turn-around will be constructed of asphalt in the base bid. Base bid also includes trees near the building, and limited trees around site, as well as all grasses as shown on L-101, L-104 and L-105 and irrigation serving these areas.

1a. Payment under bid item no. 1a will constitute full compensation for furnishing all materials, equipment, plant, tools, and all labor costs and other associated incidentals associated with testing, providing and placing "Security Forces Facility Prestressed Concrete Piles", which shall be measured and paid at the contract unit price to the nearest 0.10 linear foot. Measurement will be made from the tip of the pile to the top of the pile and will not include any length of pile that is cut off and discarded.

BID OPTION NO. 1

2. Payment under bid item no. 2 will constitute full compensation for furnishing all materials, equipment, plant, tools, and all labor costs and other associated incidentals necessary to complete the construction of the warehouse addition, except as noted in bid item 2a below.

2a. Payment under bid item no. 2a will constitute full compensation for furnishing all materials, equipment, plant, tools, and all labor costs and other associated incidentals associated with testing, providing and placing "Warehouse Addition Prestressed Concrete Piles", which shall be measured and paid at the contract unit price to the nearest 0.10 linear foot. Measurement will be made from the tip of the pile to the top of the pile and will not include any length of pile that is cut off and discarded.

Exhibit 3-4 (Continued)

BID OPTION NO. 2

3. Payment under bid item no. 3 will constitute full compensation for furnishing all materials, equipment, plant, tools, and all labor costs and other associated incidentals necessary to complete the construction of the covered exterior parking (except as noted in item 3a below), roof over the weapons cleaning area and screen wall with manual cantilevered ornamental gate in the courtyard area. Paving under parking and weapons cleaning roofs shall be concrete in Bid Option 2. Remaining courtyard and turn-around area paving will be asphalt. See Drawings C-103 and C-105.

3a. Payment under bid item no. 3a will constitute full compensation for furnishing all materials, equipment, plant, tools, and all labor costs and other associated incidentals associated with testing, providing and placing "Covered exterior parking prestressed concrete piles", which shall be measured and paid at the contract unit price to the nearest 0.10 linear foot. Measurement will be made from the tip of the pile to the top of the pile and will not include any length of pile that is cut off and discarded.

BID OPTION NO. 3

4. Payment under bid item no. 4 will constitute full compensation for furnishing all materials, equipment, plant, tools, and all labor costs and other associated incidentals necessary to complete the construction of the court yard and turn around area in concrete, rather than asphalt which is the base bid. See Drawings C-103 and C-105.

BID OPTION NO. 4

5. Payment under bid item no. 5 will constitute full compensation for furnishing all materials, equipment, plant, tools, and all labor costs and other associated incidentals necessary to complete the construction of the concrete patio and screen wall.

BID OPTION NO. 5

6. Payment under bid item no. 6 will constitute full compensation for furnishing all materials, equipment, plant, tools, and all labor costs and other associated incidentals necessary to complete the construction of the full landscaping and irrigation as shown on Drawings L-102, L-103, L-106, L-107, L-108 and L-109.

BID OPTION NO. 6

7. Payment under bid item no. 7 will constitute full compensation for furnishing all materials, equipment, plant, tools, and all labor costs and other associated incidentals necessary to complete the construction of the perimeter sidewalks around the project site adjacent to South Boundary Boulevard and Tampa Point Boulevard.

BID OPTION NO. 7

8. Payment under bid item no. 7 will constitute full compensation for furnishing all materials, equipment, plant, tools, and all labor costs and other associated incidentals necessary to complete the construction of the pedestrian bridge over the canal. See Drawings C-103 and C-508.

--END OF SECTION--

Exhibit 3-4 (Continued)

Sample

W91278-06-R-0130

TABLE OF CONTENTS

Exhibit 3-5 (Continued)

TABLE OF CONTENTS (CONT.)

Exhibit 3-5 (Continued)

TABLE OF CONTENTS (CONT.)

Exhibit 3-5 (Continued)

TABLE OF CONTENTS (CONT.)

Exhibit 3-5 (Continued)

TABLE OF CONTENTS (CONT.)

* *

Exhibit 3-5 (End)

Sample

Submittal Register (SpecsIntact Automated)

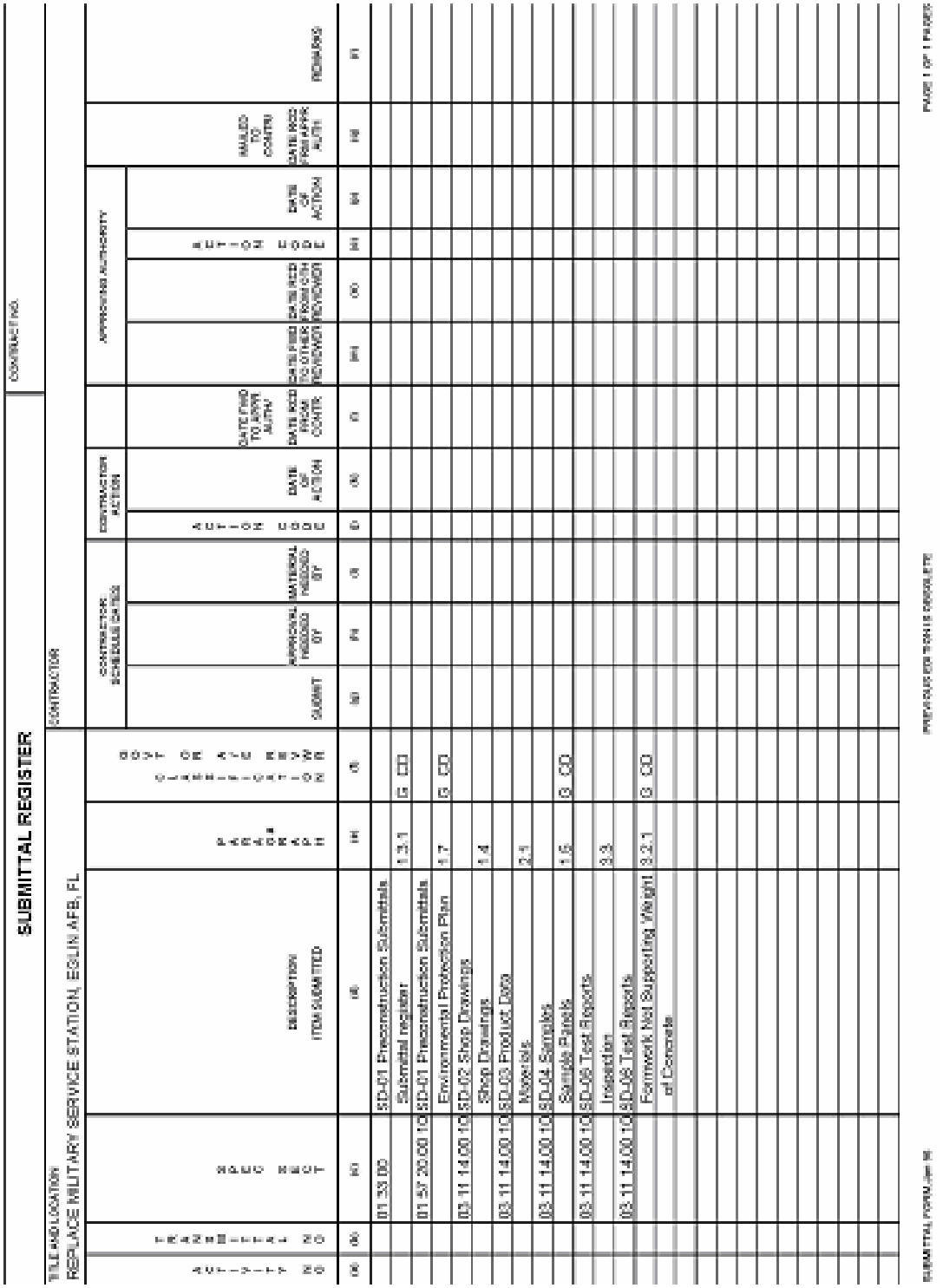


Exhibit 3-6

Sample

AMENDMENT REPORT

Report for Amendment 0002:
FY-04 SOF Squad Ops / AC-130 – Hurlburt Field, FL (MB02F312)
Hurlburt Field, FL
Solicitation No. W91278-03-R-0068
Date for Amendment: 10 Oct 2003

1. SPECIFICATIONS:

a. Add Revised Table of Contents. (Deleted Section 16755)

b. Add Revised Bid Schedule and Explanations.

c. Revise specification Section 06650 "Solid Polymer (Solid Surfacing) Fabrications" as follows:

(1)Revise Paragraph 2.3.4 as follows:

2.3.5 Window Stools and Stage Edge

Window stools and stage edge details shall be fabricated from ~~3/~~8 ***1/2*** inch thick solid surfacing, solid polymer material. Dimensions, edge shape, and other details shall be determined during the design phase of the project.

d. Revise specification Section 08330 "Overhead Coiling Doors" as follows:

(1)Revise Paragraph 2.1.13 as follows:

2.1.13 Finish

Steel slats and hoods shall be hot-dip galvanized G90 in accordance with ASTM A 653/A 653M, and shall be treated for paint adhesion and shall receive a factory powder coat finish. The ~~paint~~ ***powder coat*** system shall withstand a minimum of 1500 hours without blistering, bubbling, or rust. Surfaces other than slats, hood, and faying surfaces shall be cleaned and treated to assure maximum paint adherence and shall be given a factory dip or spray coat of rust inhibitive metallic oxide or synthetic resin primer. Interior door surface shall be painted to match the adjacent wall color. The exterior ***and interior*** of the door shall be painted to match Devoe "Tortoise Shell" 2M54E (See ICI Dulux Paints for discontinued Devoe formula).

e. Revise specification Section 09915 "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.

Exhibit 3-7 (Continued)

2. DRAWINGS:

The Following drawings have been revised:

CADD DWG. NO.	LATEST DATE	DRAWING TITLE
C-105	OCTOBER 2003	SITE PLAN = BASE BID - SHEET 1 OF 2
C-500	OCTOBER 2003	SITE DETAILS
A-100	OCTOBER 2003	FIRST FLOOR PLAN
A-101	OCTOBER 2003	SECOND FLOOR PLAN
A-402	OCTOBER 2003	ROOFING DETAILS AND WALL SECTIONS
A-600	OCTOBER 2003	DOOR SCHEDULE - SHEET 1 OF 2
A-602	OCTOBER 2003	FINISH SCHEDULE

The Following drawings have been added:

CADD DWG. NO.	LATEST DATE	DRAWING TITLE
P-401	OCTOBER 2003	PLUMBING DETAILS - SHEET 1 OF 2
P-402	OCTOBER 2003	PLUMBING DETAILS - SHEET 2 OF 2

Exhibit 3-7 (End)

CHAPTER 4

SITE DEVELOPMENT

INDEX

CHAPTER 4

SITE DEVELOPMENT

4.1 GENERAL

4.1.1 Scope

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

4.1.2 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 paving, grading, and drainage conditions.

4.2 APPLICABLE PUBLICATIONS

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.

AASHTO — A Policy on Geometric Design of Highways and Streets, American Association of Highway and Transportation Officials (AASHTO).

USDOT — Manual of Uniform Traffic Control Devices for Streets and Highways, United States Department of Transportation (USDOT).

NPDES — State specific requirements documents and publications for National Pollutant Discharge Elimination System (NPDES) construction permits and best management plans.

4.3 PROJECT DEFINITION (10-15%)

The designer shall develop a narrative and conceptual site plan which describe and present the conceptual site features based on the project requirements. The narrative will discuss siting requirements and site concerns including wetlands, installation restoration program (IRP) sites, and soil and ground water contamination. The conceptual site plan should be an efficient layout with emphasis given to user requirements. The plan shall show building locations, parking areas, roads, limits of paving and hardstands, and pedestrian access points. The plan shall be developed so that a preliminary cost estimate can be prepared.

4.4 CONCEPT DESIGN REQUIREMENTS (30-35%)

4.4.1 Concept Design Analysis

Provide information concerning the following, as applicable:

4.4.1.1 General

(a) General overview of major site features planned, such as building orientation, drainage patterns, parking provisions, traffic circulation, provisions for the handicapped, security requirements, airfield pavement work, etc.

(b) 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 shall be defined by qualified professionals and flagged in the field. The topographic survey shall label and present the defined areas. Geometric coordinates shall be clearly shown on the design drawings for all environmental areas, such as an IRP site or wetland boundaries.

(c) Provide applicable State/local flood requirements.

(d) Discuss existing site features including general topography, acreage, boundaries, adjacent site usage, etc.

(e) Impacts of new construction on existing facilities. For projects with critical phasing requirements, such as airfields or projects with major impacts to existing facilities, present a preliminary phasing discussion. This preliminary phasing plan shall also be presented in plan form and shall fully discuss anticipated lengths of construction, alternate phasing schemes, and project cost impacts.

4.4.1.2 Removals

(a) Preliminary discussion of items requiring removal or relocation.

(b) Method and location of the disposition of waste or salvage materials

4.4.1.3 Geometry

(a) Provide rationale for locating major site elements.

(b) Airfields: Provide list of specific clearances based on airfield criteria and list reference manual(s) for all portions of the new work.

(c) Work Other Than Airfields. Provide set back requirements or specific clearance requirements for major features of work, such as buildings, parking areas from streets, hardstands, etc.

4.4.1.4 Storm Drainage

(a) Provide a summary of specific Federal, 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 check will be written. Discuss the impacts on the site design. If no storm water permits or requirements are required, provide a statement to that effect. Provide documentation from the appropriate regulatory agency and regulators name.

(b) Discuss the preliminary storm water design scheme and discuss impacts on the existing storm drain systems.

(c) 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, 25-year, and the 100-year storm frequency.

(d) Provide preliminary sizes of storm drain pipes.

(e) Provide preliminary size and preliminary calculations for required storm water treatment/storage ponds. Discuss impacts on the project site.

(f) Provide preliminary Pre and Post construction discharge values for the 10-year & 100-year storm event.

(g) Discuss the proposed storm drain pipe materials.

4.4.1.5 Grading

(a) Discuss existing site features affecting grading such as buildings, streets, curbs, walks, fences, water courses, ponds, elevation of high ground water, rock outcrop, etc.

(b) Provide minimum elevation to provide flood protection (if applicable).

(c) Planned finished floor elevation.

(d) Cut or fill requirements and rough estimate of quantities.

(e) Discuss minimum and maximum slopes to be used in the design for embankments, ditches, pipes, etc.

4.4.1.6 Pavement Structure Design

(a) Vehicular Pavements Thickness Design.

(1) Specific design values for which pavement thickness is based including the number, type, and maximum weights of vehicles, category of traffic, class road or street, and resulting design index.

(2) Flexible Pavements - required thickness of base and pavement (7-1/2 inch (19cm) minimum) based on the design index and established sub grade CBR.

(3) Rigid Pavements - required thickness of non-reinforced concrete pavement (6-inch (15cm) minimum) based on a 28-day flexural strength concrete of 650 psi and the established modulus of sub grade reaction.

(b) Aircraft Pavement Thickness Design. The Architectural/ Structural/Civil Engineering Section (EN-DA) shall prepare the airfield pavement structure(s) design and materials specification. This information shall be provided to the A-E. The A-E shall collect all airfield traffic data and provide to EN-DA during the 35% design phase.

(1) Flexible Pavements - specific design values for which pavement thickness is based including the airfield class, type traffic area, gross weight of aircraft, number of passes, sub grade CBR, and resulting minimum thickness of base and pavement.

(2) Rigid Pavements - specific design values for which the pavement thickness is based including the type of aircraft gear, gear design load, modulus of sub grade reaction or resultant modulus of both sub grade and base course, flexural strength of concrete, and resulting pavement thickness.

(3) For project requiring airfield pavement, the designer shall coordinate with the Geotechnical and Dam Safety Section (EN-GG), for required material investigations and specification requirements. Notification of the proposed pavements should be given EN-GG as soon as possible to allow time for any needed sampling.

(c) Discuss the proposed base course type and select sub grades. Provide intended compaction requirements.

4.4.1.7 Road and Streets, and Parking Areas

(a) Provide listing of traffic volumes and vehicle types.

(b) Provide AASHTO design vehicle for which turning movements are to be provided for and corresponding minimum turning radius.

(c) Provide project design speed.

(d) Provide maximum degree of curvature and control grades.

(e) Provide sight and stopping distance requirements.

(f) Provide lane and shoulder widths.

(g) Provide cross-slopes for lanes and shoulders.

(h) Embankment slopes.

(i) Requirements for curbs, sidewalks, guardrails, traffic signs and markings, fencing, etc.

(j) Rights-of-way and easements

4.4.1.8 Parking and Open Storage Areas

(a) Type vehicles to be accommodated

(b) Size of individual parking spaces and number to be provided

(c) Number and location of handicapped parking spaces

(d) General location of parking or storage areas

(e) Location of ingress and egress

(f) Pedestrian access

(g) Use of 90°, 60°, or 45° parking and relation to traffic operation

4.4.1.9 Miscellaneous Site Features

(a) Curbs, and curbs and gutters - types and locations

(b) Sidewalks - width, and locations

(c) Fencing - justification, type, size and location of gates

4.4.1.10. Railroads

(a) Type of service for which track shall be provided.

(b) Anticipated volume

(c) Maximum grade and degree of curvature

(d) Features of track construction such as thickness and type of ballast, weight of rail, dimension of ties, size of turnouts, etc.

(e) Special requirements for track scales, bumpers, signals, grade crossings, derailers, etc.

4.4.1.11 National Pollutant Discharge Elimination System (NPDES) Construction Permit

Provide specific requirements for State and/or Federal NPDES construction permit for the project.

4.4.1.12 Erosion and Sediment Control Plan

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

4.4.1.13 Outline Specifications

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

4.4.1.14 Additional Information

List additional information or criteria needed for design.

4.4.2 Concept Drawings

Provide the following minimum 35-percent plan assembly:

Title Sheet and Index
Project Location & Vicinity Maps
Project Symbols Legends and Abbreviations Sheet
General Site Overview Plan
Geometric Layout Plan
Grading and Storm Drain Plan
Demolition and Removal Plan
Centerline Profile Sheets
Typical Sections Sheet
Composite Utility Plan
Existing Site Topographical Survey and Utilities Plan
Special Project Phasing Requirements

4.4.2.1. Title Sheet and Index

(a) Provide Project Title;

(b) Plan Sheet Index.

4.4.2.2 Location and Vicinity Maps

(a) Indicate project site. Provide preliminary borrow and spoil areas, haul routes, and contractor's access to the site.

(b) Provide State vicinity map.

(c) Provide Location map for local access to project site.

4.4.2.3 Project symbols Legends and Abbreviations Sheet

(a) Provide graphic symbols legends (see Tri-Service Standards);

(b) Provide preliminary list of abbreviations used in plan assembly.

4.4.2.4 Provide General Site Overview Plan

(a) Show the overall site plan of planned work (Scale may be determined by the designer to best fit project requirements).

(b) Annotate major items of work, significant removals, and or phasing.

(c) Site topography with major existing features, buildings, and or roads shall be presented with the new work.

4.4.2.5 Geometric Layout Plan

(a) Provide an overall site plan showing total development.

(b) Show the proposed geometry of the site plan using a minimum scale of 1" = 30'(1:500), unless otherwise approved by EN-DA. Include the existing topography without contours that shall remain after construction.

(c) Use graphic symbols to distinguish new and existing site work.

(d) Provide sufficient geometric information to adequately locate all new major site elements.

(e) Identify the grid state system used. Include a north arrow.

(f) Provide centerline stationing for all roads, streets, parking areas, runways, taxiways, etc.

4.4.2.6 Grading and Storm Drainage Plan

(a) Show the complete drainage concept using either finished contours or slope arrows include preliminary storm drain pipe sizes.

(b) Use a minimum scale of 1" = 30' (1:500), unless otherwise approved.

(c) Show and identify all existing buildings and facilities on plan.

(d) Show the proposed finished floor elevation and critical spot elevations.

(e) Provide control monument data, list horizontal and vertical data for each.

(f) Reflect existing utilities with the topography. If necessary for clarity, show removals, relocations, and new work for utilities on separate plans as directed herein.

(g) All contour intervals shall be 1-foot (25cm) interval, unless otherwise approved.

4.4.2.7 Demolition and Removal Plan

(a) Indicate items to be demolished and removed.

(b) Pavement structures: Indicate pavement layer thickness for removal depths, if information is available.

(c) Drawing scale shall match the geometric layout and grading plan scales.

4.4.2.8 Centerline Profile

(a) Airfields: Provide preliminary profile for runway and/or taxiway centerlines. Provide edge of pavement profiles if applicable for milling and overlay projects. Show existing ground line and preliminary new finish grade with percent new grades indicated.

(b) Roads, Streets, & Parking Areas: Provide preliminary profile for centerlines. Show existing ground line and preliminary new finish grade with percent new grades indicated.

4.4.2.9 Typical Sections (New work) for Airfields, Roadways & Parking Areas

(a) Roadways: Provide preliminary typical sections presenting each different roadway type or width. Indicate lane widths, shoulder widths, curb and gutter, and cross-slopes.

(b) Parking Areas: Provide preliminary typical section for various parking areas.

(c) Airfields: Provide preliminary typical sections for runways, taxiways, and aprons.

4.4.2.10 Composite Utility Plan

Present the new and existing site features with all utilities underground and overhead shown.

4.4.2.11 Existing Site Topographical Survey and Utilities Plan

Present the site topographic survey. The scale shall match the geometric layout and grading plan scales presented.

4.4.2.12 Project Construction Phasing Plan

Present the preliminary project phasing requirements. Show impacts to existing facilities and the preliminary plan of each construction phase.

4.4.3 Specifications

Provide a basic outline in accordance with Chapter 3, SPECIFICATIONS.

4.5. INTERIM DESIGN (50-65%)

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

4.5.1. Design Analysis

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

4.5.1.1. Storm Drainage Design

(a) Complete storm drainage design-calculations consistent with the requirements of the applicable UFC(s) and based on the design values established in the Concept Design Analysis.

(b) Provide a map outlining drainage areas affecting new construction.

(c) Use the General Instructions Relative for the Design of Storm Drainage Systems for Other Than Airfields based on UFC 3-230-17FA (old designation TM 5-820-4)(See paragraph 4.8 below).

(d) Provide complete calculations for sizing retention and/or detention ponds. Provide calculations verifying compliance with all State regulations. Coordinate calculations with applicable State Regulatory Agencies. Provide documentation of coordination meetings.

(e) Provide watertight joints for drainage pipe under all pavements (aircraft and vehicular) when the pipe is placed in a non-cohesive soil (see TM 5-820-4, paragraph 2-06j). Provide soil tight joints at all other locations.

(g) Contour intervals should be 1-foot (25cm), unless otherwise directed.

4.5.1.2 Pavement Design

(a) Complete 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. The PCASE website is:

https://transportation.wes.army.mil/triservice/pcase/

(b) Present complete calculations for pavement options to be allowed.

(c) Provide materials to be used in pavement structure and their thickness.

(d) Provide the minimum compaction requirements.

4.5.1.3 Additional Information

List additional information or criteria needed for final design.

4.5.2 Interim Drawings

Although it is intended that major items of work be shown separately, different items may be shown on the same sheet provided that the presentation is sufficiently clear to permit legible reproduction at half-scale.

Title Sheet and Index
Project Location & Vicinity Maps
Project Symbols Legends and Abbreviations Sheet
Demolition and Removal Plan
General Site Overview Plan
Geometric Layout Plan
Grading and Storm Drain Plan
Centerline Profile Sheets
Storm Drain Profile Sheets
Typical Sections Sheets
Concrete Layout and Joint Plans
Construction Details
Composite Utility Plan
Existing Site Topographical Survey and Utilities Plan
Preliminary Best Management Practices Plan (Erosion and Sedimentation Control Plan)
Project construction Phasing Plan

4.5.2.1 Location and Vicinity Maps

Update from 35% as required.

4.5.2.2 Project symbols Legends and Abbreviations Sheet

(a) Update from 35% as necessary, provide graphic symbols for all items used in plan assembly;

(b) Update from 35% as necessary, provide list of all abbreviations used in plan assembly.

4.5.2.3 Demolition and Removal and/or Relocation Plan

(a) Indicate all items of site work, which shall require removal or relocation.

(b) Provide dimensioning for removal items such as pavements, curbs, sidewalks, etc.

4.5.2.4 General Site Overview Plan

This sheet may be omitted for small projects where the complete site can be presented on one geometric layout sheet(s). For larger projects, update this sheet from the 35% to present the 65% design.

4.5.2.5 Geometric Layout Plan

(a) Complete the geometric layout of all items of new work using offset dimensions from existing structures or use coordinates for locating new work. Coordinates shall be to the one-hundred of a foot.

(b) Include on the plan sheet information on specific items of work.

(c) Provide locations of soil boring locations and designations.

(d) Complete the legend to include all items and symbols shown on the plans. Symbols should be consistent between successive drawings.

(e) Show on the plan the construction centerline, right-of-way limits, and all critical topographical features such as fences, buildings, streams, railroads, etc.

(f) Locate or make reference to monuments and benchmarks for horizontal and vertical control.

(g) Provide layout survey information necessary for establishment of the survey centerline, new structures, building column lines, runway centerlines, etc, including coordinates or computed bearings, radii, curve data, super-elevation requirements, pavement widening requirements, point of intersection of centerlines, etc.

(h) When super-elevation is required, include in the plan a diagrammatic profile of how the super-elevation is obtained and also tables of shoulder slopes versus cross slopes for the super-elevated section.

(i) Unless otherwise shown on the demolition and removal plan, note on the plans the size and type of all existing structures and the manner in which they are to be utilized, removed, or otherwise affected by new work.

(j) If widening of the pavement is required in curves provide sufficient data to facilitate the construction.

4.5.2.6 Grading and Storm Drainage Plan

(a) Indicate all items of work superimposed on the existing topography.

(b) Indicate the proposed contours for new grading and provide spot elevations as required to facilitate field layout. All contour intervals should be 1-foot, unless otherwise approved.

(c) Layout the new storm drainage system using the symbols presented in the legend.

(d) Identify drainage structures with number designations corresponding to those used in the storm drainage schedule to be included in the drawings.

(e) Indicate the finished floor elevations of new buildings.

(f) Locate or make reference to monuments and benchmarks for horizontal and vertical control.

(g) Present clearing and grubbing limits.

4.5.2.7 Centerline Profile Sheets

(a) Airfields: Update from the 35%: present the interim design profile for runway and/or taxiway centerlines. Provide edge of pavement profiles if applicable for milling and overlay projects. Show existing ground line and interim new finish grade with percent new grades indicated.

(b) Roads, Streets, & Parking Areas: Update from the 35%: present the interim design profile for centerlines. Show existing ground line and interim new finish grade with percent new grades indicated.

(c) Unless otherwise approved, 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.

(d) Provide elevations at points where changes of grade occur.

(e) Indicate the lengths of vertical curves and present all vertical curve data.

(f) 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.

(g) Provide centerline grade elevations at each 50-foot station.

(h) Show new and existing drainage structures on the profile.

4.5.2.8 Storm Drain Profiles

Provide interim design profiles for all storm drains and airfield/roadway culverts. Show existing ground line and interim new finish grade. Indicate invert elevations of all drainage structures, storm drain pipes with size(s) and invert elevations, and new or existing structures or utilities crossing above or below the new storm drain.

4.5.2.9 Typical Sections (New Work) for Airfields, Roadways & Parking Areas

(a) Roadways: Update preliminary typical sections presenting each different roadway type or width. Indicate lane widths, shoulder widths, curb and gutter, and cross-slopes.

(b) Parking Areas: Update preliminary typical section for various parking areas.

(c) Airfields: Update preliminary typical sections for runways, taxiways, and aprons.

(d) Present pavement structure diagram or show layers on typical section.

(e) Define on typical section the various layers of new work: stripping, unclassified excavation, compacted fill, shoulder build-up, pavement section, pavement widths, shoulder widths, ditch widths,

earthwork slopes, seeding, and sodding, and all special requirements as necessary for the specific project.

4.5.2.10 Concrete Joint Plans

(a) Concrete Joint Layout Plans: Provide a joint layout plan for each concrete apron, hardstands, road, pavement, etc. Joint plan shall clearly indicate the required joint type for all joints as well as specific slabs which require reinforcement. The scale of layout plans shall be enlarged to clearly show all details for layout and grading. Typical scale shall be 1”=10’ or 1”=20 or unless otherwise approved.

(b) Concrete Joint Grading Plans: Provide a joint grading plan for all concrete pavements, aprons, hardstands, roads, etc. Grade for each joint intersection shall be provided on the plan at the specific joint. Only joints with grades, which can be linearly interpolated, may be omitted. Sufficient grades must be provided to facilitate calculation of all joints in the plan. Scale of grading plan shall be in accordance with 4.5.2.10(a).

(c) Concrete joint details: Provide details of all joint types as applicable to the project. Provide detail of joint sealant.

(d) Sidewalk joint layout: Provide details of sidewalk joints for entrances at buildings, handicap ramps, and circular drives, etc, as applicable.

4.5.2.11 Construction Details and Special Plans

Plans shall include the following,

(a) Minimum paving and compaction requirements not otherwise presented by the typical sections.

(b) Typical sections through the building site as required for clarity.

(c) Storm drainage details: inlets, manholes, pipe bedding, headwalls, special structures, and pipe and drainage structure schedule(s) as required.

(d) Parking layout(s).

(e) Super-elevation and widening details.

(f) Pavement Marking and Signage.

(1) Marking and signage plans for vehicle traffic shall be based on the criteria presented in the current issue of the Manual of Uniform Traffic Control Devices (MUTCD) and the State Highway Department Standard Drawings.

(2) Marking schemes for airfield pavements shall be in accordance with the criteria presented in the current version of AFI 32-1042, Standards for Airfield Marking and ETL 94-01, Standard Airfield Pavement Marking Schemes.

(g) Sidewalk, curb, curb and gutter, ditch(s), pedestrian ramps, miscellaneous ramps, drives, hardstands, brick paving, etc.

(h) Enlargement sheets; to present all construction details clearly present enlargement plans or details as required or necessary.

(i) Traffic Control Plans. On projects which interface with existing streets or roadways which will remain open to traffic during construction, a Traffic Control Plan shall be developed and presented in the plan assembly. The plan shall be in accordance with the MUTCD.

4.5.2.12 Composite Utility Plan

(a) Update the preliminary new and existing site plan with all utilities underground and overhead shown.

(b) Coordinate and resolve utility conflicts as necessary.

4.4.2.13 Existing Site Topographical Survey and Utilities Plan

(a) Present the site topographic survey. The scale shall match the geometric layout and grading plan scales presented.

(b) Present any special notes and locations of IRP sites, wetlands, or other environmentally sensitive areas. Present any archeological or culturally significant areas.

4.5.2.14 Preliminary Best Management Practices Plan (Erosion and Sedimentation Control Plan)

(a) For all projects with land disturbance provide a Best Management Practices Plan (Sediment and Erosion Control Plan). The plan shall be prepared by a Professional Engineer registered in the State where the project exist and shall also meet the minimum State specific qualifications requirements as a "Qualified Credentialed Professional" as defined by State specific regulations. The Plan shall present the preliminary "best management practices" both temporary and permanent, anticipated to control sedimentation and erosion throughout the life of the project. Plans shall be in accordance with the specific State adopted Best management Practices handbook(s) as referenced in the specific State NPDES Construction Permit Program.

(b) Provide calculations in the design analysis for sizing temporary and permanent sedimentation basins or ponds, ditches, ditch liners, diversions, etc.

(c) Provide preliminary details for all erosion and sediment control devices such as sediment traps, sediment ponds, slope diversions, filter strips, seeding and grassing requirements, structures, and maintenance schedules. Details shall be in accordance with the specific State adopted Best management Practices handbook(s) as referenced in the State NPDES Construction Permit Program.

(d) Provide erosion and sediment control phasing sequences.

4.4.2.15 Project Construction Phasing Plan

Update the preliminary project phasing requirements. Show impacts to existing facilities and the interim plan of each construction phase.

4.5.3 Specifications

Provide redlined marked up specifications in accordance with Chapter 3, SPECIFICATIONS.

4.6 FINAL DESIGN (UNREVIEWED 100%)

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. The Final plan assembly shall include, as a minimum the following completed plan sheets, as applicable to the specific project.

Title Sheet and Index;
Project Location & Vicinity Map(s);
Project Symbols Legends and Abbreviations Sheet;
Demolition and Removal Plan.
General Site Overview Plan;
Geometric Layout Plan;
Grading and Storm Drain Plan;
Centerline Profile Sheet(s);
Storm Drain Profile Sheet(s);
Typical Sections Sheet(s);
Concrete Layout and Joint Plan(s);
Construction Detail(s) and enlargement Plan(s);
Composite Utility Plan(s);
Existing Site Topographical Survey and Utilities Plan;
Final Best Management Practices Plan (Erosion and Sedimentation Control Plan);
Project Construction Phasing Plan.

4.6.1 Final Design Analysis

4.6.1.1 Update previously prepared analysis to support final plans and specifications. Any required permit application packages shall be included as an appendix in the Final Design Analysis.

4.6.1.2 NPDES Construction Permit “Notice of Registration” Application

(a) The A-E as “Engineer of Record” shall prepare and submit to the Mobile District, the State specific “Notice of Registration” (NOR) application. The “Qualified Credentialed Professional” (QCP) who prepared the Best Management Practices Plan shall be required to sign all required certifications as QCP. The “Owner”, “Operator” or “Responsible Facility Contact” designations shall be left blank by the A-E. The “NOR” application shall be submitted with the Final Design Submittal.

(b) The designer shall prepare six required copies of all permit application packages including plans, specifications, calculations, and other documentation to the Mobile District Project Manager.

4.6.2 Final Drawings

(a) Add general notes to drawings as required.

(b) Insure correct cross-referencing among site drawings for appropriate details, sections, match lines, etc.

(c) Eliminate all conflicts (horizontal and vertical) among site plans and architectural, structural, and utilities plans.

4.6.3 Final Specifications

(a) 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 3, 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 shall be included as an appendix in the specifications.

(b) Insure consistency of terminology between plans and specifications for notations on specific items of work.

(c) Perform check to insure adequate referencing for construction details.

4.7 READY-TO-ADVERTISE SUBMITTAL REQUIREMENTS (100% REVIEWED)

4.7.1 RTA Design Analysis

Complete analysis supporting the requirements of the project.

4.7.2 RTA Design Drawings and Specifications

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

4.8 GENERAL INSTRUCTIONS RELATIVE TO DESIGN OF STORM DRAINAGE SYSTEMS FOR OTHER THAN AIRFIELDS

4.8.1 References

(a) TM 5-820-4, Drainage for Areas Other Than Airfields.

(b) Design compilation sheets (4 totals).

(c) Sample "Storm Drainage Pipe and Structure Schedule" (To be included on the Plans as appropriate).

4.8.2 General

(a) For the design of other than airfield storm drainage systems, the procedure that follows and, as appropriate, TM 5-820-4 shall be utilized. Design compilation sheets, reference l.c., shall be used during the design and included as a part of the design analysis. The design analysis shall also include an overall drainage map depicting individual drainage areas, assumed paths, and slopes of runoff used to compute times of concentration, and the types of surface within the individual areas.

(b) For projects located in the states that require storm water permits, the designer shall perform the drainage design in accordance with the state's criteria. The designer shall maintain a complete record of the criteria and calculations.

4.8.3 Notes To Designer

(a) The "Procedure for Design of Storm Drainage Systems for Other Than Airfields" was developed to consolidate and clarify design criteria and procedures presented in TM 5-820-1 and TM 5-820-4, to facilitate designs of other than airfield drainage systems, and to achieve design consistency.

(b) This design procedure in no way relieves designers of their responsibility to comply with the provisions and requirements of TM 5-820-4.

(c) The storm runoff design procedure presented in Steps l through l2 in 4.8.5 applies to both the closed storm drainage system and individual culverts. The pipe sizing procedure presented in Steps l3 through l9 applies to closed storm drainage systems only. Individual culverts shall be sized using procedures contained in TM 5-820-4.

4.8.4 Drainage Design Criteria

(a) The criteria and procedures are for areas up to one square mile, where only peak discharges are required for design, and ponding is not permitted.

(b) The design storm shall be based on l0-year storm frequency with “no ponding”. The designer will check the 100-year event through the proposed system to insure no flooding or damage occurs.

(c) Minimum times of concentration, t, of l0 minutes for paved areas and 20 minutes for grassed areas shall be used.

(d) Manholes or junction boxes shall be provided at points of change in conduit grade or size, at junctions with laterals or branches, and wherever entry for maintenance is required. Distance between points of entry shall be not more than about 300 feet for conduits with diameter smaller than 30 inches. Conduit alignment between entry points shall be straight, except for 30 inches and larger sizes.

(e) Pipe discharge velocities must not be less than 2.5 fps to provide for adequate pipe cleansing.

(f) Minimum pipe sizes shall be l2 inches for closed drainage systems and l8 inches for individual culverts, unless unusual or special design considerations warrant using smaller pipe.

(g) Storm drainage systems shall be constructed in accordance with UFGS specifications section 33 40 01. The specifications contain instructions and information that must be considered during design.

(h) Metal pipes will receive paved inverts when pipe velocities exceed 6 fps.

(i) Plain Galvanized Steel pipes shall receive bituminous coating.

(j) Aluminized Steel, Type 2, will not require bituminous coating.

(k) Plastic pipes shall be HDPE Double wall.

4.8.5 Procedure For Design Of Storm Drainage Systems For Other Than Airfields

Step 1 - Columns 1 through 14 of Table "A" of **Exhibit 4-1** shows data necessary for drain inlet design. The drainage area for each inlet is calculated with respect to the paved, bare soil and turfed surface conditions within the area. These areas are entered in Columns 2, 3, and 4. The total drainage area for each inlet is then entered in Column 5. Surface runoff coefficients "C" are assigned from Figure II of **Exhibit 4-3** based on the predominant paved, bare soil, and turfed surface conditions encountered in the overall drainage area and are entered at the top of Columns 2, 3, and 4. Only under unusual circumstances shall bare surface areas be considered in the drainage calculations. The weighted coefficient "C" for inlet number 1 is calculated as follows:

$$\frac{{}^{A}\text{Paved}\ ({}^{C}\text{Paved}) + {}^{A}\text{Turf}\ ({}^{C}\text{Turf})}{{}^{A}\text{Total}} = \frac{0.06\ (0.90) + 1.83\ (0.40)}{1.89} = 0.42$$

Step 2 - The actual length of runoff "L" for each inlet or design is scaled from contour maps, etc., with respect to the paved, bare soil and turfed surface conditions encountered. The sum of the individual lengths involved is entered in Column 7. Considerations must be given to the type of flow (sheet, channelized, ditch, swale, etc.), slopes, (along the flow path), and surface retardence coefficients when selecting the runoff length. Sheet flow is assumed to become channelized flow on unpaved surfaces after a sheet flow distance of 200 feet. The selected length of runoff should represent a realistic path of flow measured perpendicular to contours and one that shall provide the maximum runoff flow time (time of concentration). The actual runoff length "L" for inlet 1 drainage area was determined to be 260 feet. The first 200 feet occurred with sheet flow on an average grass surface sloping at 0.70%. The next 35' occurred with channelized flow on an average grass surface sloping at 0.70%. The assumed surface retardence "n" was 0.40 for sheet flow and 0.20 for channelized flow. The remaining 25 feet of runoff occurred on an asphalt paved surface sloping at 0.50% and having a retardence "n" of 0.02. Retardence "n" is the term used to designate the resistances to sheet, channelized, and ditch flow caused by various surface conditions such as vegetation, surface and alignment in the path of flow. Retardence coefficients are assigned from Figure III of **Exhibit 4-3**. The average retardence "n" for inlet number 1 is calculated as follows:

$$\frac{{}^{L}\text{Surface 1}\ ({}^{n}\text{Surface 1}) + {}^{L}\text{Surface 2}\ ({}^{n}\text{Surface 2})}{{}^{L}\text{Total}} = \frac{200\ (0.4) + 35\ (0.20) + 25}{260}$$

Enter in Column 8.

The average slope "S" for inlet number 1 is calculated as follows:

$$\frac{{}^{L}\text{Surface 1}\ ({}^{S}\text{Surface 1}) + {}^{L}\text{Surface 2}\ ({}^{S}\text{Surface 2})}{{}^{L}\text{Total}} = \frac{235\ (0.7) + 25\ (0.5)}{260} =$$

Enter in Column 9.

Equivalent length "L_E" is now calculated using Formula I:
$L_E = 2.5\ Ln / s$
Where L_E = equivalent length in feet for n = 0.4 and 5 = 1%

L = actual measured distance of flow path in feet
n = average retardence coefficient
S = average slope in percent of flow path
For inlet number l, L_E is calculated as follows:

$$L_E = \frac{2.5\ (260)\ (0.34)}{0.68} = 268'$$

Enter in Column l0

Step 3 - The time required for surface runoff to reach an inlet or design point when traveling along the previously determined flow path is the time of concentration "tc." The time of concentration for each inlet or design point is obtained from Figure V of **Exhibit 4-4** using equivalent lengths of runoff "LE" from Column 10. The time concentration for inlet number 1 was determined from Figure V to be 22.1 minutes using the equivalent length of runoff "LE" value of 268 feet. The 22.1 figure is rounded to 22 minutes and entered in Column 11.

Step 4 - Select a design storm index from Figure I of **Exhibit 4-2**, based upon the location of the project, and enter at the top of Table A of **Exhibit 4-1**. For this example, the project is located in Columbus, Mississippi, which yields a design storm index of 2.6 in./hr.

Step 5 - Using Figure VI of **Exhibit 4-5** for inlet number 1, enter the chart from the left using tc" = 22 min. from Column 11 and read rainfall intensity under design storm index 2.6 as 4.60 in./hr. Enter in Column 12.

Step 6 - Infiltration "F" is the term used to refer to the absorption of rainfall by the ground during a design storm following a rainfall of one hour. Infiltration rates are assigned from Figure IV of **Exhibit 4-4** according to the predominant type of soil and ground cover encountered in the overall drainage area, and are shown at the tops of Columns 2, 3, 8, and 4. The weighted infiltration "F" for inlet number 1 is calculated as follows:

$$\frac{0.06\ (0.0) + 1.83\ (0.5)}{1.89} = 0.48,$$ enter in Column 13.

Step 7 - The Rational Method for computing runoff is Q = CA(i-F) where,

Q = runoff in cubic feet/sec
C = surface runoff coefficient
A = area (acres)
i = intensity (in./hr.)
F = infiltration rate (in./hr.)

The runoff for inlet number l is calculated as follows:

Q = 0.42 (l.89) (4.60 - 0.48) = 3.3 cfs.

Enter 3.3 cfs in Column l4. It is essential at this point to check the capacity of inlet No. l. All inlets, etc., must be sized to accommodate the design storm runoff without ponding.

Step 8 - Columns 15 through 28 of Table "B" **Exhibit 4-1** show data necessary to calculate rate of inflow into drains. Enter in Column 17 distance between inlets. Enter in Column 18 the areas calculated and

shown in Column 5 of Table "A." Accumulate areas as each contributes to the entire system and enter in Column 19. The weighted runoff coefficient "C" for drain 2-3 is calculated as follows:

$$\frac{1.89\ (0.42) + 1.72\ (0.57)}{3.61} = 4.49$$

Enter in Column 20.

The weighted runoff coefficient for drain 5-6 is calculated as follows:

$$\frac{5.33\ (0.46) + 2.07\ (0.40) + 1.21\ (0.60)}{8.61} = 0.47$$

Enter in Column 20.

Step 9 - As runoff accumulates and increases in its passage through the system, the increase in runoff is not the summation of the peak runoff of each individual area, but is an increase modified by various factors. The major factor is the decreasing intensity of the storm effect on the lower areas due to the increasing time of concentration. To attain the maximum rate of runoff at a given point, the storm must continue long enough to produce the maximum rate of inflow into each upstream drain inlet and to permit the inflow to travel through the drain from the "critical inlet" to the given point.

The "critical inlet" is the inlet whose drainage area requires the longest time of concentration within the pipe system being considered. The "critical inlet" and its time of concentration "t_c" are determined from Column 11 of Table "A" and entered respectively in Columns 21 and 22. Pipe flow time from the "critical inlet" to the given point is referred to as "drain time" "t_d." Drain time is computed using an assumed average pipe velocity of 6 fps. and entered in Column 23 for individual pipe runs. The drain time, "t_d," from the "critical inlet" to the given point is accumulated in Column 24. The critical time of concentration, "t_c," for the individual pipe run design, is calculated by adding "t_c" for the critical inlet from Column 22 to the accumulated drain time "t_d" from Column 24. The sum of the two, rounded to the nearest minute, is entered in Column 25.

Step 10 - With the time of concentration calculated in Column 25, storm intensity "i" for the drains can be derived as in Step 5, above, and entered in Column 26.

Step 11 - The weighted infiltration rate "F" for drain 2-3 is calculated as follows:

$$1.89\ (0.48) + 1.72\ (0.33) = 0.41$$

Enter in Column 27.

Step 12 - The rate of inflow into the drains is calculated as in Step 7 above and entered in columns 28 and 32.

Step 13 - Columns 29 through 42 show data necessary for the design of storm drains. Pipe sizes, gradients, and velocities are determined on the basis of flowing full using Manning's equation ($Q = \frac{1.49}{n} \times R^{2/3} \times S^{1/2} \times A$). All projects shall include designs for smooth interior and fully-paved corrugated metal (c.m.) pipe ("n" = 0.024). Nomographs

shown in Figures VII may be used for the design of circular pipe having respective "n" values of 0.012 and 0.024. On occasion when non-circular pipe and/or pipe having other "n" values are required, they shall be designed using the Manning's Equation. Hydraulic Design Series No. 3 of "Design Charts for Open-Channel Flow" published by the U. S. Department of Transportation, Federal Highway Administration (Reprinted 1979) is an acceptable design aid that may be used to design for these special conditions. Pipe roughness coefficients "n" for various pipe are shown in Figure X of **Exhibit 4.9**.

Step 14 - The pipe roughness coefficient "n" is entered in the appropriate space of the top of Table "C" of **Exhibit 4-1**. For this example, an "n" value of 0.012 is being used.

Step 15 - Enter Figure VII of **Exhibit 4-6** using the design discharge from Column 32. Select a pipe size such that a line drawn from the design discharge from Column 32 through the selected pipe size intersects the slope and velocity lines at minimum values. Slopes for the required pipe size should be held to a minimum consistent with limitations imposed by cover requirements, proximity to other structures, and interference with other utilities. Also, pipe sizes and slopes should be selected such that flow velocities in successive pipes remain fairly constant. To avoid ponding at intake points (inlet, catch basins, etc.), pipe inverts and velocities must be established such to maintain the kinetic energy line (velocity head V plus the entrance 2g loss, head $(K\ V^2)$ at or below the top or gutter line elevation of the intake structures. In most cases, providing minimum pipe cover shall fulfill or exceed the velocity head plus entrance loss requirement. Both conditions, however, must be checked to ensure that ponding shall not occur.

In profile proceeding downstream, the crowns of pipes where sizes progressively increase shall be matched. Crowns of incoming laterals shall be matched to that of mainline. Additional lowering of an outgoing pipe shall be required to compensate for head loss within the junction structure.

Step 16 - For pipe 1-2, a Q of 3.3 cfs (from Column 32) is entered into Figure VII of **Exhibit 4-6**. At a slope of 0.85%, a 12" pipe shall handle the design discharge with a reasonable velocity. A line drawn through the pipe size of 12" and a slope of 0.85%, intersects the discharge line at 3.5 cfs and the velocity line at 4.6 fps. This indicates the capacity of the pipe flowing full is 3.5 cfs at a velocity of 4.6 fps. Enter the selected pipe size and slope into Columns 33 and 34, respectively. It is now necessary to determine the Velocity in the pipe for the design Q of 3.3 cfs. Compute the ratio of the design discharge (3.3 cfs) to the flowing full discharge (3.5 cfs) as follows:

$$\frac{Q\ Design}{Q\ Full} = \frac{3.3}{3.5} = 0.94$$

Enter the bottom of Figure IX of **Exhibit 4-8** at 0.94 and project a vertical line intersecting the "Capacity" curve. Continue the line horizontally from this point intersecting the "Velocity" curve. The partial full to full flow velocity ratio (Design/Full) is interpreted as 1.135 by projecting a vertical line from the "Velocity" curve to the bottom of Figure IX of **Exhibit 4-8**. The partial full or Pipe 1-2 design velocity (Design) is found to be (4.6) (1.135) = 5.2 fps and is entered into Column 35.

Step 17 - Head losses at junction structures shall now be taken into account. A loss coefficient "K" shall be selected from Figure XI of **Exhibit 4-9**, depending on the type of junction. The "K" which produces the largest head loss at the junction shall be selected. For pipe 1-2 passing through inlet number 2, a "K" value of 0.20 is selected from Figure XI. The head loss is calculated as follows:

$$H_L = \frac{K\ V^2}{2\ g} = \frac{0.20(5.2^2)}{2(32.2)} = 0.08'$$

and is entered in Column 37.

This value is the amount of lowering required below the entrance invert of pipe 1-2 for pipe 2-3 as it exits inlet number 2 to compensate for head loss through inlet. This lowering is in addition to any lowering required due to change in pipe size.

Step 18 - For each junction structure, the finished grade at the structure shall be determined and entered in Column 40. The upper and lower inverts of each pipe are then calculated and entered in Columns 38 and 39, respectively. Actual depths of cover are calculated for each pipe and entered in either Column 41 or 42, whichever is applicable. Inverts shall be set so as to maintain the cover requirements specified in Tables II-1 through II-9 of TM 5-820-4 for pipe located under traffic areas and/or high fills. The minimum cover for reinforced concrete Class III or corrugated metal pipe is 1.0 foot for Civil Works Recreation and Public Use projects. In non-traffic areas, 1.0 foot minimum cover is required.

Step 19 - Maximum permissible outfall velocities for non-erosive flow are given in Table 9-1 of TM 5-820-3. Pipe 5-6 outfalls into an existing silty-clay bare soil ditch, which permits a maximum non-erodable velocity of 3.5 fps (from Table 9-1). The discharge velocity in pipe 5-6 is 6.4 fps; therefore, energy dissipation, erosion protection and/or discharge velocity reduction (increase pipe size and/or reduce pipe slope) is required to prevent erosion of the outfall ditch. A good design shall require analysis of several feasible alternatives to determine the most economical method of controlling erosion.

Sample

Tables A, B, C

DESIGN STORM INDEX 2.6IN/HR (FIG. I)
Q=CA(I-F) DESIGN STORM 10 YEARS
C=SURFACE RUNOFF COEFFICIENT I=INTENSITY
A=AREA (ACRES) F=INFILTRATION RATE

TABLE "A" DRAINAGE DRAIN INLET CAPACITIES (OTHER THAN AIRFIELDS)

DATE: 10JULY 75 | SHEET 1 OF 3
PROJECT: COLUMBUS L & D
LOCATION: COLUMBUS, MS
DESIGNED BY:W.D.P | CHECKED BY: R.N.S.

INLET NUMBER	DRAINAGE AREA (ACRES) PAVED C=0.90 F=0.00	UNPAVED BARE C=0.60 F=0.20	UNPAVED GRASSED C=0.40 F=0.50	TOTAL AREA (COL 2+ COL 3+ COL 4)	EQUIVALENT LENGTH "L" WEIGHTED "C"	ACTUAL LENGTH "L" (FT)	AVG RETARDENCE "n"	AVG SLOPE "S" %	"LE" EQUIV LENGTH "LE" (FT)	DRAIN INLET CAPACITY CRITICAL TIME Tc (FIG. V) (MIN)	STORM INTENSITY "I" (FIGVI)	WEIGHTED "F"	RATE OF SUPPLY "Q" (CFS)
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	0.06	–	1.83	1.89	0.42	260	0.34	0.68	268	22	4.60	0.48	3.3
2	0.57	–	1.15	1.72	0.57	185	0.33	0.50	216	20	4.75	0.33	4.3
3	–	–	1.72	1.72	0.40	190	0.80	3.00	219	20	4.75	0.50	2.9
4	–	–	2.07	2.07	0.40	285	0.34	0.60	313	24	4.40	0.50	3.2
5	–	1.21	–	1.21	0.60	165	0.10	0.25	83	13	5.70	0.20	4.0

TABLE "B" DRAINAGE UNDERGROUND STORM DRAINS (OTHER THEN AIRFIELDS)

DATE: 10JULY 79 | SHEET 2 OF 3
PROJECT: COLUMBUS L & D
LOCATIONS: COLUMBUS, MS
DESIGNED BY:W.D.P | CHECKED BY: R.N.S.

DESIGN POINT FROM INLET OR JUNCTION NUMBER	DESIGN POINT TO INLET OR JUNCTION NUMBER	LENGTH (FT)	DRAINAGE AREA INDIVIDUAL AREA (ACRES) (COL.5)	DRAINAGE AREA ACCUM. TOTAL (ACRES)	WEIGHTED "C"	CRITICAL RUNOFF TIME TO PRODUCE MAX. FLOW IN DRAIN: CRITICAL INLET NUMBER	CRITICAL INLET TIME Tc(MIN) (COL 11)	DRAIN ASSUME PIPE VEL 6 FPS (MIN)	TIME Tc ACCUM. TOTAL (MIN)	CRITICAL PIPE TIME Tc(MIN) (COL 22+ COL 24)	STORM INTENSITY "I" (FIG.VI)	WEIGHTED "F"	RATE OF INFLOW INTO DRAINS (CFS)
15	16	17	18	19	20	21	22	23	24	25	26	27	28
1	2	170	1.89	1.89	0.42	1	22	–	–	22	4.00	0.48	3.3
2	3	240	1.72	3.61	0.49	1	22	0.5	0.5	23	4.50	0.41	6.6
3	5	200	1.72	5.33	0.46	1	22	0.7	1.2	23	4.50	0.44	10.0
4	5	215	2.07	2.07	0.40	1	24	–	–	24	4.40	0.50	3.2
5	6	130	1.21	8.61	0.47	4	24	0.6		25	4.30	0.42	15.7

TABLE "C" DRAINAGE UNDERGROUND STORM DRAINS (OTHER THAN AIRFIELDS)

PIPE "n" 0.012

DATE: JULY 1979 | SHEET 3 OF 3
PROJECT: COLUMBUS LTD
LOCATION: COLUMBUS, MS
DESIGNED BY:W.O.P | CHECKED BY:R.N.B.

DESIGN POINT FROM INLET OR JUNCTION NUMBER	DESIGN POINT TO INLET OR JUNCTION NUMBER	LENGTH (FT.)	HYDRAULIC DESIGN DATA FOR STORM DRAIN: DESIGN DISCHARGE CAPACITY (CFS) (COL 23)	SELECTED PIPE SIZE (IN.)	SLOPE IN FT./FT.	HEAD LOSS AT SECTION CHANGE: VELOCITY OF IN FLOW "V" (FPS)	LOSS COEFFICIENT "K" (FIG XI)	HEAD LOSS $KV^2/2g$ (FT.)	CONSTRUCTION DATA: INVERT ELEVATION AT COL 29 (FT.)	INVERT ELEVATION AT COL 30 (FT.)	ELEVATION OF FINISHED GRADE AT COL 29	DEPTH OF COVER AT COL 29 (FT.)	DEPTH OF COVER MINIMUM IN LINE IF LOSS THAN COL 29(FT.)
29	30	31	32	33	34	35	36	37	38	39	40	41	42
1	2	170	3.3	12	0.0083	5.2	0.20	0.08	135.75	134.31	138.6	1.10	–
2	3	236	6.6	15	0.0100	6.6	0.20	0.14	133.98	131.62	137.5	2.11	–
3	8	200	10.0	18	0.0065	6.1	0.60	0.35	131.23	129.93	136.6	3.10	–
4	5	215	3.2	12	0.0085	5.2	0.60	0.25	132.26	130.43	137.6	3.59	–
5	6	130	15.7	24	0.0050	6.4	–	–	129.08	128.43	135.5	4.21	–

Exhibit 4-1

Figure I

Design Storm Index, 10 Years, 1-Hour Rainfall (Inches)

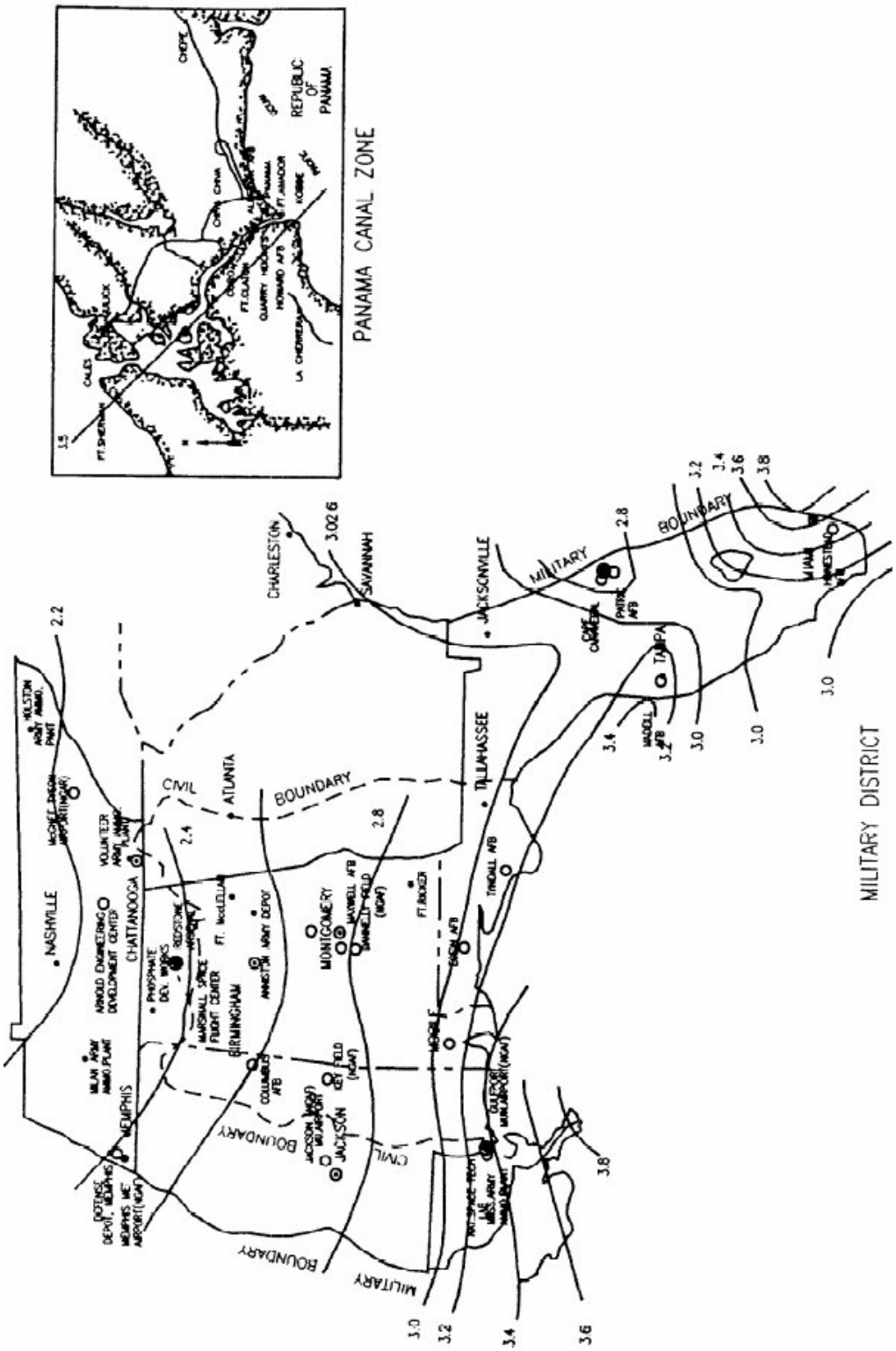


Exhibit 4-2

Figure II

Surface Runoff Coefficients

TYPE OF SURFACE	"C"
ASPHALT PAVEMENT	0.90
CONCRETE PAVEMENT	0.90
GRAVEL OR MACADAM PAVEMENTS	0.35–0.70
IMPERVIOUS SOILS	0.40–0.65
IMPERVIOUS SOILS WITH TURF	0.30–0.55
SLIGHTLY PERVIOUS SOILS	0.15–0.40
SLIGHTLY PERVIOUS SOILS WITH TURF	0.10–0.30
PERVIOUS SOILS	0.01–0.10
WOODED AREAS (DEPENDING ON SURFACE SLOPE AND SOIL COVER)	0.01–0.20

EXAMPLE

Figure III

Retardence Coefficients

TYPE OF SURFACE	"n"
SMOOTH PAVEMENT	[0.02]
DITCHES AND SWALES	0.02
COMPACTED GRAVEL SURFACES	0.06
BARE SURFACES	[0.10]
CHANNELIZED FLOW FROM AVERAGE GRASS COVER	[0.20]
SPARSE GRASS COVER	0.20
AVERAGE GRASS COVER	[0.40]
DENSE GRASS COVER	[0.80]

EXAMPLE

Exhibit 4-3

Figure IV

Infiltration Rates "F" (Inches/Hour)

NOTE"
"D" – DENOTES DRAINED MATERIAL
"U" – DENOTES UNDRAINED MATERIAL

MAJOR DIVISIONS		LETTER	DENSE COVER	AVERAGE COVER	SPARSE (BARE) COVER
COARSE GRAINED	GRAVEL & GRAVELLY SOILS	GW	1.0–1.5	0.8–1.2	0.6–1.0
		GP	1.0–1.5	0.8–1.2	0.6–1.0
		GM "D"	0.6–0.8	0.4–0.6	0.2–0.4
		GM "U"	0.4–0.5	0.3–0.4	0.2–0.3
		GC	0.3–0.4	0.2–0.3	0.1–0.2
	SAND & SANDY SOILS	SW	1.0–1.5	0.8–1.2	0.6–1.0
		SP	1.0–1.5	0.8–1.2	0.6–1.0
		SM "D"	0.6–0.8	0.4–0.6	0.2–0.4
		SM "U"	0.4–0.5	0.3–0.4	0.2–0.3
		SC	0.3–0.4	0.2–0.3	0.1–0.2
FINE GRAINED	SILTS & CLAYS LL<50	CL	0.1–0.2	0.1–0.2	0.02–0.1
		ML	0.6–0.8	0.4–0.6	0.2–0.4
		OL	0.6–0.8	0.4–0.6	0.2–0.4
	SILTS & CLAYS LL>50	CH	0.1–0.2	0.1–0.2	0.02–0.1
		MH	0.6–0.8	0.4–0.6	0.2–0.4
		OH	0.1–0.2	0.1–0.2	0.02–0.1
ORGANIC SOILS		PT	0.6–0.8	0.4–0.6	0.2–0.4
PAVEMENTS				0.0	

EXAMPLE

Figure V

Time of Concentration

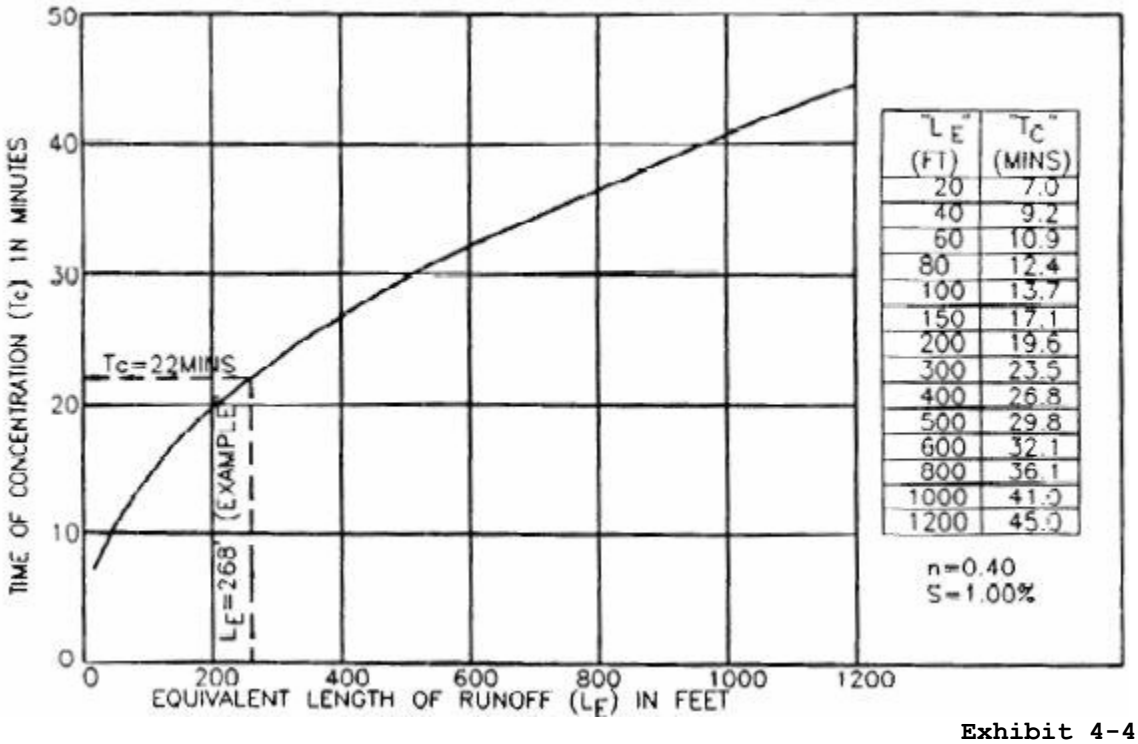


Exhibit 4-4

Figure VI

Rainfall Intensity "I"

	DESIGN STORM INDEX								
	EXAMPLE		↓						
Tc	2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.8
10	5.55	5.85	6.25	6.60	6.95	7.30	7.60	7.90	8.25
11	5.35	5.70	6.05	6.35	6.70	7.10	7.40	7.70	8.00
12	5.15	5.50	5.85	6.15	6.50	6.90	7.20	7.50	7.80
13	5.00	5.35	5.70	6.00	6.35	6.75	7.00	7.30	7.60
14	4.85	5.20	5.55	5.85	6.15	6.50	6.80	7.10	7.40
15	4.75	5.05	5.40	5.70	6.00	6.35	6.60	6.95	7.20
16	4.60	4.90	5.25	5.55	5.90	6.20	6.45	6.80	7.05
17	4.50	4.80	5.10	5.45	5.75	6.10	6.30	6.65	6.90
18	4.35	4.65	5.00	5.30	5.60	5.95	6.15	6.50	6.75
19	4.25	4.50	4.85	5.15	5.50	5.85	6.05	6.35	6.60
20	4.15	4.45	4.75	5.05	5.40	5.70	5.95	6.25	6.50
21	4.05	4.35	4.65	4.95	5.25	5.60	5.85	6.15	6.40
EXAMPLE → 22	4.00	4.25	4.60	4.85	5.15	5.50	5.75	6.05	6.30
23	3.90	4.20	4.50	4.80	5.05	5.40	5.65	5.95	6.20
24	3.85	4.10	4.40	4.70	5.00	5.30	5.55	5.85	6.10
25	3.75	4.05	4.30	4.60	4.90	5.20	5.45	5.75	6.00
26	3.65	3.95	4.25	4.55	4.80	5.10	5.35	5.65	5.90
27	3.60	3.85	4.15	4.45	4.75	5.00	5.25	5.55	5.80
28	3.55	3.80	4.10	4.35	4.65	4.95	5.15	5.45	5.70
29	3.45	3.75	4.00	4.30	4.55	4.85	5.10	5.35	5.65
30	3.40	3.65	3.95	4.25	4.50	4.75	5.05	5.30	5.60
31	3.35	3.60	3.85	4.15	4.45	4.70	4.95	5.20	5.50
32	3.30	3.55	3.80	4.10	4.35	4.60	4.85	5.10	5.40
33	3.25	3.50	3.75	4.00	4.30	4.55	4.75	5.00	5.30
34	3.20	3.45	3.70	3.95	4.20	4.45	4.70	4.95	5.20
35	3.15	3.40	3.65	3.90	4.15	4.40	4.65	4.90	5.15
36	3.10	3.35	3.60	3.85	4.10	4.35	4.55	4.80	5.05
37	3.05	3.30	3.50	3.75	4.00	4.30	4.50	4.70	4.95
38	3.00	3.25	3.45	3.70	3.95	4.25	4.45	4.65	4.90
39	2.95	3.20	3.40	3.65	3.90	4.20	4.40	4.60	4.85
40	2.90	3.15	3.35	3.60	3.85	4.15	4.35	4.55	4.80
45	2.70	2.90	3.15	3.35	3.60	3.85	4.05	4.25	4.50
50	2.50	2.70	2.95	3.15	3.40	3.60	3.80	4.05	4.20
55	2.35	2.55	2.75	2.95	3.20	3.40	3.60	3.80	4.05
60	2.20	2.40	2.60	2.80	3.00	3.20	3.40	3.60	3.80

Exhibit 4-5

Figure VII

Nomograph

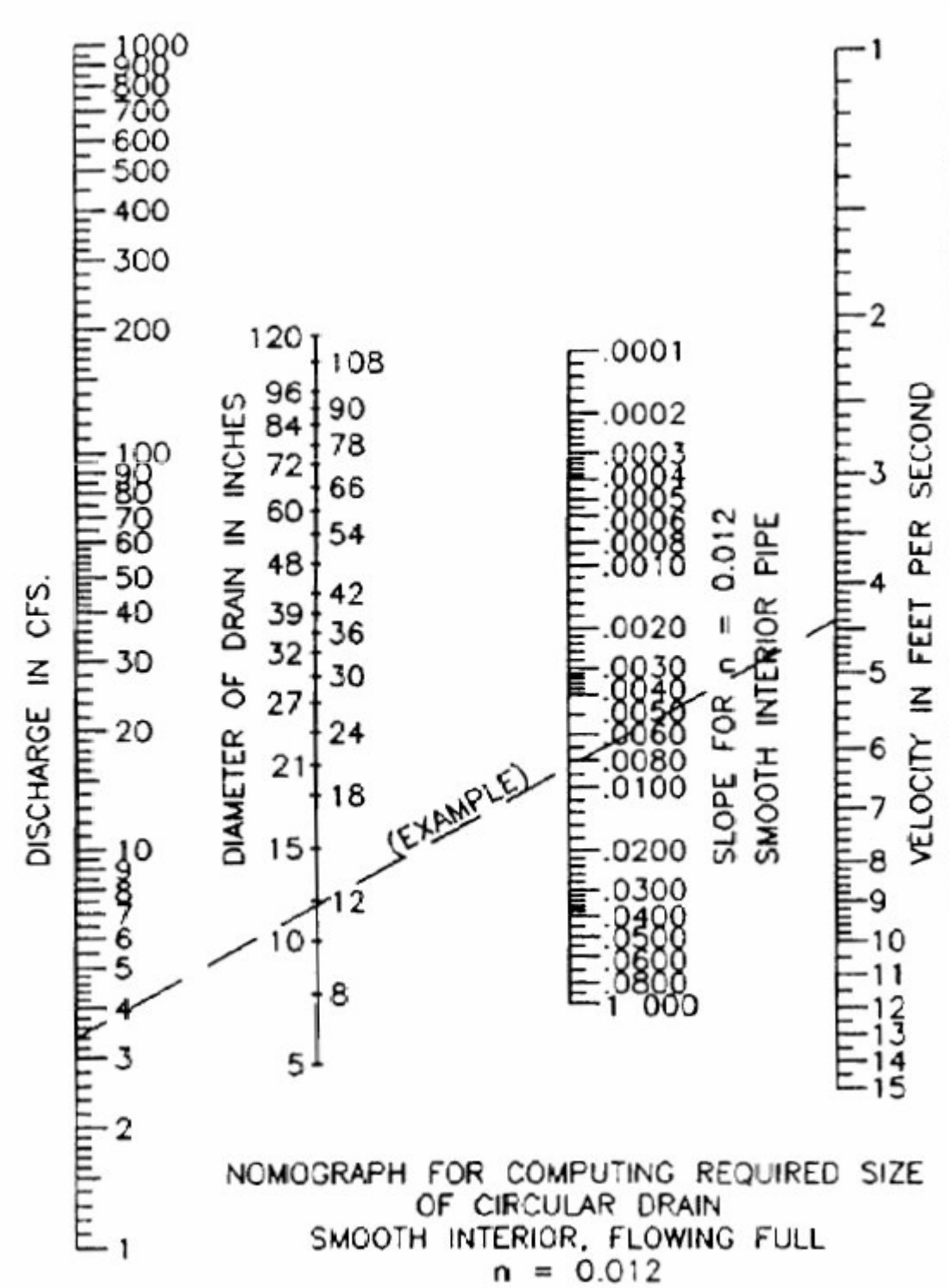
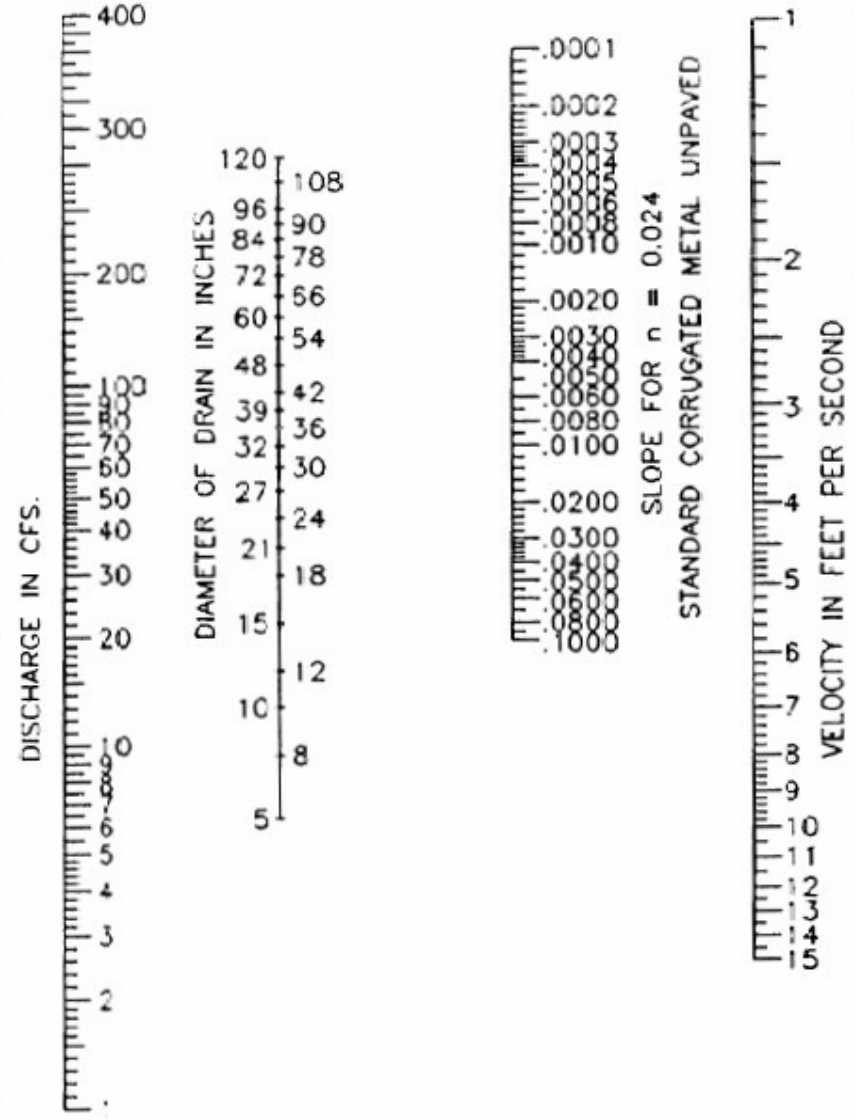


Exhibit 4-6

Figure VIII

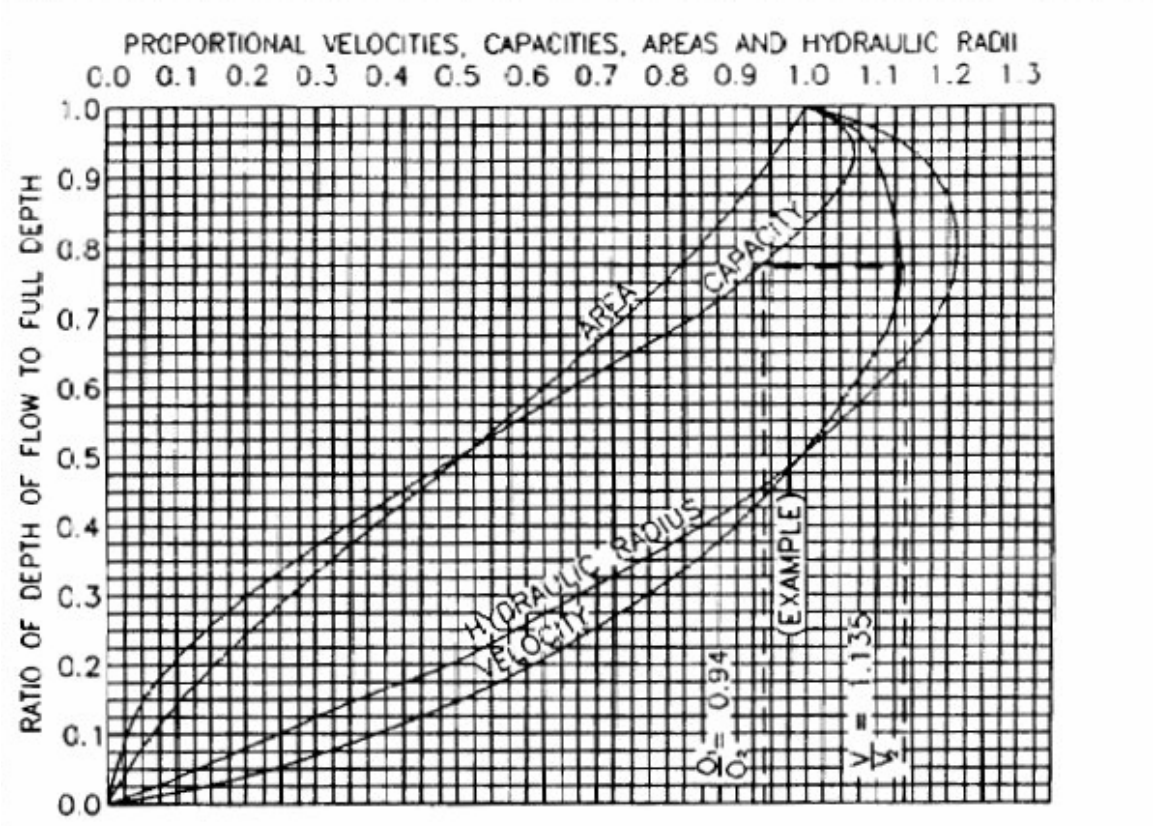
Nomograph



NOMOGRAPH FOR COMPUTING REQUIRED SIZE
OF CIRCULAR DRAIN
STANDARD CORRUGATED METAL PIPE UNPAVED
FLOWING FULL
n = 0.024

Exhibit 4-7

Figure IX



D/d	a/A	R1/R2	V1/V2	Q1/Q2
0.025	0.00576	0.066	0.163	0.0011
0.050	0.01870	0.133	0.258	0.0048
0.100	0.05210	0.252	0.396	0.0207
0.150	0.09410	0.372	0.587	0.0490
0.200	0.14240	0.484	0.616	0.0876
0.300	0.25320	0.684	0.777	0.1959
0.400	0.37360	0.856	0.901	0.3365
0.500	0.50040	1.000	1.000	0.5000
0.600	0.62650	1.112	1.073	0.6722
0.700	0.74740	1.184	1.119	0.8362
0.750	0.80470	1.208	1.134	0.9122
0.800	0.85820	1.216	1.139	0.9775
0.850	0.90660	1.212	1.137	1.0301
0.900	0.94660	1.192	1.124	1.0657
0.950	0.98170	1.144	1.094	1.0732
0.970	0.99190	1.116	1.076	1.0670
0.980	0.99570	1.096	1.053	1.0583
0.990	0.99820	1.068	1.045	1.4100
1.000	1.00000	1.000	1.000	1.0000

LEGEND

D - DEPTH OF FLOW
d - DIAMETER OF CONDUIT
A - CROSS-SECTIONAL AREA OF CONDUIT
a - CROSS-SECTIONAL AREA OF SEGMENT
R_1 - HYDRAULIC RADIUS OF SEGMENT
R_2 - HYDRAULIC RADIUS OF CONDUIT FLOWING FULL
V_1 - VELOCITY OF FLOW IN SEGMENT
V_2 - VELOCITY OF FLOW IN CONDUIT FLOWING FULL
Q_1 - CAPACITY AT PARTIAL DEPTH
Q_2 - CAPACITY OF CONDUIT FLOWING FULL

HYDRAULIC ELEMENTS
CIRCULAR CONDUITS

Exhibit 4-8

Figure X

Roughness Coefficient "n" for Various Pipe

"n"=0.012 FOR SMOOTH INTERIOR PIPES OF ANY SIZE, SHAPE OR TYPE*

"n" VALUE FOR ANNULAR CORRUGATED METAL

CORRUGATION SIZE	
2 2/3 BY 1/2 INCH	0.024
3 BY 1 INCH	0.027
6 BY 2 INCH	0.028–0.033
9 BY 2 1/2 INCH	0.033

"n" VALUE FOR HELICAL CORRUGATED METAL (2 2/3 BY 1/2 INCH CORRUGATIONS)

PIPE DIAMETER	
12–18 INCHES	0.011–0.014
24–30 INCHES	0.016–0.018
36–96 INCHES	0.019–0.024

* INCLUDES BITUMINIZED FIBER, CAST IRON, CLAY, CONCRETE (PRECAST OR CAST-IN-PLACE) OR FULLY PAVED CORRUGATED METAL PIPE.

Figure XI

Head Loss Coefficients at Junctions

TYPE OF JUNCTIONS	"K"
FOR NO BENDS AT JUNCTIONS	0.20
FOR BENDS AT JUNCTIONS OF 25 DEGREES	0.25
FOR BENDS AT JUNCTIONS OF 45 DEGREES	0.35
FOR BENDS AT JUNCTIONS OF 90 DEGREES	0.40
FOR JUNCTIONS OF THREE OR MORE PIPE	0.60

Exhibit 4-9

Sample

Plan – Design Example

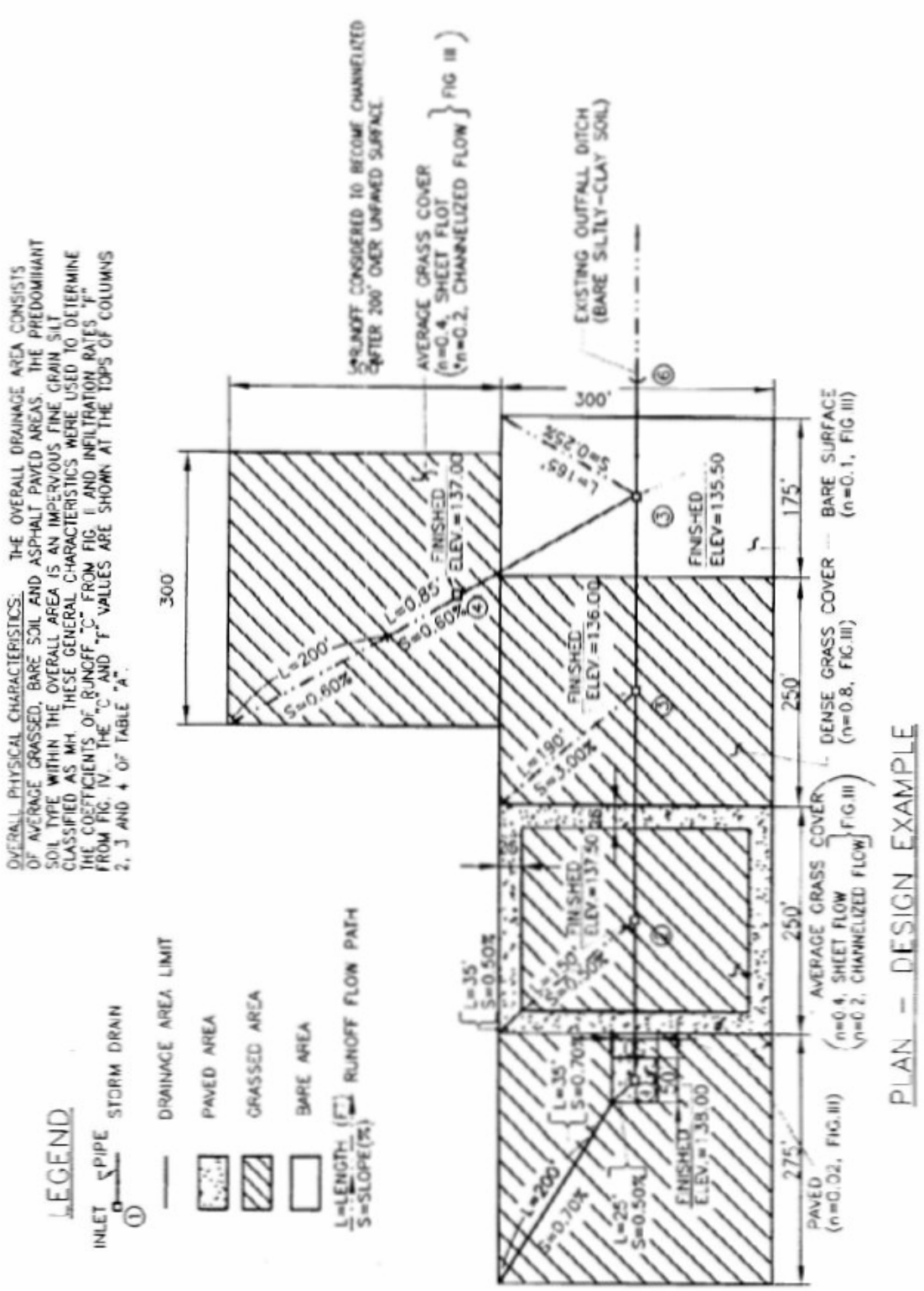
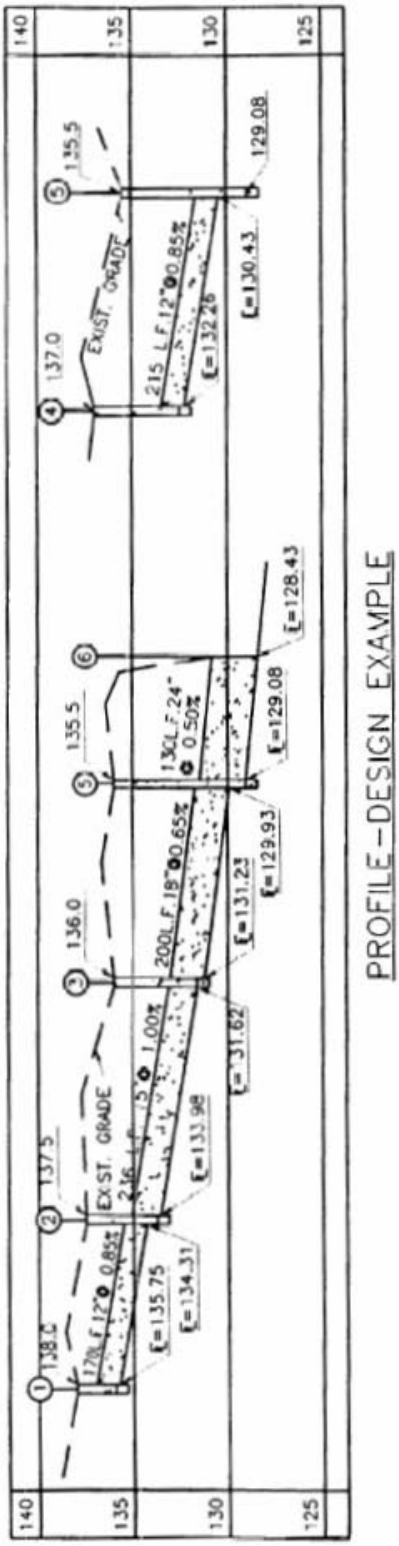


Exhibit 4-10

Sample

Plan – Design Example



PROFILE – DESIGN EXAMPLE

BIBLIOGRAPHY:

(1) FIGURES VII AND VIII WERE TAKEN FROM TM 5-820-1 FIGURES 25 & 27 RESPECTIVELY, DATED APRIL 1977.

(2) FIGURE IX WAS TAKEN FROM TM 5-820-4, FIGURE 10, DATED JULY 1965.

(3) FIGURE X WAS TAKEN FROM TM 5-820-3 TABLE 2-1, DATED JANUARY 1978.

(4) FIGURE XI WAS DERIVED FROM "HANDBOOK OF HYDRAULICS", FIFTH EDTION BY KING AND BRATER.

Exhibit 4-11

Table

Hydraulic Design for Culverts

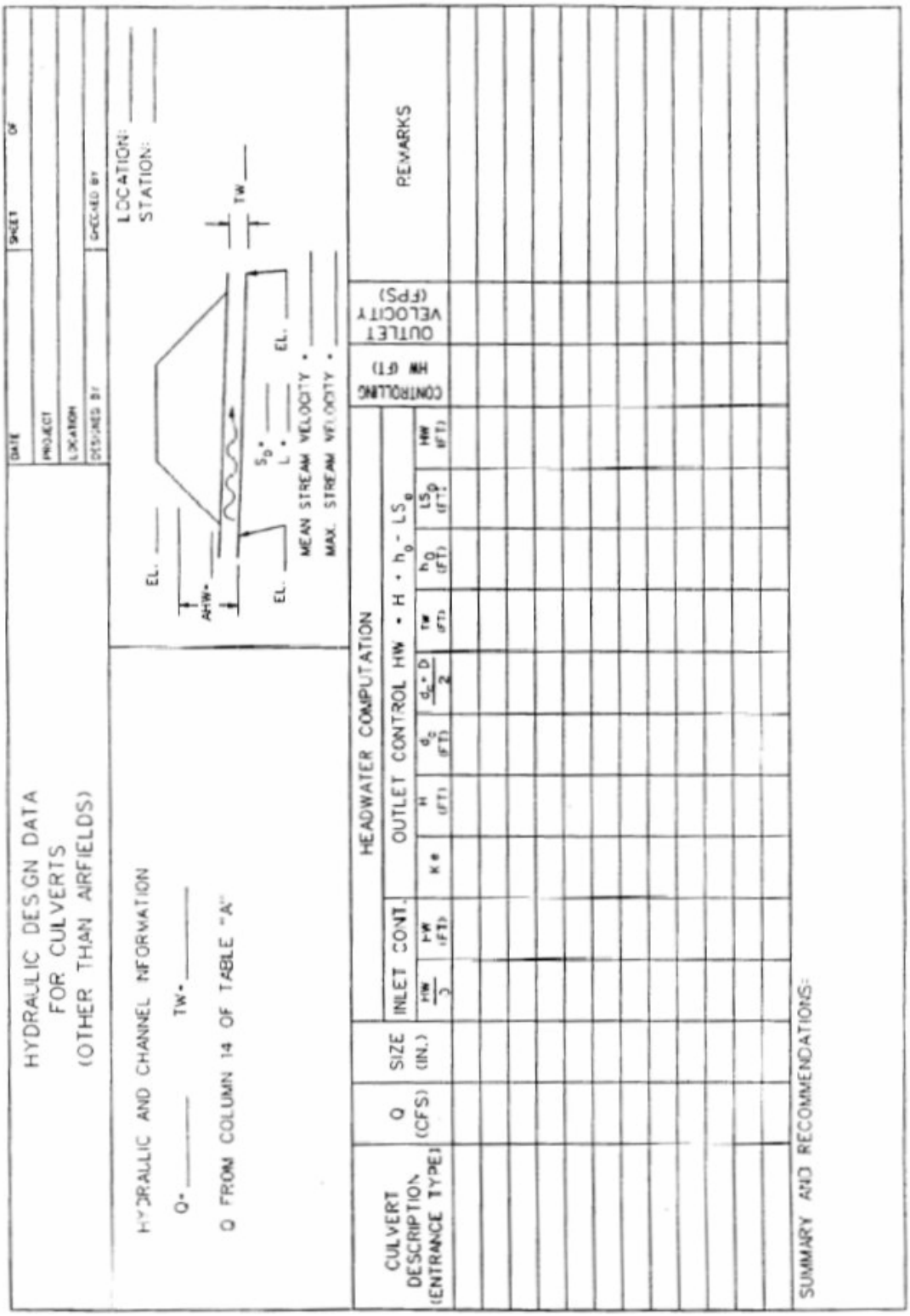


Exhibit 4-12

Table A

Blank Form

TABLE "A" DRAINAGE
DRAIN INLET CAPACITIES
(OTHER THAN AIRFIELDS)

DESIGN STORM INDEX ________ IN./HR. (FIG. I)
Q= CA (I-F)
DESIGN STORM __ YEAR
C= SURFACE RUNOFF COEFFICIENT
I= INTENSITY
A= AREA (ACRES)
F= INFILTRATION RATE

DATE: SHEET __ OF __
PROJECT:
LOCATION:
DESIGNED BY: CHECKED BY:

INLET NUMBER	DRAINAGE AREA (ACRES)			TOTAL AREA (COL. 2 + COL. 3 + COL. 4)	WEIGHTED "C"	EQUIVALENT LENGTH L_E				DRAIN INLET CAPACITY			
	PAVED	UNPAVED				ACTUAL LENGTH "L" (FT.)	AVG. RETARD. "n"	AVG. SLOPE "S" %	EQUIV. LENGTH "L_E" (FORMULA I) (FT.)	CRITICAL TIME T_c (FIG. VI) (MIN.)	STORM INTENSITY "I" (FIG. VII)	WEIGHTED "F"	RATE OF SUPPLY "Q" (CFS)
		BARE	TURF										
	C=0.90	C=	C=										
	F=0.00	F=	F=										
1	2	3	4	5	6	7	8	9	10	11	12	13	14

Exhibit 4-13

Table B

Blank Form

TABLE "B" DRAINAGE
UNDERGROUND STORM DRAINS
(OTHER THAN AIRFIELDS)

DATE:	SHEET	OF
PROJECT:		
LOCATION:		
DESIGNED BY:	CHECKED BY:	

DESIGN POINT			DRAINAGE AERA			CRITICAL RUNOFF TIME TO PRODUCE MAX. FLOW IN DRAIN							
								DRAIN TIME					
FROM INLET OR JUNCTION NUMBER	TO INLET OR JUNCTION NUMBER	LENGTH (FT)	INDIVIDUAL AREA (ACRES) (COL 5)	ACCUM TOTAL (ACRES)	WEIGHTED "C"	CRITICAL INLET NUMBER	CRITICAL INLET TIME T_c (MIN) (COL 11)	ASSUME PIPE VEL. 6 FPS (MIN)	ACCUM. TOTAL (MIN)	CRITICAL PIPE TIME T_c (MIN) (COL 22 + COL 24)	STORM INTENSITY "I" (FIG. VI)	WEIGHTED "F"	RATE OF INFLOW INTO DRAINS (CFS)
15	16	17	18	19	20	21	22	23	24	25	26	27	28

Exhibit 4-14

Table C

Blank Form

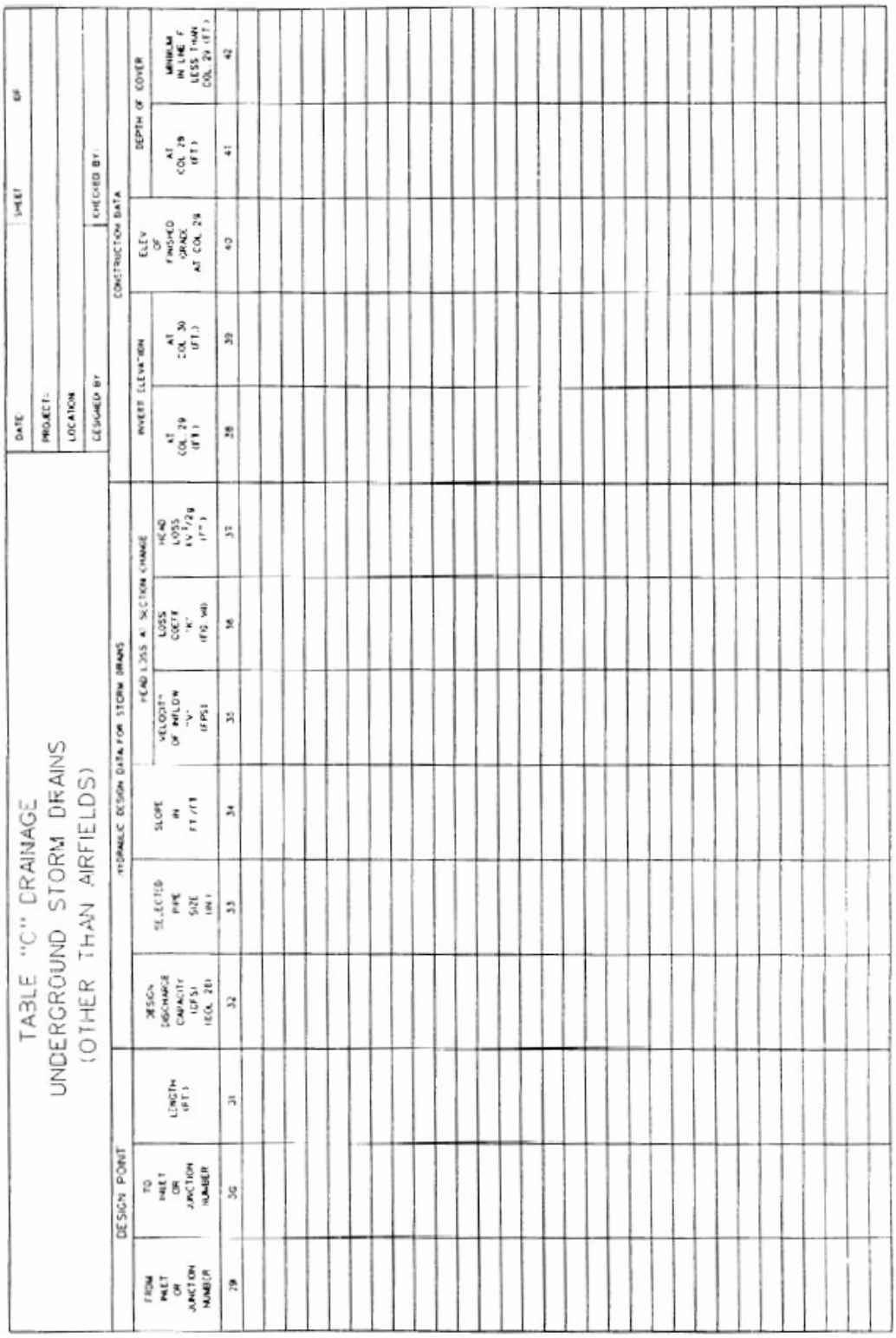


TABLE "C" DRAINAGE
UNDERGROUND STORM DRAINS
(OTHER THAN AIRFIELDS)

DATE | SHEET | OF
PROJECT:
LOCATION
DESIGNED BY | CHECKED BY:

DESIGN POINT			HYDRAULIC DESIGN DATA FOR STORM DRAINS						CONSTRUCTION DATA			
						HEAD LOSS AT SECTION CHANGE			INVERT ELEVATION			DEPTH OF COVER
FROM INLET OR JUNCTION NUMBER	TO INLET OR JUNCTION NUMBER	LENGTH (FT.)	DESIGN DISCHARGE CAPACITY (CFS) (COL 28)	SELECTED PIPE SIZE (IN.)	SLOPE IN FT./FT.	VELOCITY OF INFLOW "V" (FPS)	LOSS COEFF "K" (FIG. 44)	HEAD LOSS $KV^2/2g$ (FT.)	AT COL. 29 (FT.)	AT COL. 30 (FT.)	ELEV OF FINISHED GRADE AT COL. 29	AT COL. 29 (FT.)	MINIMUM IN LINE IF LESS THAN COL. 29 (FT.)
29	30	31	32	33	34	35	36	37	38	39	40	41	42

Exhibit 4-15

Storm Drain Pipe and Structure Schedule

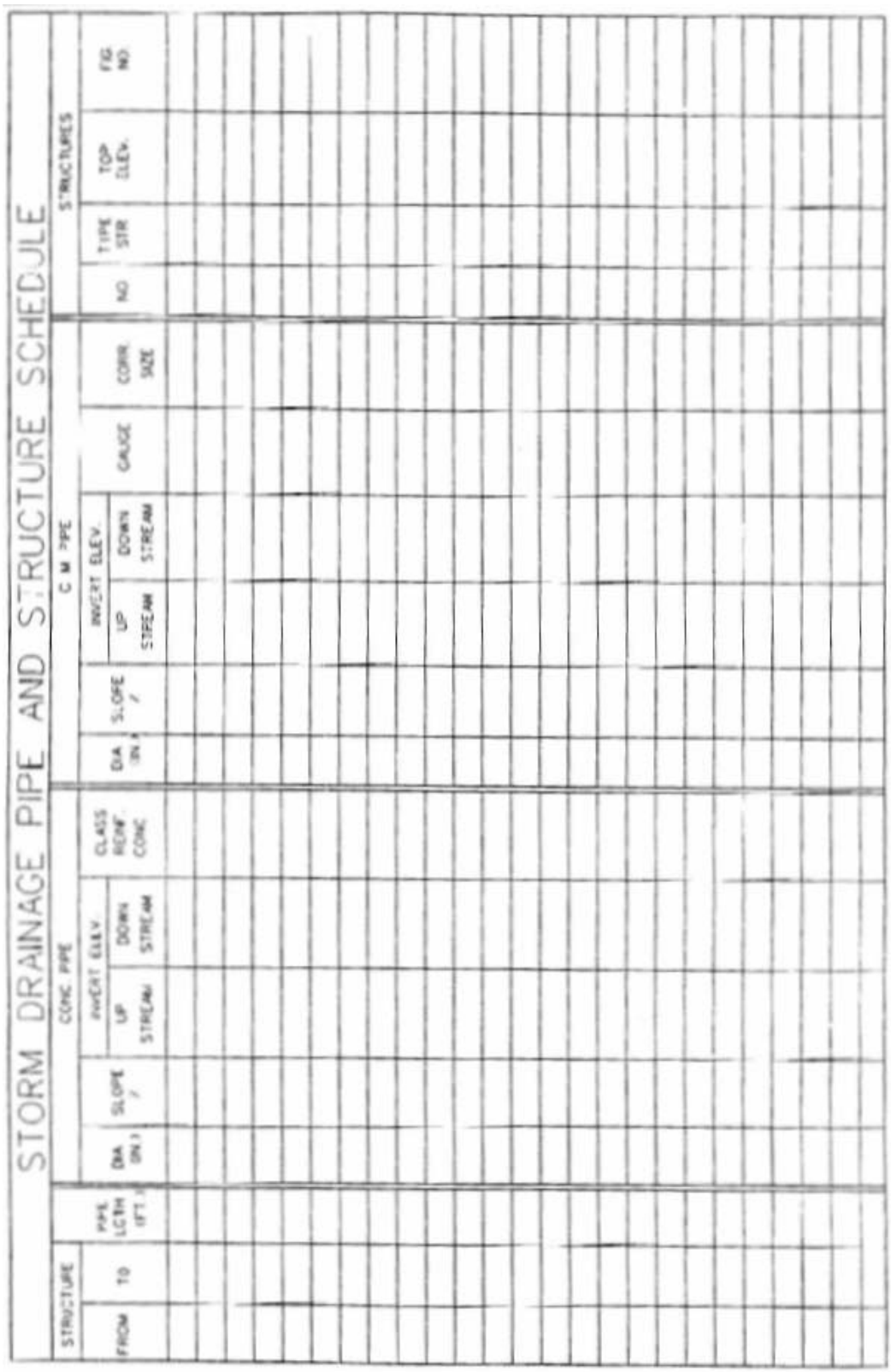


Exhibit 4-16

CHAPTER 5

SURVEYING AND MAPPING

INDEX

CHAPTER 5

SURVEYING AND MAPPING

5.1 GENERAL

This chapter 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. All labor, materials, and equipment necessary to perform site surveying and mapping services are required. Adequate professional supervision and quality control to assure the accuracy, quality, and completeness of the site surveys is required. Work may be required anywhere within the boundaries or assignments of the Mobile District in connection with the acquisition of site surveys and preparation of maps.

5.2 APPLICABLE PUBLICATIONS

	Mobile District, Manual of Instructions for Geodesy, Cartography, Hydrography and Photogrammetry
EM-385-1-1	Safety and Health Requirements Manual
ERDC/ITL TR-01-6	Architect/Engineer/Contractor (A/E/C) Computer Aided Design and Drafting (CADD) Standards
EM 1110-1-1000	Photogrammetric Manual
EM 1110-1-1003	NAVSTAR Global Positioning System Manual
EM 1110-1-1004	Geodetic and Control Surveying
EM 1110-1-1005	Topographic Surveying
EM 1110-2-1003	Hydrographic Surveying

The referenced publications (Engineering Manuals (EM's), Technical Manuals (TM's), and other references) may be applicable for site surveying and mapping for design of assigned projects. The EM's listed take precedence over District Manuals. EM's and TM's may be acquired from:

www.usace.army.mil/inet/usace-docs

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

https://tsc.wes.army.mil/products/standards/aec/aecstd.asp

The Manual of Instructions for Geodesy, Cartography, Hydrography and Photogrammetry for the Mobile District, dated January 1988, can be acquired from:

U. S. Army Engineer District, Mobile
Attention: CESAM-EN (Survey Unit)
Post Office Box 2288
Mobile, Alabama 36628-0001

5.3 PROJECT DEFINITION

5.3.1 General Statement of Surveying and Mapping Services

The designer shall 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:

(a) Name and location of the project.

(b) Type of surveying and/or mapping services (geodetic, topographic, hydrographic, route location surveys, etc.).

(c) English or metric surveys.

(d) Site map to scale showing area to be surveyed (acres, length of route location survey, etc.). Scale required for the new survey (1"=30", 1"=50", 1"=100", 1"=200', etc.) and contour interval (1', 2', 5', etc.).

(e) 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.

5.3.2 Existing Horizontal and Vertical Site Control

Existing horizontal and vertical control shall 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 on file. The following information is required:

(a) Location and name of the project.

(b) General site map showing location and coordinate values (NAD27 or NAD83) of the project area.

5.4 CONCEPT OF SURVEYING AND MAPPING SERVICES

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

5.4.1 Geodetic and Control Surveys

These include 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. These include all orders of 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. Conventional, electronic instrumentation, inertial, satellite and other survey methods, as applicable, may be utilized. This reference is available at:

http://www.ngs.noaa.gov/FGCS/tech pub/1984-stds-specs-geodetic-control-networks.htm

5.4.2 Topographic Engineering and Construction Surveys

These include acquisition of topographic surveying and mapping data representing three dimensional spatial relationships on the earth's surface. 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.

5.4.3 Route Location Surveys

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

5.4.4 Quantity Surveys

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

5.4.5 Layout Surveys

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

5.4.6 Hydrographic Engineering and Construction Surveying

These include surveys of channels, lakes, rivers, bays and open coastal waters in support of engineering design, construction, operations and maintenance include 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, subbottom profiling, marine magnetometer, and other surveying methods, as applicable, may be utilized.

5.4.7 Precise Surveys

These include third order or better horizontal and vertical surveys required to monitor movement of structures or precise location of structures.

5.4.8 Boundary and Cadastral Surveying

These include property, boundary and easement surveys, etc. Conventional, electronic instrumentation, inertial, satellite, and other survey methods, as applicable, may be utilized.

5.4.9 Photogrammetric Services

These include acquisition of surveying and mapping data from measurement of 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, drafting and scribing, photogrammetric mapping to

include film negatives, film and glass positives, photo indexes, photo enlargements, computations, scribecoats, compilation histories, and mapping on stable base materials my be required.

5.4.10 Supplemental Map Control (SMC)

This includes establishment of third order horizontal and vertical control on photo identifiable points for photogrammetric mapping.

5.4.11 Cartographic Surveying

These include acquisition and assimilation of topographic and/or hydrographic surveying and mapping data for preparation of maps, charts, and similar products for planning. Conventional and electronic instrumentation, inertial, satellite and other survey methods, as applicable, may be utilized.

5.4.12 Subsurface Utility Investigations

(a) Where there are a number of known utilities and communication lines crossing the proposed construction site, a Subsurface Utility Investigation is recommended. Typically, Subsurface Utility Investigations are categorized based on the quality of information obtained in an ascending level as follows:

Quality Level D - A search of all reasonably accessible utility databases from surveys, Base As-Built drawings and Base maps, and public utility company drawings.

Quality Level C - A physical site investigation of aboveground infrastructure associated with utilities such as manholes, valve boxes, utility poles, etc, to access the general accuracy of surveys, Base As-Built drawings and Base maps, and public utility company drawings.

Quality Level B - involves the use of surface geophysical techniques to determine the existence and horizontal position of underground utilities and communication lines utilizing electromagnetic, two-dimensional ground penetrating radar (GPR), Computer Assisted Radar Tomography (CART), or other means.

Quality Level A - involves the use of nondestructive digging techniques, such as vacuum extraction, at critical points to determine the precise horizontal and vertical position of underground utilities, as well as the type, size, condition, material, and other characteristics.

(b) The minimum acceptable Subsurface Utility Investigation shall be a Quality Level B. All subsurface utilities and communications lines shall be located to an accuracy of +/- 6-inches (0.15M). All subsurface utility information obtained during the investigation shall be shown on drawings containing the topographical survey.

5.4.13 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 maybe associated with engineering, land/boundary, geodetic and/or cartographic surveys. Conventional,

electronic, or computer assisted design & CADD systems as applicable may be utilized.

5.4.14 Digital Data

A digital CADD file with the survey data is required in the latest release of both MicroStation and AutoCAD. The designer shall store and maintain a copy of all electronically created digital files (CD's, tapes and disc) through the construction phase of the project. The CD's, tapes and disc shall be made available to the government upon request and shall be maintained with no additional cost to the Government.

5.4.15 AutoCAD Layering Standard

(a) The list of standard Cadd layer names shown in **Exhibit 5-1** shall be utilized for topographical surveys. Where strict adherence to this naming standard is not possible, the layer names assigned shall easily identify those elements placed on that particular layer, and follow the same layer naming logic.

(b) The latest version of the AEC CADD Standards shall be used. This standard can be located at:

https://tsc.wes.army.mil/products/standards/aec/.

5.5 MINIMUM TECHNICAL STANDARDS FOR SURVEYING AND MAPPING SERVICES

5.5.1 Registered Land Surveyor

All surveying and mapping services shall be accomplished under the direction/supervision of a Registered Land Surveyor in the State in which the project is located. Site plan mapping shall 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)".

5.5.2 Horizontal and Vertical Datum

Unless otherwise stated within the Scope of Work, all horizontal data shall be referenced to NAD83 with a projection in the local state plane coordinate system. Unless otherwise stated within the Scope of Work, all vertical data shall 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 shall 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 shall indicated what horizontal and vertical control datum were used for the site surveys.

5.5.3 Survey Monuments

A minimum of three (3) permanent survey control points shall 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 shall be stamped on each survey control point. No less than

third (3rd) order horizontal and vertical control shall be established on each survey control point. A detailed description with horizontal and vertical datum shall be indicated on the site plan survey and design drawings. The following are requirements for a survey monument:

5.5.3.1 Be composed of a durable ferrous or magnetic material with minimal length of eighteen (18) inches and cross-section area of material of 0.3 square inches.

5.5.3.2 Be identified with durable marker or cap bearing designation, date and Registration Number of the land surveyor in responsible charge.

5.5.3.3 Be detectable with conventional instruments for finding ferrous or magnetic objects.

5.5.4 Site Plan Drawing(s)

All permanent survey control points established on site shall be shown on the final design drawings. Inserts on the drawing and/or digital files shall show a detailed sketch of the location with description of the permanent control points established on site. Course chart on the drawings shall show coordinate and vertical values of each permanent monument. The following is an example of a course chart:

NAME OF PROJECT AND LOCATION

DESIGNATION OF POINT	TYPE MARK AND DATE	NORTHING SPC w/zone NAD83 (ft)	EASTING SPC w/zone NAD83 (ft)	ELEVATION NAVD88 (ft)
21A-3B	CONC. MON, 1994	345,123.34	1,234,456.00	234.56 FT.
21A-3C	REBAR	345,140.66	1,234,400.56	246.98 FT.
BB-3	REBAR	345,340.45	1,234,645.14	250.42 FT.
21A-3D	CONC. MON, 1994	345,450.98	1,234,823.34	254.10 FT.
212-3	3/4" IRON ROD	345,003.45	1,234,700.98	224.21 FT.
212-4	3" PVC PIPE (WE)	256,234.67	1,989,067.00	225.90 FT.

5.5.5 Compliance with Applicable Laws

All personnel shall strictly observe the laws of the United States or other governing body affecting operations at all sites. The personnel shall comply with all 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.

5.5.6 Security Clearance

Personnel working on military projects shall 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.

5.6 DESIGNER'S RESPONSIBILITY FOR UNSATISFACTORY SITE SURVEYS

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

STANDARD AUTOCAD LAYERS FOR TOPOGRAPHICAL SURVEYS

Below are AutoCAD layers used by the Mobile District's Site Development Section to aid the site designer in the development of site model files. The layering names follow the same basic scheme as dictated in the Tri-Service CADD Standard with the addition of the suffices "DM" for Demolition (removal), "EX" for existing features, and "NW" for new or proposed features. These layers allow easier manipulation of layers by other disciplines when using the Site Model File as a reference file to their designs. The surveyor has the liberty of creating additional layers, however, the Corps recommends that the same basic logic as represented in the Tri-Service Standard be used.

The color and line type of each drawing entity shall be drawn using the BY-LAYER setting. This will allow the color and line type to be easily manipulated to suit the District's or the Base's pen table.

C-ANN0-PATT - Miscellaneous Patterns, Hatching.
C-ANNO-DIMS - Dimension Lines, Arrowheads, and Text.
C-ANNO-KEYN - Keynotes with leader lines and arrowheads.
C-ANNO-NOTE - General Notes
C-ANNO-NPLT - Construction Lines, viewport windows.
C-ANNO-SYMB - Miscellaneous Symbols.
C-ANNO-TEXT - Miscellaneous Text, leader lines, and text.

C-APRN-OTLN-DM - Apron outline.
C-APRN-OTLN-EX
C-APRN-OTLN-NW

C-APRN-TXT-DM - Apron text.
C-APRN-TXT-EX
C-APRN-TXT-NW

C-BLDG-OTLN-DM - Building and primary structure outlines
C-BLDG-OTLN-EX
C-BLDG-OTLN-NW

C-BLDG-TXT-DM - Building and primary structure text
C-BLDG-TXT-EX
C-BLDG-TXT-NW

C-CONTMJ-LINE-DM - Major contour lines
C-CONTMJ-LINE-EX
C-CONTMJ-LINE-NW

C-CONTMJ-TEXT-DM - Major contour line text
C-CONTMJ-TEXT-EX
C-CONTMJ-TEXT-NW

C-CONTMN-LINE-DM - Minor contour lines
C-CONTMN-LINE-EX
C-CONTMN-LINE-NW

C-CONTMN-TEXT-DM - Minor contour line text
C-CONTMN-TEXT-EX
C-CONTMN-TEXT-NW

Exhibit 5-1 (Continued)

```
C-ELEC-LINE-DM    - Electrical lines (OH and UG)
C-ELEC-LINE-EX
C-ELEC-LINE-NW

C-ELEC-TXT-DM     - Electrical line text
C-ELEC-TXT-EX
C-ELEC-TXT-NW

C-FENC-LINE-DM    - Fence lines
C-FENC-LINE-EX
C-FENC-LINE-NW

C-FENC-TXT-DM     - Fence line text
C-FENC-TXT-EX
C-FENC-TXT-NW
C-GAS-LINE-DM     - Gas lines
C-GAS-LINE-EX
C-GAS-LINE-NW

C-GAS-TXT-DM      - Gas line text
C-GAS-TXT-EX
C-GAS-TXT-NW

C-PAVE-JNT-DM     - Pavement Joints
C-PAVE-JNT-EX
C-PAVE-JNT-NW

C-PAVE-TXT-DM     - Pavement Joint Text (Elevations)
C-PAVE-TXT-EX
C-PAVE-TXT-NW

C-PKNG-OTLN-DM    - Parking outline
C-PKNG-OTLN-EX
C-PKNG-OTLN-NW

C-PKNG-PVMK-DM    - Parking pavement markings
C-PKNG-PVMK-EX
C-PKNG-PVMK-NW

C-PKNG-TXT-DM     - Parking text.
C-PKNG-TXT-EX
C-PKNG-TXT-NW

C-RAIL-CNTL-DM    - Railroad centerlines.
C-RAIL-CNTL-EX
C-RAIL-CNTL-NW

C-RAIL-OTLN-DM    - Railroad outlines.
C-RAIL-OTLN-EX
C-RAIL-OTLN-NW

C-RAIL-TXT-DM     - Railroad text.
C-RAIL-TXT-EX
C-RAIL-TXT-NW

C-RIPR-OTLN-DM    - Riprap outline
C-RIPR-OTLN-EX
C-RIPR-OTLN-NW
```

Exhibit 5-1 (Continued)

```
C-ROAD-CNTR-DM    - Road centerline.
C-ROAD-CNTR-EX
C-ROAD-CNTR-NW

C-ROAD-CURB-DM    - Road curbs
C-ROAD-CURB-EX
C-ROAD-CURB-NW

C-ROAD-GARD-DM    - Road guardrails
C-ROAD-GARD-EX
C-ROAD-GARD-NW
C-ROAD-OTLN-DM    - Road outline
C-ROAD-OTLN-EX
C-ROAD-OTLN-NW

C-ROAD-TXT-DM     - Road Text.
C-ROAD-TXT-EX
C-ROAD-TXT-NW

C-RUNW-CNTL-DM    - Runway centerlines.
C-RUNW-CNTL-EX
C-RUNW-CNTL-NW

C-RUNW-OTLN-DM    - Runway outline
C-RUNW-OTLN-EX
C-RUNW-OTLN-NW

C-RUNW-TXT-DM     - Runway Text
C-RUNW-TXT-EX
C-RUNW-TXT-NW

C-SIGN-OTLN-DM    - Signs
C-SIGN-OTLN-EX
C-SIGN-OTLN-NW

C-SIGN-TXT-DM     - Sign Text
C-SIGN-TXT-EX
C-SIGN-TXT-NW

C-SNSW-LINE-DM    - Sanitary Sewer lines.
C-SNSW-LINE-EX
C-SNSW-LINE-NW
C-SNSW-MNHL-DM    - Sanitary Sewer Manholes.
C-SNSW-MNHL-EX
C-SNSW-MNHL-NW

C-SNSW-TXT-DM     - Sanitary Sewer Text.
C-SNSW-TXT-EX
C-SNSW-TXT-NW

C-STEAM-LINE-DM   - Steam lines
C-STEAM-LINE-EX
C-STEAM-LINE-NW

C-STEAM-TXT-DM    - Steam line text
C-STEAM-TXT-EX
C-STEAM-TXT-NW
```

Exhibit 5-1 (Continued)

```
C-STRM-HDWL-DM    - Storm water headwalls
C-STRM-HDWL-EX
C-STRM-HDWL-NW

C-STRM-LINE-DM    - Stormwater lines.
C-STRM-LINE-EX
C-STRM-LINE-NW
C-STRM-MNHL-DM    - Stormwater manholes.
C-STRM-MNHL-EX
C-STRM-MNHL-NW

C-STRM-TXT-DM     - Stormwater text.
C-STRM-TXT-EX
C-STRM-TXT-NW

C-SURV-BND-LNS    - Survey boundary lines.
C-SURV-BND-TXT    - Survey boundary line text.
C-SURV-CNTL-PTS   - Survey control points.
C-SURV-CNTL-TXT   - Survey control text.

C-TAXI-CNTR-DM    - Taxiway centerlines.
C-TAXI-CNTR-EX
C-TAXI-CNTR-NW

C-TAXI-OTLN-DM    - Taxiway outlines.
C-TAXI-OTLN-EX
C-TAXI-OTLN-NW

C-TAXI-TXT-DM     - Taxiway text.
C-TAXI-TXT-EX
C-TAXI-TXT-NW

C-TOPO-BORE       - Topographical Soil borings.
C-TOPO-COOR       - Topographical coordinates
C-TOPO-GRID       - Topographical grid tick marks


C-TOPO-SPOT-DM    - Topographical spot elevations
C-TOPO-SPOT-EX
C-TOPO-SPOT-NW

C-TOPO-TXT-DM     - Topographical text.
C-TOPO-TXT-EX
C-TOPO-TXT-NW

C-VEG-OTLN-DM     - Vegetation outline
C-VEG-OTLN-EX
C-VEG-OTLN-NW

C-VEG-TXT-DM      - Vegetation text.
C-VEG-TXT-EX
C-VEG-TXT-NW

C-WALK-OTLN-DM    - Walkways.
C-WALK-OTLN-EX
C-WALK-OTLN-NW

C-WALK-TXT-DM     - Walkway text.
C-WALK-TXT-EX
C-WALK-TXT-NW
```

Exhibit 5-1 (Continued)

```
C-WATF-OTLN-DM    - Water Feature outline.
C-WATF-OTLN-EX
C-WATF-OTLN-NW

C-WATF-TXT-DM     - Water Feature text.
C-WATF-TXT-EX
C-WATF-TXT-NW

C-WATR-HYDT-DM    - Water hydrants
C-WATR-HYDT-EX
C-WATR-HYDT-NW

C-WATR-LINE-DM    - Water lines.
C-WATR-LINE-EX
C-WATR-LINE-NW

C-WATR-TXT-DM     - Water line text.
C-WATR-TXT-EX
C-WATR-TXT-NW
```

Exhibit 5-1 (End)

CHAPTER 6

GEOTECHNICAL

INDEX

CHAPTER 6

GEOTECHNICAL

6.1 GENERAL

This chapter outlines the content of subsurface investigations, geotechnical design reports, geotechnical design analyses, and geotechnical data for inclusion in design and contract documents. A geotechnical design report is typically identified as a "Foundation Report" for projects that include structures as primary features but may otherwise be identified as a "Subsurface Investigation Report". The term "Geotechnical Report" is used synonymously for both types of reports hereinafter. The geotechnical report shall be provided to all designers for use in design and incorporated in the various submittal stages. As soon as possible after locations of the primary features of the project are identified, the Geotechnical and Dam Safety Section of Mobile District (EN-GG) shall evaluate any existing subsurface data for the site and identify the need for subsurface investigation at the site. EN-GG, or the Architect-Engineer (A-E) if included in the statement of work, shall plan and perform such 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. This chapter also lists the specific requirements of the submittal stages for geotechnical design features.

6.2 APPLICABLE PUBLICATIONS

6.2.1 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 117-95	Test Method for Material Finer Than 75-um (No. 200) Sieve in Material Aggregates for Washing
C 136-84	Method for Sieve Analysis of Fine and Coarse Aggregates
D 420-87	Recommended Practice for Investigating and Sampling Soil and Rock for Engineering Purposes
D 421-85	Practice for Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants
D 422-63	Method for Particle-Size Analysis of Soils
D 653-90a	Terminology relating to Soil, Rock and Contained Fluids
D 698-91	Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft3) (600kN-m-m/3)

D 1140-54	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 1452-80	Practice for Soil Investigation and Sampling by Auger Borings (1990)
D 1556-90	Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
D 1557-91	Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort
D 1586-84	Method for Penetration Test and Split-Barrel Sampling of Soils
D 1587-83	Method for Thin-Walled Tube Sampling of Soils
D 2113-83	Method for Diamond Core Drilling for Site Investigation (1987)
D 2167-84	Test Method for Density and Unit Weight of Soil In-Place by the Rubber Balloon Method (1990)
D 2216-90	Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock
D 2487-90	Classification of Soils for Engineering Purposes
D 2488-90	Practice for Description and Identification of Soils (Visual-Manual Procedure)
D 2922-91	Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
D 2937-83	Test Method for Density of Soil in Place by the Drive-Cylinder
D 3017-78	Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
D 3740-88	Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design
D 4043-91	Guide for Selection of Aquifer Test Method in Determining Hydraulic Properties by Well Techniques
D 4044-91	Test Method (Field Procedure) for Instantaneous Change in Head (Slug Test) for Determining Hydraulic Properties of Aquifers.
D 4318-84	Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
D 4428/4428M-91	Test Method for Crosshole Seismic Testing
D 4718-87	Practice for the Correction of Unit Weight and Water Content for Soils Containing Oversize Particles

D 4829-88	Test Method for Expansion Index of Soils
D 5299-99	Decommissioning of Groundwater Wells, Vadose Zone Monitoring Devices, Boreholes and Other Devices for Environmental Activities
G 57-78	Method for Field Measurement of Soil Resistivity Using the Wenner Four-Electrode Method (1984)

6.2.2 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:

http://www.usace.army.mil/inet/usace-docs/eng-manuals/em.htm

The technical manuals can be accessed at:

http://www.usace.army.mil/inet/usace-docs/armytm/

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

http://www.adem.state.al.us/LandDivision/Guidance/guidance.htm

Click-open the Alabama Environmental Investigation and Remediation Guidance document (.pdf file). Appendix B (page 33 out of 116); Section B.5 (page 41); subsection B.5.1 (page 42)

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)
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 4 SITE DEVELOPMENT and Chapter 11 STRUCTURAL for additional publications to be used in the design of roads and buildings.

6.3 PROJECT DEFINITION (10-15%)

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 and Toxic Waste (HTW) contamination. 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.

6.4 SUBSURFACE INVESTIGATION AND GEOTECHNICAL REPORT

6.4.1 Subsurface Investigation

Planning for and implementation of the subsurface investigation shall be performed by the entity tasked to perform the subsurface investigation.

6.4.1.1 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, etc. should be prepared. Drilling instructions detailing the type and required depths of borings should be prepared. The method of locating borings should be planned and coordinated.

6.4.1.2 Boring Locations and Elevations

(a) If the designer is tasked to perform the subsurface investigation, accurate determination of locations and elevations of borings including any required surveys shall be the designer’s responsibility unless specifically otherwise stated in his statement of work. Locations of borings at their as-drilled locations shall 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 shall be indicated on the boring logs and boring location map. All changes to proposed boring locations at any stage should be documented.

(b) When topographic survey of site is conducted after preparation of preliminary boring location map and either before or concurrently with subsurface investigation, generally a copy of boring location map should be provided to surveyor and the surveyor's statement of work should require placement of stakes marked with boring name and ground surface elevation at the proposed boring locations and that coordinates and ground surface elevations at the staked locations be provided.

(c) If borings on land are not staked out in advance by survey and if features, spot elevations, and elevation contours of sufficient detail and accuracy are shown on the boring location map, the proposed boring locations may be staked out based on offset distances from the boring locations to other surveyed features shown on the boring location map and ground surface elevations may be estimated from the elevations shown on the map. Otherwise, a new survey should be conducted for the purpose of staking out the borings and determining the coordinates and elevations at these locations.

(d) For offshore borings in water too deep or rapid to stake out, location survey measurements shall be made while and after navigating to the required location. Ground 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 shall be made and recorded periodically as necessary to calculate the correct sampling depths.

(e) The method of locating borings shall be described in the Geotechnical Report.

6.4.1.3 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. Right-of-entry and drilling permits shall be obtained where required. No drilling shall be performed prior to obtaining utility clearance. Drilling, sampling, and presentation of results should be in accordance with USACE South Atlantic Division DM-1110-1-1.

6.4.1.4 Laboratory Testing

Laboratory testing shall be performed on selected samples as needed to accurately characterize the subsurface conditions at the site and to determine parameters for design analysis. Tests shall be appropriate for the type of materials encountered in the borings.

6.4.1.5 Abandonment of Bore Holes

All soil or core borings shall be abandoned in accordance with the following:

(a) Each hole shall be measured for depth before it is sealed to ensure freedom from obstructions that may interfere with effective sealing operations. Any obstruction shall be cleared before proceeding with borehole sealing operations.

(b) All borings in a Karst terrain area shall be sealed by backfilling with concrete, grout, neat cement or a bentonite/cement mixture.

(c) All other borings greater than 12 feet deep shall be sealed by backfilling with concrete, grout, neat cement or a bentonite/cement mixture.

(d) All other borings 12 feet or less in depth shall be sealed by backfilling with concrete, grout, neat cement or a bentonite/cement mixture or filled with soil or cuttings from the hole, tamped in place with the auger or bit.

(e) All grout materials shall be pumped into the borehole from the bottom to the top by pressure grouting with the positive displacement method (tremie method).

(f) Each grouted boreholes shall be given time to allow the backfill material to settle in the borehole. If the backfill material settles 2-feet or more below ground surface (BGS) then the contractor shall place more backfill material in the borehole to the top. If the backfill material is less than 2-feet BGS than the contractor may backfill the borehole using compacted native material.

6.4.2 Geotechnical Report

(a) The Geotechnical Report shall be prepared by or under the direction of the geotechnical engineer or geologist responsible for the subsurface investigation. The Geotechnical Report shall present the results of the subsurface investigation including laboratory testing and shall 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 shall be included for use in design, if appropriate. The designer shall be responsible for selecting the structure foundation type based on the recommendations offered in the Geotechnical Report. The Geotechnical Report shall 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 shall adequately characterize the site geology and hydrogeology and shall provide all geotechnical data required to complete the project design. The Geotechnical Report including logs of borings and laboratory test data shall be made a part of the Design Analysis and shall 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 resited. 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.

(b) The Geotechnical Report Checklist (**Exhibit 6-8**) should be used to verify that the report is complete regarding the items described in the checklist

6.4.2.1 Structures

(a) The Geotechnical Report shall recommend the type of foundation system to be used for each primary structure in the project. The designer shall prepare earthwork specifications for the structures. See requirements for shallow foundations and deep foundations below, and Chapter 11 STRUCTURAL for further design requirements.

(b) If shallow foundations are recommended, the Geotechnical Report shall 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 shall be addressed in the Geotechnical report if these measures are needed. The designer shall size all footings, grade beams, slabs, etc., utilizing the recommendations and restrictions presented in the Geotechnical Report. The designer shall 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.

(c) If deep foundations are recommended, the Geotechnical Report shall 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 designer shall determine the number of piles or caissons, actual spacing, 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.

6.4.2.2 Dewatering Systems

(a) Groundwater levels at borings, soil classifications, and sieve analysis of aquifer samples shall be routinely conducted and included in the Geotechnical Report and shall be used to determine routine requirements for temporary dewatering systems. More specialized investigation such as piezometer installation, field pumping tests, 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 shall 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.) shall be collected during the geotechnical investigation and presented in the Geotechnical report. The use of slug tests to determine aquifer characteristics shall not be acceptable for dewatering designs.

(b) 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 shall require dewatering. When temporary construction dewatering shall be required due to a consistently high water table or the effects of underlying artesian aquifers, the designer shall design and present a dewatering plan in sufficient detail that the contractor can bid on and install the dewatering system.

(c) Design of long-term or permanent dewatering systems, including selection of well screen slot sizes, screen lengths, discharge pipe

sizes, installation methods, etc. shall be the responsibility of the designer.

6.4.2.3 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 thickness', and slope stabilization requirements. The designer shall be required to apply for all necessary permits. As part of the permitting process he shall 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 shall be permitted when material to be retained has a pH below 5.

6.4.2.4 Cathodic Protection and Grounding Systems

The geotechnical investigation and report should include all pH tests, salinity tests, resistivity measurements, etc., required to design corrosion control and grounding systems. The raw field data shall be provided in the Geotechnical Report without interpretation or recommendations. The designer shall design all corrosion control and grounding systems required for the project and shall advise MDO immediately if additional field data is required.

6.4.2.5 Permanent Water Well Design and Construction

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

6.4.2.6 Pavements

The Geotechnical Report shall recommend for pavement subgrades the allowable design CBR and modulus of subgrade reaction parameters with the required compaction effort. Guidance shall be offered on the types of base course materials available in the area and design strengths. The designer shall prepare all earthwork specifications for pavement subgrades. The designer shall prepare all pavement material specifications with consultation from the Geotechnical Branch. See Chapter 4 titled SITE DEVELOPMENT, for deviations or exceptions.

6.4.2.7 General Earthwork and Special Features

The Geotechnical Report shall 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 shall consult with the geotechnical engineer or geologist responsible for the subsurface investigation, or his office in his 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 shall 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.

6.4.3 Boring Logs

(a) Logs of borings shall be provided as an appendix to the Geotechnical Report, design analysis, and contract specifications. ENG Form 1836 and ENG Form 1836A, modified to 8.5 inch x 11 inch page size as shown in **Exhibits 6-6** and **6-7**, shall 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" shall be provided for the appendices. General Notes, Soil Classification Legend, Rock Classification Legend, if applicable, and Abbreviations pages (**Exhibits 6-1**, **6-2**, **6-3**, **6-4** and **6-5** respectively) shall be included at the beginning of the logs.pdf file, followed by the boring location map, if applicable, and followed by the boring logs. For subsurface investigations conducted by the designer, his subcontractor, or by a contractor under MDO's direction, the designer or contractor shall, in addition to the required PDF files, provide complete and accurate boring log data in comma-separated-value (CSV) files as described in **Exhibit 6-10** not later than when the Geotechnical Report is required.

(b) 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, shall be stored and maintained by EN-GG for future use. Digital file formats used by the Borlog application shall be used. Soon after receipt of CSV files containing boring log data from contractors, EN-GG shall import the data to the Borlog digital formats using the Borlog application.

6.4.4 Boring Location Map

Locations of borings, test pits, monitoring wells and piezometers shall 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 shall be clearly legible when printed at 8.5 in. x 11-in. size if included in the log's .pdf file.

6.4.5 Laboratory Test Data

(a) Laboratory test data shall be provided as an appendix to the Geotechnical Report, design analysis, and contract specifications. Laboratory test data shall be provided in a Portable Document File (PDF) file named "tests.pdf". The designer or contractor shall, in addition to the required PDF files, provide laboratory test data in comma-separated-values (CSV) files as described in **Exhibit 6-10** not later than when the Geotechnical Report is required.

(b) Laboratory test data obtained for all subsurface investigations conducted for Mobile District projects shall be stored and maintained by EN-GG for future use. Soon after receipt of the CSV files containing laboratory data, EN-GG shall import the data to the Borlog digital formats using the Borlog application.

6.5 CONCEPT DESIGN (30-35%)

6.5.1 Design Analysis

(a) Incorporate recommendations stated in the Geotechnical Report into the design.

(b) Provide geotechnical design calculations using parameters outlined in the Report and include a copy of the Report in the design analysis.

(c) 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 no later than the date for the submittal of the 35% design.

(d) Include boring logs and laboratory test data as an appendix.

6.5.2 Design Drawings

(a) Locate soil borings, test pits, monitoring wells and piezometers on the civil site plan. Add the appropriate symbol to legend.

(b) 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.

6.6 INTERIM DESIGN (50-65%)

(a) Comply with the accepted comments on the concept design.

(b) Perform any Concept Design tasks that were not completed.

(c) Provide redlined marked up specifications in accordance with Chapter 3, SPECIFICATIONS.

6.7 FINAL DESIGN (UNREVIEWED 100%)

6.7.1 General

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

(b) 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 3, SPECIFICATIONS.

(c) 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.

(d) Use the Plans and Specifications Submittal Checklist (**Exhibit 6-9**) to verify that the submittal is complete regarding the items described in the checklist.

6.7.2 Design Analysis

(a) Incorporate recommendations stated in the Geotechnical Report into the design.

(b) Provide foundation design calculations using parameters outlined in the Report, and include a copy of the Geotechnical Report in the design analysis.

(c) 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.

6.7.3 Design Drawings

(a) Locate soil borings, test pits, monitoring wells and piezometers on civil site plan. Add the appropriate symbol to legend.

(b) 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.

6.7.4 Specifications

The designer for A-E designed projects or EN-GG for in-house design shall 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 36	Earthwork
31 31 16	Soil Treatment for Subterranean Termite Control
31 00 00.15 36	Excavation, Filling and Backfilling for Buildings
31 00 00.16 36	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 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 from the Mobile District Geotechnical and Dam Safety Section, (251) 694-3685. If the UFGS Section 31 00 00 is used as the only earthwork specification, it shall be edited and care shall 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 Unified Facilities Guide Specifications can be found in SpecsIntact.

6.8 READY TO ADVERTISE (REVIEWED 100%)

(a) Comply with comments on the final design review.

(b) Include, or verify that they are included, any drawings and specifications in the Index of Drawings and the Table of Contents for specifications.

(c) Include boring logs and laboratory test data (PDF files named logs.pdf and tests.pdf) as appendices of the specifications.

(d) 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.

Sample

Boring Log – General Notes

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.

Exhibit 6-1

Sample

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

Exhibit 6-2

Sample

Boring Log - Rock Classification Legend


SANDSTONE


SILTSTONE OR CLAYSTONE


SHALE


CEMENTED SHALE


LIMESTONE


DOLOMITE


SCHIST


PHYLLITE


QUARTZITE


NOT SAMPLED OR
SAMPLE NOT RECOVERED


RHYOLITE


BASALT


GRANITE


GNEISS


CONGLOMERATE


CHERT


COAL


SHELL, SHELL FRAGMENTS,
OR SHELL-SOIL MIXTURE
CONSISTING MOSTLY OF SHELL


VOID (CAVITY,
OPEN JOINT, ETC.)

Exhibit 6-3

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 6-4 (Continued)

Sample

Boring Log - Abbreviations

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)

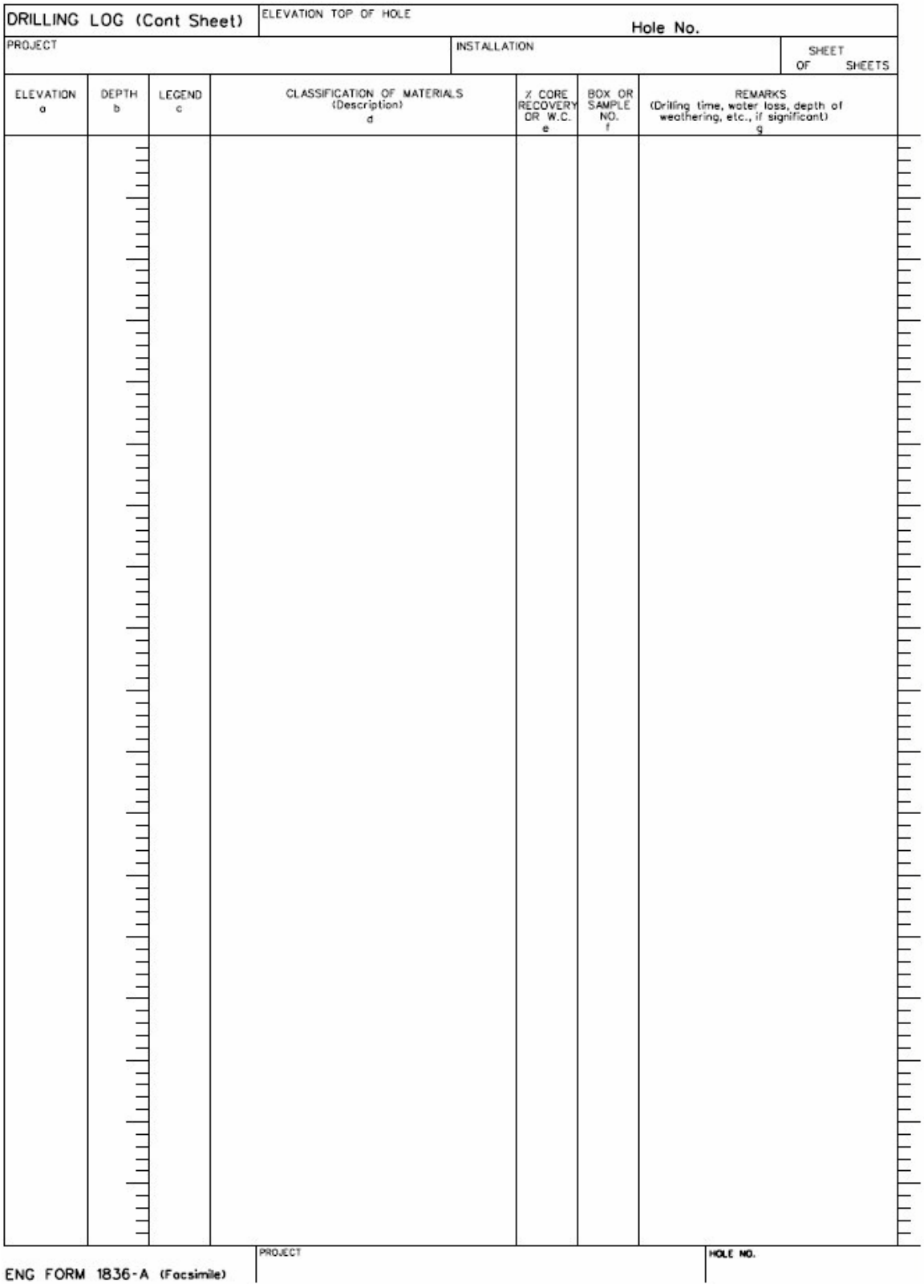
Hole No.

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	
		16. DATE HOLE	STARTED / COMPLETED
7. THICKNESS OF OVERBURDEN		17. ELEVATION TOP OF HOLE	
8. DEPTH DRILLED INTO ROCK		18. TOTAL CORE RECOVERY FOR BORING	
9. TOTAL DEPTH OF HOLE		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 (Focsimile) PROJECT HOLE NO.

Exhibit 6-5



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)

Exhibit 6-6

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 6-7 (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 6-7 (End)

Plans and Specifications Submittal Checklist

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.

Exhibit 6-8

CSV File Requirements for Boring Log and Laboratory Test Data

1. Data Format. Comma-separated-value (CSV) file format shall be used. CSV file format is used by many spreadsheet and database software applications and is used for importing and exporting to and from the Borlog and Bordbs MDL (Microstation Development Language) applications. In CSV format files, data fields for each spreadsheet row or database record are written to a ASCII file as a single line with text fields separated by commas.

There may be subtle but important differences in the way double-quote characters and embedded comma characters in CSV files are used, interpreted, and displayed by various software. Boring log and laboratory test data shall be provided in CSV files with the following characteristics::
a) Text data fields including embedded comma character(s) must be enclosed with beginning and ending double-quote characters.
b) Data fields not including embedded comma character(s) may optionally be enclosed with beginning and ending double-quote characters, but they are not required.
c) Data fields including embedded double-quote character(s) must include a contiguous pair of double-quote characters for each double-quote character in the data field.
d) Numerical data must not include embedded comma characters. For example the numerical value 100000 must appear as either ...,100000,... or as ...,"100000",... when viewed with Notepad. It must not appear as ...,"100,000",... .

For example illustrating text with neither an embedded comma or an embedded double-quote, the text data "BROWN LEAN CLAY (CL)" must appear in the CSV file when viewed with Notepad as either ...,"BROWN LEAN CLAY (CL)",... or as ...,BROWN LEAN CLAY (CL),... .

For example illustrating text with both an embedded comma and an embedded double-quote, the text data "TAN POORLY GRADED GRAVEL (GP), 2" MAX." must appear in the CSV file when viewed with Notepad as ...,"TAN POORLY GRADED GRAVEL (GP), 2"" MAX.",... .

CSV files produced with the "Save As" command (specifying CSV as file type) in Microsoft Excel software are compatible with these requirements. Users producing CSV files for importing data into Borlog should verify that their software is capable of producing CSV files with meeting these requirements or should edit the CSV file data as required after producing it.

CSV files for boring log and laboratory testing use keywords (as defined in following paragraphs) that describe the content of the data that follows the keyword. By convention if the keyword ends with a colon character, the data associated with that keyword follows in the next data field on the same line. If the keyword does not end with a colon character, the keyword is a column heading and data associated with that keyword follows in the same data field on the following lines.

2. File Name Conventions and Data Content for Boring Log Data. Six types of Borlog CSV files can be used to import boring log data into Borlog (.bor) format files. The files should be named according to the conventions described in paragraphs 2.1 to 2.6 so as to be able to easily identify the data content by the file name. The first line of

Exhibit 6-9 (Continued)

each type of CSV files when viewed in Notepad (or first row in spreadsheet) must contain heading text that matches keywords that are defined in the Borlog application. Valid heading keywords are listed Table 2.1 to 2.6. The keywords are not case sensitive. For keywords with units of length (northing, easting, and various depths and elevations), the units of length can be specified by appending to the base keyword ",ft" or ",ft_s" for U.S. survey feet, ",ft_i" for international feet, or ",m" for meters (for example, ...,"Easting,m","Northing,m",...). The difference between U.S. survey feet and international feet is significant only for northing and easting boring location coordinates. Default units if units are not appended to the base keyword are U.S. survey feet. Data columns with invalid heading keywords are allowed but are not imported. The data corresponding to the keywords must be placed in columns if viewed with spreadsheet.

Each line of data in CSV files (or a row in spreadsheet) is limited to a maximum of 511 characters. The first heading keyword of all .csv files (at cell A1 in spreadsheet) must be "Boring". The second and third keywords (cells B1 and C1 in spreadsheet) of all .csv files except zzznnnnn-gen.csv must be "Top_D" and "Bot_D". All other keywords are optional and, with a few exceptions, may appear in any sequence, but generally should appear in the sequences indicated in the following in the interest of consistency.

Data fields for which no data is available should be left blank except where otherwise stated.

2.1 File gen.csv (or zzznnnnn-gen.csv if Borlog project ID zzznnnnn has been defined, where zzz is a 3-character zone abbreviation and nnnnn is a zero-filled 5-digit sequential number for subsurface investigations in that zone) should contain data that is general; i.e., it contains information about the boring that is not specific to any particular depth, sample, or stratum. It should include the data with keyword headings listed in Table 1.

If mm/dd/yy or mm-dd-yy formats are used for dates in the Date_Start and Date_Compl data fields, years between 50 and 99 inclusive are assumed by Borlog to be between 1950 and 1999 and years between 0 and 49 inclusive are assumed to be between 2000 and 2049. Use of mm/dd/yyyy format is recommended for dates to avoid any possibility of misinterpretation.

Depth zero is usually assumed to be at ground surface level at the boring location; However, any depth datum may be used provided that the same datum is consistently used for all depths recorded for the boring. Levels below depth zero should be entered as positive depth values and levels above depth zero should be entered as negative depth values.

Table 1: Borlog Heading Keywords, Descriptions and Variable Types for Gen.csv File:

Boring - boring name, 12-character max. text
Easting - easting coordinate at boring location, numeric
Northing - northing coordinate at boring location, numeric
GS_E - ground surface elevation at boring location, numeric
GS_D - ground surface depth at boring location (usually zero), numeric
BOH_D - bottom of hole depth, numeric
GW_DI - initial groundwater depth, numeric (same as GW_DF if only one reading made)
GW_DF - final groundwater depth, numeric

Exhibit 6-9 (Continued)

TOR_D - top of rock depth, numeric
Date_Start - start date, text in m/d/y format
Date_Compl - completion date, text in m/d/y format
No_Dist_Samp - number of disturbed soil samples
No_Undist_Samp - number of undisturbed soil samples
No_Core_Boxes - number of core boxes
Driller - driller's name (first name, middle initial and last name, or portion thereof), 32-character max. text
Inspector - drilling inspector's name (first name, middle initial and last name, or portion thereof), 32-character max. text
Recov_Tot - total sample recovery percentage for boring, 5-character max. text
Drilling_Org - drilling organization, 32-character max. text
Installation - installation, 24-character max. text

2.2 File des.csv (or zzznnnnn-des.csv) should contain strata description data using heading keywords listed in Table 2. It should not contain any remarks related to drilling method or anything else that does not describe the materials that were encountered. An example is:

Boring, Top_D, Bot_D, Classif, Description
SS-1-99,0.0,1.5,SM,"BROWN SILTY SAND (SM), SOME ROOTS NEAR SURFACE"
SS-1-99,1.5,6,SP,TAN POORLY GRADED FINE SAND (SP)
SS-2-99,0.0,1.5,GP-GM,"TAN SILTY GRAVEL (GP-GM), 1-1/2"" MAX. SIZE"
SS-2-99,1.5,10.0,LMS,"DARK GREY LIMESTONE, HARD"

Table 2: Borlog Heading Keywords, Descriptions and Variable Types for Des.csv File:
Boring - boring name, 12-character max. text
Top_D - top depth of stratum, numeric
Bot_D - bottom depth of stratum, numeric
Classif - field classification abbreviation (cell name) of stratum, NS, NA or *, 12-character max. text.
Description - field description of stratum, text, length controlled by max. line length of 511 characters

The abbreviation in the Classif field of data, except for NS, NA and * entries described below, should be the Microstation cell names used for the symbology column on the boring log. These include all of the standard USCS 2-character soil classifications (GP, GW, GM, GC, SP, SW, SM, SC, ML, MH, CL, CH, OL, OH, and Pt), 3-character abbreviations for rock classifications (BST for basalt, CHT for chert, CLS for claystone, CNG for conglomerate, COL for coal, DLM for dolomite, GNS for gneiss, GRN for granite, LMS for limestone, PHY for phyllite, QTZ for quartzite, RHY for rhyolite, SCH for schist, SDS for sandstone, SHA for shale, SHC for cemented shale, STS for siltstone, and TUF for tuff and 3-character abbreviations for certain other materials (ASP for asphalt, CNC for concrete, SHL for shell, and WAT for water), and CAV for a cavity. Use of dual classifications made by combining two of the abbreviations listed above, separated with either a hyphen or an ampersand character, is allowed by the Borlog program (for example, SP-SM or GP&CL). However use of dual classifications, except those with specific procedures for identification defined in the Unified Soil Classification System (GP-GM, GW-GM, GP-GC, GM-GC, SW-SM, SW-SC, SP-SM, SP-SC, and CL-ML), is considered poor practice and is discouraged.

"NS" may be used in the Classif column of data to indicate that the boring was not sampled at the depth interval indicated. Alternately, the line of data may be omitted at any depth intervals that were not sampled.

Exhibit 6-9 (Continued)

"NA" should be used in the Classif column of data to indicate a material for which no classification abbreviation is defined. No symbol will be drawn on the boring log by Borlog in this case.

An asterisk should be used in the Classif column of data to indicate that the data in that row is a detail note (having the same classification as the previous line of data) for which bracketed text or a leader line with or without text should be drawn. Bracketed description text will be drawn if the top and bottom depths are different, else a single leader line with description text will be drawn. A leader line without text connected to a bracket (typically used to indicate interior locations of more than two joints in rock with the same description at various depths) will be drawn if an asterisk is in the Classif column, top and bottom depths are the same, and the Description column is left blank.

2.3 File smp.csv (or zzznnnnn_smp.csv) should contain sample identification data for all samples and optionally may contain moisture content and Atterberg limits lab test data, laboratory classification, and laboratory descriptions. The sample identification data should be shown in column f of the boring log. The results of the index laboratory tests should be shown in the Remarks column of the boring log. Typically for subsurface investigations conducted by SAM-EN-GG, this data is initially input or imported before lab data is available. Later when lab data becomes available, the data is supplemented either by inputting the lab data from index testing or by importing a similar file that also contains lab data from index testing (file T01.csv, see paragraph 3.1) and imported again. Examples of both are shown.

```
Boring,Top_D,Bot_D,Sample
SS-1-99,0,1.5,JAR 1
SS-1-99,0,1.5,JAR 2
SS-2-99,0,1.5,JAR 1
SS-2-99,4.5,6.0,JAR 3

Boring,Top_D,Bot_D,Sample,LL,PL,MC,Lab_VC,Lab_Descr
SS-1-99,0,1.5,JAR 1,,,12.3,SM,SILTY SAND
SS-1-99,0,1.5,JAR 2,,,,,
SS-2-99,0,1.5,JAR 1,65,25,30.3,CH,
SS-2-99,4.5,6.0,JAR 3,NP,NP,27.4,ML,
```

Table 3: Borlog Heading Keywords, Descriptions and Variable Types for Smp.csv File:

Boring - boring name, 12-character max. text
Top_D - top depth of sample, numeric
Bot_D - bottom depth of sample, numeric
Sample - sample name, 12-character max. text
LL - liquid limit, text (NP for nonplastic or numeric text)
PL - plastic limit, text (NP for nonplastic or numeric text)
MC - moisture content, in percent, numeric
Lab_VC - laboratory visual classification of sample, 12-character max. text
Lab_Descr - laboratory description of sample, text, max. character controlled by max. line length of 511 characters

2.4 File spt.csv (or zzznnnnn-spt.csv) should contain Standard Penetration Test (SPT) data. If the computed N-value data is available for input but C1, C2 and C3 data is not available, use zero values for C1, C2 and C3, 0.5 values for P1, P2 and P3, and the N-values for

Exhibit 6-9 (Continued)

SPT_Text. Otherwise, only use the SPT_Text column to input W.O.R. or W.O.H. values (abbreviations for weight of rods and weight of hammer respectively) for zero blow counts. The example file below includes an example of typical SPT data entry in the first line after the heading, an example for zero blow count in the second line, and examples for 100+ blow counts in the following 3 lines.

```
Boring, Top_D, Bot_D,C1, C2, C3, P1, P2, P3, SPT_Text
SS-1-99,0,1.5,8,12,18,.5,.5,.5,
SS-1-99,1.5,3,0,0,0,.5,.5,.5,W.O.H.
SS-2-99,15,16.3,17,35,50,.5,.5,.3,
SS-2-99,16.5,17.2,32,50,0,.5,.2,0,
SS-2-99,18.5,18.9,50,0,0,.4,0,0,
```

Table 4: Borlog Heading Keywords, Descriptions and Variable Types for Spt.csv File:

Boring - boring name, 12-character max. text
Top_D - top depth of sample, numeric
Bot_D - bottom depth of sample, numeric
C1 - number of blows in first drive in SPT test, integer
C2 - number of blows in second drive in SPT test, integer
C3 - number of blows in third drive in SPT test, integer
P1 - penetration in first drive in SPT test in feet, numeric
P2 - penetration in second drive in SPT test in feet, numeric
P3 - penetration in third drive in SPT test in feet, numeric
SPT_Text - SPT N-value 15-character max. text (optional, overrides computed SPT N value if not field is not blank, should be W.O.R., W.O.H., 100+, or an integer SPT N value from 0 to 100)

2.5 File rem.csv (or zzznnnnn_rem.csv) should contain remarks data to be drawn in the "Remarks" column of the boring log. The top and bottom depth data is used only to determine the location for placement of the remark text, which will placed as close as possible to the average of the top and bottom depths without overlapping other remarks data. An example is:

```
Boring, Top_D, Bot_D, Remark
SS-1-99,0,1,BORING OFFSET 20’ SOUTH TO AVOID POND
```

Table 5: Borlog Heading Keywords, Descriptions and Variable Types for Rem.csv File:

Boring - boring name, 12-character max. text
Top_D - top depth of sample, numeric
Bot_D - bottom depth of sample, numeric
Remark - remark for Remarks column of boring log, text, max. character controlled by max. line length of 511 characters. The remark may contain tilde ~ characters which force a new line when the text is drawn.

2.6 File crc.csv (or zzznnnnn_crc.csv) should contain core recovery data for rock core samples. The Cor_Remark data may contain tilde (~) characters which force a new line when the text is drawn. The entire remark should be included in one field on the same line of data as the other data (the line is wrapped for display purposes in the example below).

```
Boring, Top_D, Bot_D, Pull_Num, Corr_D, Recov, Cor_Remark
SS-1-99,105.4,112.3,PULL-1,109.4,3.5,RAN: 6.9~W.L.: 30%~W.C.:
BROWN~DRILL P.: 200 - 300~DRILL A.: LIGHT CHATTER~WATER RETURN: 70%
```

Exhibit 6-9 (Continued)

Table 6: Borlog Heading Keywords, Descriptions and Variable Types for Crc.csv File:

Boring - boring name, 12-character max. text
Top_D - top depth of sample, numeric
Bot_D - bottom depth of sample, numeric
Pull_Num - pull number of core sample, 12-character max. text
Corr_D - corrected depth of core sample, numeric
Recov - recovered length of core sample, numeric
Cor_Remark - remark for core sample, text, max. character controlled by max. line length of 511 characters

3. File Name Conventions and Data Content for Laboratory Test Data. Each CSV file for laboratory test data shall be named according to the established file name convention and shall include data at the beginning lines of the file that includes the keywords in Table 7 and the associated data for those keywords.

Table 7: Heading Keywords, Descriptions and Variable Types for General Data:

Laboratory: - laboratory performing test, 32-character max. text
Client: - organization requesting test, 32-character max. text
Project: - name of project site where sample was obtained, 32-character max. text
Location: - location of project site where sample was obtained, 32-character max. text
Started: - date that first test in the file was started, m/d/y format
Completed: - date that last test in the file was completed, m/d/y format
Test_Type: - type of test, text

If mm/dd/yy or mm-dd-yy formats are used for dates in the Started and Completed data fields, years between 50 and 99 inclusive are assumed to be between 1950 and 1999 and years between 0 and 49 inclusive are assumed to be between 2000 and 2049. Use of mm/dd/yyyy format is recommended for dates to avoid any possibility of misinterpretation.

The text value for the Test_Type keyword shall be one of the following, which are not case sensitive: "Index Testing", "Grain Size Multiple", "Grain Size Single", "Consolidation", or "Consolidation Time Curve".

Data for each type of test shall include the keywords in Table 8 with associated data to identify the sample that was tested. The keywords Top_D and Bot_D should be replaced with "Top_D,m" and "Bot_D,m" respectively if the depth values are entered in meter units; otherwise, depths should be entered in units of feet.

Table 8: Heading Keywords, Descriptions and Variable Types for Sample Indentification Data:

Boring - boring name, 12-character max. text
Top_D - top depth of sample, numeric
Bot_D - bottom depth of sample, numeric
Sample - sample name, 12-character max. text

3.1 Index Testing. File T01.csv shall contain general and sample identification data using keywords defined in Tables 7 and 8 respectively, and moisture content and Atterberg limits lab test data, laboratory classification, and laboratory descriptions using the keywords defined in Table 9. A short example to illustrate the format follows:

Exhibit 6-9 (Continued)

```
; Example of T01.csv file for Index Testing
Laboratory:,"Materials Testing Center, Vicksburg MS",,,,,,,,,,,,,,,,,
Client:,USACE Mobile District,,,,,,,,,,,,,,,,,
Project:,Dining Facility,,,,,,,,,,,,,,,,,
Location:,"Redstone Arsenal, Alabama",,,,,,,,,,,,,,,,,
Started: - 3/23/1999
Completed: - 3/24/1999
Test_Type:,Index Testing,,,,,,,,,,,,,,,,,
,,,,,,,,,,,,,,,,,,
Boring,Top_D,Bot_D,Sample,LL,PL,MC,Lab_VC,Lab_Descr
SS-1-99,0,1.5,JAR 1,,,12.3,SM,SILTY SAND
SS-2-99,0,1.5,JAR 1,65,25,30.3,CH,
SS-2-99,4.5,6.0,JAR 3,NP,NP,27.4,ML,
```

Table 9: Heading Keywords, Descriptions and Variable Types for Index Testing T01.csv File:

LL - liquid limit, text (NP for nonplastic or numeric text)
PL - plastic limit, text (NP for nonplastic or numeric text)
MC - moisture content, in percent, numeric
Lab_VC - laboratory visual classification of sample, 12-character max. text
Lab_Descr - laboratory description of sample, text, max. character controlled by max. line length of 511 characters

3.2 Grain Size Tests. File T02.csv shall contain general and sample identification data using keywords defined in Tables 7 and 8 respectively, and test data for grain size tests, including sieve analysis and/or hydrometer test data. Column heading keywords for sieve analysis may include any of following U.S. Standard sieve sizes: 3 in, 2-1/2 in, 2 in, 1-1/2 in, 1 in, 3/4 in, 1/2 in, 3/8 in, #3, #4, #6, #10, #16, #20, #30, #40, #50, #70, #100, #140, #170, #200, and #230. Column heading keywords "Size,mm" and "Value" shall be used for hydrometer analysis and if sieves other than the U.S. standard sieve sizes are used. An example file including both types of data is shown below:

```
;Example of CSV file for Grain Size Tests
Organization:,"Materials Testing Center, Vicksburg MS",,,,,,,,,,,,,,,,,
Client:,USACE Mobile District,,,,,,,,,,,,,,,,,
Project:,Dining Facility,,,,,,,,,,,,,,,,,
Project Location:,"Redstone Arsenal, Alabama",,,,,,,,,,,,,,,,,
Started:,9/25/2002,,,,,,,,,,,,,,,,,
Completed:,10/3/2002,,,,,,,,,,,,,,,,,

Test Type:,Grain Size Sieves,,,,,,,,,,,,,,,,,
Table Value:,Percent Finer,,,,,,,,,,,,,,,,,

Boring,Top_D,Bot_D,Sample,#1/2 in,#3/8
in,#3,#4,#6,#10,#16,#20,#30,#40,#50,#70,#100,#140,#200
DF-1-02,0,1.5,JAR 1,100,97,96.2,
96,95.8,94.8,93.1,91.5,89,86.8,84.6,82.8, 80.8,79.7,79.5
DF-2-02,6,7.5,JAR
5,100,100,100,100,100,98.9,97.6,96.9,96.4,95.8,94.8,93.2,90.8,88.3,86.1
,,,,,,,,,,,,,,,,,,
Boring:,DF-1-02,
Top_D:,0
Bot_D:,1.5
Sample:,JAR 1
Test Type:,Grain Size Single,,,,,,,,,,,,,,,,,
Table Value:,Percent Finer,,,,,,,,,,,,,,,,,
```

Exhibit 6-9 (Continued)

```
"Size,mm",Value,,,,,,,,,,
.0031,69.6,,,,,,,,,,,,
.0043,38.4,,,,,,,,,,,,
```

3.3 Consolidation Tests. File T03.csv shall contain general and sample identification data using keywords defined in Tables 7 and 8 respectively, and test data for consolidation tests. Keywords specifically for consolidation tests include "Initial void ratio:" and column heading keywords "Load,tsf" and "Void Ratio". An example file that includes both loading and unloading is shown below:

```
;Example CSV file for Consolidation Test
Organization:, USACE ERDC
Client:,USACE Mobile District
Project:,Fire Crash Station
Project Location:,"MacDill AFB, Florida"
Started:,11/07/2002
Completed:,11/21/2002
,,
Test Type:,Consolidation
Boring:,DF-1-02
Top_D:, 16.5
Bot_D:, 18.8
Sample:,TUBE 1
Initial void ratio:,1.20
,,
"Load,tsf", Void Ratio
0.1,1.150
0.25,1.124
0.5,1.072
1,0.990
2,0.910
4,0.826
8,0.740
16,0.656
32,0.578
60,0.499
16,0.516
4,0.560
1,0.616
0.25,0.67
0.1,0.684
```

Exhibit 6-9 (End)

CHAPTER 7

LANDSCAPING, IRRIGATION, PLANTING AND TURFING

INDEX

CHAPTER 7

LANDSCAPING, IRRIGATION, PLANTING AND TURFING

7.1 GENERAL

7.1.1 Scope

Specific submittal and technical requirements 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,

7.2 APPLICABLE PUBLICATIONS

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.

U.S. Army Corps of Engineers Technical Instructions (TI)

TI 800-01	Design Criteria

Unified Facilities Criteria (UFC)

UFC 3-210-05FA	Landscape Design and Planning Criteria
UFC 4-010-01	Minimum Antiterrorism Standards for Buildings

7.3 PROJECT DEFINITION (10-15%)

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.

7.4 CONCEPT DESIGN (30-35%)

7.4.1 Design Analysis

(a) 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, 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.

(b) The concept cost estimate for the landscape irrigation system shall be coordinated with the conceptual landscaping, planting, and turfing plan in order 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.

7.4.2 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 site layout and grading plans, and shall include reference coordinates, north arrows, graphic scales, and appropriate legends.

7.5 INTERM DESIGN (50-65%)

7.5.1 Design Analysis

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

7.5.2 Drawings

(a) The interim design submittal shall expand the concept 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 taken into account. Grassing limits, seeded or sodded, shall be clearly described in the contract documents.

(b) 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.

7.5.3 Specifications

Provide redlined marked up specifications in accordance with Chapter 3, SPECIFICATIONS.

7.6 FINAL REVIEW (UNREVIEWED 100%)

7.6.1 Design Analysis

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

(b) 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.

7.6.2 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 3, SPECIFICATIONS.

7.6.3 Drawings

(a) Final 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. Final 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.

(b) Irrigation system plans as described above shall be brought to completion and include detail drawings as needed to describe system performance. Final 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.

7.7 READY-TO-ADVERTISE (REVIEWED 100%)

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

7.8 TECHNICAL REQUIREMENTS

7.8.1 Design Criteria

(a) Designer Qualifications

(1) The designer shall obtain and use the services of a qualified Landscape Architect who is registered, preferably in the State in which the work is to be done, and is experienced in site planning and planting design. The person performing this work shall be thoroughly familiar with the referenced Technical Manuals, and specifications.

(2) The landscape irrigation system shall be designed and installed by an experienced firm regularly engaged in this type of work. The designer/installer shall have a minimum of three (3) years of successful experience with designing and installing this type of system. Guidance shall be included in the specifications for the contractor to submit approval evidence of these qualifications.

(b) Major Design Considerations

(1) Design plans shall reflect user needs, simplicity of layout, proper scale and spacing of materials, low maintenance considerations, and compatibility with adjacent surrounding and anti-terrorism/force protection requirements. Specified plant materials shall be readily available for purchase, require minimum maintenance, be suitable and tolerant to both the geographic locale and the specific site conditions, be the proper quantities selected for the surroundings, and be of sufficient size to give an immediate effect. The types and locations of plant materials shall be utilized, as appropriate to the function and prominence of specific facilities, to define the functional use areas and circulation systems of the site layout; to provide open space buffers between land uses and within parking areas; to reinforce the orientation of buildings and the use of earthforms for energy conservation; to supplement erosion control; to provide screening; and to emphasize entrances to buildings. The aesthetic quality of planting design shall be supportive in providing visual continuity in the relationships between buildings, the site, and the surrounding environment.

(2) If a performance specification is to be included for the irrigation system design, then this specification shall be written such that it can be used as a guide for the design and installation of a complete operating lawn irrigation system. This design and installation shall be the responsibility of the Contractor. The piping design and layout shall be coordinated with the landscaping plan to provide irrigation for all areas of

plants, shrubs, and grassing within the design boundaries. The system shall be divided into zones and be automatically controlled. The sprinkler heads, laterals, control valves, and other related irrigation system appurtenances shall be in accordance with the requirements contained within this landscape irrigation performance specification. Sprinkler performance such as operating pressure, radius of throw, etc., shall be chosen as best fitted for the intended area to be irrigated. Provide the sprinkler system as a complete unit produced by a single acceptable manufacturer for all major components including sprinkler heads, valves, controller, and other accessories.

7.8.2 Site Investigation

A visit to the project site is recommended as a necessary aspect of initial concept development. Visual observation of the surrounding environment of the Installation, determination, where applicable, of the continuity between new construction planning and existing development and ascertainment of the types of recommended materials and maintenance practices are influential factors in the analysis of site problems and the formulation of concept solutions.

7.8.3 Coordination

(a) Interface with Applicable Construction Drawings. Landscape planting and irrigation plans shall be coordinated with existing conditions and demolition plans, site layout, grading and drainage, utilities, architectural floor plans and elevations, and pertinent aspects of mechanical, plumbing, and electrical drawings for the locations of items such as compressors, fuel oil tanks, transformers, meters, light standards, and hose bibs.

(b) User Requirements. Coordination of USACE and Installation requirements shall be accomplished prior to initiation of design submittals. The designer shall consult with the local user and involved Installation personnel in order to substantiate the extent of design requirements and to provide planting proposals, which correspond with maintenance capabilities.

CHAPTER 8

WATER, WASTEWATER AND ENVIRONMENTAL PROTECTION

INDEX

CHAPTER 8

WATER, WASTEWATER AND ENVIRONMENTAL PROTECTION

8.1 GENERAL

This chapter presents general requirements for the preparation of plans, specifications, and design analyses for water supply and wastewater treatment systems. The general requirements for water and wastewater systems for US Army projects will generally follow the order of Unified Facilities Criteria (UFC), Military Handbooks (MIL-HDBK), Technical Instructions (TI), Engineering Instructions (EI), Technical Manuals (TM), industry organization standards as recognized in the listed documents for applicable publications, such as American Water Works Association (AWWA) and Water Environment Federation (WEF). US Air Force projects will generally follow the same criteria order as above, except after Military Handbooks and before the TI series, Air Force Instructions (AFI) will precede the remaining list. 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 supercedes the military requirements. Where details are left to the designer, standards dictated herein shall 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, shall be in accordance with Chapter 2, PRESENTATION OF DATA.

8.1.1 Water Supply Systems

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

8.1.2 Wastewater Systems

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

8.1.3 National Environmental Protection Act (NEPA) Documentation

In the event that the Government has prepared any NEPA Documentation, i.e. Environmental Impact Statement (EIS), Environmental Assessment (EA), or a Findings of No Significant Impact (FONSI), the designer shall prepare the design so that it is entirely compatible with any and all requirements of that NEPA Documentation.

8.2 APPLICABLE PUBLICATIONS

Unified Facilities Criteria (UFC)

UFC 3-230-02	O&M: Water Supply Systems
UFC 3-230-03A	Water Supply
UFC 3-230-04A	Water Distribution

UFC 3-230-07A	Water Supply: Sources and General Considerations
UFC 3-230-08A	Water Supply: Water Treatment
UFC 3-230-09A	Water Supply: Water Storage
UFC 3-230-10A	Water Supply: Water Distribution
UFC 3-230-11A	Water Supply for Special Projects
UFC 3-230-12A	Water Desalination
UFC 3-230-13A	Water Supply: Pumping Stations
UFC 3-230-19N	Water Supply Systems
UFC 3-240-02N	Wastewater Treatment System Augmenting Handbook
UFC 3-240-03N	Wastewater Treatment System Augmenting Handbook Operation and Maintenance
UFC 3-240-04N	Wastewater Collection
UFC 3-240-06N	Wastewater Collection and Pumping
UFC 3-240-07FA	Sanitary and Industrial Wastewater Collection: Gravity Sewers and Appurtenances
UFC 3-240-08FA	Sanitary and Industrial Wastewater Collection: Pumping Stations and Force Mains
UFC 3-240-09FA	Domestic Wastewater Treatment
UFC 3-600-01	Design: Fire Protection Engineering for Facilities

Water System Design Documents - Military

TI 800-01	Design Criteria
TI 814-01	Water Supply
TI 814-03	Water Distribution
TI 814-10	Wastewater Collection
TM 5-809-10	Seismic Design for Buildings
TM 5-810-5	Plumbing
TM 5-813-1	Water Supply: Sources and General Considerations
TM 5-813-3	Water Supply: Water Treatment
TM 5-813-4	Water Supply: Water Storage
TM 5-813-5	Water Supply: Water Distribution

TM 5-813-7	Water Supply for Special Projects
TM 5-813-8	Water Desalination
TM 5-813-9	Water Supply for Pumping Stations
TL 1110-3-446	Revision of Thrust Block Criteria in TM 5-813-5/AFM 88-10, Volume 5, Appendix C
TL 1110-3-465	Design and Construction of Water Meters and Appurtenances at New Army Facilities.
TL 1110-3-481	Containment and Disposal of Aqueous Film-Forming Foam (AFFF) Solution
TL 1110-3-484	Aircraft Hangar Fire Protection Systems
TL 1110-3-485	Fire Protection for Helicopter Hangars
EM 1110—2-503	Design of Small Water Systems
Wastewater System	Design Documents - Military
TI 814-10	Wastewater Collection
TM 5-814-1	Sanitary and Industrial Wastewater Collection; Gravity Sewers and Appurtenances
TM 5-814-2	Sanitary and Industrial Wastewater Collection – Pumping Stations and Force Mains
TM 5-814-3	Domestic Wastewater Treatment
TM 5-814-5	Sanitary Landfill
TM 5-814-7	Hazardous Waste Land Disposal/Land Treatment Facilities
TM 5-814-8	Evaluation Criteria Guide for Water Pollution Prevention, Control, and Abatement Programs
TM 5-814-9	Central Vehicle Wash Facilities
TL 1110-3-466	Selection and Design of Oil/Water Separators at Army Facilities
TL 1110-3-469	Alternatives for Secondary Treatment at Central Vehicle Wash Facilities
EM 1110-1-501	Process Design Manual for Land Treatment of Municipal Wastewater
EM 1110—2-501	Small Wastewater Systems
Military Handbook	
MIL-HDBK-1005/7A	Water Supply Systems
MIL-HDBK 1005/16	Wastewater Treatment System Design Augmenting

Handbook

MIL-HDBK 1005/17 Industrial Pretreatment Design and Nondomestic Wastewater Control

Industry and Organizational Standards

IPC International Plumbing Code, Latest Edition

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

NFPA 409 Standard on Aircraft Hangars

Recommended Standards for Wastewater Facilities (Ten States' Standards), Health and Environmental Managers

Recommended Standards for Water Works (Ten States' Standards), Health and Environmental Managers

Design of Wastewater and Stormwater Pumping Stations (MOP FD-4), Massachusetts Water Pollution Control Association (MWPCA)

MOP FD-5 Gravity Sanitary Sewer Design and Construction, MWPCA

MOP 7 Wastewater Collection Systems Management, MWPCA

MOP 8 Design of Municipal Wastewater Treatment Plants, MWPCA

MOP FD-12 Alternative Sewer Systems, MWPCA

AWWA Water Treatment Plant Design, McGraw- Hill

Manual of Septic Tank Practice, National Center for Urban and Industrial Health

EPA 625/1-80-012 Design Manual: Onsite Wastewater Treatment and Disposal Systems

Applicable State Criteria

8.3 PROJECT DEFINITION (10-15%)

The project definition shall 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.

8.3.1 Design Analysis

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

8.3.2 Water and Sanitary Site Plan

The water and sanitary site plan shall show all existing water lines and sanitary sewers. The new water lines for building service and fire flow shall be shown from the point of connection to the existing water distribution system. All necessary valves, fire hydrants, ground storage tanks, pump stations, etc. shall be indicated. Building connections for wastewater shall 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. shall be shown. All pipe sizes shall be indicated. At this stage or earlier, the designer shall request a fire flow test(s) specifying exact hydrant locations required to flow and where residual pressure is to be measured. Request shall be furnished to COE project manager.

8.4 CONCEPT DESIGN (30-35%)

8.4.1 Design Analysis

Base all new designs on the most economical plan consistent with the applicable criteria; i.e., Army Technical Manuals, Air Force Manuals, etc. Include in the design analysis any assumptions made or source of information if not included in manuals, guides, or instructions. The design analysis shall be sufficiently complete to clearly show project requirements and utility support capacity. Prepare outline specifications as directed in Chapter 3, SPECIFICATIONS.

8.4.1.1 Water Supply Sources

The source of the potable water supply for domestic and industrial use and fire flow demand shall be identified in this submittal. If lawn irrigation is required, the source of water for the irrigation system shall 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 experienced in fire protection systems must accomplish design of fire pumping stations. The designer shall determine in this submittal whether a fire pump station with or without a ground storage reservoir is required.

8.4.1.2 Service Lines

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

8.4.1.3 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, and other appurtenances used to supply water for domestic, industrial, and fire fighting purposes. If new water distribution lines are required to meet fire flow demands, a Hardy Cross or similar analysis shall be provided in the Design Analysis. This shall consist of a flow analysis based on 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. The flow through all lines shall be balanced by use of a Stet Cross analysis or other approved means. 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 project. The designer shall request fire flow tests results through the Project Manager if not provided earlier.

8.4.1.4 Sanitary Sewers

New gravity sanitary sewers will be sized in this submittal. The design analysis shall 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 shall be checked to determine whether it has adequate capacity for the additional flow. If the existing system does not have sufficient capacity, it shall be revised to handle the increased flow. The design analysis shall 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. The design analysis shall be prepared in accordance with TI 814-10. A design analysis is required for onsite sewage treatment and disposal systems (e.g. septic tank and tile field). The feasibility of an onsite sewage treatment and disposal system where buildings are remotely located and it is not economically possible to connect to an existing wastewater collection system shall be determined. Coordination shall 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.

8.4.1.5 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 shall be provided to determine pipe slope. The minimum diameter pipe shall not be less than 6 inches.

8.4.1.6 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 rational for pump selection and size of force main.

8.4.1.7 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.

8.4.2 Drawings

The water and sanitary site plan shall be adequately detailed to show new work and connections to the existing water distribution system and wastewater collection system. The proposed designs shall include sufficient details to obtain adequate concept cost estimates for all items such as lift stations, septic tanks, 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 shall be shown on concept plans. The water and sanitary site plans shall be on a minimum scale of 1" = 30'. The designer shall provide any additional drawings other than those listed above which he considers necessary to show the intent of design.

8.4.3 Environmental Permitting

A separate section shall be provided in the design analysis entitled "Environmental Permits". A separate sheet for each environmental permit contact shall be provided in the design narrative. The sheet shall be in a block format and contain the following information: Subject; Type Permit Required; Approving Agency and Address; Point-of-Contract and Telephone Number; Fee; Agency Processing Requirements; and any Special Requirements or Information. See **Exhibit 8-1** for an example.

8.5 INTERIM DESIGN (50-65%)

8.5.1 Design Analysis

The Interim Design Analysis shall 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.

8.5.2 Drawings

The following specific items shall be submitted, when applicable.

8.5.2.1 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.

8.5.2.2 Domestic and Industrial Water 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.

8.5.2.3 Water Distribution and Wastewater Collection Systems

Provide a site plan showing all existing and new valves, fire hydrants, manholes, pumping stations, laterals, meters, 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.

8.5.3 Specifications

Provide redlined marked up specifications in accordance with Chapter 3, SPECIFICATIONS.

8.6 FINAL DESIGN (UNREVIEWED 100%)

8.6.1 Design Analysis

The Final Design Analysis shall be a refinement of the Interim Design Analysis. Design analysis shall include all references for design assumptions. Design analysis shall incorporate all accepted comments from the previous design submittal. All pipe-sizing computations shall be included in analysis. Piping analyses shall show design flows, pipe sizes, friction factors, slopes, lengths, elevations where applicable, conducted quantity, and velocity in each line. Provide flow diagrams in the analysis. Determination of pump heads shall be based on complete takeoff of friction losses and static heads. Systems head curves are required for all pumping systems. Pumping stations with multiple pumps shall be provided with pumping curves for the individual pumps and any combination of possible pump operation that will occur.

8.6.2 Drawings

Final plans shall be the refinement and completion of the interim drawings. All comments relating to interim or concept design shall be incorporated in the final drawings. Where crowded conditions exist due to close proximity of other phases of the work, sufficient sections and elevations shall be shown to indicate clearly the exact location of new facilities. The number of elevations and details shall 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 make sure that valves, fittings, etc., that are specified to be furnished with each piece of equipment are included in the detail. Final plans shall show all pipe sizes. Catwalks, ladders, platforms, access panels, and doors required for operation and maintenance of equipment, valves, and accessories shall be detailed on the drawings. Performance characteristics for all items of equipment shall 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 shall not be restrictive to any one manufacturer but must be competitive among at least three major manufacturers. Manufacturer's trade names shall 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 shall not be included in equipment schedules. Location of equipment and piping shall be completely coordinated with other features of the

project; architectural, plumbing, mechanical, structural, electrical, etc. Profiles shall be provided for all new sanitary sewers and force mains. These profiles shall 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 shall be required on final plans. A legend shall 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 shall be included on the drawings.

8.6.3 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 3, SPECIFICATIONS. Guide specifications shall be included in this submittal. Specifications shall not be restrictive. Generally, the description shall 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" shall be carefully coordinated with the electrical section of the specifications. There shall 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.

8.6.4 Environmental Protection

(a) The appropriate UFGS Guide Specification section for “Environmental Protection,” shall be included in this submittal. A list of all required construction permits, existing environmental permits, and new environmental permits shall be included in this specification section.

(b) All permits obtained by the user or required to be obtained by the user or designer shall be listed by title, permit number or form number, permitting agency, effective date and expiration date. The list shall 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 (Florida - water wells)

(c) 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.

8.7 READY-TO-ADVERTISE (REVIEWED 100%)

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

8.8 TECHNICAL REQUIREMENTS

8.8.1 Standard Systems Criteria

8.8.1.1 Building Services

(a) 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. The pressure drop through the service line will not exceed 10 psi or a velocity of 8 feet per second at the peak building demand. Provide a gate valve or service stop near the connection point to the distribution system. The designer shall insure that all state and local cross connection requirements have been incorporated into the design.

(b) 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 constructed of 6-inch minimum size pipe on an appropriate slope to achieve a velocity (or equivalent) cleansing velocity of two (2) feet per second. 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. 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 TI 814-10.

8.8.1.2 Fire Protection

(a) 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 TI 814-03 and UFC 3-600-01. The residual flow pressures at design flows at fire hydrants will not be less than 20 psi. Water lines shall be installed parallel to streets and roads, but not under roadway pavements, except for crossings. The sum of the fire flow, 50% of the average domestic demand rate, and any industrial demand that cannot be reduced during a fire period determine the fire demand. Provide fire hydrants in accordance with TM-5-813-5, NFPA 24, and UFC 3-600-01. Any point of the building should be within 350 feet of at least 2 hydrants. Fire hydrants shall be installed with not less than a 6-inch connection to a supply line and be valved at the connection.

(b) Building Sprinkler Supply Lines. Sprinkler supply lines shall 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,Fire Protection for Facilities-Engineering Design, and a fire flow analysis or other approved means of analysis must justify Construction. Where required, augment the existing distribution system to provide at least a 15-pound residual pressure at the highest sprinkler heads in the building at design fire demands. Provide cutoff valves on the supply lines. These shall be located not

less than 25 feet nor more than 50 feet from the face of the building, which they are to serve. They may be of either the post indicator type, or the rising stem and yoke type installed in a pit, as dictated by the proposed construction provided for that area. Use post indicator valves generally in grassed areas, and use the rising outside stem and yoke type installed in underground pits in paved areas. Fire pumping stations shall comply with UFC 3-600-01 and NFPA Codes 20, 24, and 409, as appropriate, and shall be designed by persons experienced in design of fire protection systems. The design of a fire pump or series of fire pumps shall not exceed 1500 GPM each without approval of the Corps of Engineers. Provide standby fire pumps where required by NFPA 409.

8.8.1.3 Sewage Collection System

(a) Gravity Sewers. Where more than one building is involved, use gravity sewers. Design is to conform to the applicable requirements of TI 814-10. Size gravity sewers to discharge the expected peak rate of flow. Design pipes to run not more than 80% full, except that regardless of the design quantities, the minimum size of gravity sewers is 8 inches. Gravity sewers shall normally be laid on a sufficient slope to provide a velocity of at least 2.5 feet per second when the pipe is flowing full and 2.0 feet per second at the average rate of flow. Locate gravity sewers by the topography of the site to minimize excavation.

(b) Force Mains and Sewage Lift Stations. Where more than one building is involved, if gravity type sewers cannot be provided, sewage pumps shall be installed in a sewage lift station constructed on the lowest terrain in the vicinity. Since force mains do not require a specific grade for satisfactory operation, they shall be constructed as straight, short, and shallow as possible. Routings for force mains shall generally follow existing right-of ways, roads, or utility corridors. In the Mobile District, force mains are generally installed a minimum of 30 inches below final grade. Force mains and sewage lift stations shall conform to the applicable requirements of TI 814-10. The capacity of the lift station shall be sufficient to handle peak rates of sewage flow, determined in accordance with TI 814-10. Sewage pumps must be designed to meet actual head conditions of the force main provided for the lift station. The design point on the pump characteristic curve shall be justified by plotting this curve against the system head-capacity curve. The system head curve shall be obtained by plotting the static lift plus the friction head at various flow rates. Where pumps operate in parallel or series, combined curves shall be provided. Intersection of characteristic curve with system head curve shall be the design operating point. Where appropriate, grinder-type pumps shall be considered.

(c) Septic Tank and Tile Field. Design septic tanks and tile fields in accordance with Manual of Septic Tank Practice and applicable state criteria. When state criteria is not relevant, then use 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 is 4 inches and calculations are provided for structural soundness.

(d) Oil/Water Separators. Oil/water separators shall be provided for process wastewaters in accordance with ETL 1110-3-466 for Army projects and as required by state and local regulators for Air Force projects. Separators shall be of the prefabricated type or built in place. Oil/water separators shall be designed to meet the effluent requirements for pretreatment by the EPA and/or applicable State Agency. The effluent from the oil/water separator shall be routed to a sanitary sewer or an

industrial sewer. Oil/water separators shall be designed so that large quantities of storm water are not processed through the separator. Separators shall be installed to meet installation requirements for containment of hazardous 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 in order 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.

8.8.1.4 Treatment Plants

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

8.8.1.5 Seismic Provision

All projects shall include appropriate provision for protection of piping, equipment, and underground utilities against damage from seismic events in accordance with TM 5-809-10, Seismic Design for Buildings and Air Force projects using the latest recognized civilian standard, such as ASCE.

8.8.1.6 Fire Protection Using AFFF Systems

Fire protection using AFFF Systems shall comply with the requirements of ETL 1110-3-481. Provide a means for containment of and disposal of AFFF foam solution runoff through coordination with Government personnel and the local environmental regulatory authority. Containment and disposal must meet the requirements of the applicable State Agency, and shall be a part of permitting requirements. Other options that can be approved by the installation and state regulatory agencies should be presented as economic alternatives before the 30% design is finalized.

8.8.2 Supplemental Design Criteria

8.8.2.1 Water Supply/Water Distribution

(a) Water wells shall conform to AWWA Standard A-100; TI 814-01 and applicable State Public Health Department criteria for public water supplies. Specification for water wells shall be based current UFGS specification provided.

(b) The designer through the Mobile District geologist (CESAM-EN-GG) shall coordinate design of water wells.

(c) Vertical turbine pumps larger than 5 hp shall conform to AWWA E-101 and the appropriate UFGS.

(d) Design of water treatment plants shall conform to TI 814-02 and Mil-Handbooks as appropriate and any applicable State criteria for public water supplies; and as a minimum the Recommended Standards for Water Works (Ten States' Standards).

(e) Small isolated facilities shall utilize a hydro-pneumatic pressure tank and, if appropriate, a ground storage reservoir as discussed below. Small systems shall normally be located in a protective building. Where permitted by the State, pitless well adapters may be used. Use of well pits is prohibited.

(f) Supply and distribution piping shall comply with TI 814-03 and appropriate UFCs and UFGS. Piping materials shall be based on UFGS unless technical considerations require other methods.

(g) Water storage designs shall comply with UFC 3-600-01, TI 814-01, and AWWA D100. Specifications shall be based on the appropriate UFGS.

(h) Hydraulic analyses shall normally be made using a value of C = 100 for the roughness co-efficient; 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 insure that excessive velocities are not generated in new piping by using only coefficients for aged pipe.

(i) Fire hydrant branches shall not be less than 6 inches in diameter, shall be as short in length as possible, and shall have a gate valve and box.

(j) Locate water lines at least l0 feet horizontally from a sewer or drain line. When required, a minimum horizontal separation of 6 feet can be allowed, but the bottom of the water line must be at least 12 inches above the top of the sewer pipe, unless state regulations require a more strict limitation.

(k) Where water lines must cross sewers they shall conform to the requirements of TM 5-813-5, UFGS Guide Specifications for water lines, and applicable state criteria.

(l) Water lines crossing railroads shall be installed in protective casings conforming to the requirements of American Railway Engineering Association (AREA), Volume 1. Design should specify method of construction for each particular site (i.e., ut vs. jacking). The designer shall obtain permits from the railroad authority, as required. Permit application procedure and submittal should occur as soon as practicable.

(m) Water lines located in airfield pavement shall conform to the requirements of TM 5-813-5.

(n) Control valves shall be provided on distribution systems in accordance with TM 5-813-5.

(o) Air release and vacuum relief valves shall be provided in accordance with the requirements of TM 5-813-5.

(p) Fire hydrants shall be provided in accordance with the requirements of TM 5-813-5;; NFPA 24, Outside Piping; and UFC 3-600-01. Hydrants should not be located closer than 25 feet to a building and should be located not more than 7 feet nor less than 6 feet from the edge of a paved roadway surface. Residual pressures at fire hydrants shall not be less than 20 psi when flowing at the desired rate.

(q) Thrust blocking shall be provided in accordance with TM 5-813-5; ETL 1110-3-446 Revision of Thrust Block Criteria in TM 5-813-5, Appendix C, and the UFGS water lines specification.

(r) Where the base distribution system is unable to provide the fire flow demand at the required residual pressure, the designer shall analyze the existing distribution system and provide pumping equipment and ground storage tanks, if necessary. A complete design analysis is required, including fire flow test data. Pumping stations shall conform

to the requirements of NFPA 20, UFC 3-600-01, and TM 5-813-9. Pumping stations for aircraft and helicopter hangars shall conform to UFC 3-600-01, TM 5-813-9, and NFPA 409, except that fire pumps shall be diesel engine driven. Provide post indicating cutoff valves in accordance with NFPA 24.

(s) Water for domestic purposes and fire protection for special projects such as reserve centers shall be provided in accordance with the requirements of TM 5-813-7.

(t) Service lines to new buildings shall be sized to meet peak building demands in accordance with TM 5-810-5. Pressure drop between the connection to the distribution line and the building shall not exceed l0 psi at peak rate. Provide control valves, in accordance with the appropriate UFGS Guide Specification.

(u) All water lines, water wells, and storage tanks shall 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.

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

(w) Hydropneumatic Pressure Systems:

(l) Use at small activities where 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.

(2) Generally, use 20-psi pressure differential between high water level and low water level.

(3) Provide duplex high service pumps to meet the peak 4-hour demand of 2.5 times average flow. When water well source is inadequate to provide peak 4-hour demand, investigate the feasibility of providing ground storage or a pressure tank equal to 40 times the well pump.

(4) Tank capacity. Conventional tank capacity shall be based upon a withdrawal, in gallons, of 2-l/2 times the GPM capacity of the pump and a low-water level of not less than l0 percent of total tank capacity or 3 inches above top of tank outlet, whichever is higher. Table l indicates high water levels and withdrawals for efficient operation of tanks with bottom outlets and a l0 percent residual. Using the table, the tank capacity may be determined as per Example l:

Example l: Determine the tank capacity when pump capacity is 150 GPM and tank operating pressure range is 40-60 psi. Referring to

table 1, the withdrawal from the tank is 24 percent of the tank capacity.

Total tank capacity = 2.5 X 150 GPM = 1,562 gallons or 0.24

TABLE I

HYDROPNEUMATIC TANK HIGH-WATER LEVELS AND WITHDRAWALS

Pressure Range (PSI)	High-Water Level (% of Total Tank Capacity)	Withdrawal (% of Total Tank Capacity
20-40	43	33
30-50	38	28
40-60	34	24
50-70	32	22
60-80	28	18

(5) Compressed Air. Compressed air is supplied for tank operation according to the tank capacities. For tank capacities up to 500 gallons, provide 1.5 CFM. Provide 2.0 CFM for capacities from 500-3,000 gallons and each additional 3,000 gallons or fraction thereof. Quantities are expressed in CFM free air at pressure equal to the high-pressure maintained within the hydropneumatic tank.

(6) Controls. The controls of a hydropneumatic system shall maintain the predetermined pressures, water levels, and air-water ratio within the tank. When duplex pumps are provided, controls shall start only one pump at a time; pumps shall be operated alternately. Pumps shall operate simultaneously only when a single pump cannot maintain the predetermined low pressure. Controls shall admit compressed air into the tank only when tank pressure at high-water level is below normal.

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

(8) Provide a chlorine disinfection system for water to be consumed by humans. Size to provide 1 mg/l chlorine residual when flowing at the peak 4-hour rate. Consider using a hypochlorite feeding machine for intermittent pumping rates up to 200 gpm or when maximum chlorine demand is less than 3 pounds per day. When hypochlorite feeders are not practical and chlorine gas is the only reasonable choice for disinfection, due consideration must be presented regarding local, state, and federal requirements concerning storage or hazardous materials.

(9) Refer to the publication "Handbook of Chlorination" by George White (Van Nostrand Reinhold) and manufacturer's literature for details of design of chlorination systems.

(10) Diaphragm-type tanks shall be designed and sized in accordance with the manufacturer’s instructions.

(y) Asbestos-cement pipe shall not be specified for water lines.

8.8.2.2 Wastewater Treatment and Disposal

(a) Design of on site treatment/disposal facilities shall conform to applicable criteria published by the appropriate state regulatory agency

and MIL-HDBK 1005/16. When appropriate, a "mound" system shall be considered where high water tables or impervious layers of soil exist. Other alternative systems may be considered when approved by the installation facility and environmental regulators.

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

(c) Gravity Sewers (TM 5-814-1)

(1) Provide a minimum of 24" to 30" of cover over pipe.

(2) Manholes are required at the end of laterals and at each change of direction or slope.

(3) Distance between manholes shall not exceed the following:

Diameters less than 18"	400'
Diameters 18" and larger	600'

(4) Drop connections are required at manholes when the invert of the inlet pipe is more than 18 inches above the manhole floor.

(5) Minimum size for building connections is 6 inches in diameter.

(6) Sewers shall be laid with sufficient slope to ensure cleansing velocities (2 fps when flowing full or half full).

(7) Capacity of building connections shall be based on fixture units.

(8) Minimum size sanitary sewers between manholes shall be 8 inches in diameter.

(9) Use Mannings formula for computing gravity flows in sewers. Use n = 0.013 for pipes 12 inches or smaller and n = 0.014 for pipe larger than 12 inches.

(10) Deep sewers shall be analyzed for excessive loads using the equations of TM 5-814-1, Paragraph 12.

(11) Selection of pipe materials shall consider structural loads, soil conditions, and characteristics of transported wastes.

(12) Design analyses are required for sizing all 8 inch and larger sewers.

(13) Asbestos-cement pipe shall not be specified for gravity sewers or force mains.

(d) Pumping Stations (TI 814-10).

(1) Force mains shall be analyzed for water hammer conditions.

(2) Minimum size force mains where nonclog pumps are used is 4 inches. Smaller pipe sizes can be considered when grinder pumps are used.

(3) Small lift stations shall be of the wet-pit, submerged-pump type.

(4) Capacity of pumping stations shall be sufficient to handle maximum rates of flow when the largest pump is out of service. See TI 814-10 for determining pumping rates.

(5) Overflows shall not be provided.

(6) A complete design analysis is required.

(7) Force mains shall be provided with a minimum of 24" to 30" cover.

(8) Systems head curves are required for all pumping systems.

(e) Wastewater treatment plant designs shall conform to MIL-HDBK 1005/16; applicable State criteria; and Recommended Standards for Sewage Works (Ten States' Standards). Designs shall be based on meeting NPDES discharge permit limitations for the site, as provided by the State or EPA, depending on who has authority.

(f) Treatment plants for industrial wastes shall conform to MIL-HDBK 1005/17 and TM 5-814-8. Designs shall be based on meeting NPDES discharge permit limitations for the site or meeting owner of the final treatment systems requirements.

(g) Wastewaters containing oils shall be treated in accordance with the requirements of local environmental authorities. Oil-water separators shall 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 non-existent, 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 Base personnel is required because of environmental constraints.

(h) Special Requirements for Fire Pump Stations/Fire Booster Stations. A comprehensive transient analysis shall be performed and submitted for pumping systems required to provide water pressure and flow for sprinkler systems and/or standpipes. The analysis shall be a computerized model of the pipe, control and relief fittings, and pumps required by the A-E to support the fire suppression system being designed. A report describing the analysis procedures, control methods, need for corrosion control, etc., shall be submitted with the design analysis. As a minimum requirement, the following shall be included in the analysis:

(1) Pump start and stop against a closed (no flow) system such as motor or engine exercising only.

(2) Single pump running with other pumps coming on line to supplement the single pump.

(3) Pump(s) trip in a single run mode and a multiple pump trip with all pumps tripping at the same instance.

(4) Pump(s) start and stop at intermediate design flow; e.g., 35 to 50 percent.

(5) Analysis of all pressure relief or reduction elements such as air chambers, surge relief valves, by-pass, etc.

(6) All assumptions used to model the system shall be clearly explained. In addition, any physical phenomenon anticipated to occur shall be described so that Base operations personnel can be made fully aware of these phenomenons and take any appropriate actions required.

Sample Environmental Permit Contact Sheet

SUBJECT: Wastewater Treatment Plant – Construction Permit

PERMIT REQUIRED: Permit to Construct

APPROVING AGENCY: Central Florida District, FDER
(P.O.C.) Denise Judy or alt. Lee Miller

ADDRESS: Central Florida District
Department of Environmental Regulation
3319 Maguire Blvd., Suite 232
Orlando, FL 32803
Attn: Office of Domestic Permitting
(407) 894-7555

FEE: $5,000 (Includes cost of both applications.)

PROCESSING: Two Applications --
1) App. To Const. Domestic
Wastewater Facility
2) App. To Const. Reuse/Land
Application System

30 days to review plus public notice period plus any time needed to incorporate FDER changes

SPECIAL REQUIREMENTS: Controls for this facility are TSS 20 mg/L, BOD 20 mg/L, and N-NO3 12 mg/L. Construction permit good for up to 6 months after construction is finished. Can be extended during construction if time expires for $50 per extension, up to 5 years.

Systems operating manual is required (Note: FDER says these manuals are usually disappointing, because they are normally only O & M manuals and not process control—but have allowed it to suffice). The systems manual is required to be ready within the 6-month period that the "construction permit" is used to operate the plant.

EXHIBIT 8-1

CHAPTER 9

ARCHITECTURE

INDEX

CHAPTER 9

ARCHITECTURE

9.1 GENERAL

9.1.1 Scope

This chapter states criteria, requirements, and guidance for architectural design. Specific requirements in this chapter supplement the requirements of Chapter 1, titled GENERAL INSTRUCTIONS. All required documents, including the drawings and the design analysis, shall be prepared in accordance with Chapter 2, titled PRESENTATION OF DATA.

9.1.2 Architectural Quality

The objective of the U.S. Army Corps of Engineers (USACE) is to obtain attractive cost-effective buildings which are designed using sound technical knowledge and which are constructed using recognized commercial building industry practices. The design shall 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.

9.2 APPLICABLE PUBLICATIONS

9.2.1 Building Code Compliance

The following publications shall be used to establish code compliance for architectural work. Additional discipline or customer specific publications will be incorporated when they affect life safety and occupational safety and health.

UFC 1-200-01	Unified Facilities Criteria (UFC) 1-200-01, General Building Requirements
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
ADAAG	Americans With Disabilities Act Accessibility Guidelines (ADAAG)
UFAS	Uniform Federal Accessibility Standards (UFAS)

9.2.2 Functional Criteria

Air Force or other customer functional criteria, and military installation specific criteria for use in the project will be determined during the pre-design conference. The following contains guidance for various Army facility types. See Chapter 24 MILCON TRANSFORMATION for additional Army facility type criteria.

TI 800-01	Technical Instructions (TI), Design Criteria

9.2.3 Community Criteria

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

9.3 PROJECT DEFINITION SUBMITTAL (10% - 15%)

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.

9.3.1 Narrative

9.3.1.1 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 shall reflect the regional architecture as well as the visual characteristics of the existing facilities around the site.

9.3.1.2 Basis of Design Summary

Provide a summary of the Basis of Design including, but not limited to, the following:

a. State the building construction type and occupancy classification appropriate to the model code(s) in use.

b. List the functional areas and describe their relationships.

c. List authorized space allocations.

d. Describe the energy conservation measures used in the design.

e. Describe the noise control criteria established for the design.

f. Describe methods to ensure safety and accessibility compliance with the latest requirements of OSHA, ADAAG and UFAS.

g. 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.

h. Describe any special functional or technical requirements including, but not limited to, physical or classified document security, anti-terrorism and force protection, sustainable design.

9.3.1.3 Criteria

List the functional and technical criteria used to guide the design work.

9.3.1.4 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 shall be indicated, including schedules for phasing.

9.3.1.5 General Design Statement

The designer shall state the assumptions and rationale behind all major facility design decisions including, but not limited to, discussions of the following:

a. Orientation to the sun, wind, and water (when applicable).

b. The relationship to any surrounding natural or manmade environment.

c. The interface with any contiguous traffic circulation.

d. The visual impact of the facility with regard to the overall area.

9.3.1.6 Building Systems Analysis (Applicable only where no specific base criteria exists.)

Include any substantiating material to support the selection of architectural materials or systems. Selection shall be based on a comparison of several alternate systems, which shall 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:

a. Exterior wall systems.

b. Passive solar systems.

c. Fenestration.

d. Roof systems.

e. Interior partition systems.

f. Openings in interior partitions (doors, windows, etc.).

g. Ceiling systems.

h. Floor systems.

i. Integrated building systems.

j. Noise and/or acoustics control measures.

k. Special equipment such as trash handling systems and dock levelers.

l. Vertical transportation systems (elevators).

9.4.1.7 Design Calculations

Submit complete calculations for the following:

a. Gross building areas.

b. "U" values for each exterior construction assembly (walls and roofs).

c. Calculations for toilet fixture count.

d. Roof Drainage (Roof drain sizes and quantities, gutters and Downspout sizes)based on rainfall intensity at the project location.

e. Gross area tabulations.

9.3.2 Drawings

This submittal consists of one or more single line 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. 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 shall be coordinated with the requirements of Chapter 4, titled SITE DEVELOPMENT.

9.4 CONCEPT DESIGN SUBMITTAL (30% - 35%)

9.4.1 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.

9.4.2 Design Analysis

Update and continue development of the narrative submitted at Project Definition.

9.4.3 Drawings

9.4.3.1 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 shall show the following:

a. The general building layout showing exterior walls, interior partitions, and circulation elements (stairs, elevators, corridors, etc.) drawn to scale.

b. The identification of major areas and their functional relationship.

c. Overall building dimensions, out to out.

d. Planning grid or column lines where applicable.

e. Match lines locations indicating larger scale floor plan segments.

f. Cross-references for enlarged floor plans and building sections.

9.4.3.2 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 shall be shown:

a. Planning grid and/or column lines.

B. Overall and building element location dimensions.

c. Room names and numbers.

d. Finish floor elevations for each floor or change in floor level.

e. Opening designations in walls (doors, windows, etc.).

f. All major equipment.

g. Furnishings layouts for typical rooms where required. (See Chapter 10, INTERIOR DESIGN for additional furniture placement plan requirements).

h. Gross floor area tabulations if not shown in composite floor plans.

i. Cross-references for sections and details.

j. Provisions for the handicapped where required.

9.4.3.3 Roof Plan

Provide a roof plan showing the following:

a. Planning grid and/or column lines.

b. Overall and building element location dimensions.

c. Indication of roof slope and drainage.

d. Roof accessories (skylights, roof scuttles, etc.).

e. Major roof-mounted equipment.

f. Gutters and downspouts.

g. Roof details cross-references.

9.4.3.4 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 shall 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 shall 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.

9.4.3.5 Building Elevations

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

a. Planning grid and/or column lines.

b. Building masses.

c. Door and window opening designations, and penetrations by other disciplines.

d. Identification of major building materials.

e. Roof-mounted equipment and roof accessories when visible in elevations.

f. Elevation and vertical dimensions of floor lines.

9.4.3.6 Building Sections

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

a. Planning grid and/or column lines.

b. Structural system.

c. Changes in floor levels.

d. Finish ceilings.

e. Floor-to-ceiling and floor-to-floor heights.

f. Floor elevations.

g. Spaces to be used by the lighting and HVAC systems

h. Adjacent grades.

9.4.3.7 Typical Wall Sections

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

a. Structural system.

b. Exterior wall and roof assemblies.

c. Ceiling systems.

d. Floor-to-ceiling and floor-to-floor heights.

e. Floor elevations.

f. Spaces to be used by the lighting and HVAC systems.

g. "U" values through roof, walls and floors.

9.4.3.8 Finish Schedules

Finish schedules requirements are included in Chapter 10, INTERIOR DESIGN.

9.4.3.9 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.

9.4.3.10 Life Safety Analysis Plan

Life Safety Analysis Plan sheets shall be referenced as architectural sheets and placed after the other Architectural Drawing sheets in the contract drawing submittal set. Include the following data and provide a legend for symbols used on the drawings:

a. Type of occupancy.

b. Type of construction.

c. Fire/smoke compartments.

d. Exit width calculations and number of exits.

e. Location and rating of walls (1 hr., 2 hr., etc.).

f. Door labels.

g. Door hold open devices.

h. Fire extinguisher and/or fire hose cabinet locations.

i. Egress, dead-end, and common path of travel distances indicating code compliance.

j. Smoke proof doors.

k. Exit lights.

9.4.4 Specifications

Provide outline specifications in accordance with Chapter 3, SPECIFICATIONS.

9.5 INTERIM DESIGN SUBMITTAL (50% - 65%)

9.5.1 Design Analysis

The Design Analysis shall include all items in the Concept 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 10, INTERIOR DESIGN for interior signage requirements.

9.5.2 Drawings

Incorporate comments from the Concept Design review.

9.5.2.1 Building Plans

a. Provide plans for each floor, roof, and ceiling showing dimensions, functional arrangement, and equipment for all areas, including corridors, exits, stairs, and utility spaces.

b. The relationship of the building to exterior access, vehicle parking, service areas, etc., shall be indicated on site plans.

c. Individual treatment shall be given to special design or items involving deviation from normally accepted standards.

d. All column lines shall be designated to aid in locating project components.

e. Identify fire walls, smoke partitions, and all fire rated construction.

f. Show indications of phased construction if required.

g. Thoroughly cross-reference section cut symbols on plans and elevations to detail sheets.

h. Complete door and window details to minimum of 65%.

i. Identify all interior wall and partition types on floor plans and reference them to detail sheets showing construction, heights, fire ratings, and acoustical ratings.

9.5.2.2 Schedules

The drawings shall include door, window, and equipment schedules. Schedules need not be complete at this point, however, they shall be sufficient to indicate the door and window sizes and major equipment items.

9.5.3 Specifications

Provide redlined marked up specifications in accordance with Chapter 3, SPECIFICATIONS.

9.6 FINAL DESIGN SUBMITTAL (UNREVIEWED 100%)

9.6.1 Design Analysis

The Final Design analysis narrative shall include all items in the Interim Design analysis narrative and any revisions made necessary by comments about the Interim Design submittal.

9.6.2 Drawings

a. Complete to the extent required for the Ready-To-Advertise Submittal. Drawings are to be complete, except for incorporation of comments about this submittal.

b. Incorporate Interim Design review comments into the drawings.

c. Insure that all details, sections, etc., necessary for the final documents have been added to the drawings and are complete and thoroughly cross-referenced.

d. Complete all schedules. Insure that hardware sets have been added to the door schedule and coordinated with the specifications.

9.6.3 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 3, SPECIFICATIONS.

9.7 READY TO ADVERTISE SUBMITTAL (REVIEWED 100%)

9.7.1 Design Analysis

Complete analysis supporting the requirements of the project.

9.7.2 Drawings and Specifications

Complete thoroughly checked drawings and specifications, with all comments from the final review incorporated.

9.8 TECHNICAL REQUIREMENTS

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

9.8.1 Coordination

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

a. Insure adequate above-ceiling space for ductwork, piping, lighting, structural members, etc.

b. Coordinate reflected ceiling plans with lighting and HVAC plans.

c. Coordinate light switches with door swings.

d. Coordinate electrical and mechanical drawings with architectural plans to assure proper power, gas, water, etc. for drinking fountains, kitchen equipment, etc.

e. Coordinate with other disciplines to insure no there are no conflicts in roof drain, exhaust fan, louvers, and other similar item locations.

f. Insure that all louvers are coordinated with mechanical drawings and that no louvers are located in fire or smoke doors.

g. Coordinate structural with architectural to insure framing at all roof openings.

h. Coordinate electrical and instrumentation to ensure utilities are provided for power operated doors and doors requiring electrical or electronic controls.

i. Insure all rated wall penetrations receive fire stopping or receive fire rated sealant around penetrations.

9.8.2 Site Work

9.8.2.1 Floor Relation to Grade

The finish floor of concrete floor slabs on fill shall be a minimum of 6 inches above the finished grade.

9.8.2.2 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, shall be shown and detailed on the architectural drawings. Ramps complying with the requirements of ADAAG and UFAS shall be provided where required to allow access by the physically impaired.

9.8.3 Masonry

(a) Coordinate with the project Structural Engineer for incorporation of standard CMU details.

(b) Coordinate with the project Structural Engineer for incorporation of an efflorescence-controlling admixture for mortar.

9.8.3.1 Interior Walls and Partitions

Concrete masonry units (CMU) for interior masonry walls and partitions shall be not less than 6 inches in nominal thickness.

9.8.3.2 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.

9.8.3.3 Coursing

Concrete masonry unit coursing generally shall be coordinated with door heights to minimize the need for cutting block.

9.8.4 Miscellaneous Metals

All access panels required to service mechanical items normally furnished and installed by the non-mechanical trades shall be shown on the architectural drawings. Insure that access panels, when required, are specified and detailed.

9.8.5 Thermal and Moisture Protection

9.8.5.1 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 shall be indicated as coordinated with the project Mechanical Engineer.

9.8.5.2 Vapor Barrier

The exterior envelope of all cooled facilities shall have a continuous, positive vapor barrier of at least 0.06 permeance as coordinated with the project Mechanical Engineer.

9.8.5.3 Moisture Barrier

(a) Verify and incorporate appropriate moisture barriers in exterior veneer wall systems.

(b) Standing seam metal roofs installed over a structural metal deck and rigid insulation shall include a 40 mil, self-sealing, secondary water barrier.

9.8.6 Roof Systems

(a) When roof top equipment is installed that will requirement 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 shall be secured to prevent unauthorized access.

(b) The minimum roof slope for built-up roofs shall 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 shall a built-up roof slope exceed 2 inches per foot. Roof slope for standing seam metal roofs shall be 1 in 12 minimum. Installation policy will dictate required slope above that minimum.

(c) Confirm roof system warranty and water tightness requirements with the installation prior to the Final (Unreviewed 100%) Submittal, and incorporate these requirements in the specifications.

9.8.6.1 Standing Seam Metal Roofs

(a) Roof panels shall be a minimum thickness of 24-gauge steel or 0.040 aluminum.

(b) Follow manufacturer guidelines in design and installation to permit expansion/contraction of the roof system.

(c) Vented ridge caps are not desirable due to potential leaks.

(d) 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.

(e) An independent roofing consultant shall be hired by the roofing subcontractor for roofs over 10,000 square feet. The consultant shall review and approve roofing shop drawings prior to submittal to the government. The consultant shall be present to monitor the entire roof installation. The consultant shall be certified by the roofing manufacturer.

(f) Ensure that pressure treated wood blocking is designed and shown in the drawings at roof edges.

(g) Roof penetration flashing, curbs, gutters, and flashing shall be the product of the roofing manufacturer.

(h) All laps shall be in the direction of water flow.

(i) Full length, job fabricated panels are recommended. Individual roof panels less than 50 feet in length with joints are not permitted.

(j) Ensure that roof penetrations occur in the center of individual roof panels rather than at edges.

(k) Roof edge gutters shall be installed with gutter hangars, and shall not be attached directly to the roof membrane or fascia. The front edge of the gutter shall be below the back edge at least 1 inch below the roof edge

(l) 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.

(m) Where rigid insulation is installed, ensure that its compressive strength is compatible with the standing seam metal roof system as recommended by the manufacturer.

9.8.6.2 Other Roofs

For other roof types comply with the National Roofing Contractors Association standards.

9.8.6.3 Sheet Metal

In all cases sheet metal for various elements used throughout a building shall be of the same basic metal. Atmospheric conditions shall be considered in the selection of exposed sheet metal. Different types of sheet metal that can cause accelerated corrosion (galvanic action) of either one shall not be placed in direct contact. Sheet metal used on roofs with concrete roof tiles shall not react with nor corrode excessively due to the concrete.

9.8.6.4 Gutters and Downspouts

When downspouts are required they shall not drain directly onto a walk or platform. When downspouts must occur at walks or platforms they shall pass through or under into underground drains or toward open ground beyond. Downspouts draining onto open ground shall be diverted using precast concrete splash blocks to prevent erosion. Use of interior downspouts shall 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 shall have leaf screens at locations susceptible to collection of leaves and other wind blown debris.

9.8.7 Doors

Door schedules shall be indicated on the drawings.

9.8.7.1 Pedestrian Doors

All pedestrian doors shall be 7 feet 0 inches or 7 feet 2 inches high, except in family housing where they may be 6 feet 8 inches high. Door openings shall, in general, be 3 feet 0 inches wide, except for special purpose doors, toilet rooms (except for handicap) or closet doors in family housing, for instance.

9.8.7.2 Doors to Rooms

Doors to rooms shall be of adequate size to accommodate the installation and removal of furniture and equipment installed therein.

9.8.7.3 Exterior Doors

(a) 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 to the building interior.

(b) Where galvanized steel doors and frames are required, ensure use A40 or A60 designation in lieu of G type coatings.

9.8.7.4 Special-Purpose Doors

Special-purpose doors such as rolling and coiling doors shall be adequately designed to safely resist the design wind pressure. Rolling and coiling steel or aluminum doors shall be designed so as to permit operation of the doors at maximum wind velocities defined in the area where used.

9.8.7.5 Finish Hardware

(a) Carefully read the "Notes to Specifier" for the UFGS hardware specification. Hardware shall be selected from BHMA and ANSI standards. All cylinders shall have 7 pins. Provision of these items must conform to individual requirements of the installation on which the project is located.

(b) Floor mounted center door stops for door pairs shall not be installed above floor level.

9.8.7.6 Hardware Set Designations

Hardware set designations shall be listed in the Door Schedule in preference to locating on the floor plans. Specification Section 08 71 00, Door Hardware, shall provide the necessary hardware set designation numbers, plus description and function of each hardware item included in the Hardware Set.

9.8.7.7 Return Air

Overall size of return air louvers located in doors shall be included in the Door Schedule. Minimum bottom rail dimension shall be 10 inches and the minimum stile dimension shall be 5 inches. Door undercuts shall be shown in the Door Schedule.

9.8.8 Windows

(a) Window schedules and types shall be indicated in the drawings.

(b) Ensure that window types and locations are coordinated with furniture placement to avoid blocking views.

9.8.9 Finishes

9.8.9.1 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 shall be limited to acoustical tile or gypsum wallboard with non-dusting characteristics.

9.8.9.2 Ceramic Tile

(a) Caulk joints between ceramic tile and bathroom fixtures (showers, tubs) in lieu of filling with grout.

(b) Ensure that ceramic tile installation is coordinated with toilet accessories and light switches in restrooms.

9.8.9.3 Gypsum Wall Board

Ensure that control joints are located in drawings and installed as recommended by gypsum wall board manufacturers.

9.8.9.4 Chair Rails

In rooms with movable furniture, ensure that chair rails are installed at appropriate heights to protect wall finish.

9.8.9.5 Paint

Exterior grade paint shall be specified for interior spaces open to exterior humidity and temperature weather conditions (i.e., aircraft hangars).

9.8.10 Equipment

(a) Verify that partition thicknesses are sufficient for installation of recessed or semi-recessed equipment including toilet accessories.

(b) Ensure that partition thicknesses are sufficient for installation of concealed plumbing utilities.

(c) Ensure that ceiling recesses are provided at overhead coiling doors.

9.8.11 Rooms and Spaces for Utilities

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

9.8.12 Floor Drains and Slopes

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

CHAPTER 10

INTERIOR DESIGN

INDEX

EXHIBITS

CHAPTER 10

INTERIOR DESIGN

10.1 GENERAL

10.1.1 Scope

The purpose of this chapter is to provide general and technical information that applies to both building related and furniture related interior design projects. It covers the requirements for developing design criteria and project presentations. Following the instructions in this chapter and coordinating this chapter with Chapter 9 ARCHITECTURE, Chapter 22 DESIGN BUILD REQUEST FOR PROPOSAL DEVELOPMENT, and the other building related engineering chapters in this Design Manual will ensure the practice and benefit of interior design is fully integrated into the project and the project delivery process used to solicit for the design, construction and "outfitting" of a facility.

10.1.2 Overview

The Mobile District has two categories for interior design services and two primary project delivery processes to solicit for the design, construction and "outfitting" of facilities. **Exhibit 10-1a** describes the two categories for interior design services. **Exhibit 10-1b** describes the two project delivery processes. The percentage level of design criteria and presentation information for building related and furniture related submittals vary within each project delivery process. However, 100% building related and furniture related interior designs shall be accomplished at the end of the project delivery process regardless of which type of solicitation is used.

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

Exhibit 10-1a	Two Categories for Interior Design Services
SID	Structural Interior Design (SID) is the selection, specification and sampling of all the building's interior features exposed to view in the finished construction. The SID submittal will include SID material/finish samples, interior floor plans, and detail drawings showing finish placement, finish schedules, interior signage schedules and material specifications. The SID is purchased and installed by the General Construction Contractor using Military Construction (MILCON), Military Construction Program (MCP), or Military Construction Army (MCA) Funds.
FFE	Furniture, Fixtures and Equipment (FFE) formerly known as the Comprehensive Interior Design (CID) is the development and documentation of a very large consolidated procurement furniture package developed during the design phase of a project and implemented during the construction phase of a project. The FFE is the selection and illustration of all furnishings (interior and in some cases exterior furnishings) required to "outfit" a facility. The FFE includes market research narratives and "best value" determination statements, samples of furniture finishes, furniture placement plans, illustrated order forms and a comprehensive cost estimate. The FFE is to be fully coordinated with the SID, architectural layout, and building engineered system designs to ensure a fully integrated SID/FFE project is developed to meet User/project requirements. The FFE design, like the SID design, is funded with MILCON funds when the FFE is documented as part of the project requirements described in the DD 1391. However, procurement and installation of the FFE package is funded with operations & maintenance (O&M) funding requested by the User Group and funded by their Command. Although packaged in a "book set" the SID and FFE are two separate and distinct projects when executing them.

Exhibit 10-1b	Project Delivery Process
PPTO	Price Performance Trade Off (PPTO). When the PPTO project delivery process is used, 100% of the SID/FFE will be developed by a single interior design source in the prescribed formats discussed herein. The single source may be either a government in-house interior design source or an Architecture-Engineering (A-E) interior design source.
D-B RFP	Design Build Request for Proposal (D-B RFP). When the D-B project delivery process is used, the SID/FFE project becomes a "two-step" process and will require the services of two different interior design sources to develop the SID/FFE in the prescribed format herein. • Step 1: During the first step, either a government or A-E interior design source will provide nominal (10%-35%), partial (35%-50%) or full (100%)SID/FFE design criteria. Two sections within the D-B RFP will require Interior Design criteria and instructions. The two sections are (1) Section 01 10 10 "Design Criteria" and (2) Section 01 10 12 "Design After Award". • Step 2: The second step occurs after award of the RFP

	D-B contract. During the design phase after award of the D-B contract, the D-B Contractor's interior design source will respond to the D-B RFP SID/FFE instructions provided in Sections 01 10 10 and 01 10 12. When the design phase of the project is complete, 100% SID/FFE submittals will be completed as well. Reference Chapter 22 for specific instructions.

10.1.3 Furniture, Fixtures and Equipment (FFE) Procurement Criteria Review

As early as possible and before starting a PPTO or D-B RFP project, a FFE procurement criteria discussion is to be held in conjunction with the pre-design meeting. Answers to the following questions are to be used to develop the overall project solicitation instructions and possible bid options for development and installation of the FFE. Typical FFE items to be incorporated include:

- Accessories, Artwork, Planters, Plants
- Audio Visual support, carts, project screens
- Chairs(all kinds)
- Desk (all kinds)
- Files & Storage (all kinds)
- Furniture Systems
- Tables (all kinds)
- Equipment, TV. Refrigerators, Washer/Dryers
- Bedding, all Dormitory Room furniture, Sheets, Bedspreads
- Window Treatments, cubicle curtains, shower curtains

Exhibit 10-1c	**FFE Procurement Criteria Review**
Review Questions	• Will a FFE package be part of the project design? (See the DD 1391) • Will the FFE be government procured, contractor installed? • Will the FFE be installed after the building is complete? • Which Contracting Group will buy the furniture? • Will systems furniture be procured with the building and the remaining FFE procured by the User under a different action?
Attendees	• District Project Management • District Project Architect-Engineer • District Interior Designer • A-E Interior Designer • A-E Project Manager • User • Major Command Representative • Installation Contracting Specialist if not using General Services Administration

10.1.4 Reviews and Revisions of Interior Design Projects

Reviews of SID/FFE projects are to be performed by the Government regardless of the project delivery process. Chapter 10 is to be used by the Government reviewer as the basis for the SID/FFE technical review comments.

Revisions and updates will require hard copy and digital copies of the SID/FFE to be refreshed and resubmitted at the next formal submission unless otherwise required by the reviewer.

It is the responsibility of the in-house interior designer or A-E interior designer to request the return of SID/FFE binders for updating and revision. Revisions will incorporate accepted comments and provide updated information as the project proceeds to the next phase of design. Some Air Force Major Commands require "in-process" updating to revise finishes that were disapproved at the formal submittal level. Their requests are to be met.

10.2 SID/FFE REQUIREMENTS AND INFORMATION

SID/FFE projects shall always be "packaged" and delivered as a "book set" but are two distinct products and shall not be cross-referenced. Both SID and FFE packages shall use a "hard copy" and "digital" format. Ninety percent (90%) of the SID/FFE project will be developed and reviewed electronically. The remaining ten percent (10%) will be "hard copy". The "hard copy" products are the SID/FFE binders and Color Boards.

10.2.1 Hard Copy SID/FFE Deliverable Format Requirements

Hard copy deliverables for both SID/FFE projects will use the same presentation format for binders and color boards. The SID/FFE binders become the "book set" envelope. The binders will hold the "hard copy" SID/FFE color Boards and the digital project data (CD-ROM). Do not merge the SID and FFE color samples together on the same board. Building related finishes are packaged separately and "stand alone" from furniture related finishes. Requirements for SID/FFE binders and color boards are shown in **Exhibits 10-2a** and **10-2b.**

Exhibit 10-2a	**SID/FFE Binder and Labels**
Size	• Three Ring Binders to be 8-1/2" x 11"(210 x 280 mm)
Features	• Inside pocket inserts for CD-ROM submittals and review comments • Clear outside cover and spine for project label inserts
Project Identification	Outside Cover and Spine • % Design Phase, Volume Number (i.e. Vol.1 of 3) • "SID" or "FFE" Interior Design title • Project Title • Project Location • Date • Design Agents or A-E Firm and Design Build Contractor
Side Marks for Distribution	• Typical side mark distributions are (EN-DW), (BCE), (Resident Office)(User) etc. • The project specific distribution list may be obtained from the Project Manager.

Exhibit 10-2b	**SID/FFE "Material, Finish & Color" Sample Boards**
Size	• Color Boards shall be an 8-1/2" x 11" module • Fold out color boards should have a maximum spread of 640 mm (25-1/2”).
Header	• Room/Area Color Scheme or Furniture Category
Footer	• Project name, Project Location, no dates
Samples	• Actual samples only • Duplications of samples are not required. • Label samples consistent with drawings, specifications and illustrated order forms (IFO) codes
Photos of Samples	• Photos are not allowed on any project including MILCON medical projects.

10.2.2 Digital Deliverables for SID/FFE Projects

This paragraph provides a general list of SID/FFE Deliverables and general guidance for developing these deliverables. Digital deliverables for SID projects are shown in **Exhibit 10-2c**. The FFE digital deliverables are shown in **Exhibit 10-2d**. Computer software requirements are discussed in paragraph 10.2.3. Furniture Systems drawings and specifications requirements are discussed in paragraph 10.7.

Exhibit 10-2c	**SID Digital Drawings and Specification Deliverables**
SID Drawings	• Building related floor plans, floor patterns plans • Building related elevations and details • Finish Schedules • Interior signage plans and schedules
Drawing Standards	• Based on Architect/Engineer/Contractor (A/E/C) Computer Aided Design and Drafting (CADD) Standards • SID Sheet Letter “I”
SID Specifications	• UFGS 09 06 90 “Color Schedule” (exterior and interior) • Carpet, Resilient Floor Coverings, Ceramic Tile, Terrazzo, industrial floor coatings • Wall base (all kinds) • Wall paint, wall coverings (all kinds) • Ceiling Tiles, Grid, Ceiling treatments • Plastic Laminates, solid surfacing • Auditorium Seating (Fixed) • Blinds or attached Widow Treatments • Stage Curtains and Hardware • Visual Communication Boards • Trim, Signage, Operable Doors, • Toilet Partitions, Lockers • Built-in Casework • Elevator Cab interior finishes
Specifications Standards	• Based on DoD Tri Services Standards • Unified Facility Guide Specifications (UFGS) are used. • Contact EN-DW for specification software. • Use UFGS Section 09 06 90 Color Schedule to list all

	SID finishes, colors and manufacturers in lieu of putting this information on the "I" or "A" drawings.
Jewel Box & CD-ROM Labels	• *EN-DW will provide the title block • *EN-DW will consolidate all building related drawings • *EN-DW will press the CD-ROM and add the labels • The Ready-To-Advertise (RTA) CD-ROM (building related contract (drawings & specifications) may be requested from *EN-DW and submitted in the inside pocket of the SID binder.

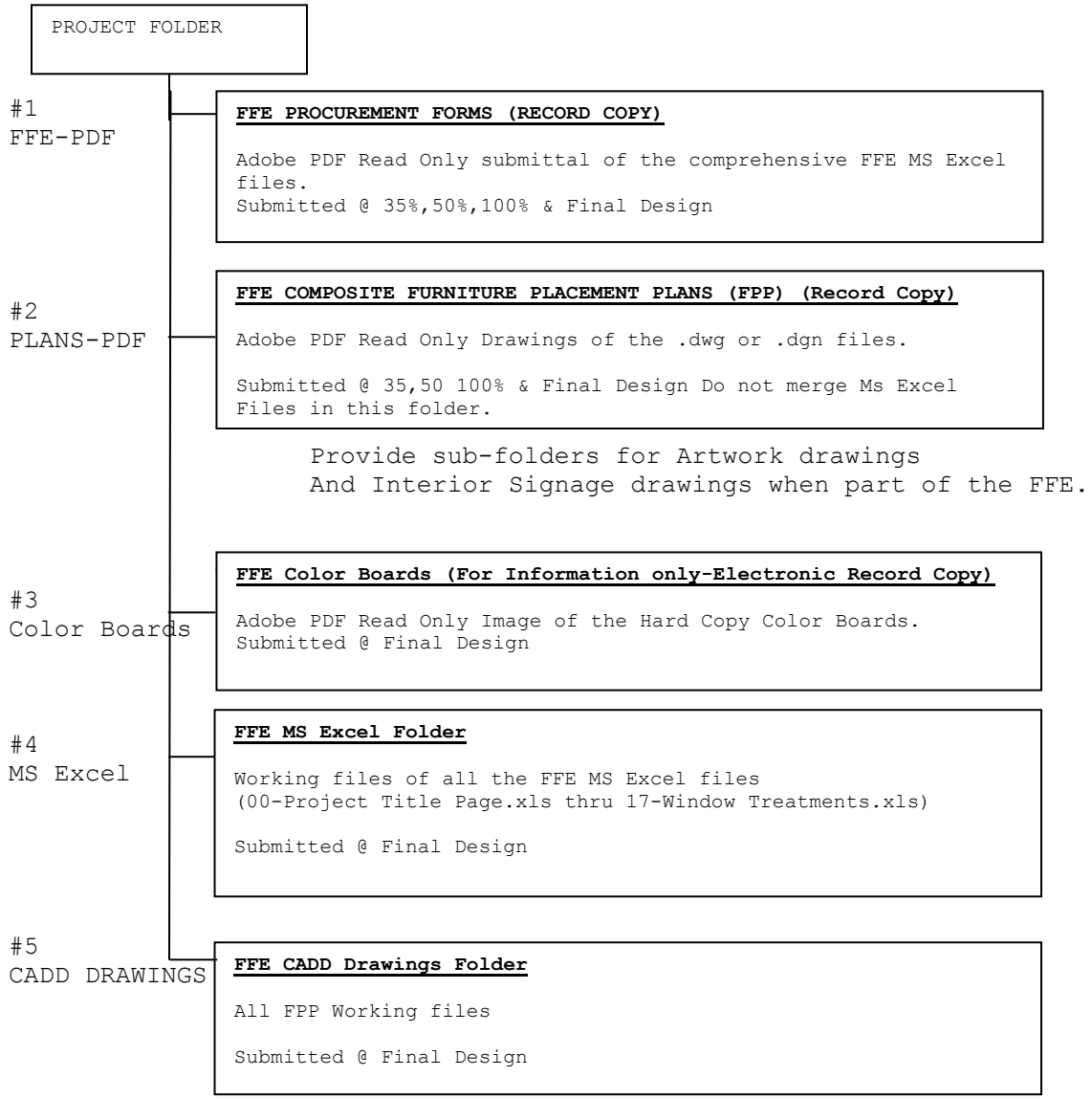
* EN-DW = Mobile District Engineering Division Project Support Section

Exhibit 10-2d	**FFE Digital Drawings and Specification Deliverables**
FFE Composite Furniture Placement Drawings	• Based on DoD Tri-Services CADD Standards, "I" Drawings. • Composite Furniture Placement Plans (FPP) are working drawings showing all furniture systems and freestanding furniture and equipment specified in the FFE package. • FPP validates the building layout ensuring the furniture and equipment within the room functions to meet User requirements. • All furniture items and furniture systems will be identified with a location code that is fully coordinated with the FFE package discussed in paragraph 10.7 • Room numbers are to appear on the FPP drawings. • The FPP drawings, showing the proposed furniture layouts are to be at a scale of 1:100 (1/4 inch = 1 foot), (1/4 inch = 1 foot,) unless otherwise specified. • Coordination notes referencing the electrical plans are to be added to FPPs to locate Power, Voice and Data (PVD) connections/junction box locations as they relate to FFE items. • See Unified Facility Guide Specification (UFGS) Section 12 50 00 Furniture Systems for shop drawings submittal requirements detailing furniture systems designs and installations. • Artwork Placement Plans are to show typical elevation drawings dimensioning the vertical and horizontal location of the artwork. If large quantities of artwork are specified such as for medical projects, provide these drawings in a separate "stand-alone" electronic folder and name the folder "Artwork drawings". Provide working drawings and Adobe PDF drawings in the 100% FFE. • Other Drawings: Provide detailed drawings related to items that require cutting and fitting and are not being installed during the building's construction. Provide any necessary instructions on the Illustrated Order Form (IOF) for that item(s). Provide working drawings and Adobe PDF drawings on the 100% FFE CD-ROM. • See Paragraph 10.4 for developing FPP drawings into the required Adobe PDF files and inserts.
FFE Specifications	• Use UFGS Section 12 50 00 Furniture Systems when specifying and bidding Furniture Systems is required. • Illustrated Order Forms (IFO) are used to specify freestanding furniture and equipment. • IFO formats are discussed in paragraph 10.4.
Jewel Box & CD-ROM Labels	• Label the FFE CD jewel box and CD with the project • information used on the hard copy SID/FFE binders. • Unlike the RTA SID CD-ROM, the Ready to Procure (RTP) FFE CD-ROM (furniture related contract) is consolidated and pressed by the project's Interior Designer of Record will be submitted in the inside pocket of the FFE binder. EN-DW will not be responsible for the FFE.

10.2.3 FFE Digital Folder/File Structure

The digital FFE data used to create the "electronic FFE binder" shall be organized in a file structure to differentiate between Portable Document Files (Adobe PDF), CADD files, and MS Excel files. The Master Adobe PDF Folders can be linked together to facilitate easy viewing between Adobe PDF SID electronic data submitted and coordinated through EN-DW and will not appear in the FFE CD-ROM. The FFE file structure shall be as follows:

Exhibit 10-2e Final Electronic FFE Binder Folder/File Structure



10.2.4 Computer Software Requirements

SID and FFE digital deliverables are to be developed and viewed using five (5) computer software programs with no exceptions. The five software programs relate to: (1) CADD drawings, (2) Unified Facility Guide Specifications (UFGS), (3) FFE procurement data (other than drawings), (4) viewing the SID/FFE Record Copy and (5) writing the digital data to CDs.

All digital data files shall be delivered in a format that is directly readable and compatible with the CADD, MS Excel and Adobe Acrobat software and platforms without conversions.

Exhibit 10-2f	**Software Requirements**
1. CADD Working Drawings	SID/FFE working CADD drawings shall be developed in the latest version of AutoCAD (.dwg) or Microstation (.dgn). Customer requirements will dictate which software version to use. AutoCAD is the preferred CADD program for developing FFE (furniture related) drawings.
2. UFGS	SID specifications will be edited using SpecsIntact software. Contact the office of EN-DW to obtain project specific software programs available for downloading.
3. FFE Procurement Ordering data (Other than drawings)	FFE Procurement Ordering data shall be developed in the latest version of MS Excel (.xls). The required 18 editable working files are ready for copy and downloading on the Mobile District Public FTP web site. The Website address is ftp://ftp.sam.usace.army.mil/pub. Open the folder marked "INTERIOR DESIGN" for the editable FFE .xls files and copy to your hard drive.
4. SID/FFE Record Copy	The SID/FFE digital record copy shall be developed and viewed in the latest version of Adobe Acrobat Read/Write portable document format (Adobe PDF). Working CADD drawings are to be "printed" in black and white (no color output) Adobe PDF format. FFE MS Excel.xls files are to be "printed" in the Adobe PDF format.
5. CD's and Jewel Box	Write CDs using Easy CD Writer written in "Data/Data CD" platform. Don't use Direct CD with DVD driver to write the CD. Write to CD-Recordable discs.
General Notes For FFE Digital Files	Do not write digital data information using "DIRECT CD with .udf or .ulf extensions". No additional drivers or programs shall be installed on the hard drives of reviewers. Projects submitted in .udf or .ulf extensions will automatically be disapproved. All submittals are to be directly opened and viewed through AutoCAD or Microstation, MS Excel and Adobe Acrobat Read software programs.

10.3 SID SPECIFIC INSTRUCTIONS

This paragraph gives instructions for developing SID criteria and assembling sequence of the SID package for the PPTO. For D-B RFP project delivery process reference Chapter 22 DESIGN BUILD REQUEST FOR PROPOSAL DEVELOPMENT. A matrix is provided for each project delivery process to summarize submittal deliverables. Carefully read and follow the instructions before beginning a project. SID submittals will run concurrent with the architectural submittal regardless of the design delivery process.

10.3.1 SID Deliverable Matrixes

There are four matrixes to use for SID projects. The project delivery process used for the project solicitation will determine which SID matrix to use. The **Exhibit 10.3a** list the project specific SID Matrixes. For D-B specific instructions, see Chapter 22 DESIGN BUILD REQUEST FOR PROPOSAL DEVELOPMENT for SID and FFE Design specific instructions.

Exhibit 10.3a	**Project Specific SID Matrixes**
Project Delivery Process	Matrix Description
PPTO **Exhibit 10.3b**	SID PPTO Deliverable Matrix • Gives the sequence of assembly • Gives Format requirements and • "Project Phase" specific submittal requirements. • Not all projects will have a formal 65% design review phase. If that is the case, those items may move to the 100% submittal phase. • MILCON Medical Projects will follow this matrix.
Reference Chapter 22 D-B RFP **Exhibit 10.3c**	SID D-B RFP Section 01 10 10 "Design Criteria" Matrix • Gives the sequence of assembly • Gives Narrative requirements • It is important that the User be involved in the development of the interior design criteria to ensure their project requirements are fully integrated into the D-B RFP solicitation. The D-B Contractor will only provide what is required of him/her after the award of the contract
Reference Chapter 22 D-B RFP **Exhibit 10.3g**	SID & FFE D-B RFP Section 01 10 12 "Design After Award" Matrix • Gives the standard clause to "cut and paste" into D-B RFP "Section 01 10 12 Design After Award". • The standard clause may require modification to meet project specific requirements. A project specific requirement may include the purchase and installation of the FFE.
Reference Chapter 22 D-B RFP After Award **Exhibit 10.8a**	SID D-B Contractor's Deliverables • Gives instructions for the pre-definition SID/FFE presentation after award of the D-B Contract. • Gives the sequence of assembly for design 50%,100% and final designs.
Coordination of the FFE	It is important to reference paragraph 10.4 for FFE PPTO and D-B RFP project specific criteria to ensure coordination of SID and FFE products.

10.3.2 SID PPTO Projects

SID PPTO projects will require 100% of the SID to be developed by one interior design source. During the project development process, the project interior designer will be required to write the SID CD-ROM. The CD will be submitted in the front pocket of the SID binder at each submittal phase. These preliminary contract documents will be submitted in the Adobe PDF Read Only format.

When the project is complete and Ready-To-Advertise (RTA) all the contract drawings and specifications, including SID drawings and specification, will be sent to the Mobile District. The District's project support section, EN-DW, will write the final RTA Project CD-ROM. The project interior designer will be required to obtain copies of the RTA CD-ROM from EN-DW and include it in the front pocket of the SID Binder before the final SID binders are distributed.

EXHIBIT 10.3b	**SID-PPTO Deliverable Matrix** This applies to MILCON Medical Projects * Hard Copy Presentation ** Digital Data Presentation					
ITEM	DESCRIPTION	10%-15% S-2	30%-35% S-3	50%-65% S-4	100% S-5	RTA S-6
1.	* COVER SHEET/SPINE LABEL		X	X	X	X
2.	* TABLE OF CONTENTS (SID) *Include the FFE table of contents if part of the "packaged book set".*		X	X	X	X
3.	** NARRATIVE of SID OBJECTIVES (printed to a Adobe PDF file)	X	X	X	X	X
4.	*INTERIOR FINISHES-COLOR BOARDS		X	X	X	X
5.	*INTERIOR SIGNAGE-COLOR BOARDS		X	X	X	X
6.	**DRAWINGS- Floor plans, Room Finish Schedule, etc. (Black and White out put Adobe PDF format)		X	X	X	X
7.	**INTERIOR SIGNAGE ILLUSTRATIONS PLANS AND SCHEDULES (Black and White out put Adobe PDF format)				X	X
8.	** UFGS SPECIFICATIONS (printed to the Adobe PDF format)				X	X
9.	** Ready to Advertise (RTA) CD with all drawings and specifications. Obtain from EN-DW.					X

MATERIAL (MAT.), FINISH (FIN.) AND COLOR (COL.) SCHEDULE

ROOM NO.	ROOM NAME	FINISH FLOOR		BASE		WAINSCOT		HEIGHT	NORTH WALL			SOUTH WALL			EAST WALL			WEST WALL			CEILING		HEIGHT	REMARKS
		MAT.	FIN. & COL.	MAT.	FIN. & COL.	MAT.	FIN. & COL.	AMJ	MAT.	FIN. & COL.	CHAIR RAIL	MAT.	FIN. & COL.	CHAIR RAIL	MAT.	FIN. & COL.	CHAIR RAIL	MAT.	FIN. & COL.	CHAIR RAIL	MAT.	FIN. & COL.		

MATERIAL (MAT.), FINISH (FIN.) AND COLOR (COL.) LEGEND SEE SPECIFICATION C9915 COLOR SCHEDULE FOR MORE DETAIL INFORMATION ON EXTERIOR AND INTERIOR COLOR, FINISH AND MANUFACTURER

MARK	FINISH FLOOR MATERIAL
CONC	
MARK	BASE/ WALL MATERIAL
GWB	GYPSUM WALL BOARD
EXC	EXPOSED CONCRETE
CMU	EXPOSED CONC. MASONRY
CM	CULTURED MARBLE
MARK	CEILING MATERIAL
EXP	EXPOSED
GWB	GYPSUM WALL BOARD
ACT	ACOUSTICAL CEILING TILE

MARK	FINISH FLOOR FINISH & COLOR
CPT-1	CARPET
CPT-2	CARPET TILE
CPT-3	CARPET TILE
CPT-4	CARPET TILE
PT-1	PORCELAIN TILE
PT-2	PORCELAIN TILE
PT-3	PORCELAIN TILE
SV-1	SHEET VINYL
SC	SEALED CONC. (CLEAR)

MARK	WALL BASE FINISH & COLOR
PT-4	PORCELAIN TILE
PT-5	PORCELAIN TILE
RB-1	RUBBER BASE
RB-2	RUBBER BASE

MARK	WALL FINISH & COLOR
P-2	PAINTED, EGGSHELL FINISH
AD-1	ARCHITECTURAL ORNAMENT

MARK	CEILING FINISH & COLOR
P-1	PAINTED, EGGSHELL FINISH
ATC-1	ACOUSTICAL CEILING TILE
-	UNFINISHED
EXP	EXPOSED

Exhibit 10-3c Room Finish Schedule "I" Drawing

10.4 FFE SPECIFIC INSTRUCTIONS

This paragraph gives information and instructions for developing FFE criteria and assembling sequence of the FFE package for the PPTO and D-B RFP project delivery processes. A matrix is provided for each project delivery process to summarize submittal deliverables. Carefully read and follow the instructions before beginning a project. **Exhibit 10-4a** provides a summary of the FFE matrixes to use. When a FFE is part of the D-B RFP design process and the D-B RFP Sections 01 10 10 "Design Criteria" and Section 01 10 12 "Design After Award" requires FFE information and standards clauses previously discussed.

Paragraph 10.4.2 thru 10.4.17 gives specific "step-by-step" instructions and development sequence of the digital FFE package. The electronic FFE package will begin with the documenting the procurement information in MS Excel workbooks and end with the MS Excel workbooks transposed into a Adobe PDF files and which are then assembled into an Adobe PDF "folder" that is opened and viewed through Adobe Reader.

Carefully read and follow the instructions before beginning a FFE project. FFE submittals will run concurrent with the architectural submittals regardless of the project delivery process.

10.4.1 FFE Deliverables

There are four matrixes to use when a FFE is part of the overall project delivery process. The project delivery process used for project development will determine which FFE matrix to use. **Exhibit 10.4a** lists he project delivery process and corresponding FFE Matrix to use.

Exhibit 10-4a	**Project Specific FFE Matrixes**
Project Delivery Process	Matrix Description
PPTO Matrix **Exhibit 10.4b**	FFE PPTO Deliverable Matrix • Gives the sequence of assembly of the FFE CD-ROM • Tells what information is to be provided and the format the information is to be provided. • Not all projects will have a formal 65% design review phase. If that is the case, those items may move to the 100% submittal phase. • Use this matrix for MILCON Medical projects.
Reference Chapter 22 D-B RFP Matrix **Exhibit 10.4c**	FFE D-B RFP Section 01 10 10 "Design Criteria" Matrix • Gives the sequence of assembly of FFE narratives • Gives the level of information that is to be provided when writing the D-B RFP Section 01 10 10 "Design Criteria". • It is important that the User be involved in the development of these criteria to ensure their project requirements for "outfitting" the building are included in the D-B RFP solicitation. • Based on the FFE Criteria Review comments, the D-B RFP Design Criteria shall also provide requirements for the procurement and installation of the FFE package.

Reference Chapter 22 D-B RFP Matrix **Exhibit 22-4**	SID & FFE D-B RFP "Section 01 10 12 Design After Award" Matrix • Gives the standard clause to use when writing the D-B RFP Section 01 10 12 "Design After Award". • This is a "bridge" clause and combines SID/FFE requirements into one standard clause that gives instructions to the D-B Contractor. This standard clause may have to be modified to meet project specific requirements if a FFE is not part of the project.
Reference Chapter 22 D-B After Award Matrix **Exhibit 10.5a**	SID-FFE "D-B Contractor Response to the RFP" Matrix • Gives the sequence of assembly of the FFE presentations and package • Tells what information is to be provided and when it is to be provided during the design phase after award of the D-B Contract. • This Matrix also tells what format the information is to be provided in after award of the D-B contract.
Note: FFE INSTALLED BY THE USER GROUP	• If the client/User Group is installing the FFE package, including furniture systems (prewired) workstations, all furniture system related drawings should be indicated in the SID contract drawings with the note "FOR INFORMATION ONLY". • Reference 10.7 for furniture system drawing and specification requirements.
Note: FFE INSTALLED BY THE CONSTRUCTION CONTRACTOR	• If the D-B contractor is installing the FFE project specific clauses require the Construction Contractor to supply the installation of the FFE, it is the responsibility of the project interior designer to ensure Government/Contractor obligations are clearly stated in the D-b RFP and Bid Options and Costs are defined in the D-B RFP.

EXHIBT 10-4b	**FFE-PPTO Deliverable Matrix** * Hard Copy Presentation ** Digital Data Presentation					
ITEM	FFE SUBMITTAL DESCRIPTION	10%-15% S-2	30%-S-3 35%-S-4	50%-65% S-5	100% S-6	RTA
*	**FFE BINDER (Hardcopy)**					
	Note: Insert CD into inside front pocket of the binder.					
1.	* BINDER COVER SHEET AND SPINE LABEL		X	X	X	X
2.	* TABLE OF CONTENTS (SID/FFE)		X	X	x X	X
3.	* PRELIMINARY FURNITURE "MATERIAL, FINISH AND COLOR" SAMPLE BOARDS		X	X		
3A.	* FINAL FURNITURE SAMPLE BOARDS				X	X
**	**Sub-Folder #1 Record Copy** **FFE Procurement Information** **Ms Excel files transposed** **to Adobe PDF format**					

4.	PROJECT TITLE PAGE		X	X	X	X
5.	TABLE OF CONTENTS FFE		X	X	X	X
6.	BEST VALUE STATEMENT				X	X
7.	UNICOR WAIVER		X	X	X	X
8.	SID/FFE NARRATIVES		X	X	X	X
9.	POC LIST				X	X
10.	CODES & COST ESTIMATE		X	X	X	X
11.	MANUFACTURERS LIST				X	X
12.	ACCESSORIES SECTION TITLE PAGE		X	X	X	X
13.	PRELIMINARY ACCESSORIES ILLUSTRATED ORDER FORMS (IOF)(one IOF)		X			
13A.	ACCESSORIES IOF (All items specified)				X	X
14.	AV SECTION TITLE PAGE		X	X	X	X
15.	AV IOF			X	X	X
16.	CHAIRS SECTION TITLE PAGE		X	X	X	X
17.	PRELIMINARY CHAIRS IOF (one IOF)		X			
17A.	CHAIRS IOF (all chairs used on the project)			X	X	X
18.	DESK SECTION TITLE PAGE		X	X	X	X
19.	PRELIMINARY DESK IOF (one IOF)		X			
19A.	DESK IOF			X	X	X
20.	FILES & STORAGE SECTION TITLE PAGE		X	X	X	X
21.	PRELIMINARY FILES & STORAGE IOF (one IOF)			X	X	X
21A.	FILES & STORAGE IOF					
22.	TABLES SECTION TITLE PAGE		X	X	X	X
23.	PRELIMINARY TABLE IOF (one IOF)					
23A.	TABLES IOF			X	X	X
24.	FURNITURE SYSTEMS SECTION TITLE PAGE		X	X	X	X
25.	FURNITURE SYSTEMS IOF			X	X	X
26.	EQUIPMENT SECTION TITLE PAGE		X	X	X	X
27.	PRELIMINARY EQUIPMENT IOF(one IOF)		X			
27A.	EQUIPMENT IOF			X	X	X
28.	BEDDING SECTION TITLE PAGE		X	X	X	X
29.	BEDDING IOF			X	X	X
30.	WINDOW TREATMENT SECTION TITLE PAGE		X	X	X	X
31.	WINDOW TREATMENT IOF				X	X

**	**Folder #2 Plans.pdf** **FFE Composite FPP Drawings Adobe PDF** **To be viewed using Adobe Acrobat Read**	10%-15% S-2	30%-S-3 35%-S-4	50%-65% S-5	100% S-6	RTA
32.	Furniture Placement Plans		X	X	X	X
32.	Furniture Systems Plans		X	X	X	X
34.	Furniture Systems Product/PVD List			X	X	X

**	**Folder #3 Color Boards.pdf** **MASTER FFE SAMPLE BOARDS Adobe PDF** **To be viewed using Adobe Acrobat Read**	10%-15% S-2	30%-S-3 35%-S-4	50%-65% S-5	100% S-6	RTA
35.	Title Section Page-MARKED FOR INFORMATION ONLY-NOT FOR SHOP DRAWING APPROVAL					X
36.	SID Material, Finish and Color Boards Adobe PDF					X
37.	FFE Fabric and Finish Color Boards Adobe PDF					X

*** Note if Artworks and Interior Signage are part of the FFE provide record copy and working drawings in digital separate folders.**

**	**Folder #4 MS Excel Working Files** **Ms Excel Folder of all the FFE WORKBOOKS** **To be viewed using MS Excel**	10%-15%	30%-S-3	50%-65%	100%	RTA

		S-2	35%-S-4	S-5	S-6	
38.	00-Project Title Page.xls					X
39.	01-Table of Contents.xls					X
40.	02-Best Value Statement.xls					X
41.	03-UNIOCR Waiver.xls					X
42.	04-SIDFFE Narrative.xls					X
43.	05-POC List.xls					X
44.	06-Codes&Cost.xls					X
45.	07-Manufacturer's.xls					X
46.	08-Accessories.xls					X
47.	09-AV.xls					X
48.	10-Chairs.xls					X
49.	11-Desks.xls					X
50.	12-Files&Storage.xls					X
51.	13-Tables.xls					X
52.	14-Furniture Sys.xls					X
53.	15-Equipment.xls					X
54.	16-Bedding.xls					X
55.	17-Window Treatments.xls					X

**	**Folder #5 CADD Drawings (Working Files)** **Composite FPP Drawings** **To be viewed using AutoCAD or Microstation**	10%-15% S-2	30%-S-3 35%-S-4	50%-65% S-5	100% S-6	RTA
56.	All FFE CADD drawings					X

End of Exhibit 10-4b

10.4.2 Master FFE MS Excel Folder

The following paragraphs describe the sequence for developing and assembling the digital FFE data. The process begins with FFE procurement information developed in MS Excel Workbooks. **Exhibit 10.4d** illustrates all the MS Excel workbooks within the Master FFE MS Excel Folder. FPP Drawings will be developed using the DoD Tri-Services standards.

Master FFE MS Excel Files and Project Folder (Folder #4 MS Excel Working Files)

- The FFE project folder could be comprised of as many as of eighteen (18) separate Ms Excel files called "workbooks".
- The number of workbooks used in a FFE project will depend on project specific requirements.
- **Exhibit 10-4d** illustrates the comprehensive list of all possible FFE workbook files.
- Workbook file names "00-Project Title.xls" through "07-Manufacturers List.xls" are related to documenting the design analysis, market research analysis, project specific personnel, and the final cost estimate.
- Workbook file names "08-Accessories" through "17 Window Treatments.xls" are related to the ten-(10) furniture/equipment item categories. No new furniture categories or workbooks shall to be created.
- Each of the 10 furniture categories has its own unique, "stand-alone" workbook with its own unique "alpha code".
- All 18 workbooks are have a prescribed file name and are stacked in a prescribed order. Workbooks shall not be merged or renamed or the FFE project will be disapproved.

"Ready-to-Edit" FFE Ms Excel Workbooks

- The required "ready to edit" FFE MS Excel workbooks which are the working files needed to create the FFE can be obtain upon request.
- Request files from the Mobile District's EN-DA (Interior Design)

10.4.3 Editing the Master FFE Ms Excel Folder (Folder #4)

- The Master FFE MS Excel Folder will require editing if certain categories of furniture/equipment are not used for a project.

- For example, not all FFE packages will require bedding, dormitory furniture and window treatments like draperies. These workbook files would be deleted from the Master Project Folder to reflect only the furniture categories required for the project. Although workbooks files are removed from the master list, the prescribed order of the list shown in **Exhibit 10-4d** is to remain. Do not add, merge, rename or reorganize the structure of files in the prescribed Master Ms Excel Folder files.

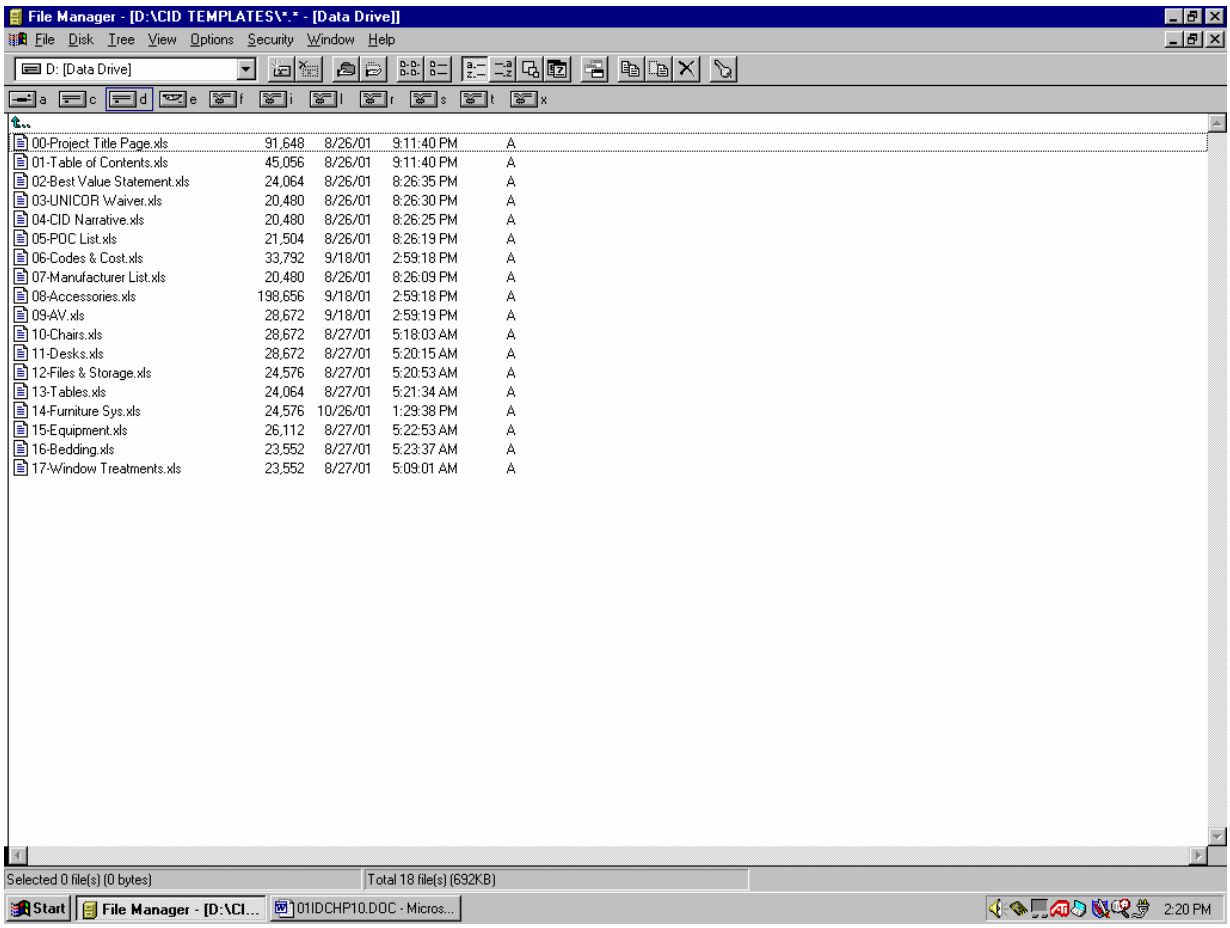


Exhibit 10-4d Master FFE MS Excel Folder of Workbook Files

10.4.4 Editing MS Excel Workbooks and Worksheets

Editing the Ms Excel Workbooks and Worksheets will begin with instructions for editing files "08-Accessories.xls" through "17-Window Treatments.xls"

and end with instructions for editing files "00-Project Title Page.xls" through "07-Manufacturer List.xls".

Default Page Set-up and hyperlinks for all Ms Excel Worksheets are follows:

- A "portrait"-"down and over" orientation
- Letter size 8-1/2" x 11"
- No gridlines
- All 18 workbooks are "hyperlinked" in two places.
- The first link is found in the workbook file "01-Table of Contents.xls".
- A second "hyperlink" is found within each of the 18 workbooks on a worksheet tab marked "Table of Contents Link".
- **Exhibit 10-4e** illustrates a workbook opened to the "Table of Contents Link" worksheet. The "hyperlinks" are ordered and listed in column "B" with corresponding digital file names in column "C". Column "C" is not hyperlinked.

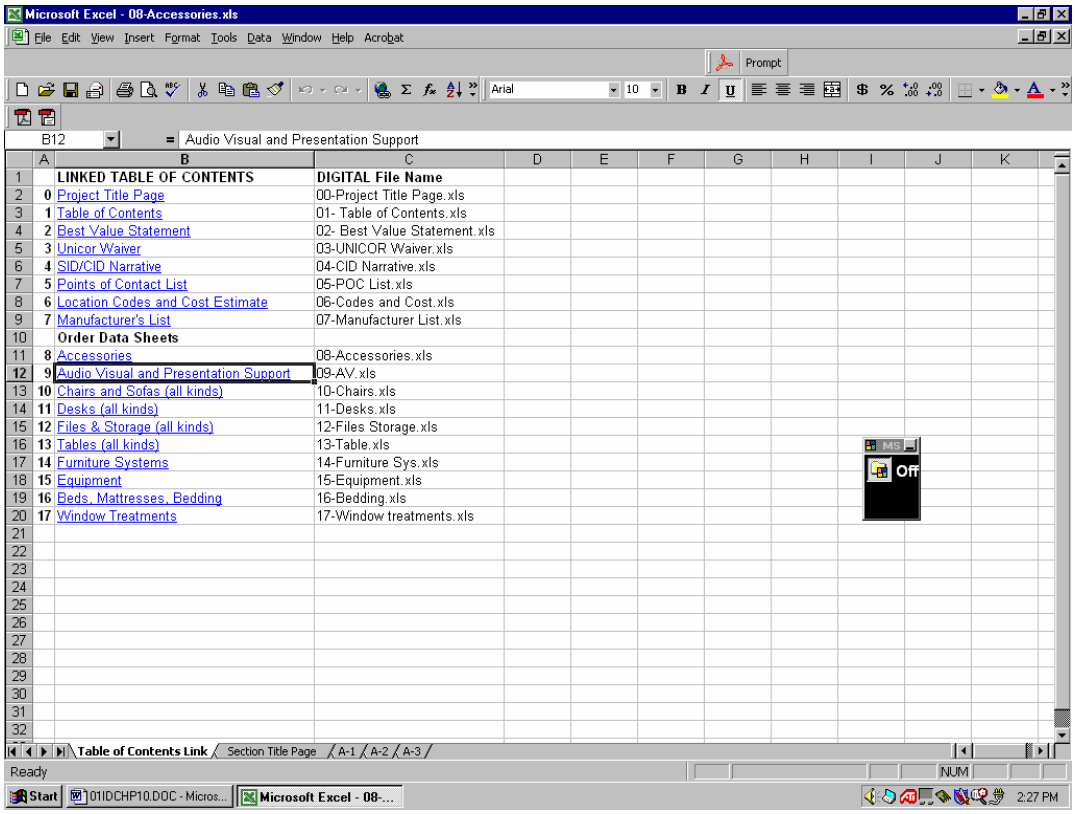


Exhibit 10-4e Opened Workbook

10.4.5 Editing The "Table of Contents Link" Worksheet

- The first worksheet tab within each workbook file shall always be the hyperlinked "Table of Contents Link". This "hyperlink" feature will facilitate easy access and navigation to all other workbook files within the master project folder during the development of the FFE. The integrity of these hyperlinks is to remain at all times.
- When workbook files are deleted from the master project Folder, edit

all "Table of Contents Links" worksheets, the corresponding digital file names and the "01-Table of Contents" workbook to reflect project specific requirements.

- The "Link" worksheets shall never be part of the Adobe Acrobat Master FFE Submittal. The "Link" worksheets will remain a unique worksheet within the Master FFE MS Excel Folder.

10.4.6 Editing the "Section Title Page"

- The second worksheet tab within each workbook file shall always be the "Section Title Page". **Exhibit 10-4f** illustrates the "Section Title Page".
- Edit the "footer" on all "Section Tile Page" worksheets to indicate the Project Name and Location. Verify the correct "Section Title" is in the header. Do not put dates or location codes in the "headers and footers".
- Edit the "Section Title Page" to provide a generic list of items specified in each section. For example the list under the general category of "Section 8-Accessories" may read: Artwork, Artificial Plants, Clocks, Coat Racks and Wastebaskets.
- Edit the "Section Title Page" for the range of location codes used within this section. For example if 32 accessory type items are being specified in "Section 8-Accessories" then the range of location codes would read: A-1 thru A-32.

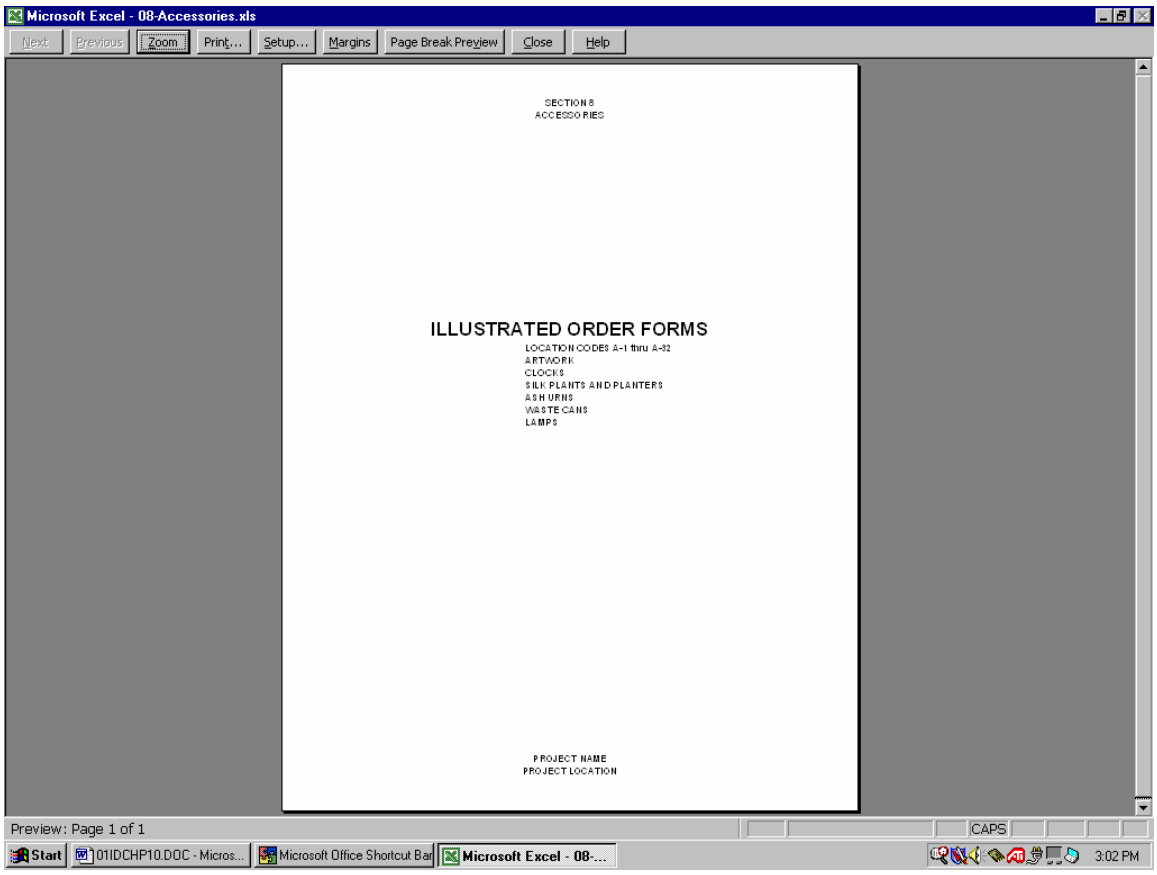


Exhibit 10-4f "Section Title Page"

10.4.7 Alphanumeric Location Codes

- The third worksheet tab within a workbook shall always start the "Illustrated Order Forms" (IOF). Each IFO is identified on a worksheet tab with the new simplified alphanumeric "Location Code".
- **Exhibit 10-4g** illustrates the Location Codes tabs and stacked horizontally for easy navigation.
- There are only 10 "alpha codes" that can be used in developing the FFE. However there are infinite "number codes" to use. Before assigning an alphanumeric location code to an item, determine the FFE category workbook the item is to be in. When the category and workbook is determined, using the workbook's unique alpha code, assign the item an "alphanumeric" location code.
- Location Codes are not in alphabetical order. Codes are selected, ordered and stacked for easy editing of the Master MS Excel Director.

10.4.8 Workbook Alpha "Location Codes"

- A= Accessories
- V= Audio Visual and Presentation support furnishings
- C= Seating (All Kinds)
- D= Desks (All Kinds of free standing units)
- F= Files and Storage (All Kinds)
- T= Tables (All Kinds)
- S= Furniture Systems (Panels, components, & worksurfaces)
- E= Equipment
- B= Bedding, dormitory room furniture, Sheets, Mattress
- W= Window Treatments not included in the SID such as draperies.

10.4.9 Editing IOF Worksheets

Editing the IOF worksheet is a two-step process. The first step is the page set-up. The second step is the actual development of the item specific ordering information. The following instructions will provide general guidance developing IOF worksheets and page set-ups:

- Only one location code per worksheet tab.

- Specify only one FFE item per worksheet tab.

- Worksheets also known, as IOFs shall not be merged. For example, if 32 different types of accessories are specified for a project, there shall be 32 worksheets tabs labeled A1, A-2, A-3 etc.

- The new simplified Location Codes are provided in the editable MS excel files obtained from the Mobile District.

- Use only the alphanumeric codes provided in the 10 Furniture/Equipment workbooks. Do not create any new locations codes or workbooks. Alpha Codes used other than those provided will be disapproved. Exceptions are for Medical Projects.

- The "Location Code" used on the worksheet tab is also to be placed in the worksheet on line "1", column "B". Do not place the Location Code

in the "header or footer".

- Edit the “header/footer” of each IOF with the Section Number and Name and the Project Name and Project Location. Dates are not required.

- If hyperlinks are used during the design development process, delete the hyperlinks in the in the Ready-To-Purchase (RTP) working files to. Hyperlinks are to be only in the "Table of Contents Link" Worksheets and the file “01-Table of Contents” workbook at the RTP submittal.

- Formulas for adding and multiplying cost and quantities can be used for quick calculations within a IFO worksheet only and can remain in individual IOFs at RTA.

- Do not hyperlink formulas to any other IOF worksheets or workbooks. Do not link the Cost Estimate workbook to any of the IOF worksheets. All 100% workbooks and worksheet are "stand alone" documents.

10.4.10 Information Provided on IOF Worksheets

The designer is to edit the IOF by completing all sections. The goal is the use of only one page, 8-1/2” x 11” with “portrait” orientation and shown in **Exhibit 10-4g**. An exception is allowed if additional sheets are needed for detail specifications. The additional pages are to be ordered “down then over” in the “page set”.

Each IOF worksheet is a “stand-alone” document and provides comprehensive ordering information including the following:

- Item’s Location Code
- GSA FSC Group and Schedule Name
- Contractor's GSA Contract Number/Expiration Date
- Contractor's Name and Address information
- Ordering Address
- Catalog Item Name
- Catalog Number
- Catalog Description
- Dimensions
- Finishes
- An image of the item to be purchased. It is suggested that furniture images be inserted into the Ms Excel page using a .bmp format.
- Do not provide an image of the finishes. Finishes shall only be placed on the Hard Copy FFE Color Boards.
- Provide all the ordering information and specification data need for the item illustrated.
- Listing of the room numbers where the item is used.
- Quantity count per room.
- Total quantity count for the project.
- Unit cost of the item.
- Extend cost of all units specified
- Freight cost if applicable.

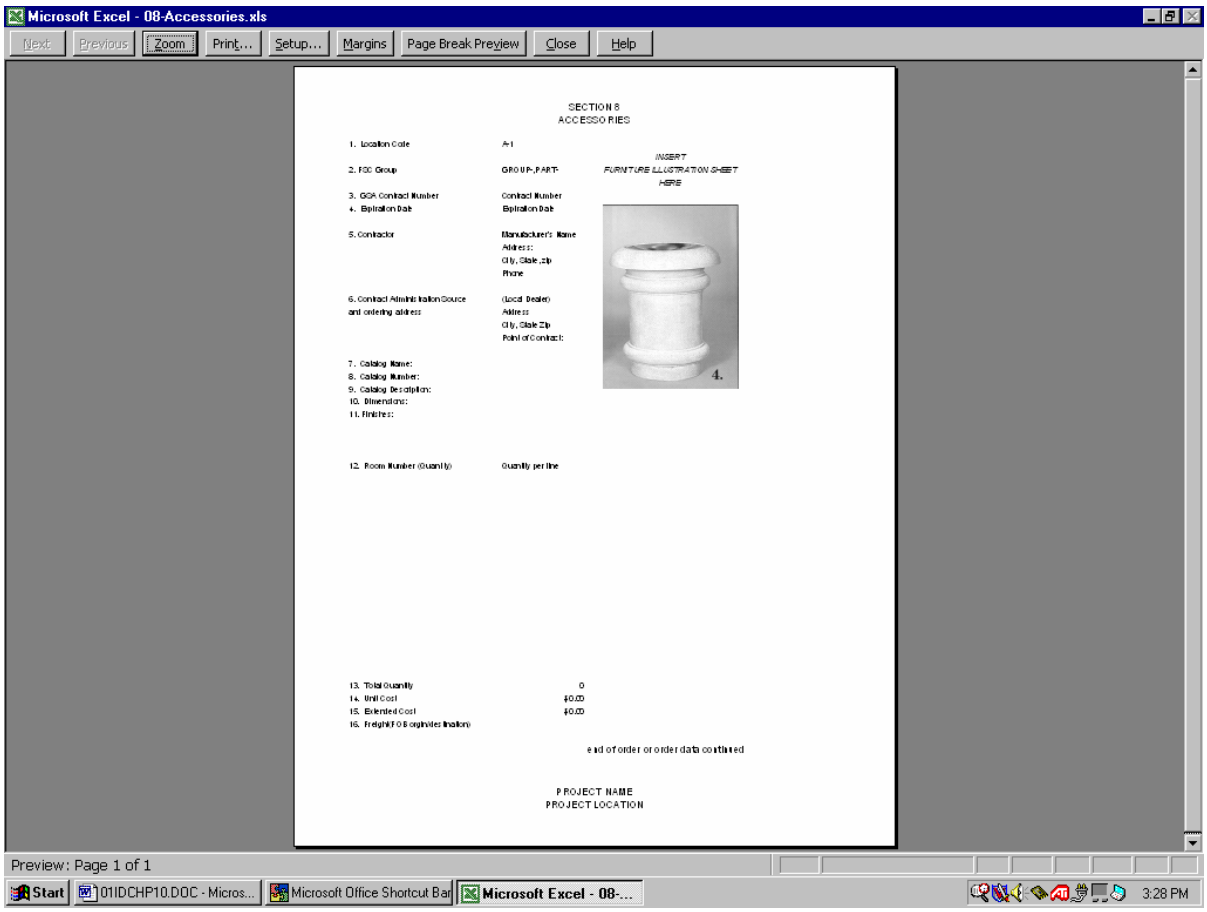


Exhibit 10-4g Illustrated Order Form (8-1/2" x 11")

10.4.11 Editing the Furniture Systems Worksheets

File "14-Furniture Systems.xls" workbook will not follow the format of the other furniture item and equipment workbooks. Paragraphs 10.4.5 Furniture Systems and 10.4 SID/FFE Drawing and Specification Requirements will discuss in detail developing projects that include Furniture Systems.

10.4.12 Editing the Project Title Page Workbook

The Project "Title Page" is found in the file "00-Project Title.xls" Edit the project specific information as indicated in **Exhibits 10-2a** and **10-2b.** This worksheet will also be printed and used as the FFE binder cover insert as well as the digital title page for the Master FFE Adobe PDF Folder, which will be discussed later. Editing the "header and footer" in this workbook is not required. Design Firms may insert their company's logo in the title page as well as project specific User and command logos.

10.4.13 Editing the Table of Contents Workbook

The "Table of Contents" is found in the file "01-Table of Contents.xls". Provide a comprehensive table of contents based on project specific requirements. Ensure this information is coordinated with the "Table of Contents Links" in each workbook.

10.4.14 Editing The Best Value Statement Workbook

10.4.14.1 Purpose. The purpose of the "Best Value Statement" is to provide a Contracting Official with the proper documentation to assist them in determining that the FFE package meets Federal Acquisition Regulations (FAR). A complete and well-written "Best Value Statement" is the first step in ensuring the FFE package will be purchased as designed.

10.4.14.2 File Name. The "Best Value Statement" is found in the file named "02-Best Value Statement.xls". This workbook contains an editable, Government Services Administration (GSA) approved "Best Value Statement" form (Reference **Exhibit 10-12** for the form) and an example of a completed "Best Value Statement". The completed "Best Value Statement" example contains (1) the "best value" market research narratives and (2) completed pricing documentations forms required by Contracting Officials to make their determination that the FFE items in the whole package meets the FAR. The approved GSA "best value" criteria form can be expanded to add additional criteria and is a valid form that can be used by Contracting Officials other than GSA.

10.4.14.3 FFE Resources. The FFE package is simply a large volume, consolidated procurement package of commercial items. To simplify and streamline the procurement process and obtain the volume of commercial items specified in the FFE, the Mobile District requires designers to use the resources and follow rules and requirements found in FAR 8, Subpart 8.4 Federal Supply Schedules (FSS). The FAR 8, Subpart 8.4-Federal Supply Schedules are actually indefinite delivery contracts established with commercial furniture manufacturer's to provide furniture and services for a given contract period of time. The FSS program, directed and managed by the GSA, mirrors commercial buying practices more than any other procurement process in the federal government today. The GSA FSS program provides Federal agencies with a simplified process for obtaining commonly used commercial furniture and services at prices associated with volume buying typical of a FFE package. The GSA FSS schedule contracting office issues publications, entitled "Federal Supply Schedules", containing the contracting information necessary for placing delivery orders with schedule contractors. When a FFE package is ready to implement, ordering offices issue delivery orders directly to the schedule contractors for the required furniture and service. All GSA FSS contractors have been extensively evaluated and their products tested to ensure Federal agencies large or small, even those in remote locations, are provided with the same services, convenience and pricing. GSA FSS provide a variety of contractors supplying comparable items and services at varying prices to provide the designer and User with the flexibility to select the "best value" items that meets the needs of the FFE project.

Below are typical GSA FSS numbers and schedule titles to be used by the interior designer to develop the FFE package. All the GSA schedules are found on the GSA web site in their "e-library".

Number	Title
71-I	Office Furniture
71-II	Household and Quarters Furniture

71-II-H	Packaged Furniture
71-II-K	Comprehensive Furniture Management Services
71-III	Special Use Furniture
71-III-E	Miscellaneous Furniture
72-I-A	Floor Coverings
72-II	Furnishings

10.4.14.4 Documenting "Best Value" Requirements

The FAR mandates that all commercial items (furniture and related services) acquisitions use and document two separate and distinct criteria to reach a "best value" determination before commercial items can be purchased. The two criteria are: (1) market research and (2) price reasonableness. Though these two determinations may both consider the same information obtained during market research, they are separate and distinct from each other. The documentation of price reasonableness is required for all contract awards. The "Best Value Statement" for all FFE packages will document both criteria. In addition, the FFE "Best Value Statement" will also document the market research and price reasonableness of UNICOR's products as well. Although the Department of Defense is not mandated to obtain a UNICOR waiver or required to buy from UNICOR, it is a requirement that UNICOR products be considered when developing a FFE package.

The Best Value Statement is to list the Location Code, then the three required vendors considered for the item, the price of the three considered and a brief statement why the selected item was the "best value" to the government.

For Example: C-1 Manufacturer #1 Chair $300.00
Manufacture #2Chair $350.00
Manufacturer #3 Chair $400.00
Chair #3 was found to be the best value to Government because it was ergonomically designed, easy to operate, and received the most favorable comments by the User when given the opportunity to test the three chairs.

The Interior Designer of record "sign" the approved GSA form electronically as follows:

/signed by/ Mary Doe, Interior of Record, Such and Such Firm, dated.

10.4.14.5 FFE Scope of Work for Additional Services

The "Best Value Statement" workbook may also be expanded to include any Scope of Work documents required to procure from the FSS 71-II-H Packaged Furniture or FSS 71-II-K Comprehensive Furniture Management Services contracts

10.4.15 Editing the "UNICOR Waiver" Workbook

The UNICOR Waiver statement is found in the file "03-UNICOR Waiver.xls. Department of Defense (DoD) activities are not mandated to obtain a waiver

from UNICOR. The UNICOR Workbook has been completed. It contains all the statements and DoD documentation required by a Contracting Official to determination that the FFE meets the FAR. No additional editing is needed.

If the FFE is being developed for another Federal Agency or Department other than the DoD, a paper copy of the UNICOR wavier is to be scanned and inserted as an image into this workbook. Edit the UNICOR Waiver Worksheet to document:

- If a UNICOR waiver is required.
- Provide the .bmp image of the required waiver.

10.4.16 Editing the FFE Narrative Workbook

The FFE Narrative worksheets are found in the file "04-FFE Narrative". The FFE narrative will provide a comprehensive discussion and design analysis as to how FFE items are integrated and function with the SID. Edit the FFE narrative worksheet using:

- A "portrait"-"down and over" orientation
- Letter size 8-1/2" x 11"
- No gridlines
- Do not import any other word document programs into this Workbook.

The FFE Narrative is intended to:

- Discuss the design decisions made to fully coordinate the SID and FFE.
- Discuss Function, Safety, and Ergonomic Considerations
- Discuss Durability, Aesthetics
- Discuss how the FFE met project specific design requirements or the building's systems (power, voice and data) requirements.

10.4.17 Editing the Point of Contact List (POC) Workbook

The POC List is found in file "05-POC List.xls" is a comprehensive list of POCs needed to implement this FFE project. The POC workbook is to list:

- Name
- Address
- Phone/Fax
- E-mail
- Job Function of those associated with the FFE project.

10.4.18 Editing the Location Codes and Cost Estimate Workbook

The comprehensive cost estimate if found in file "06-Codes & Cost.xls". The comprehensive cost estimate shall be organized and grouped by the General Service Administration (GSA) Contracting Source's Contract Number. Because GSA has consolidated many of their schedules, it is possible to have several different types of furniture items listed under one Contractor's Contract Number. Reference **Exhibit 10-3h** for an example of the Cost Estimate.

Do not organize the cost estimate by location codes. The Cost Estimate is

organized according to GSA FSS Schedule Numbers and Titles then by individual contractors and their unique contract numbers under that GSA FSS multiple award schedule.

After furniture and equipment costs have been sub-totaled add the following line item costs to determine the final total cost of the FFE package. Add:

- Freight charges 7-10% CONUS ONLY or 34% for CONUS/OCONUS
- 14% Installation fees
- 5-6% GSA FSS Project Management Fees
- 6.5% Area Office fees (If the project acceptance is accomplished by the District's Resident Office)
- Lead Vendor Management fees other than the ordering an installation fees.

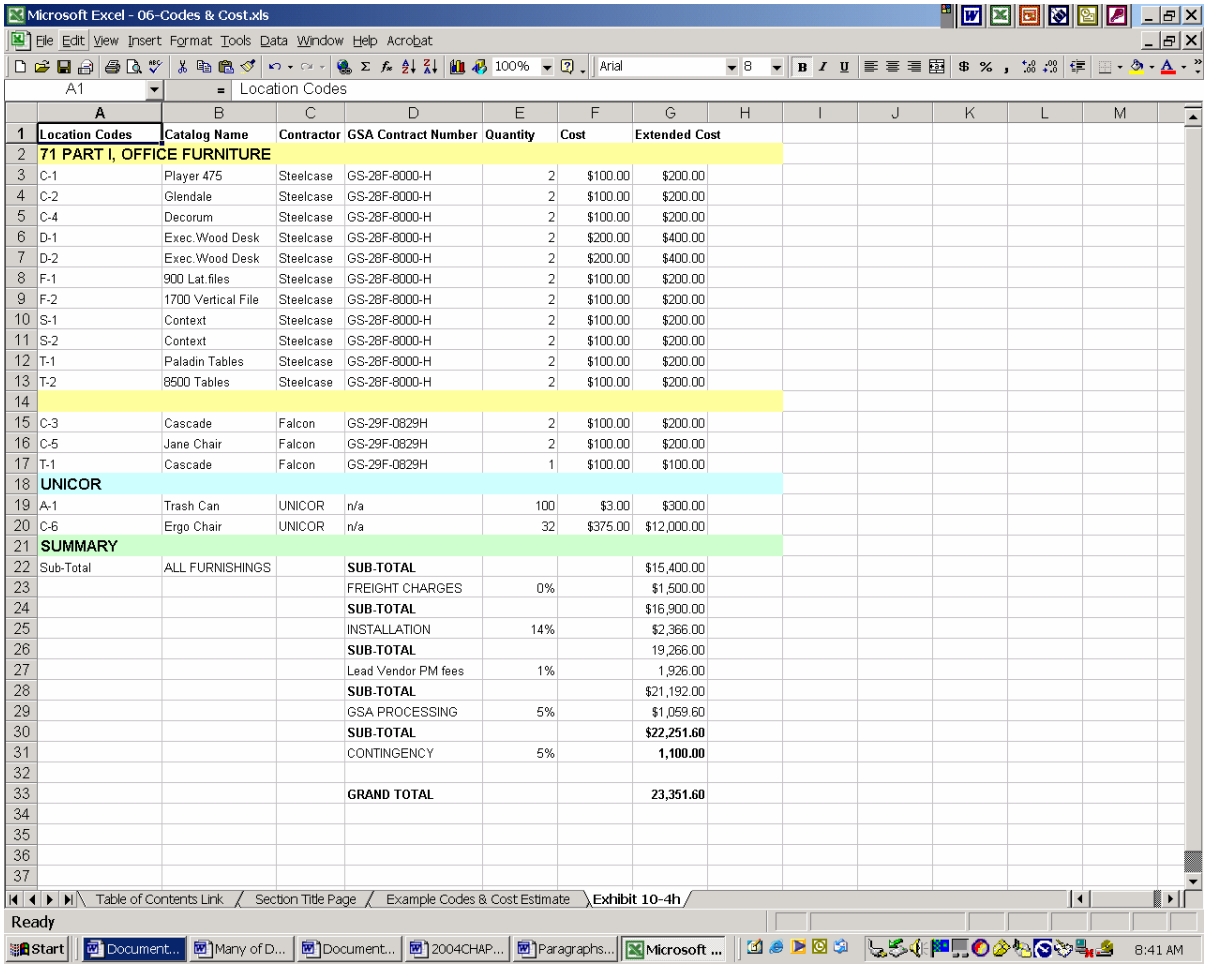
(% may vary and are to be based on the FFE Procurement Plan discussed in 10.1.3)

10.4.19 Editing the Manufacturers List Workbook

The Manufacturer Lists are found in file "07-Manufacturer List.xls". The Manufacturer's list is a comprehensive, summary list with addresses of all the contractors and sources used on the FFE project. IOF will provide other specific information required for ordering purposes in addition to the addresses shown on the Manufacturer's List.

The Manufacturer's List is to show:

- Name of the Source
- Address
- Phone/Fax
- E-Mail address



Microsoft Excel - 06-Codes & Cost.xls

File Edit View Insert Format Tools Data Window Help Acrobat

A1 = Location Codes

	A	B	C	D	E	F	G
1	Location Codes	Catalog Name	Contractor	GSA Contract Number	Quantity	Cost	Extended Cost
2	71 PART I, OFFICE FURNITURE						
3	C-1	Player 475	Steelcase	GS-28F-8000-H	2	$100.00	$200.00
4	C-2	Glendale	Steelcase	GS-28F-8000-H	2	$100.00	$200.00
5	C-4	Decorum	Steelcase	GS-28F-8000-H	2	$100.00	$200.00
6	D-1	Exec.Wood Desk	Steelcase	GS-28F-8000-H	2	$200.00	$400.00
7	D-2	Exec.Wood Desk	Steelcase	GS-28F-8000-H	2	$200.00	$400.00
8	F-1	900 Lat.files	Steelcase	GS-28F-8000-H	2	$100.00	$200.00
9	F-2	1700 Vertical File	Steelcase	GS-28F-8000-H	2	$100.00	$200.00
10	S-1	Context	Steelcase	GS-28F-8000-H	2	$100.00	$200.00
11	S-2	Context	Steelcase	GS-28F-8000-H	2	$100.00	$200.00
12	T-1	Paladin Tables	Steelcase	GS-28F-8000-H	2	$100.00	$200.00
13	T-2	8500 Tables	Steelcase	GS-28F-8000-H	2	$100.00	$200.00
14							
15	C-3	Cascade	Falcon	GS-29F-0829H	2	$100.00	$200.00
16	C-5	Jane Chair	Falcon	GS-29F-0829H	2	$100.00	$200.00
17	T-1	Cascade	Falcon	GS-29F-0829H	1	$100.00	$100.00
18	UNICOR						
19	A-1	Trash Can	UNICOR	n/a	100	$3.00	$300.00
20	C-6	Ergo Chair	UNICOR	n/a	32	$375.00	$12,000.00
21	SUMMARY						
22	Sub-Total	ALL FURNISHINGS		SUB-TOTAL			$15,400.00
23				FREIGHT CHARGES	0%		$1,500.00
24				SUB-TOTAL			$16,900.00
25				INSTALLATION	14%		$2,366.00
26				SUB-TOTAL			19,266.00
27				Lead Vendor PM fees	1%		1,926.00
28				SUB-TOTAL			$21,192.00
29				GSA PROCESSING	5%		$1,059.60
30				SUB-TOTAL			$22,251.60
31				CONTINGENCY	5%		1,100.00
32							
33				GRAND TOTAL			23,351.60
34							
35							
36							
37							

Table of Contents Link | Section Title Page | Example Codes & Cost Estimate | Exhibit 10-4h

Ready

Start | Document... | Many of D... | Document... | 2004CHAP... | Paragraphs... | Microsoft ... | 8:41 AM

Exhibit 10-4h "Location Codes and Cost Estimate"

10.5 ASSEMBLING THE RECORD COPY FFE (Folder #1 FFE.PDF)

After the MS Excel FFE workbooks are edited to meet project and submittal level requirements, each workbook is to be "printed" in Adobe PDF format and compiled into "Sub-Folder #1 which is the Record Copy FFE. The creation of the Record Copy FFE is a two-step process. The first step is to print or transposed all the Ms Excel working files into Adobe PDF files. **Exhibit 10-5a** illustrates the files names and stacking order.

Creating the FFE Adobe PDF files is quick and easy. To print the Ms Excel FFE working files into the Adobe PDF file, print one entire workbook at a time by simply "highlighting" the required worksheet tabs then print in a .PDF output. The file name will be the same with one exception. The file extension will be ".PDF". Not all the worksheets in a workbook will be printed. Do not print to the PDF file the "Table of Contents Link" worksheet tab. The "Link" worksheet tab is used only in the FFE working files within the MS Excel Master Sub-Folder #4 for navigation purposes. Typical tabs titles printed in files "08 through 17" are:

- "Section Title Page" tab
- "Illustrated Order Forms" tabs.

Workbooks with the digital file names 00-Project Title Page.xls through 07-Manufacturer List.xls will require the workbook specific tabs to be printed. Do not print the "Table of Contents Link" in these workbooks.

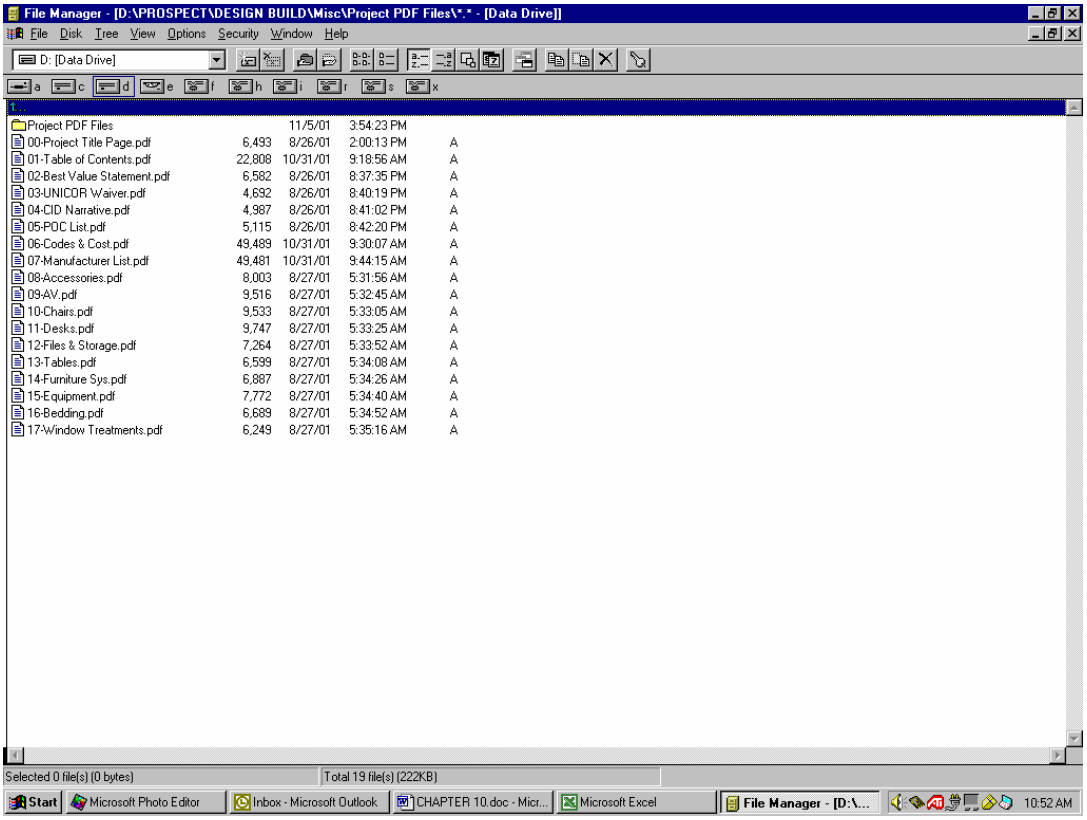


Exhibit 10-5a Adobe PDF Project Files

The second step is to insert the Adobe PDF files into the Sub-Folder #1- which will become the FFE Record Copy is created. Adobe PDF files inserted into the FFE Record Copy using Adobe Acrobat Writer program. The FFE Record Copy is the comprehensive FFE procurement data other than drawings and actual sample boards.

10.5.1 Adding Bookmarks to Section Title Pages

After the digital workbook pages have been inserted into the Sub-Folder #1 using Adobe Acrobat Writer program, begin adding bookmarks to identify each "Section Title Page" and provide the number of pages within each Section. **Exhibit 10-5b** illustrates this requirement. For example, in **Exhibit 10-5b** the Section Title page "SID FFE Narratives" has (2) pages within that section. The page numbers within the each section are noted in parentheses (#).

10.5.2 Adding Bookmarks to Illustrated Order Forms

Add IOF bookmarks as a sub-tile under the "Section Title" bookmarks. Edit the bookmarks using the simple alphanumeric location code used to identify the furniture item. If two or more sheets are required for an IOF add the number of sheets in (#) like the Section Title pages.

10.5.3 Electronic Signatures for the Record Copy

When all the information required for a submittal is inserted into the FFE Record Copy, add a digital signature with a protective password for authenticity of the "Record Copy". This signature action notes if any changes have been made to the document after the digital signature has been added.

10.5.4 Default settings Adobe PDF Record Copy

Set the default settings in the Record Copy FFE as:

- Open with page and bookmarks
- Magnification shall be set to "fit width".

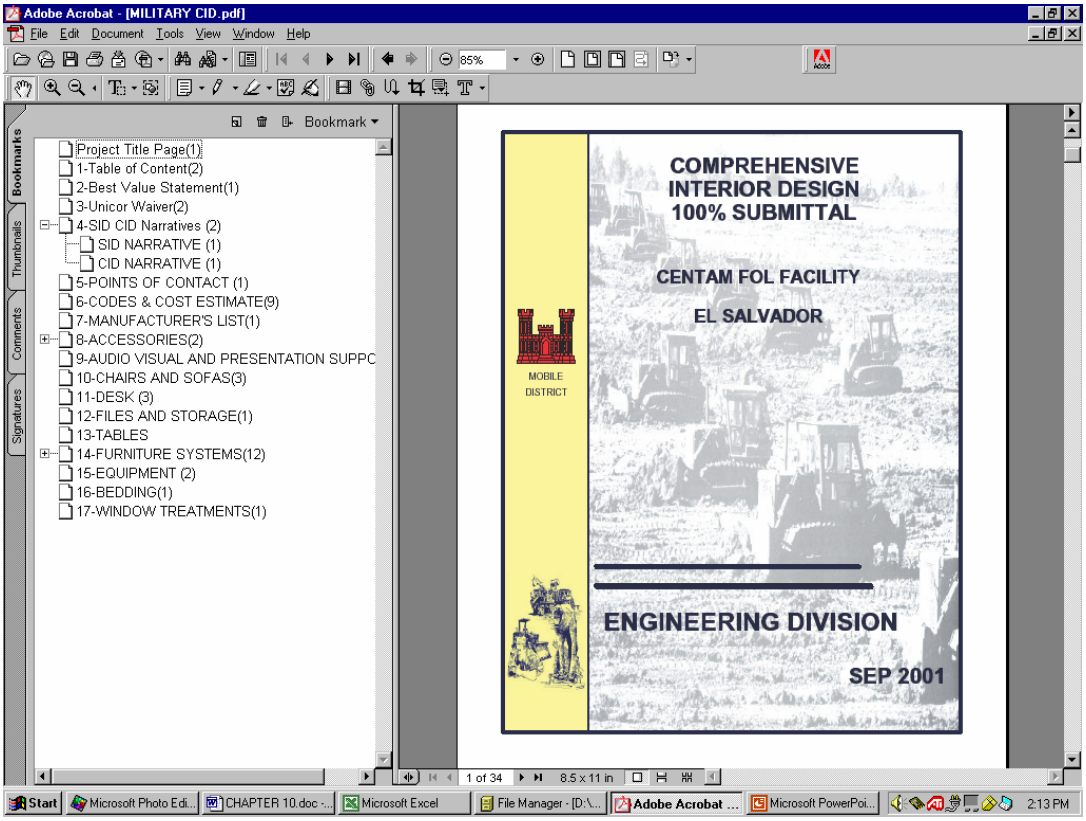


Exhibit 10-5b Adobe Acrobat Digital FFE RECORD COPY FORMAT

10.6 ADOBE ACROBAT READ DRAWINGS AND DRAWING BOOKMARKS (Sub-Folder #2)

Working drawings of the "Composite Furniture Placement Plans" (FPP) shall be printed to Adobe PDF files and placed in Sub-Folder #2. The FPP drawings are not to be included in the same folder as the IOFs. Drawings are to be stacked in a drawings folder as illustrated in **Exhibit 10-2e**.

10.6.1 Adding and Bookmarking Acrobat Read Drawings

Working files of AutoCAD or Microstation drawings are to be printed in the Adobe PDF format using black and white output. Color output is not

acceptable. When inserted into the Adobe Drawings Folder, "Bookmark" a full view of the each composite furniture placement. Use the sheet name in the drawing's title block for the "Bookmark" title.

10.6.2 Adding and Bookmarking Individual Room Placement Plans

After all the FPP drawings have been set for full view, bookmarked and titled, create individual room placement views under each Sheet title. This is done by "zooming-in" on the individual furnished rooms and inserting a "bookmark" for that one room. Edit Room Placement Plan bookmarks with the room number only. If the customer requires a hard copy of the room plan, instruct them to use the "crop and print" feature in the Acrobat program to obtain the hard copy. **Exhibit 10-6a** illustrates the Composite FPP with individual room "bookmarks".

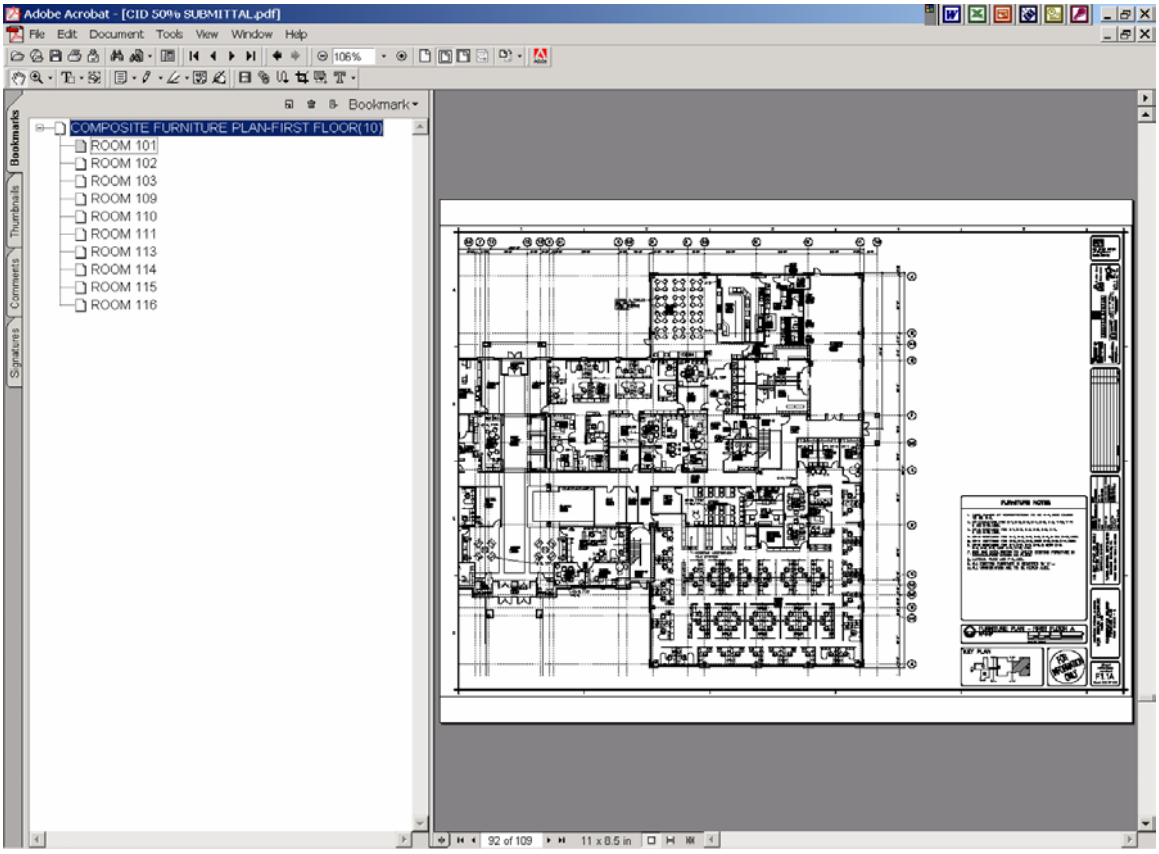


Exhibit 10-6a Composite Furniture Placement Plans and Room Bookmarks

10.7 FURNITURE SYSTEMS

Furniture systems workstations, either desk based, panel based or a frame and tile system are actually "a building within a building" because of their intended use and the requirement to fully coordinate them with the building's finishes, architectural layout, structural, electrical and mechanical systems.

Furniture system workstations are intended to function as hard walled offices providing some degree of acoustical and visual privacy in addition to having power, voice and data (PVD) network distribution outlets like

one would find in a hard walled office. Workstation designs and layouts are required to fully coordinate with the life safety plan, audio and visual alarms and the fire suppression system to ensure the "building within the building" supports life safety.

Workstation solutions for projects are not only to be designed for project specific requirements but are required to address the inevitable office reconfiguration. Workstations need to be selected for their best value features, durability, flexibility, and ease of reconfiguration. Workstations are to offer limited interruption of the PVD when reconfiguration occurs and are to be easily adaptable to incorporate new technology.

Workstations are to provide ergonomic features such as adjustable height work surfaces, fully articulating keyboards with parallel and changeable mouse pads, and paper management and storage tools to support tasking. All computer hard drives are to be mounted under the worksurfaces. A suitable, ergonomically designed task chair is to be selected and specified for each workstation. To the fullest extent possible, avoid placing an occupied workstation next to common use area such as semi-private conference spaces, copy areas or "food preparation" areas.

When considering the scope of work involved developing a furniture systems design and cost estimate and when considering the project delivery process of "fast track- Design Build", new design requirements have been developed to ensure furniture systems designs and installation efforts are reasonably distributed throughout the design and construction process. These new requirements shall be applied to PPTO and D-B RFP projects alike to ensure the SID/FFE submittal process for all projects are consistent.

10.7.1 Furniture System Requirements During the Design Phase

During the Design Phase of an PPTO or D-B RFP project provide the following design and procurement information:

- Workstation finishes,
- Coded workstation layouts plans
- Workstation product lists
- PVD requirements per typical workstation
- Cost estimates
- Edited UFGS Section 12 50 00 FURNITURE SYSTEMS

10.7.2 Furniture Systems Requirements During the Construction Phase

During the construction phase of the project furniture systems vendors and the construction contractor is to provide as a single shop drawing the following submittal information:

- Detailed drawings, panel plans, PVD plans,
- Bill of materials
- Elevations or isometrics of typical workstations

Note: These requirements are based on submittal requirements listed in the UFGS 12 50 00 Furniture Systems.

10.7.3 Editing FFE Ms Excel Furniture Systems Workbook

The following instructions will provide guidance for the development of the FFE MS Excel file "14-Furniture Systems.xls to meet "Design Phase"

requirements. The MS Excel File "14-Furniture Systems.xls is different from all other IOF files. Isometrics are not required during the design phase of the project unless a unique workstation design needs to be shown. When an isometric is needed, the isometric is to be shown on the furniture systems "I" drawings. Editing the "Table of Contents Link" and the "Section Title" page is the same as the other 17 files.

10.7.4 Workstation Finish Sample Boards

- Provide a hard copy sample color board(s) illustrating all workstation finishes.
- On the sample board identify the furniture systems manufacturer's name, and "product line"
- Identify each finish with the manufacturer's color name and number.

10.7.5 Workstation Location Codes

- A simplified workstation alphanumeric location code is to be used. The letter "S" followed by a number is all that is required.
- The intent of the location code is to identify the workstation type. The location code is not to be used as a "room number". If a combination of a desk based and frame and tile or panel based systems are used the "S" location code may be modified as follows:

    - SD-# for the desk based systems
    - SP-# for the panel based systems
    - ST-# for the frame and tile systems

10.7.6 Editing the Ms Excel Manufacturer Worksheet

- Block 1 Locations Codes: List all the location codes used. If only one manufacturer is supplying two or three types of systems, the location codes should be keyed to the ordering information make the distinction.
- Block 2 thru 6: Edit to include all the required ordering information and GSA contracting information.
- Block 7: Special Instructions.
- Block 8: List the types by Location Code and in [brackets] list the room numbers where they are used.
- Block 9: Indicate the total quantity of each typical.
- Block 10: Indicate the cost of a single workstation type.
- Block 11: Indicate the extended cost.
- Block 12: Indicate the total cost for all types.
- Block 13: Add additional costs for design, installation etc.
- Blocks 14-16: Cost may vary depending on the FFE procurement strategy agreed to during the Criteria Review meeting.
- Block 17: Indicate the Grand Total for Workstation design and installation.

NOTE: If UNICOR is designing and supplying the furniture systems a design fee of $225.00 per workstation for design and or design verification must be added to the project costs.
If the FFE WILL NOT be installed by the General Construction Contractor, fees associated with the installation of the PVD networks and distribution

systems must be added to the cost estimate.

10.7.7 Editing Fabric and Finish Worksheet

- Edit the fabric and finish worksheet by listing the manufacturer's fabric and finishes according to typicals.
- For example: Fabrics and finishes in open office areas may be different from fabrics and finishes used for private offices.
- Avoid Custom or Customer's Own Material. COMs will be disapproved.

10.7.8 Editing "Typical Workstation" Worksheets

- Worksheet Tabs: Edit the sheet tabs using the typical's location code.
- Block 1: Indicate the Location Code.
- Block 2: Workstation dimensions/square footage requirements.
- Block 3: List of product and PVD requirements.

NOTE: A "go-by" product list has been provided in worksheet "S-1".

If the designer chooses, the product and PVD requirements lists may be scheduled on an "I" drawing and included in the composite furniture placement plan drawings. The schedule may also be added to UFGS Section 12 50 00 Furniture Systems in Part 3 Execution.

10.7.9 Editing UFGS Section 12 50 00 Furniture Systems

- The UFGS 12 50 00 Furniture Systems specification provides paragraphs describing the three types of systems discussed in paragraphs 10.3.
- Ensure only the systems types specified for the projects are included in the final specification. Ensure furniture system types that are not used in the project are edited out.
- A schedule of workstation products per type may be added under "Part 3 Execution" in lieu of using the drawings for scheduling workstation type product list.

Note: When the UFGS 12 50 00 is used but not included in the set of building related contract drawings and specifications published by the District's EN-DW, submit the specification as part of the Master FFE Adobe Acrobat file. Print the SpecsIntact file to an Adobe PDF file and insert into the Master FFE Binder directly behind the last typical location code for furniture systems. Provide a Bookmark indicating it is the "Furniture Systems Specification".

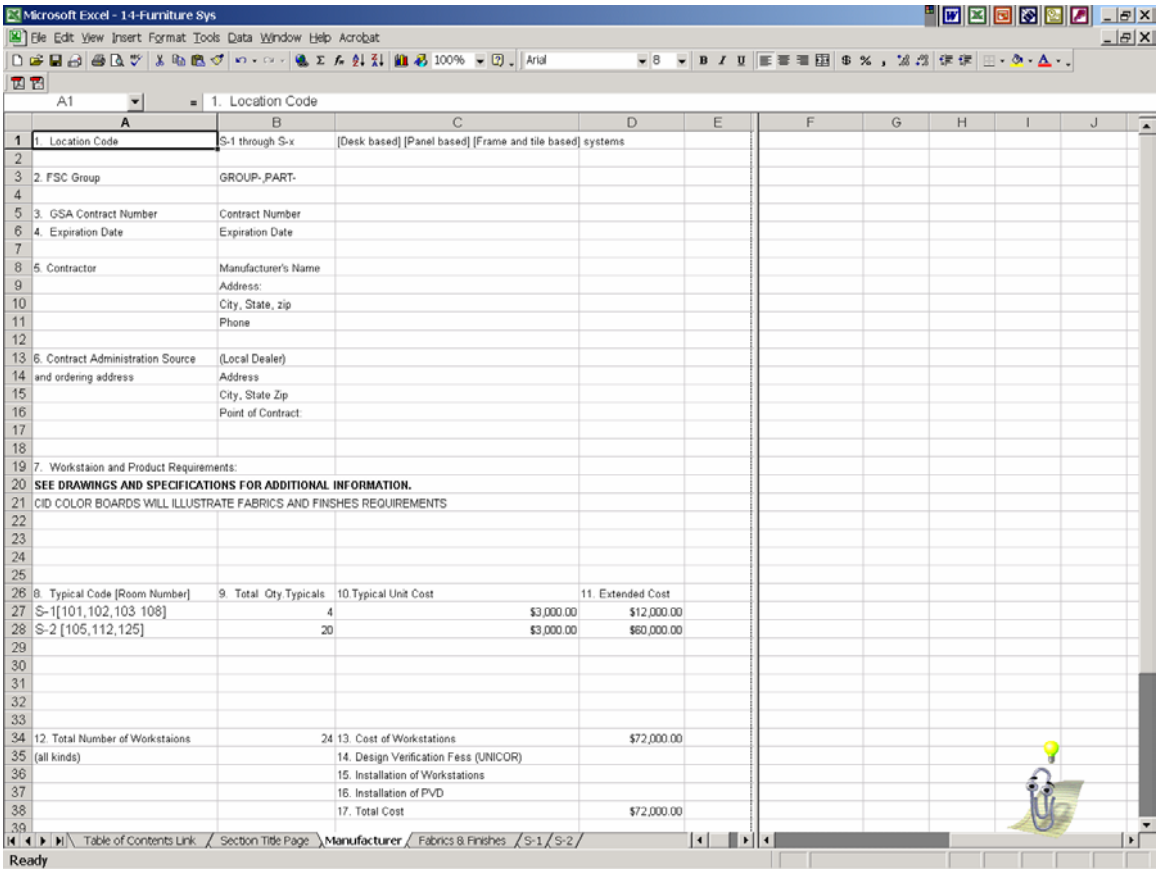


Exhibit 10-7a Furniture Systems Workbook

10.8 CONSTRUCTION CONTRACTOR INSTRUCTIONS FOR D-B SUBMITTALS

The D-B Construction Contractor is to respond to the D-B RFP by completing a 100% SID and FFE if required by the D-B RFP.

10.8.1 Full D-B Project Criteria

When full project criteria is provided in the D-B RFP the D-B Contract, the Prime Contractor will provide a 100% SID based the 100% plans and specifications provided in the RFP. If 100% of the FFE packages has been developed during the RFP phase of the project, The Prime Contractor is to coordinate any changes made during construction with the User and the 100% SID/FFE. Revisions to the SID are the responsibility of the Construction Contractor. Revisions to the FFE are the responsibility of the User Group.

10.8.2 Nominal and Partial D-B Project Criteria

When Nominal or Partial Project criteria is provided in the D-B RFP, the D-B contractor will be required to make submissions for Government acceptance of the SID and FFE during the Predefinition Conference, 50% design phase, 100% un-reviewed design phase and final design phase after award of the D-B contract.

The 100% FFE is to be completed by the D-B Contractor's Design Team and ready for government procurement at the time building construction begins. The FFE needs to be fully coordinated with the other engineering disciplines to ensure PVD connection requirements are met as well as the architectural layout and building related finishes.

- The level of Contractor response is directly related to the level of criteria and submittal requirements provided in the D-B RFP. Contractor responses are provided during the following phases:

    - D-B Pre-Definition Conference
    - D-B 50% Design Phase
    - D-B 95% Design Phase
    - D-B Final Design Phase.

10.8.3 Pre-Definition Conference

The Contractor shall lead a predefinition conference at the User's office or at a site agreed upon by the Mobile District Project Manager, 30 days before the 50% design submittal is due. Government personnel responsible for the interior design of this project shall attend this meeting.

The purpose of the predefinition conference is to present and discuss the SID color scheme for the project and to present any Contractor initiated deviations from the D-B RFP. Any SID deviations accepted are to fully integrate and coordinate with the SID materials, finishes, colors, textures, and patterns indicated in Section “01 10 10 Design Criteria” or related UFGS.

Actual exterior and interior materials, finishes and colors are to be provided for review and comment. The format for this presentation shall be on 24 inch by 36-inch (600 by 900 mm) presentation board(s).

The Contractor shall provide colored elevations or perspectives of both the SID exterior and interior color schemes to assist in the discussion and presentation. At the end of the predefinition conference the Government will determine the final SID finishes that will be accepted for incorporation into the construction and ensure that installation guide standards are met. SID finishes accepted throughout the predefinition and design phase process shall be installed during the construction phase process.

Discontinued items will be the only justification for changing an accepted SID finish during the construction process. Therefore if is critical that accepted SID finishes will be available at the time of installation. The Government shall provide specific guidance as to the types and manufacturers to be used to develop the FFE package during the Pre-definition conference.

10.8.4 50%, 100% AND Final Design Submittals

After the Pre-Definition Conference, the D-B Contractor will submit the formal 50%, 100% Un-reviewed and Final Design Package. The Contractor shall submit 5 complete sets of the 100% SID/FFE package.

EXHIBIT 10-8a SID/FFE D-B Contractor Deliverables After Award of the D-B Contract

*** Hard Copy Presentation**
**** Digital Data Presentation**

ITEM	Description of the D-B contractor SID deliverables after the award of the D-B Contract.	Pre-definition Conference	50% Design Phase	100% Un-Reviewed Final Design Phase	Final Design	FULL PROJECT CRITERIA
	Start of SID Submittals					
1. * **	The D-B Contractor shall provide 2 sets of 100% SID color boards, 120 days after the Contractor is given Notice to proceed, complying with the requirements of Full Project Criteria. The Color Boards are to be submitted in an 8-1/2" x 11 format as indicated in the Mobile District Design Manual Chapter 10. Side mark each set with "USER" and "COE Resident Engineer".					X
2. *	Provide large SID presentation color boards organized logically according to color placement and use. Deviations or alternatives samples can be provided for further development of the Design.	X				
3. *	Provide preliminary review of exterior materials etc. Colored rendering may be used as visual aid.	X X				
4.	SID binders (see 10.3) SID binders will be returned to the D-B contractor for updating.		X	X	X	
5.	Drawings (10.3)		X	X	X	
6.	Specifications (10.3)			X	X	
7.	Interior Signage Design, and placement plans (10.3)			X	X	
	Start of FFE Submittals					
8. **	Preliminary layout of the furniture and equipment plans to validate the space supports the furniture requirements. (10.4)		X			
9. **	100% layout and scheduling of the furniture and equipment plans. (10.4)			X	X	
10. **	Preliminary FFE selections and Illustrated Order Forms for one area of the facility. Preliminary discussions manufactures to use in the development of the FFE. (10.4)		X			
11. **	Preliminary digital FFE. PDF files only. (10.4)		X			
12. **	100% digital FFE. PDF files only. (10.1 & 10.4)			X		
13. **	Final FFE Adobe PDF and MS Excel working files. (10.1 & 10.4)				X	
14. **	CD-ROM with entire Contract drawings and specification				X	

10.9 GLOSSARY OF TERMS AND DEFINITIONS

The following commonly used terms and definitions are associated with SID/FFE design development process. The terms may not be used in this

Chapter but are helpful when planning or implementing an interior design package. There are many terms used in the Federal Government and many may be defined differently by other Department of Defense activities, other Federal Agencies and private sector professional societies and organizations. This Glossary provides Departments of the Air Force and Army specific acronyms related to the SID/FFE packages and related contracting actions. The Glossary is divided into three sections: (1) Army and Air Force Terms, (2) Procurement Terms and (3) Space Planning Terms

Army and Air Force Terms

A-E - ARCHITECT-ENGINEER A term generally used informally to identify a non-government designer, design team or design service contractor.

BCE - BASE CIVIL ENGINEER The Air Force term for their centralized engineering management staff. The BCE is responsible for the coordination of all MILCON and O&M design and construction projects; is the principle coordinator between the designer, users and Major Commands. See also DPW.

FFE - FURNITURE, FIXTURES AND EQUIPMENT The selection and illustration of all furniture necessary to complete the interior environment. The submittal is O&M funded and includes furniture illustrations, fabric and finish samples, plans, and ordering information. The FFE may include the furniture systems plans and purchase orders if they are not included in the SID. See also SID.

DD 1391 - DEPARTMENT OF DEFENSE FORM 1391 A programming document initiated by the installation and submitted to Congress through the Major Command for funding. It includes an outline of basic needs for a proposed facility and an estimated cost to fulfill the needs.

DPW - DIRECTORATE OF PUBLIC WORKS The Army term for the centralized engineering management staff. The DPW is responsible for the coordination of all MILCON and O&M design and construction projects; is the principle coordinator between the designer, users and Major Commands. See also BCE.

DOD - Department of Defense.

EN-DA - Mobile District Engineering Division Architectural, Structural and Civil Engineering Section responsible for SID/FFE criteria development, in-house design development and project review during design and construction.

EN-DW - Mobile District Engineering Division Project Support Section responsible for compiling and publishing the Contract Solicitations.

FSN 595B - FEDERAL STANDARD NUMBER 595B A collection of standard colors used by the various departments or agencies. The first number in the five digit series indicates a specific finish: (1)full gloss, (2) semigloss and (3)flat. The remaining 4 digits indicate a specific hue and tint/shade range.

FSN 595B – COLOR FAN DECK Federal Standard colors are available in a "fan deck" booklet for under $10.50. Use Order number # NSN 7690-01-162-2210 and mail your request and check to:

GSA

Specification Unit (3F-BP-W)
Seventh and D Sts SW
Washington, DC 20407

FY - FISCAL YEAR (a) October 1 of a calendar year through September 30 of the following calendar year; (b)"FY-...." at the beginning of a project title identifies the year Congress will fund the construction c contract.

IMCOM - Installation Management Command The Department of Army's regionalized management activities responsible for but not limited to Army Standard Design Program. This command recently replace the Installation Management Agency (IMA).

JOC or SABER - JOB ORDER CONTRACT OR SIMPLIFIED ACQUISITION OF BASE ENGINEERING REQUIREMENTS The JOC (Army) and SABER (Air Force) are methods the installation uses to contract for repair work. The Contracting Officer and the contractor agree upon unit prices for work. Individual job orders are then negotiated for specific scopes of repair work.

MILCON - MILITARY CONSTRUCTION Funds that are appropriated by Congress for new military construction. Also known as MCA or MCP.

O&M - OPERATION AND MAINTENANCE Funds provided to each installation by the Major Command and used for the day to day operations of the installation. These funds may be used for the renovation of existing buildings or for the purchase of furniture. Funds not spent to award a contract disappear at the end of the FY and cannot be recovered. OMA are Army O&M funds.

PD - Project Definition Air Force term for the requirement validation and schematic design phase of the design process. It satisfies the requirements for concept design (35%).

Select Program - A UNICOR program allowing purchasing activities to select the projects that will be purchased from UNICOR.

SID - STRUCTURAL INTERIOR DESIGN (a) The selection and sampling of building related finishes; (b) A submittal with samples of proposed building materials a for a particular project; (c) Materials and finishes purchased and installed by the General Contractor; (d) Projects that are funded with the MILCON funds. The SID may also include the O&M funded furniture systems workstations.

Sustainable Design - Designs that consider the use of re-cycled products and environmental design decisions that score rating points under programs such as Leadership in Energy and Environmental Design (LEED).

Procurement Terms

BEST VALUE - The best value provision in the FAR gives an ordering agency the authority to consider non-price-related factors in making a purchasing decision. Some non-price-related factors are:

- special features of a product not offered by other vendors that will enhance the agency's performance

- product trade-in considerations
- advantageous warranty
- product maintenance availability

When non-price related factors are used, these factors are documented as "market research". In making a "best value" determination, the Contracting Official uses price and market research assessments.

COM - CUSTOMERS OWN MATERIAL- Manufacturer's have standard fabric offerings that meet testing standards, aesthetics qualities and color trends. A custom or special order fabric which is not part of a standard offering is called "Customer's Own Material" (COM). Typical COM adds extra cost and coordination issues to the order. COM is discouraged.

DESIGN-BUILD (D-B) - The term Design-Build has many meaning. For the purposes of this chapter of the Design Manual the term Design Build will be a method of contracting in which a single entity takes responsibility for both design and construction of a facility. Performance requirements are outlined using the RFP format. See also RFP.

ENVIRONMENTAL PRODUCTS GUIDE - A GSA catalog for supply items. This guide can be obtained by contacting:

GSA CENTRALIZED MAILING LIST SERVICE (7CAFL)
P.O. BOX 6477
FT. WORTH, TX 76115
(817) 334-5215

FAR - FEDERAL ACQUISITION REGULATION (FAR) The Federal laws governing how the Federal Government buys products and services. FAR 8.4 indicates the process for ordering from Federal Supply Schedules.

FSS - FEDERAL SUPPLY SCHEDULES Contracts that provide indefinite quantity contracts for commercial items at established prices for direct ordering use by Government agencies. For copies, mail requests to:

Furniture Commodity Center (3FN-CO)
Crystal Mall 4, RM 403
Washington DC 20406
(703) 305-5056.

GSA FSC - GENERAL SERVICES ADMINISTRATION FEDERAL SUPPLY CLASSES FEDERAL SUPPLY GROUPS Government contracts with private manufacturers that have a fixed price, MOL, and expiration date. This publication can be ordered from the following address:

GSA CENTRALIZED MAILING LIST SERVICE (7CAFL)
P.O. BOX 6477
FT. WORTH, TX 76115
(817) 334-5215

The Web site is: www.gsa.gov visit the GSA "e-Library" for a list of all the FSS schedules.

MO - MAXIMUM ORDER Maximum Order replaces the old Maximum Order Limit (MOL). Under the new Maximum Order provision (MO), any size order may be placed against a Federal Supply Schedule. The MO does not require the

customer or the vendor to engage in a requote process. Under FAR 8.404, the new MO suggests the customer many want to seek a reduced price from the contractor. Under the MO principle, the customer may contract a preferred vendor(s), or dealer, and negotiate a better price directly with them. The ordering agency is not required to use the formal requote process. Depending on the specific circumstances, the vendor and dealer may order a better price than the contract. They are not required to pass reductions on to all Federal agencies.

OPEN MARKET - Designation for products that are not on a GSA or UNICOR contract.

PPTO – PRICE PERFORMANCE TRADE-OFF One of the ways the Government solicits for construction. The PPTO is a standard 100% design contract with clearly defined requirements, specifications, and terms that are not negotiated. Any proposal prepared in response to a PPTO must strictly adhere to the terms. The award is based on a "best value" bases and the past performance of the construction contractor on similar type projects.

RFP - REQUEST FOR PROPOSAL One of the ways the Government solicits for construction. An RFP usually defines a design problem and allows those who respond to the RFP to suggest a solution. The RFP is much more flexible than the PPTO because it is a solicitation document used in lieu of a sealed bid procurement. When and RFP so states, the Government reserves the right to award a contract based on initial offers received without any written or oral discussion with the Offerors.

RFQ - REQUEST FOR QUOTE An informal request for a price for a standard item.

UNICOR - The trade name for the Federal Prison Industries (FPI) Inc., a wholly owned government corporation established in 1934. UNICOR provides a variety of products and services to the Federal Government. All furniture systems workstations and conventional furniture requires a waiver. All waivers are to be requested at 35% design. Web site for FPI is www.unicor.gov. The waiver requests are sent to FPI on this web site.

Space Planning Terms

Assignment Drawings - Single-line architectural drawings, which incorporate graphic and statistical information broken down by tenant or organization.

Base Building Drawings - Scaled architectural drawings indicating the building shell and accurately representing all architectural and structural elements. They shall include but not be limited to exterior building elements, and permanent interior partitions, core areas, columns and convectors. Numerical identification of all columns, stairwells and elevators, toilets, doors, etc., shall be included.

Bay - The space in a building bounded by four columns. 20,25 and 30 foot bays are common.

Blocking, Stacking and Zoning - The first step in space planning. Arranging all organizational units by floor and within a floor to fit in the building. Determined by adjacency requirements, square footage and

special space needs. Zoning diagrams show public, semi-private and secure spaces by floor or within the facility.

Building Core - Includes elevators, stairs, restrooms, mechanical rooms, shafts, and electrical closets.

Circulation & Layout factors - In accordance with the AR-405-70, the circulation factor is a percentage of the net square footage allocation per person. The AR-405-70 space allocations for open offices include both the net square footage for an assigned workstation footprint and the net square footage of circulation required to access the assigned workstation. Net square footage allocations for private offices do not include the necessary square footage allowance to move

Color Boards - Boards displaying samples of the materials to be used in the project. There are color boards for SID building related materials and color boards for FFE furniture related materials.

Design Charrette Phase - The second part of the on-site effort is to produce a responsive schematic project solution based on the documentation of the Requirement Analysis Charrette. See Requirement Analysis Charrette.

Ergonomic - The science or study of human proportions and actions as related to the immediate human environment such as an employee’s workstation.

Footprints & Typical - The footprint is an outline of the space required for a workstation and a typical is an example type of workstation that is used repeatedly throughout the project with no variation.

FPP - Furniture Placement Plan drawings usually provided in the FFE package that show all the furniture and equipment needed to “outfit” the facility.

FURNITURE SYSTEMS - Furniture systems refer to workstation cubicles that are either desk based, panel based or frame and tile based. All types are under the same GSA Contract “Furniture Systems” Workstations are O&M funded only and never MILCON. If included in the construction contract and funded with O&M dollars, the workstations may be purchased and installed in the construction contract.

The interior designer will coordinate the workstation plans with the building and building systems and provide the plans and specifications in the contact documents for bids if the General Contractor will purchase and install the workstations and connect the workstations to the building's electrical, data, voice, and local area network (LAN) systems. Reference UFGS Section 12 50 00 Furniture Systems. Layout plans for workstations purchased and installed by the User are to be fully coordinated with the building's systems and workstation layouts are included in the contract plans for "information only."

PVD - Power, Voice and Data Electrical and Electronic systems that must be coordinated with the FPP. Each workstation must be assessed for the type of equipment that will be used and ensure the correct number of electrical and data outlet devices and circuits are specified. These requirements are to be coordinated with the Electrical Drawings.

Requirement Analysis (RA) Charrette Phase - The first part of the on-site effort to systematically collect and analyze the customer and project requirements. Information is typically gathered through the use of project specific questionnaires typically alphanumeric and proceeds to the schematic design such as a bubble diagram and the blocking and stacking plans.

Turnkey - Specific to Mobile District When a single contractor is hired to provide all services related to implement the SID and FFE packages. Typically the FFE is procured by the Government and installed by the General Construction Contractor. The coordination and installation of furniture deliveries and placement efforts are typically and option to the building related contract.

Workstation Standard - Development of a personal workspace, which includes all necessary storage, and furnishings for a specific job function.

10.10 FURNITURE PROGRAMMING COST GUIDELINES

In projects where the furniture budgets have not been established, furniture programming guidelines are provided to establish preliminary targets for FFE packages. Furniture programming costs have been developed based on the number of personnel who will occupy the facility and the facility type being occupied.

Exhibit 10-10a Furniture Cost Guidelines	
Facility Type	Average Cost per person
Administrative Space Programming figures allow for Workstation Cost Task Seating Installation	$6,500-$7000
Air Force Quarters and Army Barracks	$3,200/$3,500 per room or space

10.11 ADMINISTRATIVE SPACE UTILIZATION GUIDANCE

Department of Army programming requirements for space utilization of administrative areas is found in AR 405-70. Net square footage allowances include internal circulation within workstations. For example, a 200 net square foot office for a Division Head is the total square footage allowed for furniture and circulation within the office.

Department of the Air Force requirements for space utilization in administrative areas is contained in Air Force Handbook (AFH) 32-1084, Standard Facility Requirements Handbook", Chapter 12, Category Group 61 – Administrative Facilities.

Exhibit 10-12 (Continued) Government Services Administration (GSA) Best Value Determination Guidelines

NATIONAL FURNITURE CENTER (NFC)
MULTIPLE AWARD SCHEDULE
BEST VALUE DETERMINATION GUIDELINES as of 1/23/04

Schedule purchases are subject to FAR 8.001 (See following page)
FAR 8.4 requires that you make a best value determination before placing Multiple Award Schedule orders above the Mico-Purchase Threshold (MPT). Follow the guidelines below to make a best value determination.

- Orders under the MPT, currently $2,500-place with any schedule contractor: this form is not required.
- Orders over the MPT, but under the Maximum Order (MO)-Review GSA Advantage or at least 3 GSA vendors price lists
- Orders over the MO, review additional price lists/use GSA Advantage and seek a price reduction.

REQUISITION OR MIPR NUMBER_____

Review at least three sources under the Federal Supply Schedule and list the contractors names and prices below. Submit justification if fewer than three sources were considered. You may attach the pricing or contractor's quotes. It is important to have installation, design and other services pricing included as separate line items in each quote. Please indicate the selected contractor by placeing a check or X by the Contractor Name.

Location Code

1. Contractor	Product $	Installation$	Design $	Other Services$	Total$
2. Contractor	Product $	Installation$	Design $	Other Services$	Total$
3. Contractor	Product $	Installation$	Design $	Other Services$	Total$

Yes or No (circle one)
Was the requirement in excess of the MO? If yes, reiveiw additional sources/GSA Advantage! Under the Federal Supply Schedule and list below (attach if desired)

Location Code

1. Contractor	Product $	Installation$	Design $	Other Services$	Total$
2. Contractor	Product $	Installation$	Design $	Other Services$	Total$

Indicate the factors, other than price, considered in your best value decision:
__Special Features __Warranty Consideration ___Delivery Time
__Past Performance/Experience __Comfort/suitability of the item
__Technical Qualifications __Trade-In Considerations
__Compatibility with existing furniture
___Probable life of the item selected compared with that of a comparable item
___Environmental considerations-ie. Recycled content, naturally renewable ingredients, bio based content, energy efficiency, (See Executive Order 13101)
__Other (specify)

When ordering through the NFC, please include this checksheet with your order. Please ensure that all the information is complete. Fax order to 703-305-6032 or call 703-305-7003 for more information. Please include all the information, requested below in case additional information is required. Orders over $100,000.00 require a written Acquisition Plan, which will require extra information and time for the NFC to complete the order issuance.

Signature: Title Date

Phone Number Email
Note: This form does not apply to services.

Exhibit 10-12 (Continued)

8.001 Priorities for use of Government supply sources.

(a) Except as required by 8.002, or as otherwise provided by law, agencies shall satisfy requirements for supplies and services from or through the sources and publications listed below in descending order of priority—

(1) Supplies.

(i) Agency inventories;
(ii) Excess from other agencies (see Subpart 8.1);
(iii) Federal Prison Industries, Inc. (see Subpart 8.6);
(iv) Products available from the Committee for Purchase From People Who Are Blind or Severely Disabled (see Subpart 8.7);
(v) Wholesale supply sources, such as stock programs of the General Services Administration (GSA) (see 41 CFR 101-26.3), the Defense Logistics Agency (see 41 CFR 101-26.6), the Department of Veterans Affairs (see 41 CFR 101-26.704), and military inventory control points;
(vi) Mandatory Federal Supply Schedules (see Subpart 8.4);
(vii) Optional use Federal Supply Schedules (see Subpart 8.4); and
(viii) Commercial sources (including educational and nonprofit institutions).

(2) Services.

(i) Services available from the Committee for Purchase From People Who Are Blind or Severely Disabled (see Subpart 8.7);
(ii) Mandatory Federal Supply Schedules (see Subpart 8.4);
(iii) Optional use Federal Supply Schedules (see Subpart 8.4); and
(iv) Federal Prison Industries, Inc. (see Subpart 8.6), or commercial sources (including educational and nonprofit institutions).

(b) Sources other than those listed in paragraph (a) of this section may be used as prescribed in 41CFR 101-26.301
and in an unusual and compelling urgency as prescribed in 6.302-2 and in 41 CFR 101-25.101-5.

(c) The statutory obligation for Government agencies to satisfy their requirements for supplies available from the
Committee for Purchase From People Who Are Blind or Severely Disabled also applies when contractors purchase the
supplies or services for Government use.

NOTE: Department of Defense procedural requirements when purchasing Federal Prison Industry products changed with passage of FY 2002 and 2003 DoD Appropriations Acts. Section 811 of the 2002 Act, as amended by Section 819 of the 2003 Act, follows in part: (For the full language of Sections 811 and 819, go to http://www.wifcon.com/dod811.htm and http://www.wifcon.com/hasc819.htm)

SEC. 811. APPLICABILITY OF COMPETITION REQUIREMENTS TO PURCHASES FROM A REQUIRED SOURCE.
Conditions for Competition. -- (1) Chapter 141 of title 10, United States Code, is amended by adding at the end the following: ``Sec. 2410n. Products of Federal Prison Industries: procedural requirements

(a) MARKET RESEARCH.--Before purchasing a product listed in the latest edition of the Federal Prison Industries catalog under section 4124(d) of title 18, the Secretary of Defense shall conduct market research to determine whether the Federal Prison Industries product is comparable to products available from the private sector that best meet the Department's needs in terms of price, quality, and time of delivery"

(b) COMPETITION REQUIREMENT- If the Secretary determines that a Federal Prison Industries product is not comparable in price, quality, or time of delivery to products available from the private sector that best meet the Department's needs in terms of price, quality, and time of delivery, the Secretary shall use competitive procedures for the procurement of the product **or shall make an individual purchase under a multiple award contract**. In conducting such a competition or making such a purchase, the Secretary shall consider a timely offer from Federal Prison Industries.'; and

(c) IMPLEMENTATION BY SECRETARY OF DEFENSE- The Secretary of Defense shall ensure that--
(1) the Department of Defense does not purchase a Federal Prison Industries product or service unless a contracting officer of the Department determines that the product or service is comparable to products or services available from the private sector that best meet the

Exhibit 10-12 (End)

Department's needs in terms of price, quality, and time of delivery; and (2) Federal Prison Industries performs its contractual obligations to the same extent as any other contractor for the Department of Defense.

(d) MARKET RESEARCH DETERMINATION NOT SUBJECT TO REVIEW- A determination by a contracting officer regarding whether a product or service offered by Federal Prison Industries is comparable to products or services available from the private sector that best meet the Department's needs in terms of price, quality, and time of delivery shall not be subject to review pursuant to section 4124(b) of title 18.

CHAPTER 11

STRUCTURAL

INDEX

CHAPTER 11

STRUCTURAL

11 GENERAL

11.1 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, shall be prepared in accordance with Chapter 2 PRESENTATION OF DATA.

11.2 APPLICABLE PUBLICATIONS

American Association of State Highway Traffic Officials (AASHTO)

HB-17	Standard Specifications for Highway Bridges

American Concrete Institute (ACI)

315	Details and Detailing of Concrete Reinforcement
315R	Manual of Engineering and Placing Drawings for Reinforced Concrete Structures
318	Building Code Requirements for Structural Concrete and Commentary
530	Building Code Requirements for Masonry Structures

American Forest & Paper Association (AF&PA)

NDS	National Design Specification for Wood Construction with Supplement
SDPWS	AF&PA Supplement Special Design Provisions for Wind and Seismic

American Institute of Steel Construction (AISC)

341	Seismic Provisions for Structural Steel Buildings, including Supplements
360	Specification for Structural Steel Buildings

American Iron and Steel Institute (AISI)

NAS	North American Specification for the Design of Cold-Formed Steel Structural Members, including Supplement
General	Standard for Cold-formed Steel Framing-General Provisions

Header Standard for Cold-formed Steel Framing-Header Design

Lateral Standard for Cold-formed Steel Framing-Lateral Design

Truss Standard for Cold-formed Steel Framing-Truss Design

WSD Standard for Cold-formed Steel Framing-Wall Stud Design

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

IRC International Residential Code

SBCCI SSTD Standard for Hurricane Resistant Residential Construction

Metal Building Manufacturers Association (MBMA)

MBSM 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 3-310-01 Design: Structural Load Data

11.3 PROJECT DEFINITION (10-15%)

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 insure 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.

11.4 CONCEPT DESIGN (30-35%)

11.4.1 Structural System Selection Analysis

(a) An economical structural system will be selected to meet the requirements of the design. For projects with a construction value of $10,000,000 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 shall 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 shall 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 shall 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 shall be determined for each alternative and the cost must be included. The submittal shall include the following items:

(1) A complete description, with sketches, of each structural system considered.

(2) Design calculations supporting the member sizes used for the cost estimate.

(3) A comparative cost for each system, clearly showing all costs and quantities used.

(4) An analysis of the study results with justification for the system selected.

(b) For projects with a construction value of less than $10,000,000, provide a rational justification of the proposed structural system.

11.4.2 Design Analysis

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

11.4.2.1 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.

11.4.2.2 Design Loads

Design load values to be used in the design shall be identified, including roof and floor loads, wind loads, lateral earth pressure loads, seismic loads, etc., as applicable.

11.4.2.3 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.

11.4.2.4 Fire Resistance

Describe the fire resistance requirements of the structure and the proposed materials and systems to be used.

11.4.2.5 Antiterrorism/Force Protection (AT/FP) & 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 19 ANTITERRORISM/FORCE PROTECTION (AT/FP) for specific guidance related to AT/FP and Progressive Collapse.

11.4.2.6 Structural Calculations

Calculations for typical roof, floor, and foundation members as applicable for the structural system proposed.

11.4.3 Drawings

Sufficient framing plans are required for roof, floors, and foundations, as applicable, to indicate layout of principal members. Typical sections shall be furnished through roof, floors, and foundations indicating materials and type of construction proposed. Drawings will contain a set of general notes indicating design live, wind, and seismic loading, references used in the structural design, and applicable material strengths.

11.5 INTERIM DESIGN (50-65%)

11.5.1 Design Analysis

The interim design analysis shall include all items presented in the concept design analysis and any revisions necessitated by review comments on the Concept Submittal. Calculations shall 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.

11.5.2 Specifications

Provide redlined marked up specifications in accordance with Chapter 3, SPECIFICATIONS.

11.5.3 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 shall be included if applicable. Typical sections will be furnished for principal roof, floor, and foundation conditions. Slab-on-grade crack control joint locations shall be indicated on plans and appropriate joint details shall be provided. Formed concrete slab construction joint locations shall be indicated on plans and appropriate joint details shall be provided. Masonry wall control joint locations shall be shown on the structural and architectural plans. Wall joints shall be carefully coordinated between the structural and architectural plans. Masonry walls supported directly by thickened slabs shall insure that the slab crack control joints are located directly below the wall crack control joint. Typical applicable masonry construction details shall be provided. Comments made on the Concept Submittal shall be incorporated into the drawings for this submittal. The general notes will be developed to reflect the interim level of design.

11.6 FINAL DESIGN (UNREVIEWED 100%)

11.6.1 Design Analysis

The Final design analysis shall 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 shall be included. Any calculation changes required by comments on the Interim and Concept Design submittals must be incorporated.

11.6.2 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 3, SPECIFICATIONS.

11.6.3 Drawings

Complete final plans, sections and details of all structural elements are required. All roof and floor openings, with details, will be shown on the structural drawings. Structural drawings shall be carefully checked to insure coordination with architectural, civil/site, mechanical, and electrical drawings. Drawings will contain a complete set of general notes indicating design live, wind, and seismic loading, and all references used in the structural design. All applicable material strengths will also be provided.

11.7 READY-TO-ADVERTISE (REVIEWED 100%)

11.7.1 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.

11.7.2 Specifications

Specification sections will incorporate all comments from previous submittals. All redlines will be removed from the specification sections

and the specifications shall be checked for brackets, section references, and publication references.

11.7.3 Drawings

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

11.8 TECHNICAL REQUIREMENTS

11.8.1 General

(a) Structural design shall be in accordance with the criteria, requirements, and guidance provided in IBC 2006 as modified by UFC 1-200-01 and the following requirements. Local building codes shall not be used.

(b) The designer's Structural Engineer is responsible for insuring 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.

(c) 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.

(d) Building structural details will be shown on the structural drawings and not intermixed with architectural plans and details.

11.8.2 Design Loads

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

11.8.2.1 Wind Load Criteria

The design requirements of ASCE 7-05 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 shall be as set forth in IRC. Family housing projects located near coastal areas of the Gulf of Mexico and the Atlantic Ocean shall comply with the design requirements of SSTD 10-99.

11.8.2.2 Seismic Load Criteria

(a) Family Housing. Seismic criteria used for one and two family housing shall be in accordance with the IRC.

(b) Bridges. Seismic criteria used for bridges shall be as set forth in the AASHTO HB-17 Standard Specification.

(c) All Other Structures. Seismic criteria used for structures other than family housing and bridges shall be in accordance with the IBC as modified by UFC 1-200-01.

11.8.3 Foundations

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

11.8.4 Structural Steel

Steel structures shall 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 shall be a minimum 5/16 inch thick and bolts shall 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. 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 shall be certified by the AISC Quality Certification Program for the appropriate category. For steel framed 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."

11.8.5 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, generally, 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 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."

11.8.6 Pre-engineered Metal Buildings

Pre-engineered metal buildings shall be designed in accordance with the 2002 edition of the MBMA MBSM, except seismic loads shall be in accordance with the IBC and all other loads shall be in accordance with the ASCE 7-05, except as noted. The metal building system shall be provided by a single manufacturer and shall include all components and assemblies that form the building including the standing seam metal roof system. The metal building system shall 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 5 years. The erector shall be required to have specialized experience in the erection of steel building systems for a period of at least 3 years. When pre-engineered buildings are used in conjunction with masonry, deflection of the building frame shall be limited to H/600 to prevent cracking of the masonry.

11.8.7 Cold-Formed Steel

(a) Roof Trusses. Generally, cold-formed steel trusses shall be pre-engineered and pre-fabricated 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 shall be limited to only minor trusses. The designer shall provide proper truss load diagrams on the drawings. The diagrams shall show the design span length and all appropriate load components. Details showing required bearing conditions and connections shall be shown on the contract drawings. A special specification section shall be prepared for the cold-formed steel roof trusses. The truss fabricator shall 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 shall be required to be submitted for approval.

(b) Cold-formed steel framing shall be designed in accordance with IBC 2006. 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. 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. Deflection of exterior wall studs supporting masonry shall be limited to L/600.

11.8.8 Steel Roof and Floor Deck

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

11.8.9 Concrete

(a) Concrete design and detailing shall be in accordance with the IBC except as indicated below:

(b) 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.

(c) 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 0.15 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". Floor slabs-on-grade shall be divided by crack control joints spaced a maximum of 25 feet on center. Slab areas created by crack control joints shall be as near as square as possible; slab area lengths shall not be greater than twice the width. In addition, reentrant corners in slabs and discontinuous joints shall be reinforced with two #4 bars, 4 feet long. Slabs-on-grade to receive moisture sensitive finishes shall be placed on a minimum 15 mil vapor barrier.

(d) 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.

11.8.10 Precast Architectural Concrete

Precast architectural concrete panels shall be configured to prevent notches or excessive cutouts along the perimeter of the panels. Additional reinforcing shall be provided at corners, notches, and cutouts to prevent cracks in the panels. Precast concrete panels shall be waterproofed. Precast concrete panels shall 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 shall conform to ACI 318/318R and PCI Mnl-122. Precast concrete panels shall be manufactured and cured in accordance with the applicable provisions of PCI Mnl-117. Units shall be set true to alignment and level, with joints properly spaced and aligned both vertically and horizontally. Erection tolerances shall be in accordance with the requirements of PCI Mnl-117 and PCI Mnl-122.

11.8.11 Masonry Construction

(a) Masonry construction shall be designed in accordance with IBC 2003. All structural masonry walls (load bearing walls, shear walls, or exterior walls) shall 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 shall be incorporated.

(b) Minimum thickness of structural masonry walls shall be 8 inches. Minimum bar size shall be #4. Minimum reinforcement for structural masonry walls shall 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 shall be the same size as the minimum vertical reinforcement provided for flexural stresses.

(c) Horizontal reinforcement in continuous masonry bond beams shall be provided continuously at floor and roof levels and at the tops of all 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 shall be two #5 bars per bond beam. Lintel units shall not be used in lieu of bond beam units.

(d) Exterior and interior masonry walls shall 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.

(e) 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 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.

11.8.12 Antiterrorism/Force Protection

Antiterrorism/Force Protection design shall be in accordance with Chapter 19 ANTITERRORISM/FORCE PROTECTION (AT/FP).

11.8.13 Required Standard Details

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 and brick expansion joints.

CHAPTER 12

PLUMBING

INDEX

CHAPTER 12

PLUMBING

12.1 GENERAL

12.1.1 Scope

This chapter provides guidance for preparation and development of plumbing (including compressed air, fuel gas, and medical gas systems). Specific design submittal requirements in this chapter supplement the requirements in Chapter 1 GENERAL INSTRUCTIONS. All required documents, including drawings and design analysis, shall be in accordance with Chapter 2 PRESENTATION OF DATA.

12.2 APPLICABLE PUBLICATIONS

IPC International Plumbing Code

Unified Facilities Criteria (UFC)

UFC 3-310-03A Design: Seismic Design for Buildings

UFC 3-420-01 Design: Plumbing

UFC 3-420-02FA Design: Compressed Air

Unified Facilities Guide Specifications (UFGS) UFGS are updated on a regular basis.

12.3 PROJECT DEFINITION (10-15%)

12.3.1 General Considerations

During the Project Definition design phase the designer shall 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 plumbing system type along with a rough order-of-magnitude estimate of major equipment sizes will be provided during this phase for use in preparing the cost estimate and sizing the required mechanical spaces.

12.3.2 Narrative

The narrative shall include, but not be limited to, the following items as applicable:

(a) 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.

(b) Explain the proposed type of plumbing system.

(c) List the major equipment giving rough order-of-magnitude sizes, and piping materials to be used for each system.

(d) Describe any demolition required.

(e) List any environmental concerns and address actions to be taken.

12.4 CONCEPT DESIGN (30-35%)

12.4.1 General Considerations

(a) 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 insure adequate space for installation and maintenance of equipment and utility elements such as piping, etc., in congested areas.

(b) 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.

(c) Piping layouts shown are simple main pipe runs showing general location, routing and, when applicable, approximate rough-order-of-magnitude sizes.

(d) Schematic diagrams are simplified. The purpose of the schematic is only to show system design intent and the basic principle of system operation.

12.4.1.1 Drawings and sketches. Plans and sections shall properly show pertinent information. Quantity of concept drawings is 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.

12.4.2 Design Analysis

The Concept Design Analysis shall include but not be limited to the following items as applicable:

(a) 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.

(b) Provide justification and a brief description of the types of plumbing fixtures, piping materials, and equipment proposed for use.

(c) Prepare basic preliminary calculations for systems such as sizing of domestic hot water heater and piping, compressed air piping, compressors and receivers, vacuum piping, vacuum pumps and receivers, natural gas piping, and container gas piping and tanks.

(d) Describe any demolition required.

12.4.3 Specifications

Provide a basic outline in accordance with Chapter 3 SPECIFICATIONS.

12.4.4 Drawings

The Concept Design drawings should include, but not be limited to, the following items as applicable:

(a) Indicate locations and general arrangement of plumbing fixtures and major equipment.

(b) Indicate location and extent of any demolition that will be required concerning the plumbing system.

12.5 INTERIM DESIGN (50-65%)

In addition to the following items, the designer shall incorporate or answer all comments received concerning the Concept Submittal.

12.5.1 Design Analysis

The Interim Design Analysis shall include all items in the Concept Design Analysis and any necessary revisions. In addition, the following specific items shall 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.

12.5.2 Specifications

Provide redlined marked up specifications in accordance with Chapter 3, SPECIFICATIONS.

12.5.3 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:

(a) 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.

(b) Include equipment and fixture schedules with descriptions, capacities, locations, connection sizes, and other information as required.

12.6 FINAL DESIGN (UNREVIEWED 100%)

12.6.1 Design Analysis

The Final Design Analysis shall include all of the information required in the Interim Submittal in its final form, and incorporate or answer all review comments.

12.6.2 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 3, SPECIFICATIONS.

12.6.3 Drawings

The designer shall incorporate or answer all comments received during the Interim Submittal review. The Final Drawings for should be in a Ready-To-Advertise state which should include, but not be limited to, the following items as applicable.

(a) Plans, sections, details and riser diagrams in final condition.

(b) Complete all legends and schedules.

(c) Complete all narratives, notes, and title blocks as necessary.

12.7 READY-TO-ADVERTISE (REVIEWED 100%)

The comments generated concerning the Final Submittal shall be incorporated in the design analysis, specifications and drawing before they are submitted as "Ready-to-Advertise."

12.8 TECHNICAL REQUIREMENTS

12.8.1 General Considerations

(a) 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.

(b) Standard or "packaged" equipment shall be used to the greatest extent possible to simplify specifying, purchasing, installation, and maintenance of equipment.

(c) UFC 3-420-01 is the prime design manual supplemented by the International Plumbing Code.

(d) The requirements listed below are Mobile District requirements and take precedence over referenced criteria.

12.8.2 Plumbing Considerations

(a) Piping System. Piping materials and sizes shall comply with the recommendations in the IPC and UFC 3-420-01. Flow velocities in water pipe shall not exceed 10 feet per second. All piping shall be sloped to permit complete drainage and shall be properly supported with allowances for expansion and contraction. Expansion loops or expansion joints and anchor points shall be shown on plumbing drawings. Piping subject to freezing shall be suitably protected.

(b) 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 5 gpm for each hydrant or faucet to building load for sizing water main.

(c) Floor Drains. Floor drains shall 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. Floor drains are not allowed in rooms used as plenums.

(d) Backflow Prevention. The water distribution system shall be protected against the flow of water or other liquids into the distributing pipes from any unintended source or sources. Refer to the IPC for requirements on all systems.

(e) Domestic Hot Water. In the design of any buildings in which water closets and showers are installed, the designer shall exercise the necessary precautions to prevent personnel from being scalded while taking showers due to simultaneous operation of water closets equipped with flush valves.

(1) Domestic Hot Water Temperature. Domestic hot water supply maximum temperatures at the point of use will be as follows for the indicated facilities or areas unless higher temperatures are required for sanitizing or special processes:

a. In all latrines, heads, and toilet facilities without showers or tubs, the actual measured temperature of hot water delivered to the user shall not exceed 130 F.

b. In all latrines, heads, and toilet facilities with showers or tubs, the actual measured temperature of hot water delivered to the user shall not exceed 120 F.

c. In buildings such as bachelor officer quarters (BOQ) and bachelor enlisted quarters (BEQ) where there may be toilet facilities both with and without showers or tubs, where there is both heavy and frequent use of the bathing facilities, where there is a common hot water supply system, the delivered temperature of 120 F may be used for all facilities.

d. In buildings such as administrative, where showers are provided only in a few special cases, such as for the commanding officer and duty officer, the delivered water temperature shall not exceed 120 F. The same condition shall prevail in laboratory and special buildings where showers are provided for emergency or exceptional use, or where the number of users or frequency of use is

low.

(2) 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 might be required.

(f) Sump Pumps. Sump pumps will be provided in areas that do not have a way for gravity drainage.

(g) 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 shall be in accordance with UFC 3-420-02FA.

(h) Equipment Schedules. Each set of drawings for a project or building shall include one or more fixture schedules that will designate the symbols, P numbers, outfit numbers, description, and sizes of connections.

(i) Plumbing shall not traverse over or under electrical panels or switchboards.

12.8.3 Seismic Protection

All piping, equipment, and utilities shall be protected in accordance with UFC 3-310-03A.

CHAPTER 13

HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

INDEX

CHAPTER 13

HEATING, VENTILATING, AND AIR CONDITIONING

13.1 GENERAL

13.1.1 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). Specific design submittal requirements in this chapter supplement the requirements in Chapter 1 GENERAL INSTRUCTIONS. All required documents, including drawings and design analysis, shall be in accordance with Chapter 2 PRESENTATION OF DATA.

13.2 APPLICABLE PUBLICATIONS

Energy Policy Act of 2005 (EPACT 05) (Public Law 109-58)

IMC	International Mechanical Code
IFGC	International Fuel Gas Code
IPC	International Plumbing Code

Unified Facilities Criteria (UFC)

UFC 3-310-03A	Design: Seismic Design for Buildings
UFC 3-410-01FA	Design: Heating, Ventilating, and Air Conditioning
UFC 3-400-01	Design: Energy Conservation

American Society of Heating, Refrigeration, and Air Conditioning Engineers Inc. (ASHRAE)

Sheet Metal and Air Conditioning Contractors' National Association Inc. (SMACNA)

Unified Facility Guide Specifications (UFGS). UFGS are updated on a regular basis.

13.3 ENERGY CONSERVATION

The building HVAC systems shall be designed in accordance with ASHRAE 90.1 and UFC 3-400-01. The criteria provides manditory and prescriptive criteria that must be followed in order to provide an energy efficient facility. In addition, the design shall meet the applicable requirements of EPACT 05.

13.4 PROJECT DEFINITION (10-15%)

13.4.1 General Considerations

(a) 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.

(b) The general HVAC system type and purpose along with a rough-order-of-magnitude estimate of major equipment sizes will be provided at the this phase for use in preparing the cost estimate and sizing the required mechanical spaces.

13.4.2 Narrative

The narrative shall include, but not be limited to, the following items as applicable:

(a) 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.

(b) Explain the purpose and proposed type of the environmental system (i.e., personnel comfort, process or computer cooling, freeze protection or otherwise.

(c) List manditory and prescriptive HVAC features to be included in the design as required by ASHRAE 90.1 and UFC 3-400-01 in order to provide an energy efficient facility.

(d) 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.

(e) 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.

(f) List the major equipment and give the sizes in general order-of-magnitude.

(g) Briefly describe the proposed control system type. See Specific Base Criteria.

(h) Discuss requirements for natural gas, fuel oil, and water flow meters.

(i) Describe any demolition required.

(j) List Anti-Terrorism/Force Protection, Sustainable Design, and Seismic Protection concerns.

13.5 CONCEPT DESIGN (30-35%)

13.5.1 General Considerations

(a) 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.

(b) Equipment shown in plans and sections is not shown in great detail but is shown merely as simple geometric forms with approximately correct dimensions.

(c) 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.

(d) Schematic diagrams are simplified. System flow diagrams, layouts, and one of each type of take-off, 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.

(e) 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.

(f) Throughout the design submittals and on the Ready-to-Advertise drawings, abbreviations used on drawings shall conform to ASHRAE Fundamentals and shall be indicated in the mechanical drawing legend.

13.5.2 Design Analysis

The Concept Design Analysis shall include, but not be limited to, the following items as applicable:

(a) 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.

(b) Explain the purpose of the environmental system (i.e., personnel comfort, process or computer cooling, freeze protection or otherwise).

(c) List manditory and prescriptive HVAC features to be included in the design as required by ASHRAE 90.1, UFC 3-400-01 and EPACT 05 in order to provide an energy efficient facility.

(d) 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.

(e) 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.

(f) Prepare basic 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).

(g) Briefly describe the proposed sequence of control for temperature, humidity, ventilation, etc.

(h) Discuss requirements for natural gas, fuel oil and water flowmeters.

(i) Describe any demolition required.

(j) Provide a basic outline specification in accordance with Chapter 3 SPECIFICATIONS.

(k) Describe actions to be taken to address Antiterrorism/Force Protection, Sustainable Design, and Seismic Protection concerns.

13.5.3 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 shall indentify 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:

(a) Single-line layouts of HVAC systems with preliminary representative duct sizes of main runs and air quantities. This includes exhaust systems and makeup air systems. Representative sections of ducts in congested areas should be shown double line.

(b) Show required maintenance space for all major equipment, preferably with dashed lines.

(c) Show major piping single line with approximate size.

(d) Indicate preliminary approximate capacities of all major equipment, including horsepower of motors, KW of major electric heating elements, cfm of major air handlers, cooling and heating capacities, etc.

(e) Indicate location and extent of any demolition that will be required concerning the HVAC system.

13.6 INTERIM DESIGN (50-65%)

In addition to the following items, the designer shall incorporate or answer all comments received during the Concept Design submittal review.

13.6.1 Design Analysis

The Interim Design Analysis shall include all items in the Concept Design Analysis and any necessary revisions. In addition, the following specific items shall be included when applicable:

(a) Provide detailed calculations for the following: heating loads, cooling loads, equipment sizing, etc. Computer calculations shall include printout of input data as well as output.

(b) Equipment selection: Equipment selection shall be based on not less than three manufacturers whose equipment meets project requirements for each item. The design analysis shall 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.

(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) Major unforeseen costs and any changes from Concept Submittal shall be referenced and the impact on energy efficiency shall be indicated. Justification for departures, if any, from the original design recommendations shall be provided.

(e) 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.

(f) Specifications: The outline specifications previously submitted for concept phase shall be revised, updated, further developed and resubmitted in accordance with Chapter 3 SPECIFICATIONS.

13.6.2 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:

(a) 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.

(b) Show temperature control schematics indicating remote sensors, panel mounted controllers, reset schedules if applicable 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.

(1) Pipe fittings and accessory details shall be shown.

(2) 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 air handling unit (AHU) and variable air volume (VAV) boxes shall be double-lined and ducts downstream of the VAV boxes may be single lined.

(3) All equipment shall be outlined to scale, and maintenance or removal space shall be indicated by dashed lines.

(d) 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.

(e) The final form of all equipment schedules shall be shown with preliminary equipment data filled in.

13.6.3 Specifications

Provide redlined marked up specifications in accordance with Chapter 3, SPECIFICATIONS.

13.7 FINAL DESIGN (UNREVIEWED 100%)

Comments generated during the Interim Design submittal review shall be incorporated or answered in the design analysis, specifications and drawing before they are submitted as "Final".

13.7.1 Design Analysis

The Final Design Analysis shall include all of the information required in the Interim Submittal in its final form and the information listed below when applicable:

(a) 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.)

(b) Major unforeseen costs and any changes from Interim or Concept Submittals shall be referenced and impact on energy and economic studies shall be indicated. Justification for departures, if any, shall be provided.

(c) The designer shall 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.

13.7.2 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 3, SPECIFICATIONS. The specifications shall be edited and tailored by the designer to meet the requirements of the project under design. The Contractor Submittal Register must be edited and included.

13.7.3 Drawings

The Final Drawings should be in a Ready-to-Advertise state which should include, but not be limited to, the following items as applicable:

(a) Include all plans, sections, and details in final condition.

(b) Include all completed legends and schedules.

(c) Show all necessary piping schematics in final form.

(d) Complete narratives, notes, and title blocks as necessary.

(e) Show all temperature control systems as follows:

(1) Location of sensors, thermostats, and control panels.

(2) Schematics, diagrams, layouts, legends, narratives, sequences, etc. of the Direct Digital Control System.

(3) NOTE: Compatibility with any existing basewide control systems must be insured.

13.8 READY-TO-ADVERTISE (REVIEWED 100%)

Comments generated during the Final design submittal review shall be answered or incorporated in the design analysis, specifications and drawing before they are submitted as "Ready-to-Advertise."

13.8.1 Specifications

The designer shall prepare the final detailed Technical Provisions of the specifications in accordance with Chapter 3 SPECIFICATIONS.

13.9 TECHNICAL REQUIREMENTS

13.9.1 General Considerations

(a) 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.

(b) Standard or "packaged" equipment shall 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.

(c) For all projects, use UFC 3-410-01FA and the IMC for HVAC design.

13.9.2 HVAC Design Considerations

(a) Design Temperatures

(1) Indoor design temperatures shall be in accordance with UFC 3-410-01FA.

(2) Outdoor design conditions shall be in accordance with UFC 3-400-02.

(3) 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) shall be submitted.

(b) Noise Control. All noise control design work shall be in accordance with UFC 3-450-01. The designer shall be responsible for insuring that noise levels in the facility are less than the maximum noise levels recommended in UFC 3-450-01.

(c) Selection of HVAC Systems. UFC 3-400-01 and ASHRAE 90.1 shall be used 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 shall be honored if at all possible or feasible.

(d) Energy Saving Controls and Heat Recovery Devices. Insure UFC 3-400-01 and ASHRAE 90.1 compliance.

(e) Water Chillers

(1) Chillers greater than 200 tons shall be centrifugal, helical rotary screw type or 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 shall not be any materials other than metal. Refrigerant used must be approved by the user's installation and shall be decided at the Design Charrette.

(2) For loads greater than 400 tons, an Energy Cost Budget Study in accordance with UFC 3-400-01 and a Life-Cycle Cost Study shall be made to determine whether two or three machines may be more economical than a single machine. In no case, where only personnel comfort is involved, shall consideration be given to a standby machine. Similarly, standby chilled water and condensing water pumps are not authorized for personnel comfort applications. Exception to this policy may be granted in accordance with UFC 3-410-01FA. For an installation of more than one chiller, provide a chiller plant controller from the chiller manufacturer to control the chillers to meet the building load in the most efficient mode.

(3) Humid Areas. The following criteria shall also be applied to humid areas as defined in UFC 3-410-01FA.

(f) Air Handling Systems

(1) 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.

(2) Central station built-up systems comprised of filters, coils, and fan will be installed where system requirements cannot be satisfied with the factory-assembled package equipment. Maximum capacity for the built-up systems will be limited to 60,000 cfm. Total system demands in excess of 60,000 cfm will utilize multiple systems.

(3) Package 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 6 feet or more above the floor, or on the roof are undesirable and should be avoided where possible. Adequate height shall be provided in the form of base rails and service pads for proper trap installation.

(4) 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 shall be furnished downstream of the chilled water coil to prevent overcooling of the space. All ventilation airflow rates shall be insured.

(5) All louvers shall be extruded aluminum type with colors that match the architectural scheme or as noted.

(6) All diffusers, registers, and grilles shall be louvered face aluminum type. Diffusers in exposed round ductwork in shop areas will be industrial type drum louvers unless otherwise noted.

(7) Humid Areas. Reference the UFC 3-410-01FA for additional requirements for humid areas.

(8) Condensate drains shall be rigid metal piping.

(g) Water Coils. Water cooling coils shall be certified in accordance with ARI STD 410. In lieu of ARI certification, the manufacturer shall submit a written certification from a nationally-recognized independent testing firm to verify coil performance when tested according to ARI STD 410 testing procedures.

(h) Fire Protection. The current requirements of UFC 3-600-01, NFPA 90A and 90B will be incorporated in all heating and air conditioning system designs. Corridors shall not be used as supply, return or exhaust air plenums.

(i) Duct Work. Duct work shall be designed in accordance with applicable SMACNA standards and ASHRAE recommendations. Fibrous glass ductwork shall not be used unless specifically allowed by the Mobile District. 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 shall 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 (>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 type is described in the guide specifications and length is limited to 5 feet.

(j) Ventilation.

(1) Equipment Rooms Mechanical ventilation shall be provided to limit air temperature rise to 10 F in unoccupied equipment rooms. Normally occupied areas shall be spot cooled as required. Control rooms on central plants shall be air conditioned. Some equipment rooms such as control, electrical switchgear, or computer rooms, even though they are unoccupied, will require mechanical cooling and 100 percent backup where economically justified or required by design criteria.

(k) Heating

(1) Outside Design Conditions. Outside heating design conditions for Army and Air Force installations are listed in UFC 3-400-02.

(2) Inside Design Conditions. Unless stated otherwise the inside design temperatures shall be determined as follows:

70 degrees F	Living and administrative areas (inactive employment)
55-65 degrees F	Working areas (active employment)

40 degrees F Storage areas to prevent freezing

(3) Boilers. Boilers shall be designed, constructed, tested, and installed in accordance with the ASME Boiler and Pressure Vessel Code and UFC 3-410. Design pressures shall be 15 psig or less for steam boilers and 50 psig or less for hot water boilers. Boiler trim shall include safety valves, stop valves, water column, blow-off valves, piping and tank, low water cutoff, flame safety system, and control panel.

(4) Fuel Oil Burning Equipment and Fuel Oil Storage Tanks. This equipment and tanks shall be in accordance with NFPA Pamphlets 31 and 54, respectively. All underground fuel oil tanks shall be double wall with leak detection system. A monitoring well system shall be provided if the fuel oil tank is in ground water.

(5) Gas-firing Equipment. This equipment shall be in accordance with NFPA Pamphlet 54 and the International Fuel Gas Code.

(l) Piping, Valves, and Fittings

(1) Refrigerant Piping. This shall be designed in accordance with the ASHRAE Handbooks. Special care in designing suction lines shall 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 shall be provided. Hot gas discharge lines shall be designed to ensure oil return. Oil separators shall be provided as required.

(2) Water Distribution Piping

(a) Balancing at every point where balancing is required, a flow sensor plus a balancing valve (or a combination unit) shall be specified and shown on the plans. The required length of straight pipe before and after the flow sensor shall be clearly shown on the plans.

(b) Water velocity in medium and small diameter water piping generally shall not exceed 8 feet per second and shall be sized for friction loss not to exceed 4 feet per 100 feet.

(c) An air separator and an expansion tank shall be installed in the main line of all systems.

(d) For maintenance purposes, isolation valves and unions or flanges shall always be used for isolating equipment from the system.

(m) Chilled and Dual Temperature Water Distribution Systems. The contract drawings shall show the general arrangement of piping, sizes, grades, thrust block, and other details. Analyses shall be made to determine the most economical thickness of insulation for the supply and return lines. The systems will generally be composed of factory fabricated preinsulated conduit sections.

(1) Thermal expansion. Thermal expansion must be considered and accounted for in straight runs of high temperature 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.

(2) Anchors. Anchors shall 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.

(n) 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.

(o) Equipment Schedules. Equipment schedules are required for all HVAC equipment. The schedule shall be presented in tabular form.

(p) Insulation. Use only cellular glass insulation on chilled water piping.

(q) Controls. Most bases have in place Direct Digital Control (DDC) systems. The designer shall contact the base to insure the new controls are equal to or can seamlessly interface with the existing system.

13.9.3 Seismic Protection

All piping, equipment, and utilities shall be protected in accordance with UFC 3-310-03A.

CHAPTER 14

FIRE SUPPRESSION SYSTEM

INDEX

CHAPTER 14

FIRE SUPPRESSION SYSTEM

14.1 GENERAL

14.1.1 Scope

This Chapter provides guidance for preparation and development of the fire suppression systems. Specific design submittal requirements in this chapter supplement the requirements in Chapter 1 GENERAL INSTRUCTIONS. All required documents, including drawings and design analysis, shall be in accordance with Chapter 2 PRESENTATION OF DATA.

14.2 APPLICABLE PUBLICATIONS.

Unified Facilities Criteria (UFC)

UFC 3-600-01	Fire Protection Engineering for Facilities
UFC 3-610	Hangar Fire Protection Facilities
UFC 3-310-03A	Design: Seismic Design for Buildings

National Fire Protection Association (NFPA)

Latest Edition	National Fire Codes

Unified Facilities Guide Specifications (UFGS)

UFGS are updated on a regular basis. Instructions on retrieving UFGS are covered in Chapter 3 SPECIFICATIONS.

14.3 PROJECT DEFINITION (10-15%)

14.3.1 General Considerations

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.

The general fire suppression system type and purpose along with a rough-order-of-magnitude estimate of major equipment sizes will be provided at the Design Charrette Phase for use in preparing of cost estimate and sizing the required mechanical spaces. The possibility of a fire pump requirement shall be determined as early as possible to insure that the associated costs are included in the earliest estimate.

14.3.2 Narrative

The narrative shall include, but not be limited to, the following items as applicable:

(a) List all references used in the Design Charrette Narrative including Government design documents, industry standards, safety manuals, criteria given to designer at the Charrette or predesign meeting.

(b) Explain the proposed type of the fire suppression system and if a fire pump and/or storage tank is needed.

(c) Describe any demolition required.

(d) List any environmental concerns and address actions to be taken.

14.4 CONCEPT DESIGN (30-35%)

14.4.1 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; however, calculations must be adequate to determine whether fire pumps and/or storage tanks are required. 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.

Equipment shown in plans and sections is not shown in great detail but is shown merely as simple geometric forms with approximately correct dimensions.

If required, piping layouts shall be shown as simple main pipe runs indicating general location, routing and, when applicable, approximate order-of-magnitude sizes.

14.4.1.1 Drawings and Sketches

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.

14.4.2 Design Analysis

The Concept Design Analysis shall include, but not be limited to, the following items as applicable:

(a) List all references used in the Concept Design including Government design documents, industry standards, criteria given to the designer at the predesign meeting, etc.

(b) Classify each building in accordance with the following:

(1) Fire zone

(2) Building floor areas

(3) Height and number of stories

(c) Discuss and provide description of required fire protection

including extinguishing equipment, detection equipment, alarm equipment, and water supply.

(d) If water sprinkler systems are to be provided, preliminary hydraulic calculations shall be prepared for the most hydraulically demanding area to insure that flow and pressure requirements can be met with current water supply. Information on water supply available for fire protection will generally be provided by installation personnel through "Fire Flow Test" data. See Chapter 8 WATER, WASTEWATER, AND ENVIRONMENTAL PROTECTION.

(e) Identify any special security requirements.

14.4.3 Specifications

Provide a basic outline in accordance with Chapter 3 SPECIFICATIONS.

14.4.4 Drawings

The Concept Design Drawings should include, but not be limited to, the following items as applicable:

(a) 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.

(b) The location and coverage of any fire suppression systems (e.g., sprinkler risers, standpipes, etc.).

(c) Indicate any hazardous areas and their classification.

(d) Provide description of type sprinkler system to be provided (e.g., dry pipe, preaction, wet pipe, AFFF, etc.).

(e) Address security requirements (e.g., dielectric couplings, grounding, etc.).

14.5 INTERIM DESIGN (50-65%)

In addition to the following items, the designer shall incorporate or answer all comments received concerning the Concept Submittal.

14.5.1 Design Analysis

Provide a detailed description of the system and its controls such as activation of system, interlocks with HVAC system and connection to detection and alarm systems.

14.5.2 Specifications

Provide redlined marked up specifications in accordance with Chapter 3, SPECIFICATIONS.

14.5.3 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:

(a) Include items shown on the concept drawings and any necessary

revisions.

(b) Prepare a schedule describing the system with the following information: fire hazard and occupancy classifications, building construction type, GPM/square foot sprinkler density, area of operation, hose stream allowances and other as required.

(c) Provide drawings showing a rough layout of the main piping involved in the sprinkler system if applicable.

14.6 FINAL DESIGN (UNREVIEWED 100%)

In addition to the following items, the designer shall incorporate or answer all comments received during the Interim Submittal review.

14.6.1 Final Design Analysis

The Final Design Analysis shall include all of the information required in the Interim submittal in its final form and incorporation of, or answers to, all comments received concerning the Interim Submittal.

14.6.2 Specifications

(a) 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 3, SPECIFICATIONS. Specifications used shall be those acquired subsequent to the Interim Submittal.

(b) Specifications for fire suppression systems shall be performance type, except when aircraft hangars require specifically-designed sprinkler systems, listing hazards, minimum water densities, miminum area of operation, waterflow test data and any other data necessary for the construction contractor to design the system.

14.6.3 Drawings

The Final Drawings for sprinkler systems should be in a Ready-to-Advertise state which should include, but not be limited to, the following items as applicable.

(a) Include plans in final condition.

(b) Complete all legends and schedules.

(c) Complete all narratives, notes and title blocks as necessary.

14.7 READY-TO-ADVERTISE (REVIEWED 100%)

The comments generated concerning the Final submittal shall be answered or incorporated in the design analysis, specifications and drawing before they are submitted as "Ready-to-Advertise."

14.8 TECHNICAL REQUIREMENTS

14.8.1 General Considerations

(a) 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.

(b) Standard or "packaged" equipment shall be used to the greatest extent possible to simplify specifying, purchasing, installation, and maintenance of equipment.

(c) UFC 3-600-01, Fire Protection Engineering for Facilities is the primary design manual. This criteria is supplemented by the technical provisions listed hereinafter. In case of conflict, this document governs.

(d) If a fire pump building or room is included in the project that is to be 'fully sprinklered', this building or room also needs to be sprinklered.

14.8.2 Fire Suppression System

(a) Criteria. The use of fire suppression systems shall be governed by the requirements of the UFC 3-600-01, Fire Protection Engineering for Facilities. Where systems are required they shall be designed in accordance with the applicable NFPA standards.

(b) Fire Protection. Fire protection that is cost-effective, yet provides maximum degree of protection consistent with the type and degree of fire exposure, shall neither be diminished in an effort to reduce project costs nor shall it be set aside for security or other considerations.

(c) Automatic Systems. Automatic fire protection systems shall be employed where suitable and cost-effective. Suffocating extinguishers should not be considered in conjunction with munitions or materials that contain their own oxygen supply.

(d) Low Maintenance. Automatic fire suppression systems, smoke evacuation systems, and other fire protection systems shall be designed so that their proper operation does not depend upon a high degree of sophisticated maintenance.

(e) Sprinkler Systems. Sprinkler systems will be performance-specified by the designer in compliance with UFC 3-600-01, Fire Protection Engineering for Facilities, NFPA 13, and this document using the most stringent criteria in case of discrepancy. Preliminary hydraulic calculations shall be provided to insure that system demand does not exceed available supply. Plans developed shall indicate water densities, hazards, area of operation, waterflow test data, and any other data necessary for the construction contractor to design the system. The construction contractor will use the plans and specifications as a guide for subsequent preparation of detailed drawings which will be coordinated with requirements and options of the work of other trades required for construction of the facility. A note to this effect shall be placed on the plan. Riser locations shall also be shown on the plans.

(f) Accessibility Check. Designers shall check each system and its equipment to assure ready accessibility and operability of all maintenance points, gages, valves, controls, and signals. Devices whose operations are critical during emergency conditions shall be prominently located and singularly identified.

14.8.3 Seismic Protection

All piping, equipment, and utilities shall be protected in accordance with UFC 3-310-03A.

CHAPTER 15

OTHER MECHANICAL SYSTEMS AND EQUIPMENT

INDEX

CHAPTER 15

OTHER MECHANICAL SYSTEMS AND EQUIPMENT

15.1 GENERAL

Specific submittal requirements contained in this chapter supplement the requirements of Chapter 1 GENERAL INSTRUCTIONS. All required documents including drawings and design analysis shall be in accordance with Chapter 2 PRESENTATION OF DATA. Requirements of this chapter pertain to the following mechanical systems and equipment.

(a) Petroleum, Oils and Lubricant (POL) Facilities/Automotive and Aircraft Fueling Systems

(b) Diesel Engines for Generators and Fire Pumps

(c) Cranes and Hoists

(d) Storage Tanks

(e) Central Energy Plants and Distribution System

(f) Elevators

(g) Other Mechanical Systems

15.2 APPLICABLE PUBLICATIONS

International Building Code (IBC)

Unified Facilities Criteria (UFC)

UFC 3-460-01	Petroleum Fuel Facilities
UFC 3-400-01	Design: Energy Conservation
UFC 3-430 series	Design: Central Energy Plants and Distribution Systems

General Criteria

ASME	American Society of Mechanical Engineers - Codes and Standards
ANSI	American National Standards Institute - Codes and Standards
AWS	American Welding Society - Codes and Standards
API	American Petroleum Institute - Standards and Publications

NFPA	National Fire Protection Association - Codes

Cranes and Hoists

CMAA No. 70	Crane Manufacturers Association of America Specification for Electric Overhead Traveling Cranes
CMAA No. 74	Crane Manufacturers Association of America Specification for Top Running Single Girder Electric Overhead Traveling Cranes

Elevators

ASME A17.1	Safety Code for Elevators and Escalators

Unified Facilities Guide Specifications (UFGS)

UFGS are updated on a regular basis. Instructions for retrieving UFGS are covered in Chapter 3 SPECIFICATIONS.

15.3 PROJECT DEFINITION (10-15%)

15.3.1 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.

15.3.2 Narrative

The narrative shall include, but not be limited to, the following items as applicable:

(a) 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.

(b) Describe the proposed type of mechanical system.

(c) Describe any demolition required.

(d) List any environmental concerns and address actions to be taken.

(e) Describe proposed construction planning of mechanical system

for alteration/modification project.

15.4 CONCEPT DESIGN (30-35%)

15.4.1 Design Analysis

The following specific items shall be included where applicable.

(a) A list of all special mechanical systems and equipment in the project.

(b) A list of criteria, codes, documents, and design conditions used. Reference to any authorized waiver of these criteria or codes.

(c) 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.

(d) Preliminary sizes of equipment, piping, and space required for the equipment and distribution methods selected.

(e) A description of the proposed control system.

(f) Description, approximate capacity, and location of any special mechanical equipment such as elevators, cranes, lifts, etc.

(g) Description of the various types and quantities (supported by calculations as applicable) of POL products and their associated unloading, storage, and dispensing systems.

(h) Phasing.

15.4.2 Drawings

The following specific items shall be shown where applicable.

(a) Flow diagrams of all systems proposed. These diagrams shall be an accurate schematic representation of the system, showing all proposed equipment, piping, control valves, and primary control loops. In addition, the drawings shall indicate approximate capacities of equipment, flow rates in mains, branches, and outlets, direction of slope for pipe, and shall identify the location of equipment by building and room.

(b) Plans sufficiently complete to show the location and general arrangement of mechanical equipment and major piping. Piping may be shown with single lines.

15.4.3 Specifications

Provide a basic outline in accordance with Chapter 3 SPECIFICATIONS.

15.5 INTERIM DESIGN (50-65%)

In addition to the following items, the designer shall incorporate or answer all comments received concerning the Concept Design submittal.

15.5.1 Design Analysis

The Interim Design Analysis shall include all items in the Concept Design Analysis and any necessary revisions. In addition, the following specific items shall be included when applicable:

(a) Detailed calculations for sizing equipment.

(b) Detailed logic diagrams for control schemes used.

(c) 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.

15.5.2 Drawings

The following specific items shall be shown when applicable:

15.5.2.1 Flow Diagrams of Systems (where applicable)

These diagrams shall show all of the information given on the Concept drawings, but in greater detail. The diagrams shall include equipment capacities and power requirements, all piping sizes with flow rates indicated, all valves, piping specialties, instrumentation, and control devices.

15.5.2.2 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.

15.5.2.3 Equipment

The drawings shall 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 shall be inserted in the equipment schedules at this stage. Equipment schedules shall be completed when final rating data are established but not later than the Final Review submission.

15.5.3 Specifications

Provide redlined marked up specifications in accordance with Chapter 3, SPECIFICATIONS.

15.6 FINAL DESIGN (UNREVIEWED 100%)

Comments generated during the Interim Design submittal shall be incorporated or answered in the design analysis, specifications and drawing before they are submitted as "Final". The design analysis shall be complete. The Final Drawings should be in a Ready-to-Advertise 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 3, SPECIFICATIONS. A technical specification is required for each mechanical system or piece of equipment covered in this chapter.

15.7 READY-TO-ADVERTISE (REVIEWED 100%)

The comments generated during the Final Design Submittal shall be answered and incorporated in the design analysis, drawings and specifications before they are submitted as Ready-to-Advertise.

15.8 TECHNICAL REQUIREMENTS

15.8.1 POL Facilities

POL facilities shall be designed in accordance with UFC 3-460-01, Petroleum Fuel Facilities.

15.8.2 Engine-Generators

Diesel engine-generators shall be designed in accordance with instructions given in applicable Guide Specification and the applicable portions of this text.

15.8.2.1 Facilities for Engine-Generators

Engine-generator buildings or rooms designed for engine-generator installation shall be designed to support the unit with the following:

(a) Sufficient cooling and combustion air supply and exhaust.

(b) Correct air flow patterns to optimize cooling of both generator and engine.

(c) Door width and height to allow installation and removal of sets.

(d) Floor space for starting batteries, charger, and working space around the set, fuel oil supply and return piping trenches, day tank, electrical equipment, etc.

(e) Height of building to accommodate diesel engine, exhaust pipe, muffler and insulation. Materials should be selected for exterior piping to resist rusting, corrosion to prevent discoloration of the building exterior.

(f) 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, to prevent discoloration of the building exterior.

(g) 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 shall show each set and the above-mentioned appurtenances.

15.8.3 Cranes and Hoists

15.8.3.1 Hoists

Hoists shall be shown on the drawings in both plan and elevation. The following items shall be shown to scale and dimensioned on the drawings:

(a) Length, size and location of monorail.

(b) Location, degree and radius of all monorail curves.

(c) Location of all monorail track switches.

(d) 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 shall be used.

15.8.3.2 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 shall be shown on the drawing. For envelope dimensions, an overhead clearance of 3 inches above the high point of the crane is satisfactory. Between the crane and the side walls of the building, a clearance of 4 to 6 inches is adequate. Details of special features, such as pickup beams, control outriggers, special hooks, trolleys, hoist, end trucks, etc. shall also be shown on this drawing.

15.8.3.3 Special Hoists and Cranes

Special hoists and cranes that are not monorail or overhead traveling type shall be treated as special designs. Design requirements for these special cranes shall be requested through Project Management to the appropriate technical section at or before the predesign conference.

15.8.3.4 Coordination With Heating Systems

Hoists and cranes must be coordinated with the 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.

15.8.4 Storage Tanks for Petroleum, Oils, and Lubricants

Tanks shall be vertical or horizontal and either aboveground or underground. For tanks with a volume of 40,000 gallons or less, preference shall be given to tanks of the shop-fabricated horizontal type. Tanks with volumes larger than 40,000 gallons shall be aboveground, vertical, fixed-roof with floating pan, as required by project criteria.

15.8.4.1 Aboveground Tanks

Tanks shall be designed in accordance with UFC 3-460-01, the latest editions of API-650 and NFPA-30. Tanks to be rehabilitated or modified shall be in accordance with API-653. All aboveground tanks shall have spillage containment dikes.

15.8.4.2 Underground Tanks

Tanks shall be designed in accordance with UFC 3-460-01 and NFPA-30. Tanks with volumes of 40,000 gallons or less shall be double-wall, horizontal and suitable for underground installation. Tanks shall be either of fiberglass reinforced plastic construction or of steel construction. Steel tanks shall 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 shall be monitored by a leak detection system. The leak detection system shall indicate, by an audible alarm and indicator lights, the occurrence of a leak in any part of either tank shell. The system shall be of the electronic monitoring, pressure monitoring, vacuum monitoring, or liquid monitoring type. Observation wells shall 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 shall be clearly identified and provided with locking devices. Tanks with volumes of more than 40,000 gallons shall be vertical, and field erected unless otherwise authorized.

15.8.5 Central Energy Plants and Energy Distribution Systems

Central energy plants and energy distribution systems shall be designed in accordance with the UFC 3-430 series of criteria.

15.8.6 Elevators

Elevator systems shall be designed in accordance with the International Building Code and ASME A17.1, Safety Code for Elevators.

15.8.7 Other Mechanical Systems

All other mechanical systems shall be designed in accordance with the latest and most stringent design criteria as listed in the contract scope of work.

CHAPTER 16

ELECTRICAL AND ELECTRONIC SYSTEMS

INDEX

16.9 GENERATORS

16.10 POST/BASE SPECIFIC CRITERIA

EXHIBITS

CHAPTER 16

ELECTRICAL AND ELECTRONIC SYSTEMS

16.1 GENERAL

16.1.1 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, shall be in accordance with Chapter 2 PRESENTATION OF DATA.

16.1.2 Design Submittals

(a) 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.

(b) The requirements shall be defined, developed and agreed upon at the predesign conference and will become part of the contract.

(c) 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.

16.2 APPLICABLE PUBLICATIONS

American National Standard Institute (ANSI)

IEEE-C2	National Electrical Safety Code

Institute of Electrical and Electronic Engineers (IEEE)

IEEE 142	Recommended Practice for Grounding of Industrial and Commercial Power Systems.

Instrument Society of America (ISA)

ISA 55.1	Instrumentation Symbols and Identification
ISA 55.2	Binary Logic Diagrams for Process Operations

National Fire Protection Association (NFPA)

NFPA 70	National Electrical Code
NFPA 70E	Standard for electrical Safety in the Workplace

NFPA 72	National Fire Alarm Code
NFPA 90A	Standard for the Installation of Air-Conditioning and Ventilating Systems
NFPA 101	Life Safety Code
NFPA 170	Standard for Fire Safety and Emergency Symbols
NFPA 730	Guide for Premises Security
NFPA 780	Standard for the Installation of Lightning Protection Systems

National Electrical Manufacturers Association (NEMA)

NEMA E1 13	Pulse Initiators for Watthour and Other Integrating Meters

Military Handbooks (MIL-HDBK)

MIL-HDBK 419A	Military Handbook Grounding, Bonding and Shielding for Electronic Equipments and facilities
MIL-HDBK 1190	Military Handbook for Facility Planning and Design Guide
MIL-HDBK 1191	Military Handbook for Medical and Dental Treatment Facilities, Design and Construction Criteria Guide
MIL-HDBK 1012/3	Telecommunications Premises Distribution Planning, Design and Estimating

Technical Manuals (TM)

TM 5-811-3	Electrical Design: Lightning and Static Electricity Protection

Unified Facilities Criteria (UFC)

UFC 1-200-01	Design: General Building Requirements
UFC 3-520-01	Interior Electrical Systems
UFC 3-530-01AN	Design: Interior and Exterior Lighting and Controls
UFC 3-550-03FA	Design: Electrical Power Supply and Distribution
UFC 3-600-01	Design: Fire Protection Engineering for Facilities
UFC 4-021-01	Design and O&M: Mass Notification Systems (Draft May 2006 available from Mobile District)
UFC 4-010-01	DOD Minimum Antiterrorism Standards for Buildings

Technical Instructions (TI)

TI 800-01	Design Guide

International Code Council (ICC)

IFC	International Fire Code
IBC	International Building Code
Telecommunication Alliance (EIA)	Industry Association (TIA)/Electronic Industries
TIA/EIA-568-B.1	Commercial Building Telecommunications Cabling Standard – Part 1: General Requirements
TIA/EIA-568-B.2	Commercial Building Telecommunications Cabling Standard – Part 2: Balanced Twisted Pair Cabling Components
TIA/EIA-568-B.3	Optical Fiber Cabling components Standard
TIA/EIA-569-B	Commercial Building Standards for Telecommunications Pathways and Spaces
Building Industry	Consulting Service International (BICSI)
	Edition Telecommunications Distribution Methods Manual (TDMM)
United States Army	Information Systems Engineering Command
TG I3A	Technical Guide (TG) for Installation Information Infrastructure Architecture
United States Air	Force, Engineering Technical Letter (ETL)
ETL 02-12	Communications and Information System Criteria for Air Force Facilities
ETL 98-7	Fire Protection Criteria - New Aircraft Facilities
United States Army	
EC-385-1-223	Engineering Circular (EC) Interim Guidelines for Arc Flash Hazard Protection
ER 1110-345-700	Engineering Regulations (ER) Design Analyses, Chapter 1
ETL 1110-3-403	Electrical Power Systems for Non-Linear Loads
Interior and Exterior Lighting Fixture Standard Details	
Available at:	

http://www.wbdg.org/ccb/NAVGRAPH/UFGS%20and%20NAVFAC%20Graphics%20TOC.pdf

16.2.1 Other Publications and Code Compliance

In addition to the codes and standards listed above, all electrical work shall 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 shall be listed by the Underwriter's Laboratory (UL) or

a similar testing laboratory acceptable to COE. When codes conflict, the more stringent shall govern.

16.2.2 Guide Specifications.

Specifications are updated on a regular basis. Instructions on retrieving UFGS Specifications are covered in Chapter 3 SPECIFICATIONS.

16.3 PROJECT DEFINITION (10%-15%)

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

16.3.1 Exterior Electrical Distribution System Design Analysis Narrative

(a) 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.

(b) 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).

(c) 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). State short circuit current available at project site and state the source of this data.

(d) Provide brief description of the conductor type(s), such as copper or aluminum, and a justification for the choice made.

(e) A statement will be included describing all exterior lighting, with handicapped features if required.

(f) List Unified Facilities Guide Specifications that will be used. The designer shall obtain the appropriate guide specifications and use them for design guidance.

(g) Include a statement that no brand names or proprietary items will be used in the final plans and specifications.

16.3.2 Interior Electrical System Design Analysis Narrative

(a) 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).

(b) Provide brief description of the lighting system(s) to be used for major areas.

(c) State type of wiring system, such as rigid or intermediate conduit, electrical metallic tubing, nonmetallic sheathed cable, etc., that will be use.

(d) Provide a paragraph describing special items of design, such as equipment, handicapped and seismic requirements, etc.; include description and location.

(e) 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.

(f) Indicate if a lightning protection system will be required; if none, so state. (Reference TM 5-811-3 and NFPA 780).

(g) 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.

(h) List UFGS that will be used. The designer shall obtain the appropriate guide specifications and use them for design guidance.

(i) Provide a firm statement that no brand names or proprietary items will be used in final plans and specifications.

(j) Provide a statement identifying the sustainable design features to be incorporated. See Chapter 20 SUSTAINABLE DESIGN AND DEVELOPMENT (SDD) for specifics.

16.3.3 Exterior Electronic System Design Analysis Narrative

(a) Provide a statement describing the extent of any exterior work such as telephone lines, duct banks, etc., outside of 5 feet from the building line. Provide brief description of the standards of design.

(b) List Unified Facilities Guide Specifications that will be used. The designer shall obtain the appropriate guide specifications and use them for design guidance.

16.3.4 Interior Electronic Systems Design Analysis Narrative

(a) 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.

(b) Provide a descriptive narrative of all electronic systems that are required for project. A list of possible electronic components and/or systems that may be required on a given project are as follows:

(1) Telecommunication/Data Systems

(2) Fire Detection and Alarm System

(3) Special Grounding Systems

(4) Public Address Systems

(5) Security Systems

(6) Mass Notification System

(7) Access Control System

(c) Define any hazardous areas (as defined in the National Electrical

Code) and indicate the type of equipment proposed for use in such areas.

(d) List Unified Facilities Guide Specifications that will be used. The designer shall obtain the appropriate guide specifications and use them for design guidance.

16.4 CONCEPT DESIGN (30%-35%)

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

16.4.1 Exterior Electrical Distribution System Design Analysis Narrative

(a) 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 shall be included in the design analysis of all affected equipment and structures.

(b) Provide electrical characteristics of power supply from the service point to the main service equipment (voltage, phase, number, and size of conductors).

(c) 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.

(d) State type of conductor, such as copper or aluminum, and where proposed to use and a justification for the choice made.

(e) A statement will be included 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.

(f) A statement will be included describing all exterior lighting, with handicapped features if required. IES point-to-point calculations shall be submitted to support the selection for the aforementioned lighting system.

(g) Include a statement that no brand names or proprietary items will be used in the final plans and specifications.

(h) List Specifications that will be used. The designer shall obtain the specifications listed and use them as design criteria.

16.4.2 Exterior Electronic System Design Analysis Narrative

(a) Provide a statement describing the extent of any exterior work such as telephone lines, duct banks, etc., outside of 5 feet from the building line.

(b) List the specifications that will be used.

16.4.3 Interior Electrical System Design Analysis Narrative

(a) Indicate Electrical Characteristics (phase voltage and number of wires) for electrical system. Justification for the type of system proposed (Economical or Special Condition).

(b) Provide brief description of the lighting system(s) to be used for major areas and referencing calculations. Also include tabulation, showing the following:

(1) Room, name, and number.

(2) Lighting intensity for each room. (State the design basis such as Illumination Engineering Society (IES), Definitive Drawings, etc.)

(3) Type of fixture, either by Standard Drawing Number or, if not applicable, include three (3) manufacturers' catalog cut sheets of each fixture type.

(c) State type of wiring system, such as rigid or intermediate conduit, electrical metallic tubing, nonmetallic sheathed cable, etc., and location of proposed use.

(d) 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.

(e) 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.

(f) Describe basic characteristics of panelboards, protective devices, switchgear, motor control centers or other major equipment to be provided. Short circuit and voltage drop calculations must be included to the service. Indicate equipment interrupting rating and short circuit withstand current, and include the source of this information. Evidence shall 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.

(g) Describe electrical metering equipment to be provided.

(h) Describe lightning protection system; if none, so state. (Reference TM 5-811-3 and NFPA 780).

(i) 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.

(j) Provide a firm statement that no brand names or proprietary items will be used in final plans and specifications.

(k) Provide a statement identifying the sustainable design features to be incorporated. See Chapter 20 SUSTAINABLE DESIGN DEVELOPMENT (SDD) for specifics.

(l) Provide a statement identifying compliance with AT/FP requirements. See Chapter 19 ANTI-TERRORIAM/FORCE PROTECTION (AT/FP) for specifics.

(m) Provide a statement that Arc Flash Hazard analysis, calculations, labels and other information will be provided.

(n) List UFGS that will be used. Use Mobile Guide Specifications where available. The designer shall obtain the appropriate guide specifications and use them for design guidance.

16.4.4 Interior Electronic Systems Design Analysis Narrative

(a) 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.

(b) Provide a descriptive narrative of all electronic systems that are required for project. A list of electronic components and/or systems that may be required on a given project are as follows:

(1) Telecommunication/Data Systems

(2) Fire Detection and Alarm System

(3) Mass Notification System

(4) Special Grounding Systems

(5) Public Address Systems

(6) Security Systems

(7) Access Control System

(c) Communications layout information should be furnished from the Using Service on "marked-up" 30%-35% drawings.

(d) 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.

(e) List the specifications that will be used.

16.4.5 Drawings (30%-35%)

16.4.5.1 Exterior Electrical

(a) Existing and new electrical primary lines both overhead and underground shall be properly identified.

(b) Show removals and relocations, if any. If extensive, provide separate drawing(s).

(c) Indicate electrical characteristics of all items shown; include voltage, phase, conductor size, and kVA.

(d) Show new construction and location of transformers.

(e) Indicate the secondary service to the facility and whether it is overhead or underground.

(f) Show guy leads and guy strengths on the plans. Guying calculations shall be submitted verifying the guying design shown.

16.4.5.2 Exterior Electronic Systems

(a) Exterior work to be shown on electrical site plan or separate Electronic systems site plan.

(1) Existing and new communications service lines, both overhead and underground, shall be properly identified.

(2) Show removals and relocations, if any.

16.4.5.3 Interior Electrical

(a) Show typical room lighting and receptacle layouts on floor plan.

(b) Show the service and the main electrical service equipment and size same.

(c) Show the location of all major pieces of electrical equipment, including panelboards.

(d) Show the proposed riser diagram. Sizes of all conduit, wires, cables, panels, etc., need not be included, except for the main service feeder. Where the electrical configuration cannot be adequately explained on a power riser diagram, a complete one-line diagram will be provided.

(e) Provide samples of panelboard, switchboard, motor control and fixture schedules. (See **EXHIBITS 16-1** and **16-2**.)

(f) 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.

16.4.5.4 Interior Electronic Systems

(a) Show the location of all electronic system panels, etc., on floor plans.

(b) Show the proposed riser diagrams for all systems. Sizes of conduit, wires, cables, panels, etc., need not be included at the 30%-35% design. (See **EXHIBITS 16-3**, **16-4**, **16-5**, and **16-6**)

(c) Provide a <u>complete</u> symbol legend for all devices or equipment shown on the plans.

(d) It may be necessary for the designer to provide a recommended layout for telephone, LAN, mass notification and cable television (CATV) on floor plans.

16.5 <u>INTERIM DESIGN (50%-60%)</u>

16.5.1 <u>Design Analysis</u>

This stage of Design Analysis shall 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. Short circuit and voltage drop calculations shall be included to all panelboards.

16.5.1.1 Exterior Electrical Distribution System Design Analysis Narrative

(a) 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 shall be included in the design analysis of all affected equipment and structures. Properly label all photographs indicating pole location, pole designation and view orientation of picture.

(b) Provide electrical characteristics of power supply from the service point to the main service equipment (voltage, phase, number, and size of conductors).

(c) Indicate type, number, kVA capacity and impedance of transformer installation proposed. State primary and secondary connections of transformers (i.e., 12470 to 480Y/277 volts, Delta-wye), in accordance with ANSI C57.12.00.

(d) State type of conductor, such as copper or aluminum, and location of proposed use and a justification for the choice made.

(e) A statement will be included 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.

(f) A statement will be included describing all exterior lighting, with handicapped features if required. Types of fixtures, pole heights, and proposed intensities are to be included. IES point-to-point calculations shall be submitted to support the selection for the aforementioned lighting system.

(g) List Guide Specifications that will be used.

(h) Include a statement that no brand names or proprietary items will be used in the final plans and specifications.

16.5.1.2 Interior Electrical System Design Analysis Narrative

(a) Indicate Electrical Characteristics (phase voltage and number of wires for the electrical system. Justification for the type of system proposed (Economical or Special Condition). A life cycle analysis is required on 120/208 volt system above 300 kVA.

(b) Provide description of lighting system(s) to be used for all areas, referencing calculations and economic analysis. Also include tabulation, showing the following:

(1) Room name and number

(2) Lighting intensity for each room. (State the design basis such IES, Definitive Drawings, etc.)

(3) Type of fixture, either by Standard Drawing Number 40-06-04 or, if not applicable, provide three (3) manufacturers' catalog cut sheets of each fixture not in the 40-06-04.

(c) State type of wiring system, such as rigid or intermediate conduit, electrical metallic tubing, nonmetallic sheathed cable, etc., and location of proposed use.

(d) 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.

(e) 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. Insure that all devices installed in hazardous classified locations are shown and/or specified as suitable for the location in which they are installed.

(f) Describe lightning protection system; if none, so state. (Reference TM 5-8ll-3 and NFPA 780.)

(g) Describe grounding system to be installed. If a counterpoise, grid, etc., is to be used, state standards to be used in design calculations.

(h) Describe basic characteristics of panelboards, protective devices, switchgear, motor control centers or other major equipment to be provided. Short circuit and voltage drop calculations must be included to all panelboards. Indicate equipment interrupting rating and short circuit withstand current, and include the source of this information. Evidence shall be included to support that the equipment is manufactured and/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.

(i) List Unified Facilities Guide Specifications that will be used.

(j) Provide a firm statement that no brand names or proprietary items will be used in final plans and specifications.

(k) Describe electrical metering equipment to be provided. If the facility has a utility monitor and control systems (UMCS) energy management and control system (EMCS) system, address method to provide signals to master station.

(l) Include a statement certifying that the designer has implemented the 30%-35% annotated comments.

(m) Provide a statement identifying the sustainable design features to be incorporated. See Chapter 20 SUSTAINABLE DESIGN AND DEVELOPMENT (SDD) for specifics.

(n) Provide a statement identifying compliance with AT/FP requirements. See Chapter 19 ANTITERRORISM/FORCE PROTECTION (AT/FP) for specifics.

16.5.2 Drawings (50%-65%)

16.5.2.1 General

(a) All removals must be shown. If removals are extensive, separate demolition plans are required. The designer shall display the information in such a manner that it would not be necessary to visit the site to prepare a bid.

(b) A complete legend shall be provided for all devices and equipment shown on the plans. Mounting heights shall be included as applicable.

16.5.2.2 Exterior Electrical

All exterior electrical shall be completed in plan with poles and other pertinent components detailed. Details shall 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 3-550-03FA. Manholes and/or handholes shall be detailed on final drawings.

16.5.2.3 Interior Electrical

(a) Power riser or one-line diagram shall be essentially complete except for finalization of conduit and wire sizes.

(b) Panelboards, motor control centers, switchgear equipment and all utilization equipment shall be located with schedules and physical layout arrangement completed. Provide front elevations for freestanding equipment.

(c) Branch circuits, lighting fixtures with switches, receptacles, and motors shall be shown with number of conductors indicated.

(d) A completed fixture schedule shall be included on the drawings.

(e) Before submittal, drawings shall be thoroughly checked by the designer for discrepancies and conflicts, particularly as related between disciplines and various systems above dropped ceiling.

16.5.2.4 Electronic Systems

(a) All exterior plans should be completed.

(b) Thoroughly check for discrepancies and conflicts, particularly between disciplines.

(c) Any removals required must be shown. If removals are extensive, demolition plans are required.

(d) Provide riser diagrams for fire detection and alarm system, intrusion detection system, public address system, telephone system, mass notification system, etc. Risers should show the location of the various components and interconnections with other systems such as HVAC panel connections to fire alarm panels, etc. (See **EXHIBITS 16-3**, **16-4**, **16-5** and **16-6**)

(e) Show location of all devices (fire alarm, mass notification, communications, etc.) and equipment for electronic systems on the floor plans. Show location of devices to be interconnected; e.g., show duct-mounted smoke detectors, hood fire-suppression system contacts for fire alarm system input, etc. Location of all devices shall conform to NFPA 72 and UFC 3-600-01, ADAAG (ADA Accessibility Guideline; www.access-board.gov) and/or UFAS.

(f) Provide details of telephone outlets, telephone backboard arrangement, and other items required by criteria or comment.

(g) Provide data for special ground system.

16.5.3 Specifications

Provide redlined marked up specifications in accordance with Chapter 3, SPECIFICATIONS.

16.5.4 Additional Criteria

Any additional criteria, deviations concerning criteria, questions or problems should be listed.

16.6 FINAL DESIGN (UNREVIEWED 100%)

The comments generated during the Concept Review shall be answered or incorporated into the Final design analysis (not amended sheets) and drawings before they are submitted as Final.

16.6.1 Design Analysis

(a) The Final 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.

(b) A coordination analysis of the electrical system shall be provided as stated herein below. This requirement depends on the complexity of the project. It shall not be provided for projects having nonadjustable protective devices for which coordination is not possible (e.g. standard molded case breakers). Projects that are served by a transformer 750 kVA or less do not require a study. All other systems shall have a coordination study provided.

(c) An arc fault hazard analysis shall be performed for all buildings. The analysis shall show arc fault energy, arc fault boundaries, and PPE requirements in both tabular form and on a one-line diagram. Arc Flash labels shall also be provided (information necessary to put on labels). This information shall 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.

16.6.2 Drawings

The final drawings are an extension of the approved 50%-60% drawings and shall incorporate the 50%-60% comments.

(a) All details for final package shall be on the drawings (pole details, fixture details, etc.). Congested areas where there can be interference with various electrical systems, cable trays, piping, ducts, etc., shall be thoroughly detailed by expanded scale drawings.

(b) 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:

(1) 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.

(2) Panelboards, motor control centers, switchboard and switchgear schedules, home runs, and floor plans.

(3) Power riser or one-line diagram configuration agrees with floor plans.

(4) Legend and/or symbols complete and compatible with drawings.

(5) Fixture types indicated on the drawings agree with fixture schedule.

(6) Assure design complies with design analysis and criteria.

(7) Adequacy of details and control diagrams.

(8) Proper and practical circuitry with number of conductors and conduit sizes indicated correctly.

(9) 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. Insure that all devices installed in hazardous classified locations are shown and/or specified as suitable for the location in which they are installed.

(10) Ensure that all Electronic Systems are provided with power.

(11) Ensure that the proper receptacle types(s) are provided for the specific special purpose equipment that will be used in the facility. Obtain equipment list and requirements from user.

16.6.3 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 3, SPECIFICATIONS.

(a) Read thoroughly and comply with the instructions in each set of guide specifications, including notes to specification writer. The SPECINTACT specification writing system shall be used for specification preparation.

(b) Cross out nonapplicable index items, publications, paragraphs, phrases, words, and sentences. Fill in blanks as applicable.

(c) Add publication references, paragraphs, phrases, words, and sentences for items not adequately covered by specifications.

(d) Do not specify proprietary items. See Chapter 3 Specifications.

(e) Ascertain that major or special types of equipment are available commercially.

(f) The specifications shall require the contractor to provide a system

short circuit study and coordination curves for the equipment to be furnished. The study and curves shall be approved prior to approval of shop drawings for the equipment. The study shall not be provided for projects having nonadjustable protective devices for which coordination is not possible (e.g. standard molded case breakers). Projects that are served by a transformer 750 kVA or less do not require a study. Certain facilities where the loss or power would be critical shall also require the study.

(g) If the design is predominately 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.

16.7 READY-TO-ADVERTISE (REVIEWED 100%)

(a) The comments generated during the Final Review shall be answered or incorporated into the completed design analysis (not amended sheets), specifications, and drawings before they are submitted as Ready-to-Advertise.

(b) The analysis shall be complete and shall support the requirements of the project.

(c) The drawings and specifications shall be complete and thoroughly checked. Where additions to existing electronic systems are made, the designer shall have verified that the existing system is expandable and can accommodate the additions. This verification shall 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 shall be included in the plans and specifications. This is typical of expansions made to fire alarm and public address systems.

16.8 TECHNICAL REQUIREMENTS

16.8.1 Metering. Metering shall be provided for both Army and Air Force projects as required by UFC 3-520-01.

16.8.2 Salvageable Material

The salvageable material resulting from a demolition design and not reincorporated in the design remains property of the U.S. Government. The debris will be disposed of as directed by the Contracting Officer’s Representative. Typical removal paragraphs are listed below.

16.8.2.1 Removals

Where indicated, existing equipment and material shall be removed and shall remain the property of the Government. Salvageable equipment and materials shall 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 shall be disposed of as directed.

16.8.2.2 Reuse of Removed Materials

Removed materials with the exception of poles shall be reused if they are in good condition and they meet the requirements of this section of the specifications. Removed wood poles shall not be reinstalled. (Removed materials not incorporated in the new work shall be delivered to storage and disposed of as directed by the Contracting Officer’s Representative.)

16.8.3 Special Items

The following items will be included in each submittal, where applicable:

(a) Unified Facilities Guide Specifications must be used in preparing contract specifications for diesel-electric generators. Unless application requires otherwise, provide brushless type generators.

(b) Egress lighting must comply with life safety code NFPA 101. In the concept and design analysis, write up reference paragraph and chapter that the design is based upon.

(c) Facilities requiring design for the handicapped shall comply with UFAS as outlined in 41-CFR-101-19.6, as well as the ADAAAG, 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 shall be applicable.

(d) 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.

(e) Provide both green grounding conductors and driven electrodes for exterior lighting poles.

(f) Seismic design, when required, shall be in accordance with UFC 1-200-01.

(g) Dedicated electrical space shall be provided around and above panelboards, switchboards, transformers, transfer switches, motor control centers and similar major items of electrical equipment. This space shall be defined in accordance with UFC 3-520-01.

(h) Fire Resistant Ceilings. When the false ceiling is used as the fire resistant ceiling, then the lighting fixtures shall be installed in accordance with Underwriters Laboratories Fire Resistance Directory. The lighting fixtures specified shall be classified for fire resistance and will be so noted in the lighting fixture schedule.

(i) All air-cooled chillers shall be served by a fused disconnect switch. The fuse size shall be as indicated by the name plate on the equipment installed.

(j) Electrically-driven fire pumps. The designer will insure that the requirements of NFPA 20 are met in all designs that include fire pumps. In particular, a letter 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.

(k) Interior Lighting Systems. Interior lighting accounts for a significant portion of electrical energy consumed in a building. Energy is saved and electric demand reduced by improving lighting system efficiency and using daylighting. The lighting design shall incorporate the latest techniques of energy savings applied to lighting systems. Lighting designs shall incorporate high efficiency fluorescent tubes. Designs for work within

existing buildings shall be compatible with the existing system. When designing new lighting systems the designer shall consider incorporating the following features into the lighting design: high efficiency electronic ballasts, the use of automated dimmers sensitive to the amount of natural light in the space, the use of motion detectors and/or other devices to automatically turn off lights in unoccupied rooms. Employ sustainable design features to the greatest extent possible.

(l) Nonmetallic sheathed cable will be included in all Army designs, and in Air Force where allowed by MIL HDBK 1190, as allowed by the National Electric Code. In CMU block construction, a detail will be included to indicate how the cable shall traverse through the block and bond beams.

(m) Electrical Service to Army Reserve Centers (ARC) shall be underground as required in the "Design Guide" furnished to all designer's designing ARC's. The primary will be extended underground (UG) from the property line to a padmounted transformer near the mechanical room, and then an UG secondary will be extended into the building. A letter must be furnished (as part of the 30%-35% design analysis) from the power company giving the costs and all their requirements for the complete installation of the UG service. Where an exact cost cannot be furnished, an estimate will be adequate for the 30%-35%. An exact cost, however, must be obtained before the Final (Unreviewed 100%) submittal for inclusion in the specifications as a separate bid item.

(n) The thickness of long runs of “grounding” bus bar shall be 3” X ½” if shown to be supported at 5 ft. intervals. If thinner bus bar (1/4”) is used, supportive intervals shall be at 2-ft.

(o) Insure that the Impedance for the main transformer(s) are shown on the drawings and/or covered in the specifications.

(p) Low-pressure sodium light fixtures shall be utilized for installations where use of other types of HID fixtures present environment concerns (e.g. impact on marine life such as sea turtles). See also, installation site specific criteria.

(q) Where applicable, provide lighting controls on stage in classrooms and assembly rooms where instructions take place.

16.8.4 Design Criteria for Nonlinear Loads

(a) The design of the electrical distribution (both normal and emergency power) shall 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 shall be in accordance with ETL 1110-3-403. Per the requirements of paragraphs 4c and 4g, the use of 75 degree C (minimum) conductors is required and must be shown as such on the drawings. Eight-wire branch circuits within the building which serve nonlinear loads shall be 3#12, 3#10 N., 1#12 GND., and 1#12 Isolated GND. Feeders serving panelboards with nonlinear loads shall have the neutral conductor ampacity based on at least 1.73 the ampacity of the phase conductors. The simplest way to accomplish this is a double ampacity neutral or parallel neutrals in sizes allowed by the National Electrical Code.

(b) "K" rated transformers shall be used where the associated panelboards are feeding a large quantity of non-linear loads. Special attention shall be given to the harmonics produced by variable speed and variable frequency drive units for control of HVAC equipment.

16.8.4.1 The following sentence shall be included in the general wiring paragraph of SECTION 26 20 00 INTERIOR DISTRIBUTION SYSTEM:

"Conductor sizes for nonlinear loads (as shown on the drawings) are based on the use of 75 degree C. (minimum) insulated conductors for the branch circuits and feeders."

16.8.5 Telecommunication/Data Systems

Generally telephone/WAN (Wide Area Network) entrance cables will be provided by the telephone company to a point near the site. The designer shall design a raceway system from the point designated by the telephone company or using agency into the main communications room in the facility. All conduit shall be concrete encased when run underground. Spare conduit(s) shall be included in the service entrance run. While the communications service may be provided by the Telephone Company, the designer shall verify all telephone/data requirements.

16.8.5.1 General Design

Design shall incorporate Industry Standard Practices as provided by BICSI in the current edition of the TDMM, TIA-568 and TIA-569, additionally, include the provision of 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 shall be provided to guide the Contractor in their installation. The incoming communication service raceways and primary communications room shall 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.

16.8.5.2 Additional Design Guidance

The following additional design guidance must be practiced:

(a) The designer shall incorporate into the design a communication system in accordance with all pertinent regulations and guidelines and with criteria provided. 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.

(b) Communication outlet locations should be provided to the designer by the Using Agency. Coordinate with the Project Manager for requirements. Show location of telephone outlets on the plans. Include notation or symbol definition to indicate height above finished floor (AFF).

(c) Show a typical communication Conduit System Riser Diagram on the plans. The riser diagram shall show all interconnections between communication closet/rooms and other locations. Provide a typical size for the conduits shown. Do not show conduit runs between the communication closet backboards and outlets on the floor plans.

(d) Underground communication entrance conduit shall be shown on the electrical site plan or separate 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 the local telephone company as indicated above, the conduits must extend 5 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 ductbank 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 (30) inches below grade and concrete encased.

(e) When involved with a large complex or building (i.e., multibuilding complex, etc.), make a determination as early as possible the equipment required for telephone and LAN service. Communication equipment installations 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.

(f) When communication outlets are installed in prewired workstations, the cable shall be a continuous run from the outlet to the connector block at the backboard.

(g) The designer shall insure 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 instructions cover such items as the height of payphones, These requirements may require that power outlets be provided next to telephones for TDD devices.

(h) Provide show telephone jack in each Elevator Equipment Room. Add a note on title drawing stating that "The Contractor shall obtain the elevator response telephone number from the base via the Contracting Officer's Representative."

(i) Check with the base Communications Officer for 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.

(j) Include provisions for under floor routing of microphone and other types or cables in video teleconference rooms, courtrooms and similar areas.

(k) Local area networks shall 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 shall be wired continuously from the outlet to the backboard, multitap, etc. depending on the type of system installed.

16.8.6 Fire Detection and Alarm System

The fire detection and alarm system shall comply with the following design guidance where applicable.

(a) System shall conform to the NFPA Codes and ADA and/or UFAS Requirements.

(b) Do not show wire or conduit size, or the quantity of conductors in the circuits, as they will vary with different manufacturers and shall be required by the specifications to be included in the shop drawings. One exception to this requirement is the AC power circuit to the fire alarm equipment.

(c) Show location of all system components on the floor plans. Use NFPA 170 standard symbols.

(d) Provide a riser diagram showing the control panel, annunciator panel (if required), all zones, radio transmitter (if required), battery cabinet and interfaces to other systems (HVAC, sprinkler, hood dry chemical, etc.).

(e) Primary power shall be provided from a lockable breaker in electrical panel nearest to the originating point of the power and lighting service (208Y/120 Volts). Backup power shall be provided by batteries and charger.

(f) The fire alarm system must report to a Central Station. if required, (which will send an alarm signal to the local fire station) via transceiver, transmitter connected to telephone lines or existing fire reporting system. Conduit and wire in building to be included in design. 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.

(g) The specific project Criteria shall be followed for specific requirements. All ambiguities or conflicts should be clarified early in the design.

16.8.7 Mass Notification System

Provide either a standalone system or a system integrated into the fire detection and alarm system. The type of system may be directed by installation specific criteria. Due to the intelligibility requirements of UFC 04-021-01 a significant speaker system will be required.

16.8.8 Special Grounding Systems

16.8.8.1 General

(a) Special grounding systems, such as for computer and electronic equipment; for lightning protection of sensitive electronics equipment, such as radios and communication equipment shall be designed in accordance with the specific project POR document. A common grounding system can be utilized, when practical, for all grounding needs. When separate grounding systems are provided, all grounding systems shall be tied together below grade, unless otherwise directed.

(b) The surface area and lateral extent of the ground electrode in the earth, and resistivity of the earth are major factors in determining the effective resistance of the combination, known as the electrode ground-resistance. Frequently, a single electrode of even the maximum practical dimensions will not provide acceptable electrode ground resistance. In such cases, additional electrodes must be added, all connected together.

16.8.8.2 Qualifications

For certain special grounding systems, a design specialist will be required by the designer contract. When so indicated, field work, analysis and design must be accomplished by or under the direct supervision of an Engineer having at least 10 years experience in the design of special-type grounding systems and shall have successfully completed at least 10 projects of similar nature. Proof demonstrating the above shall be provided the Contracting Officer’s

Representative. The expert may be a consultant hired especially for the particular project or may be a regular employee of the designer, but his credentials must be acceptable in the judgment of the Contracting Officer's Representative.

16.8.8.3 Description of Analysis Work

(a) The designer will conduct measurements in a number of areas to determine the location, number and length of ground rods to provide the required ground resistance.

(b) The designer shall clearly define areas that could create corrosion problems and necessitate the need for cathodic protection, due to installation of the grounding system.

16.8.8.4 Design of a Ground System

(a) The specifications and drawings shall completely reflect all of the design requirements. The specifications shall require field tests (in the construction phase), witnessed by the Contracting Officer's Representative, to determine the effectiveness of the grounding system.

(b) The design must include drawings showing existing construction. Verification of the validity of any existing drawings and/or any other data furnished by the Government shall be the responsibility of the engineering services firm.

(c) The designer shall provide a cost estimate for the grounding system. This will include all construction and testing cost reflected to installation of the grounding system. The estimate shall be a detailed estimate, showing equipment, labor, excavation, etc.

(e) Use IEEE 142 for additional design guidance.

16.8.9 Public Address Systems

(a) Public address systems encompass many applications of amplified voice and music used for entertainment and distribution of voice messages. They run the gamut from a speech reinforcement system in a conference room, to a frequency equalized voice and music system for an auditorium, and on to a complex multi-zone system used for both background music and selective paging by zone with multi-media selectable inputs and area level control with paging capability. Most systems involve amplifiers, loudspeakers, and a program input. Inputs include microphones, AM/FM tuners, tape decks, phonographs, and compact disk players. Many configurations can be developed using standard equipment to fit any desired operational requirement. Each system is to be designed to meet the user's criteria requirements.

(b) In many cases, space limitations dictate the use of wall-mounted amplifiers. Dual voice coil speakers should be used for background music systems that require voice paging to override the music levels. The use of miniature relays at zone volume controls to override volume control settings for paging should be avoided. In small systems employing relatively-short runs of audio bus cable and low power requirements, a 25-volt distribution system should be used. Where long runs with high power requirements are levied on the distribution network, a 70-volt system should be used. The choice of all system components should be based on design calculations. These calculations should begin with the desired sound pressure level to be achieved in each area and be developed through the system to establish component power capacity and wire sizes.

(c) Specifications shall include sufficient technical data to establish minimum equipment quality levels. This data shall include frequency response, distortion, RMS power capacity, and minimum number and types of controls. Public address systems shall be designed in accordance with the specifications and EIA standards for sound systems.

(d) All-channel paging, consisting of paging microphone, push-to-talk switch paging amplifier, and one or more paging relays, shall be provided. All accessories, material and other equipment for a complete public address system shall be furnished. The system shall be accessed via the telephone system and may be located in the main telephone equipment room for convenience of interfacing. The design of Public Address System must be coordinated with the telephone system and the user. The system must be sized to be audible at all points throughout the facility. The system may be accessed through individual telephone instruments. The system shall provide hands free talk back capabilities in lab areas.

(e) At a minimum, separate paging zones shall be provided for the following areas: Administrative offices, Chemical labs, Biological labs, General office areas, Hazardous storage areas, Parking lots, and Exterior secured areas. In multi-floor facilities, further zoning will be required. Controls for individual speaker units shall be wall mounted and include volume control and on/off switching.

(f) The system shall comply with the UFAS as well as the ADAAG, and all state and local laws and standards for buildings and facilities requiring accessibility and usability for physically handicapped people. These instructions may require additional amplification devices.

16.8.10 Intrusion Detection Systems

(a) The designer shall design a complete intrusion detection system, as required by user comments and criteria. The designer shall have a minimum of 3 years experience in similar installations. The intrusion detection system shall protect all grade level doors, operable windows and openings leading into the facility as well as roof hatches and roof access doors. Operable windows shall be lockable and accessible windows shall be alarmed. Roof access doors or hatches shall 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 shall be of the balanced magnetic type.

(b) A riser diagram of the system shall be included in the drawings.

(c) A lockable circuit breaker shall be reserved for the Intrusion Detection System primary power connection in the 120V power panel located nearest the service entrance.

(d) All 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).

16.8.11 Leak Detection for Underground Storage Tanks

16.8.11.1 General

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 provisions shall

comply with all requirements established by EPA, State or local regulatory authorization.

16.8.11.2 Guidance

Specifications for the leak detection system shall be included in the specification section containing the tank and piping. Locations of control panels, cables, conduits, alarms, and all other electrical details associated with the leak detection system shall be shown on the Electrical drawings.

16.8.12 Lightning Protection System

16.8.12.1 Minimum Scope

A lightning protection system shall be provided for all facilities containing laboratory modules, as well as for facilities containing radioactive or explosive materials.

16.8.12.2 Additional Scope

For building types not in the above description, a risk assessment shall be performed using the guides in TM 5-8ll-3 and NFPA 780 to determine the risk of loss due to lightning.

16.8.12.3 Master Label

For buildings and facilities with a strong risk potential, furnish and install equipment, accessories, and material necessary for a complete "Master" labeled lightning protection system to protect all building components. The system shall comply with all the requirements of TM 5-8ll-3 and AMC-R 385-100, as well as the National Fire Protection Association (NFPA 780), the Underwriter's Laboratories, Inc., (UL 96A), and the Lightning Protection Institute (LPI 165). All cables, air terminals, and accessories shall be copper. All connections and splices shall be exothermic weld type.

16.8.12.4 Minimum Requirements

Completed installation shall present an unobtrusive appearance, with conductors built into the building during construction to conceal all conductors, and it shall be properly flashed and watertight. Installation shall be made in conformance with shop drawings prepared by supplier and approved by the Government.

16.8.12.5 Certification Delivery

Before the lightning protection system is accepted, the contractor shall obtain and deliver to the supervising architect, the "Master Label" of the Underwriters Laboratories, Inc., or an equivalent certification.

16.8.13 Hospital Systems

Hospital systems are very special designs, and specific requirements should be provided for each project. Hospital systems include Nurse Call, Central Dictation, Patient Monitoring, Radio and Public Address, CATV or MATV, Radio Paging Telephone, etc.

16.8.14 Cable Television Systems (CATV)

The CATV shall be a prewired system or a conduit system only for projects according to the criteria given. A two-inch (2") empty entrance conduit shall

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. The systems shall include cables from the backboard to each outlet, connectors on outlet plates and sufficient spare cable at backboard for future connection to splitters. All empty conduits shall have pull wires. Specifications will be included in Section ELECTRICAL WORK, INTERIOR.

16.8.15 Closed Circuit Television Security (CCTV) System

The video security system, where required, shall be integrated into the overall function of the facility. The designer shall design a complete closed circuit television security (CCTV) system and shall have a minimum of 3 years experience in similar installations. Placement of cameras must be carefully considered in order to avoid dead zones. Conduit and wiring shall be installed for the system and a camera shall be installed at all entrance and exit areas. The location of the camera shall be suitable for monitoring people movement when entering or leaving the building and an emergency circuit shall provide power for each camera location. Conduit, wiring, cameras, etc., shall also be installed in all parking lots, loading docks, and computer areas to provide monitoring.

(a) Cameras shall be of the fixed or pan-tilt-zoom type as required for each specific location. Camera components shall include cameras, lenses, fixed and remote-control camera accessories, camera housing, and environmental options. Cameras shall be housed in proper enclosures for the environment in which they are to operate (e.g., defrosters, heaters, weatherproof enclosures, corrosion resistant or vandalproof enclosures, etc.).

(b) All cameras shall be monitored/controlled at the facilities central control station. Monitors shall be event driven. Monitor components shall include monitors and monitor mounts. A VCR shall be provided where required, to record unauthorized access (control by guard). A 120 volt single duplex receptacle (emergency power) shall be provided immediately adjacent to all CCTV camera locations.

(c) CCTV cameras shall be provided to monitor entry and exiting from the loading dock areas. CCTV monitors (in addition to that at the central console for the loading dock areas), shall be provided in the loading dock office to provide identification of delivery vehicles prior to opening the loading dock doors.

16.9 GENERATORS

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.

16.10 POST/BASE SPECFIC CRITERIA

In addition to the requirements stated hereinbefore, criteria specific to a particular installation shall also be incorporated. This criteria is in many instances more restrictive that this document and must be obtained and used from the beginning of each project.

PANEL "XXX" SCHEDULE										
... AMPS MAIN CIRCUIT BREAKER xxxY/xxx VOLTS 3 PHASE 4 WIRE ..,... AIC										
MOUNTING: SURFACE										
NO	DESCRIPTION	BKR/P	VA A		VA B		VA C		BKR/P	DESCRIPTION	NO
1		20/1							20/1		2
3		20/1							20/1		4
5		20/1							20/1		6
7		20/1							20/1		8
9		20/1							20/1		10
11		20/1							20/1		12
13		20/1							20/1		14
15		20/1							20/1		16
17		20/1							20/1		18
19		20/1							20/1		20
21		20/1							20/1		22
23		20/1							20/1		24
25		20/1							20/1		26
27		20/1							20/1		28
29		20/1							20/1		30
31		20/1							20/1		32
33		20/1							20/1		34
35		20/1							20/1		36
37		20/1							20/1		38
39		20/1							20/1		40
41		20/1							20/1		42
		TOTAL	0		0		0				
CONNECTED KVA:		0 KVA									
CONNECTED AMPS		0 AMPS									
DEMAND KVA:		KVA									
DEMAND AMPS:		0 AMPS									

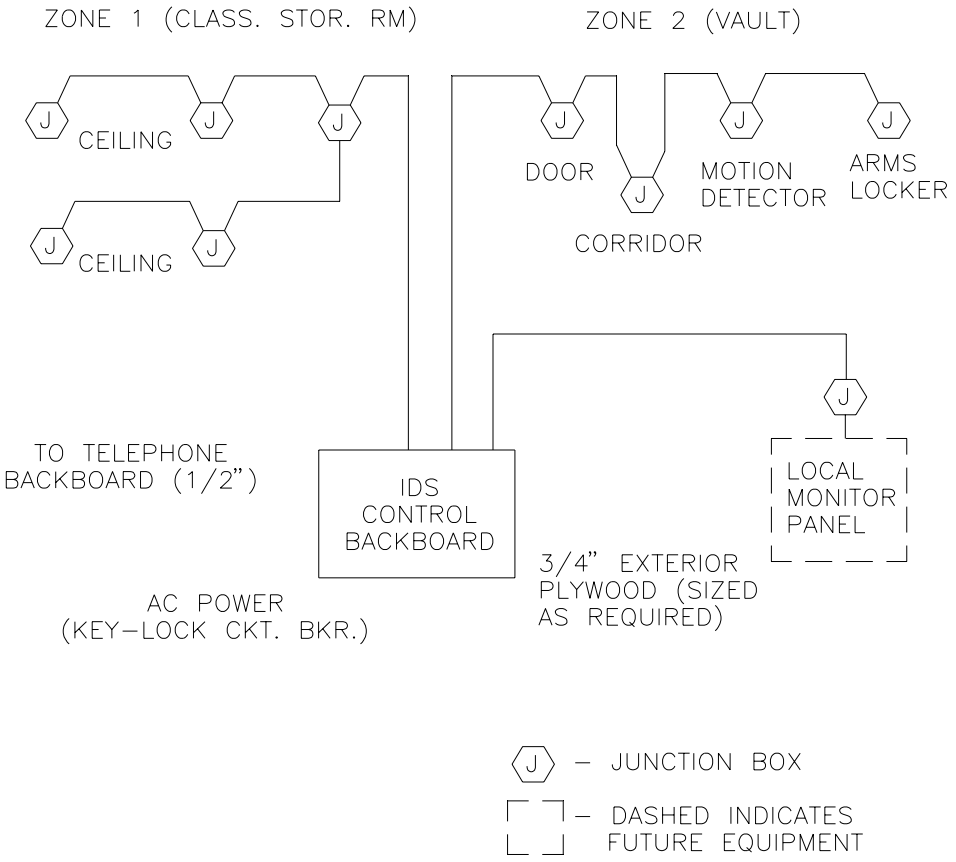
EXHIBIT 16-1

LIGHTING FIXTURE SCHEDULE

CONTRACT DRAWING FIXTURE SYMBOL	CORPS STANDARD TYPE	LAMP		FIXTURE			NOTE NO.
		QTY.	TYPE	MAX. WATT	VOLT	DESCRIPTION (INCLUDING OPTIONS)	

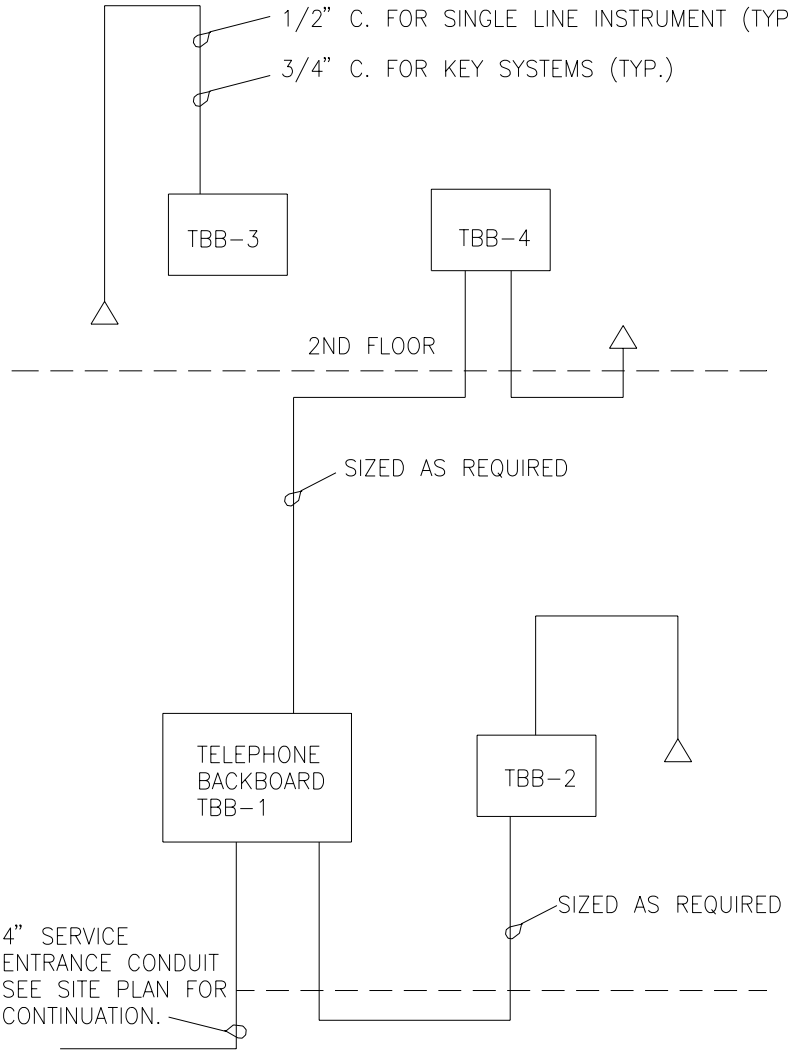
EXHIBIT 16-2

TYPICAL IDS
CONDUIT SYSTEM
RISER DIAGRAM



INTRUSION DETECTION SYSTEM RISER DIAGRAM

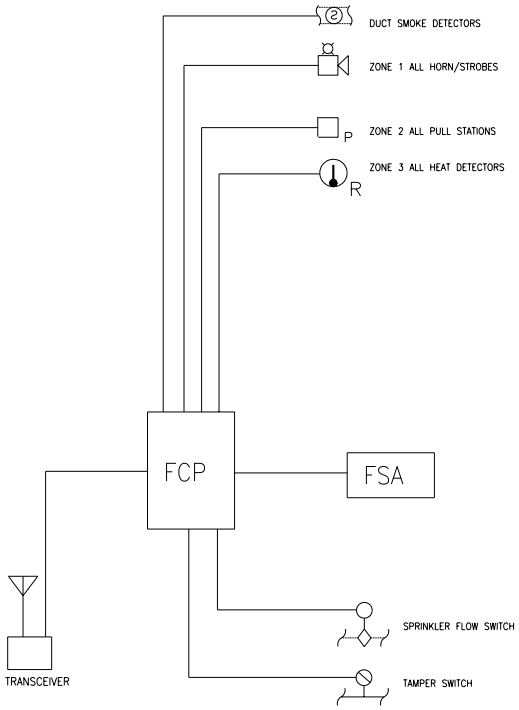
EXHIBIT 16-3



NOTE: LEGEND SHOULD COMBINED WITH LEGEND

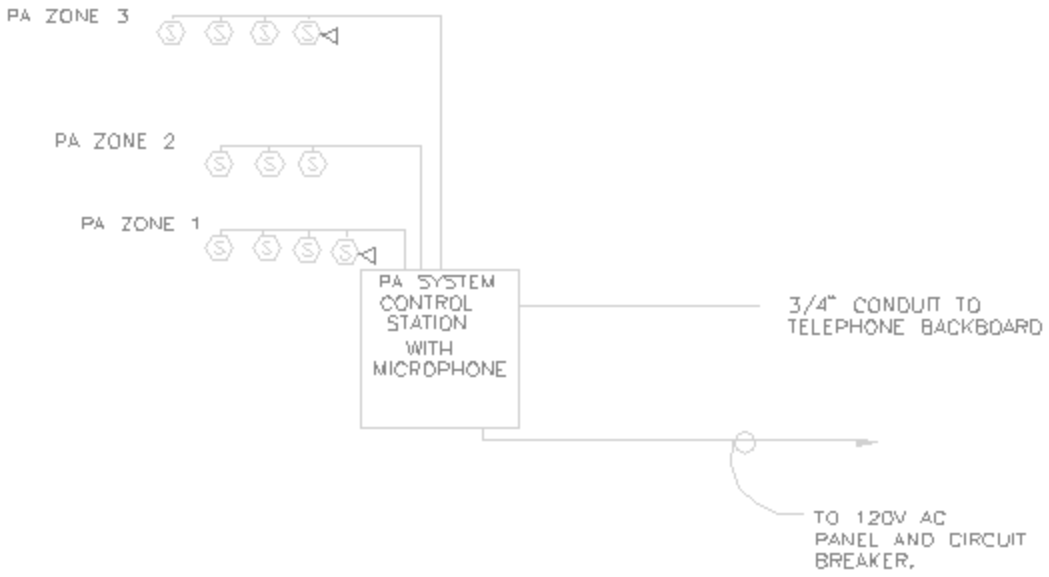
TYPICAL TELEPHONE SYSTEM RISER DIAGRAM

EXHIBIT 16-4



FIRE ALARM SYSTEM RISER DIAGRAM (TYPICAL)
NO SCALE

EXHIBIT 16-5



TYPICAL PUBLIC ADDRESS RISER DIAGRAM

N.T.S.

EXHIBIT 16-6

Design Review Checklist

Obtain a copy of the project scope. This may be in the form of the charrette report, RAMP, 1391 or other similar document. Major items of electrical equipment (e.g. generators, etc.) and special utilities (e.g. underground power lines) must be line items in the 1391 or they are not allowed.

Insure that the following criteria, where appropriate has been incorporated in the design:

MIL HDBK 1190	Military Handbook for Facility Planning and Design Guide
MIL HDBK 1191	Military Handbook for Medical and Dental Treatment Facilities, Design and Construction Criteria Guide
TM 5-811-3	Electrical Design: Lightning and Static Electricity Protection
UFC 1-200-01	Design: General Building Requirements
UFC 3-520-01	Interior Electrical Systems
UFC 3-530-01AN	Design: Interior and Exterior Lighting and Controls
UFC 3-550-03FA	Design: Electrical Power Supply and Distribution
UFC 3-600-01	Design: Fire Protection Engineering for Facilities
UFC 4-021-01	Design and O&M: Mass Notification Systems (Draft May 2005 available from Mobile District)
UFC 4-010-01	DOD Minimum Antiterrorism Standards for Buildings
TI 800-01	Design Guide
TI 800-03	Design Build Instructions

- Check the power riser diagram.
    - Main transformer
        - Check to insure that the primary and secondary voltages/connections are shown.
        - Check to see if the impedance is shown or covered in the specifications.
    - Primary
        - Insure that the size and voltage rating of the cable is shown.
        - Insure that the size is adequate for the transformer size.
        - Insure that fused cutouts or fused primary switch is shown.
    - Service
        - Insure that the service entrance conductors are sized for the demand load or the transformer secondary current as a maximum.
        - Insure that the grounding electrode conductor is in accordance with NEC Article 250.
    - Service Equipment
        - Insure that the main breaker and interrupting ratings are shown (verify interrupting rating with short circuit calculations; verify the continuous current rating with demand load calculations).
        - Insure that the main bus rating is shown (size should agree with the demand load calculations as a minimum).
        - Insure that Ground Fault Protection is shown if required be the National Electrical Code. See also additional requirements from UFC 3-520-01.
        - Insure that 15%-25% spare breakers are shown.

EXHIBIT 16-7 (Continued)

- Subpanels
  - Insure that the feeders are sized per the demand load calculations (as a minimum; can be sized to match the rating of the panel)
  - Insure that the panel main breaker (if not MLO) is sized for the panel rating. Insure that the interrupting rating is shown and verified by short circuit calculations.
  - Insure that the panel trim (flush vs. surface) is shown.
  - Insure that a oversized neutral is shown when required for nonlinear loads (ETL 1110-3-403)
  - Insure that 15%-25% spare breakers are shown.
- 208Y/120 Volt Panels
  - Insure that the required main breaker is shown. Check to insure that it is sized at the demand load as a minimum or the panel rating as a maximum. Insure that the interrupting rating is shown and verified by short circuit calculations.
  - Insure that an oversized neutral is show when required for nonlinear loads (ETL 1110-3-403).
  - Insure that 15%-25% spare breakers are shown.
- 480Y/277 Volt dry type transformers
  - Insure that these are sized by demand load calculations.
  - Indicate the K-Factor ratings on the drawings and in the specifications.
  - Insure that the grounding electrode conductor is shown in accordance with Article 250of the National Electrical Code.
  - Insure that the primary and secondary connections are shown.
  - Insure that the impedance is shown.

- Floor Plans
  - Compare the electrical plans (lighting, power, and systems) with the architectural to insure that these agree.
  - Compare these plans with the mechanical plans to insure that power is provided to mechanical equipment and it it's the correct size as shown in the mechanical equipment schedule(s).
- Lighting Plans
  - Coordinate the lighting fixture layout with the HVAC plans to insure that fixtures and registers do not conflict in location.
  - Insure that lighting switches are shown on the correct side of the door swing and that they are not located in sidelights or other glass.
  - Insure that a fixture schedule is included. Use the new 40-06-06 for details and EI 16E500 for the schedule.
  - Insure that fixtures chosen are compatible with ceiling types specified on the architectural plans.
  - Insure that boundaries of any hazardous classified location and identification of this location(s) are shown clearly.
  - If dimming ballasts are required, insure that they are shown in the details and/or schedule.
- Power Plans
  - Verify that there is power to each piece of HVAC equipment (size for the sizes shown in mechanical equipment schedules.
  - Insure that GFI is provided where required by the National Electrical Code
  - Insure that the chiller circuit is sized in accordance with manufacturer's data and that the data is included in the design analysis.

EXHIBIT 16-7 (Continued)

- Insure that receptacles are located at the TBB, LAN backboard and at DDC controls.
- Insure that there is at least one outlet on every wall.
- Panel Schedules:
  - Panel name
  - MLO or Main Breaker
  - AIC rating shown
  - Size of branch breaker and description shown
  - Oversize neutral shown where required
  - Surface or flush trim shown
  - Voltage rating and main bus rating is shown
  - Spare breakers shown
  - Insure that standard sizes are shown (100 Amps $\leq$ use 30 poles; 225 Amps $\leq$ use 42 poles)
  - Indicate any 2 section panels (state if they are feed-through or double lugs)
- Insure that boundaries of any hazardous classified location and identification of this location(s) are shown clearly.

– Fire Alarm Plans
- Initiating devices
  - Manual pull stations
    - Every egress
    - Every level
    - 200 foot maximum travel distance.
  - Area detection
    - Protect all areas including area above ceiling if needed.
    - Place all detection devices at least 12-18 inches from lights and 3 feet from HVAC registers.
  - Heat detectors
    - Reduce spacing for ceilings above 10 feet
    - Reduce spacing for other that smooth ceiling (joist, beams, etc.)
    - All points on ceiling shall be within .7 of the listed spacing after adjustments made
  - Smoke detectors
    - Use 30 foot spacing as a guide
    - Adjust spacing for other than smooth ceilings (joist, beams, etc.)
    - All points on ceiling shall be within .7 of the listed spacing after adjustments made
    - Consider the effects of stratification.
  - Special Applications
    - Use smoke detectors under raised floors and above ceilings if this area is a return air plenum. Use detectors rated for the air velocity present.
    - See NFPA 72-5.7.5.3 for areas of high air movement.
    - See NFPA 72-5.7.5.2 for high rack storage areas.
    - See NFPA 72-6.15.5.2 for smoke door release.
    - See NFPA 72-6.15.3 for elevator recall.

EXHIBIT 16-7 (Continued)

- Duct detectors
  - Coordinate with the mechanical engineer
  - Over 2000 CFM, provide on supply.
  - Over 15000 CFM and multistory building, provide on return.
  - Provide remote test station as required by NFPA 72.
  - Show detectors on floor plans and in the riser.

- Notification Appliances
  - Audible Appliances
    - Locate to provide sufficient sound level
      - 15 dB above ambient
      - 5 dB above maximum 60 second sound level
      - Double the distance loses 6 dB
      - Lose 25 dB through walls
      - Lose 10 dB through doors
      - UFGS states that bells/horns have 85 dBA at 10 feet
      - Provide devices on every floor
      - Provide devices in noisy areas (e.g. mechanical rooms, etc.)
      - Devices shall have a temporal sound pattern in accordance with NFPA 72
    - Visual Appliances
      - Space in accordance with NFPA 72 and ADAAG.
- Control Panel
  - Where connecting to an existing system, insure that the existing and new systems are compatible.
  - For conventional systems, use the following zones:
    - Fire suppression system
    - Hazardous areas
    - Flow switches
    - Tamper switches
    - Other supervisory devices
    - Fireman's elevator service
    - Attic detectors
    - Pull station
    - Kitchen equipment
    - Notification appliances
    - Automatic door release
    - Power shutdown to data processing equipment
    - AHU shutdown
  - Provide manual override for AHU shutdown testing
  - NFPA 72 lists maximum number if devices fir a zone.
  - Annunciator: use a graphic annunciator if one is required.
  - Specify transceiver to be compatible with the base/post system

EXHIBIT 16-7 (Continued)

        - Riser Diagram
            - Show FACP
            - Show power supply
            - Show signaling method
            - Show annunciator
            - Show all zones
        - Power supply
            - Provide primary source from light and power system (208Y/120 volts) per NFPA 72.
            - Secondary source is primarily batteries. Size per NFPA 72 requirements. PROVIDE A SEPARATE BATTERY CABINET.
            - Power all devices from the FACP
        - Wiring
            - All wiring is to be Class A, Style D
            - When connecting to an existing system, insure compatibility, Do not connect a 4-wire system to a 2-wire system.
        - Sprinkler System Supervision
            - Coordinate with the Mechanical/fire protection engineer.
            - Flow switches
            - Tamper switches
            - Pressure switches (on all systems)

- Telephone
    - Coordinate that receptacles are located at the TBB
    - Verify that phone outlets are located as desired by the user
    - Provide telephone outlets at the DDC panel location
    - Verify that the telephone room complies with EIA/TIA standards
    - Insure that CAT 5 circuits have not exceeded the 90-meter limit in length.

- Mass Notification System
    - Insure that audible and visual devices are shown
    - Insure that the system is shown interconnected with the FACP

- Site Plan
    - Verify that the electrical site plan agrees with the civil site plan
    - Coordinate with the landscaping plans to avoid conflicts between electrical equipment (transformers, lighting fixtures, etc.) and planting materials
    - Coordinate with the mechanical plans to avoid conflicts in location between transformers and chillers, etc.
    - Verify the lighting layout meets design lighting level prescribed in IES and the TI; support with calculations
    - Verify that required details are shown; these include pole details, pad details, manhole/handhole details, duct bank sections, etc.
    - Coordinate with other utilities (water, sewer, gas, storm sewer, etc.) to identify any conflicts and to insure that required code (IEEE C2 and NFPA 70) clearances are obtained

EXHIBIT 16-7 (Continued)

- Verify that manholes/handholes have been located in accordance with pulling calculations
- Verify that overhead line clearances meet IEEE C2 (verified with sag calculations where required)
- Verify that guy leads and guy sizes are shown and supported by calculations.
- Verify that cathodic protection is provided where required and that all appropriate details are shown and that the current specifications have been used.
- Insure that all circuits that are intended to remain and be reconnected to new circuits are properly shown and all necessary work is identified.

- Miscellaneous Drawings
  - Verify that all symbols are included in the legend (use Triservice standard symbols)
  - Verify that enlarged plans of electrical and/or mechanical rooms are included if necessary
  - Insure that the size of large items of equipment can be provided by at least three manufacturers
  - Verify that NFPA 70 clearances have been obtained
- Miscellaneous
  - Insure that Customer Specific Criteria has been incorporated
  - Insure that all design techniques for nonlinear loads have been incorporated
- Design Analysis
  - Calculations included
    - Demand load analysis
    - Lighting Calculations
      - Zonal cavity for interior
      - Exterior
    - Short circuit calculations
    - Voltage drop calculations
  - Coordination study provided (as required in the design manual)
  - Arc Flash Hazard Analysis has be performed and results presented
  - Design narrative
  - Interior, exterior narratives
  - Catalog cuts
- Lessons Learned
  - Verify that all applicable lessons learned from the district database have been incorporated (at each design/review submittal).

EXHIBIT 16-7 (End)

CHAPTER 17

CORROSION CONTROL AND CATHODIC PROTECTION SYSTEMS

INDEX

CHAPTER 17

CORROSION CONTROL AND CATHODIC PROTECTION SYSTEMS

17.1 GENERAL

17.1.1 Scope

(a) 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 shall be provided where applicable; project design and construction without considering CP are 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 sprinkler systems are one example of projects requiring CP. Although new fire lines supplying new buildings may be constructed of non-metallic materials such as polyvinyl chloride (PVC), fire 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 lines require cathodic protection under this chapter. Specific submittal requirements in this chapter supplement the requirements of Chapter 1 GENERAL INSTRUCTIONS. All required documents, including drawings and design analysis, shall be in accordance with Chapter 2 PRESENTATION OF DATA.

(b) For additional information and guidance relating to Corrosion Control and Cathodic Protection Systems, see the "Corrosion Control and Cathodic Protection Systems DX" website at:

http://www.sam.usace.army.mil/en/cp.

17.1.2 Design Submittals

(a) 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 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.

(b) The requirements shall be defined, developed and agreed upon at the pre-design conference and will become part of the contract.

(c) 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.

17.2 APPLICABLE PUBLICATIONS

National Fire Protection Association (NFPA)

NFPA 70	National Electrical Code

National Association of Corrosion Engineers (NACE)

NACE RP0169	Control of External Corrosion on Underground or Submerged Metallic Piping Systems
NACE RP0177	Mitigation of Alternating Current and Lightning Effects on Metallic Piping Systems
NACE RP0187	Design Considerations for Corrosion Control of Reinforcing Steel in Concrete
NACE RP0188	Discontinuity (Holiday) Testing of Protective Coatings
NACE RP0193	External Cathodic Protection of On-Grade Metallic 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 RP0286	The Electrical Isolation of Cathodically Protected Pipelines
NACE RP0388	Impressed Current Cathodic Protection of Internal Submerged Surfaces of Carbon Steel Water Storage Tanks
NACE RP0572	Design, Installation, Operation, and Maintenance of Impressed Current Deep Groundbeds

Unified Facilities Criteria (UFC)

UFC 3-570-02A	Design: Cathodic Protection Systems
UFC 3-570-02N	Electrical Engineering Cathodic Protection
UFC 3-570-06	Operation and Maintenance: Cathodic Protection Systems
UFC 3-570-07	Cathodic Protection System Design

Technical Instruction (TI)

TI 800-01	Design Criteria

Air Force Instruction (AFI)

AFI 32-1054	Corrosion Control

Engineering Regulation (ER)

ER 1110-345-700 Appendix B, Design Analyses

Army Material Command Regulation (AMCR)

AMCR 385-100 Safety Manual

Engineering Technical Letter (ETL)

ETL 1110-3-474 Engineering and Design Cathodic Protection

Code of Federal Regulations (CFR)

CFR 40 Part 280 Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Fuel Storage Tanks (UST)

CFR 49 Part 192 Transportation of Natural and other Gas by Pipeline: Minimum Federal Safety Standards

CFR 49 Part 195 Transportation of Hazardous Liquids by Pipeline

Other Publications and Code Compliance:

In addition to the codes and standards listed above, all electrical work associated with cathodic protection work shall 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) shall list all new manufactured equipment. When codes conflict, the more stringent shall govern.

Unified Facility Guide Specifications (UFGS)

Specifications are updated on a regular basis. Instructions on retrieving UFGS Specifications are covered in Chapter 3 SPECIFICATIONS. For cathodic protection design, the following guide specifications shall be utilized, as applicable:

UFGS 26 42 14.00 10 Cathodic Protection System (Sacrificial Anode)

UFGS 26 42 15.00 10 Cathodic Protection System (Steel Water Tanks)

UFGS 26 42 17.00 10 Cathodic Protection System (Impressed Current)

17.3 PROJECT DEFINITION (10%-15%)

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

17.3.1 Design Analysis

(a) Provide the name of the licensed Corrosion Engineer, certified NACE Cathodic Protection Specialist, or certified NACE Corrosion Specialist.

(b) New or supplemental CP shall 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, etc., must be considered in the design. The design shall require remedial actions that will mitigate all interference, grounding, and other undesirable effects to enable the new CP system to afford the required potentials. 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 shall 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 in order 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 shall be included in the plans and specifications.

(c) Provide a descriptive narrative of all cathodic protection systems and other corrosion control measures that are required for project. The narrative shall describe the extent of the corrosion control and cathodic protection work both inside and outside of the 5 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.

(d) Provide the following for cathodic protection systems:

(1) Clearly define areas of structures or components in soil or water to be protected.

(2) Type system recommended (i.e., sacrificial or impressed current), comparison of systems, and cost estimate showing all equipment

alternatives.

(e) 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.

(f) List the specifications that will be used.

17.4 CONCEPT DESIGN (30%-35%)

17.4.1 Design Analysis

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

(a) Provide the name of the licensed Corrosion Engineer, certified NACE Cathodic Protection Specialist, or certified NACE Corrosion Specialist.

(b) New or supplemental CP shall 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, etc., must be considered in the design. The design shall require remedial actions that will mitigate all interference, grounding, and other undesirable effects to enable the new CP system to afford the required potentials. 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 shall 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 in order 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 shall be included in

the plans and specifications.

(c) Provide a descriptive narrative of all cathodic protection systems and other corrosion control measures that are required for project. The narrative shall describe the extent of the corrosion control and cathodic protection work both inside and outside of the 5 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.

(d) Provide the following for cathodic protection systems:

(1) Clearly define areas of structures or components in soil or water to be protected.

(2) Type system recommended (i.e., sacrificial or impressed current), comparison of systems, and cost estimate showing all equipment alternatives.

(3) Calculations on all systems that are considered, showing all information and descriptions.

(4) Estimate showing materials and cost.

(e) 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.

(f) List the specifications that will be used.

17.4.2 Drawings

Cathodic Protection work to be shown on Utilities Site Plan or separate Cathodic Protection Systems Site Plan:

(a) 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.

(b) Show removals and relocations, if any.

17.4.3 Removal or Demolition

A general narrative of the removal and/or demolition will be included.

17.4.4 Specifications

Provide a basic outline in accordance with Chapter 3 SPECIFICATIONS.

17.4.5 Additional Criteria/Information

Any additional criteria, deviations concerning criteria, questions or problems developed during the Concept Design phase will be listed.

17.5 INTERIM DESIGN (50%-65%)

In addition to the following items, the designer shall incorporate or answer all comments received during the Concept Design submittal review.

17.5.1 Design Analysis

This Interim Design Analysis shall 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.

17.5.2 Drawings

17.5.2.1 General

(a) All removals must be shown. If removals are extensive, separate demolition plans are required. The designer shall display the information in such a manner that it would not be necessary to visit the site to prepare a bid.

(b) A complete legend shall be provided for all devices and equipment shown on the plans. Mounting heights shall be included as applicable.

17.5.2.2 Cathodic Protection Systems

(a) All plans should be completed.

(b) Thoroughly check for discrepancies and conflicts, particularly between disciplines.

(c) Cathodic protection system should be complete including analysis, narrative description of system, and drawings. The submittal shall 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.

(d) 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.

17.5.3 Specifications

Provide redlined marked up specifications in accordance with Chapter 3, SPECIFICATIONS.

17.5.4 Additional Criteria

Any additional criteria, deviations concerning criteria, questions or problems should be listed.

17.6 FINAL DESIGN (UNREVIEWED 100%)

Comments generated during the Interim Design submittal review shall be incorporated or answered in the design analysis, specifications and drawing before they are submitted as "Final".

17.6.1 Design Analysis

This analysis is an extension of the approved 50%-65% design analysis and supports and verifies that the design complies with the requirements of the project.

17.6.2 Drawings

The final drawings are an extension of the approved 50%-60% drawings and shall incorporate the Concept Design submittal review comments.

(a) All details for final package shall be on the drawings.

(b) Thoroughly check the drawings for discrepancies, for compatibility between drawings and specifications, and for compatibility between disciplines. The Final Drawings should be in a Ready-to-Advertise state which should include, but not be limited to, the following items as applicable:

(1) 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.

(2) Panel board locations and home runs to rectifiers.

(3) Terminal cabinet and test station locations.

(4) Rectifier locations.

(5) Legend and/or symbols complete and compatible with drawings.

(6) Assure design complies with design analysis and criteria.

(7) Adequacy of details and diagrams.

(8) Proper and practical circuitry with type, quantity, and size of conductors; and the type, quantity and size of conduits indicated correctly.

(9) Ensure that all hazardous areas are clearly defined where rectifiers and other electrical equipment are to be located.

(10) Ensure that all cathodic protection rectifiers are provided with power.

17.6.3 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 3, SPECIFICATIONS.

(a) Do not specify proprietary items. See Chapter 3 Specifications.

(b) Ascertain that major or special types of equipment are available commercially.

17.7 READY-TO-ADVERTISE (REVIEWED 100%)

(a) The comments generated during the Final design submittal review shall be incorporated into the design analysis (not amended sheets), specifications, and drawings before they are submitted as Ready-to-Advertise.

(b) The analysis shall be complete and shall support the requirements of the project.

(c) The drawings and specifications shall 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.

17.8 TECHNICAL REQUIREMENTS

17.8.1 Salvageable Material

The Designer shall clearly identify materials that are to be salvaged. Salvageable material resulting from demolition that is not reincorporated into the design shall remain the property of the U.S. Government. Salvageable equipment and materials shall be delivered to the Contracting Officer’s representative for storage on the premises as directed.

17.8.1.1 Removals

All materials not identified to be salvaged or reused shall be disposed of by the Contractor either off Government property or as directed by the Installation.

17.8.1.2 Reuse of Existing Materials

Existing materials shall be reused if they are in good condition and they meet the requirements of this section of the specifications.

17.8.2 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.

17.8.3 Corrosion Control and Cathodic Protection

(a) For all metal facilities located in the atmosphere, soil, or water electrolytes, corrosion control shall be provided. In all instances, cathodic protection, or approval to omit it, shall be provided for metals in soils or water. Coatings are normally provided as corrosion protection in the atmosphere. A cathodic protection system shall be provided where applicable; project design and construction without considering cathodic protection are not acceptable. As a minimum, cathodic protection and protective coatings shall 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 and water 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

(b) 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.

(c) The results of an economic analysis and recommendations by a "corrosion expert" shall govern 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).

(d) The "Corrosion Expert" shall 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.

17.8.3.1 Coating Requirements

(a) In addition to cathodic protection requirements, a minimum coating thickness of 40 mils is required on all underground metal.

(b) The only coating types that are allowed to be utilized on metallic components, structures, and pipelines that are cathodically protected are listed in the applicable cathodic protection specification section. These coating types shall 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.

(c) Unbonded coatings, such as polyethylene encasement, shall 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.

(d) Services of a NACE International certified Coating Inspector shall be ascertained. The NACE Certified Coating Inspector shall closely coordinate with the "Corrosion Expert" described herein in order to assure 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 NACE Certified Coating Inspector shall assure, 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 shall assure that the use of unbonded coatings (such as PE encasement on ductile iron piping) is not allowed; the use of such unbonded coatings is strictly prohibited. The NACE Certified Coating Inspector shall perform a complete coating inspection of all applied coatings prior to backfilling, in accordance with the applicable NACE coating standards. The qualifications documentation of the coating inspector must be submitted to the government for approval.

17.8.3.2 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 [formerly the 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 and/or submerged metallic surfaces of the type under this contract. The "corrosion expert's" name and qualifications shall be certified prior to start of design. He must be available to answer questions relating to his work.

17.8.3.3 Description of Analysis Work

(a) The "Corrosion Expert" is responsible for assuring that all

necessary field data such as resistivity measurements, etc., is obtained for the cathodic protection design. He must assure that resistivity measurements are taken along the pipeline and/or other buried or submerged metallic structure that will be cathodically protected and also 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" in order 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.

(b) The preliminary design submittal shall 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.

(c) The design shall 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.

(d) 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.

17.8.3.4 Design of Cathodic Protection

(a) 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 this facility; ONLY the latest Corps of Engineers' edition of UFGS specifications will be allowed and shall 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 through the Techinfo homepage of Huntsville Division, Corps of Engineers (which currently points to the following web address in order to obtain the applicable specification sections: http://www.wbdg.org/ccb/browse_org.php?o=70), or can 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.

(b) The cathodic protection systems provided on the metallic structures listed in this chapter shall 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 below), 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 shall, as a minimum, comply with all the requirements of Unified Facilities Guide Specification (UFGS) section 26 42 14.00 10 (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 water storage tanks (if provided and installed in this project) shall, 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 17.00 10. Furthermore, the interior surfaces of metal water storage tanks, including riser piping if so equipped, shall 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 15.00 10.

(c) The design of the cathodic protection system shall be completed prior to construction contract advertisement except for Design-Construct 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.

(d) In addition to the soil and water resistivity surveys, current requirement tests and design, the designer shall provide recommended tests, formats, required methodology, etc., for the final acceptance of the cathodic protection system based upon the USACE cathodic protection acceptance criteria.

(e) The design shall clearly provide thorough and comprehensive specifications and drawings. The design must meet the requirements of Army ETL 1110-3-474 and shall incorporate guidance from all referenced documents and other applicable criteria, such as NACE RP0169, NACE RP0177, NACE RP0187, NACE RP0188, NACE RP0190, NACE RP0193, NACE RP0285, NACE RP0286, NACE RP0388, NACE RP0572, applicable Code of Federal Regulations (CFR), etc. The expected results shall be provided by field test (in the construction phase) witnessed by the Contracting Officer’s representative.

(f) 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 shall be the responsibility of the designer.

(g) The designer shall 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 shall be a detailed estimate showing equipment, labor, excavation, etc.

(h) The design shall identify all locations for interference testing (all pipes that passes within 1000 feet of an impressed current anode bed and then crosses the cathodically protected line).

(i) 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 shall be complete enough to purchase equipment and build, without design changes, to meet criteria of protection.

(j) For non-metallic pipelines or other structure with buried or submerged metallic components, each buried or submerged metallic component 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. Header cables shall not be used for connection of anodes. Each anode shall 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 shall be connected to the structure being protected via two conductors.

(k) 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 (such as a PVC sleeve) between the pipe and concrete in order to provide isolation. 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.

(l) The cathodic protection designer shall coordinate his design with any existing cathodic protection systems in the area of the new facility. As necessary, the contractor shall 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 has to be moved shall be relocated to areas approved by the Contracting Officer’s representative.

(m) All potential tests shall be made at 2.5 ft. intervals witnessed by the Contracting Officer's Representative. Design shall 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 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.

17.8.3.5 Criteria of Protection

Criteria for determining the adequacy of protection on a buried structure are defined in the following NACE International Publications: NACE RP0169, 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 RP0388. For buried metallic components, 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 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) 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 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.

17.8.4 Other Electronic Systems

17.8.4.1 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 16 ELECTRICAL AND ELECTRONIC SYSTEMS.

17.8.4.2 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 in order 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 16 ELECTRICAL AND ELECTRONIC SYSTEMS for guidance on electrical grounding systems.

CHAPTER 18

COST ESTIMATING

INDEX

CHAPTER 18

COST ESTIMATES

18.1 GENERAL

The purpose of this chapter is to provide specific guidance for the preparation of cost estimates for military 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 bid.

18.2 APPLICABLE PUBLICATIONS

Unified Facilities Criteria (UFC)

UFC 1-300-08 series	Criteria for Transfer and Acceptance of Military Real Property
UFC 3-700 series	Cost Engineering

Air Force Parametric Cost Engineering System User Guidebook (PACES)

Civil Works Work Breakdown Structure

Engineering Instructions (EI)

EI 01D010	Construction Cost Estimates

Engineering Pamphlet (EP)

1110-1-8, Volume 3	Construction Equipment Ownership and Operating Expense Schedule - Region III

Engineering Regulation (ER)

1110-1-1300	Engineering and Design Cost Engineering Policy and Requirements
ER 1110-2-1302	Engineering and Design Civil Works Cost Engineering
ER 1110-3-1300	Engineering and Design Military Programs Cost Engineering
ER 1110-3-1301	Engineering and Design Environmental Restoration Cost Engineering

Hazardous, Toxic, Radioactive Waste Work Breakdown Structure

Historical Air Force Construction Cost Handbook

Military Work Breakdown Structure

18.3 GENERAL INSTRUCTIONS

(a) The Cost Engineer is responsible for obtaining the current version of all software and applicable user manuals. MCACES 2nd Generation (MII) software can be obtained through the U.S. Army Engineering and Support Center, Huntsville, AL at:

www.hnd.usace.army.mil/traces

Air Force Parametric Cost Estimating System (PACES) software can be obtained from Earth Tech, 9100 E. Panorama Drive, Suite 200, Englewood, CO, 80112 at 303-771-3103 or

www.talpart.com/products/paces.

(b) The following supplemental cost estimating information required to complete the cost estimate is available on the Internet at the Mobile District cost estimating data page:

http://www.sam.usace.army.mil/en/cost/encost.html

Air Force (AF) Form 1178 (Blank Form)
Engineering (ENG) Form 1354 (Blank Form)
Cost Estimate Submittal Checklist (Blank Form)
Cost Growth Factors - Army
Air Force
Civil Works
MCACES 2nd Generation (MII): Cost Library
Equipment Library
Labor Library
Military Template

Guide for Estimating Latin American Projects - Panama, El Salvador and Honduras

Guide for Estimating Payroll Taxes & Insurance and Sales Tax Costs (Stateside Projects Only)

Historical Analysis Generator (HAG) Data Sheet
Work Breakdown Structure: Civil
HTRW
Military

(c) 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 shall be changed to Metric Units of Measure and Metric Cost Data.

18.4 DELIVERABLES

The following items are to be included in estimate submittals, which are to be reviewed by the Mobile District:

(a) Cost Estimate Submittal Checklist. (Required for all submittals). The checklist shall be filled in and used as a cover sheet for each cost estimate submittal. The Checklist can be downloaded off

the Internet (See Paragraph 18.3 above). Access to each cost estimate and its contents shall be limited to those persons whose duties require knowledge of the cost estimate.

(b) Estimate. (Required for all submittals, number of copies specified in Appendix A, A-E Design Contracts). For manually-prepared, the complete detail and required summaries; for MII, all material printed out in accordance with the "Project Template", in reduced size (8-1/2"x11"), landscape, and suitably-bound. MCACES 2nd Generation (MII) guidance can be obtained from the Mobile District Cost Engineering Branch. All electronically prepared cost estimates can be e-mailed or ftp'ed to the Mobile District Cost Engineering Branch. The Ready-To-Advertise (RTA) cost estimate that is submitted to the Government shall be accompanied by a letter of transmittal, which includes the following statement: "To the best of my knowledge the confidential nature of this estimate has been maintained". This statement should be signed, dated and maintained until the official markings have been removed. A-E RTA estimates shall include all amendments that might occur during the advertising period.

(c) Bid Schedule. (Required for all submittals.) Prepare in a format in accordance with instructions in Chapter 3 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.

(d) AF Form 1178. (Required for all submittals on Air Force Projects only), properly filled out in accordance with the instructions below. A blank AF Form 1178 can be downloaded off the Internet (See Paragraph 18.3 above).

(1) Blocks 1 through 59, excluding 14 and 46, are to be completed. If a block is not applicable, so state as N/A.

(2) Blocks 48 and 50 (Area Cost factor and Size Adjustment Factor) should be listed as N/A if actual area costs are used. If unit costs for common DOD facilities are used, the appropriate factors listed in the latest Tri-service report should be used.

(3) Compute Items 55 and 57 (Construction Contingency and SIOH) based on the appropriate percentage of Item 54f, Subtotal.

(4) Reference Block 52:

a. The desired midpoint of construction (month/year) is to be calculated from Block 19, Construction Start, and Block 20, Months of Construction.

b. The midpoint of available estimate (month/year) is the date the cost estimate is prepared.

c. Both raw inflation indexes are to be obtained from the latest AF Cost Growth Factors via the Cost Engineering Branch Internet address.

(5) The Supervision, Inspection and Overhead (SIOH) in Block 57 is to 5.7%.

(e) Depart of Defense (DD) Form 1354. (Transfer and Acceptance of Military Real Property) (Required at Final and RTA submissions.) must be

prepared for specified military project as required. A blank DD Form 1354 and applicable instructions can be downloaded off the Internet (See Paragraph 18.3 above).

(f) 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 backup must be traceable to the line item task in the cost estimate that the backup supports.

(g) 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. The Spreadsheet and instructions are available at the Mobile District cost estimating data page.

(h) HAG Data Sheet. (Required with RTA submittal only). The HAG Data Sheet and instructions can be downloaded from the Mobile District cost estimating data page.

(i) Annotated Comments, as appropriate.

Note: The various customers specified in the Task Order (TO) Statement of Work (SOW) will receive the Cost Estimate Plus AF Form 1178, if applicable. All other items listed plus 1 each bound cost estimate and 1 each unbound cost estimate will be provided to the Mobile District Cost Engineering Branch only.

18.5 ESTIMATOR QUALIFICATIONS

The designers cost estimating staff shall 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 shall obtain assistance from a qualified firm whose specialty is cost estimating. In making this determination, the designer shall 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 shall 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 insure coordination and compliance with contract requirements.

18.6 METHODS OF ESTIMATING

18.6.1 General

(a) The method(s) used to prepare estimates for the various required submittals shall 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.

(b) Regardless of the method used, the designer shall make all necessary investigations, evaluations, calculations, and adjustments to insure 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.

18.6.2 PACES Building Models

When PACES building models system is specified, the estimate shall 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.

18.6.3 MCACES 2nd Generation (MII)

Under the MCACES 2nd Generation (MII) procedure, the estimate shall 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.

18.6.4 Manual

When the manual procedure is directed or elected for a specific submittal, the estimate shall be prepared similarly to the sample final estimate which will be furnished if applicable. At the Ready-To-Advertise submittal, the estimate forwarded to the Mobile District shall be the original, prepared in pencil, in order that any necessary revisions by the Government may be readily made.

18.6.5 Excel Spreadsheet

When the Excel Spreadsheet method is directed, the estimate shall 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.

18.7 SUBMITTAL REQUIREMENTS

18.7.1 General

The designer shall 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 actually 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.

18.7.2 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.

18.7.2.1 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 shall 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 shall 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 shall be explained in narrative form.

18.7.2.2 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.

18.7.3 Format

18.7.3.1 General

When PACES or MII is specified, the format will be as outlined in the Statement of Work-Cost Estimating Criteria. The Cost Estimate shall 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 shall 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 shall 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 shall 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 shall also conform to the example provided, with similar breakdown of features and bid items.

18.7.3.1.1 Military Projects

The Military WBS as specified in Section 18.11 will normally be used on all Military Construction Projects.

18.7.3.1.2 Civil Works Projects

(a) 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.

(b) 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.

(c) 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. The Government Estimate does not include Prime Contractor Profit.

(d) 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.

18.7.3.1.3 HTRW Projects

HTRW Environmental Restoration Projects shall 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 shall be prepared to the fourth level followed by detail. The quantity take-off shall be prepared following the WBS to the same level. In no case shall 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 shall be a separate estimate from the environmental work and shall follow the Military WBS. HTRW projects will likely have two distinct phase; 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 (3) separate estimates for each submittal. One for the vertical building construction, one for the HTRW construction, and one for plant operations.

18.7.3.2 Bid Schedule

For Project Definition submittals, estimated contract costs shall 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 and at least one to cover exterior work. For later than concept submittals, estimates shall 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 shall 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 shall 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 Military Cost Engineering Unit. 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 is mandatory.

18.7.3.3 Contractor Type

The estimate shall 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.

18.7.4 Cost Breakdown

18.7.4.1 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.

18.7.4.2 Project Definition (10-15%)

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.

18.7.4.3 Concept Design (30-35%)

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.

18.7.4.4 Interim Design (50-60%)

The Interim Design Submittal Cost Estimate shall 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.

18.7.4.5 Final Design (Unreviewed 100%)

The Final Design Cost Estimate shall 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.

18.7.4.6 Ready-to-Advertise (100%)

At the Ready-To-Advertise submittal, a final update of the Final submittal, the estimate will be comprised entirely of work tasks for which basic costs are detailed. 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 4 days prior to the final bid/proposal opening date.

18.7.5 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 shall, 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 shall promptly provide sufficient and satisfactory explanation and/or supporting data.

18.7.6 Bid Exceeds Estimate

(a) 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.

(b) 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 shall be performed at no increase in the cost to the Government.

18.8 TECHNICAL REQUIREMENTS

18.8.1 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.

18.8.2 Quantity Survey

(a) Accuracy and completeness of the quantity survey (takeoff) is essential as it directly and critically affects the accuracy of the estimate. The takeoff shall be comprehensively and accurately prepared to cover all work for the project. It shall 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 insure that total cost of the overall project work is covered. In such cases, statements and explanations of necessary assumptions shall 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 shall be dated and contain appropriate references to plans, specifications, or design analyses. Relevant

sketches shall 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.

(b) The importance of accurate and concise quantity take-off to the cost estimate cannot be overstressed. The following procedures and exhibits must be followed in order 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.

(c) The quantity take-off and cost estimate shall be treated in a confidential manner and only those personnel concerned with the preparation and/or review of the project shall have access to it. The cost estimate will be utilized in preparing government estimates for evaluating bids and shall be classified "FOR OFFICIAL USE ONLY". Such material cannot be divulged to other than accredited Government personnel with a need to know.
Information contained within estimates shall 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.

(d) Prepare a quantity take-off in accordance with appropriate WBS showing all quantities used in the cost estimate. The estimator shall show all assumptions as to scope and design used in preparation of the cost estimate. These assumptions shall include WBS systems contained within the project. Proper allowances shall be made for WBS system and subsystems not completely determined in the plans, specifications and design analysis. The quantity take-off and cost estimate shall be an accurate representation of the complete design submitted. Quantity take-offs shall not be written on the drawings themselves. The quantity take-off shall 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 shall contain backup and supporting sheets showing breakdown for all quantities of all materials contained within the design drawings and/or specifications.

(e) The top of each quantity take-off sheet shall 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.

18.8.3 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. Guide for Estimating sales Taxes can be downloaded off the Internet (See Paragraph 18.3 above). Each submittal for which quotations are appropriate shall 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 Military Cost Engineering Unit.

18.8.4 Labor

18.8.4.1 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 Branch, contractors in the project area, etc. Ultimately, the designer is responsible for all wage rates used in the cost estimate.

18.8.4.2 Unit Costs

18.8.4.2.1 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.

18.8.4.2.2 PACES

PACES does 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 specify line items can be adjusted.

18.8.4.2.3 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.

18.8.4.2.4 Manual or Excel Spreadsheet

Productivity must also be carefully evaluated for Manual or 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 crewhours, 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.

18.8.4.2.5 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. Guide for Estimating Payroll Taxes & Insurance can be downloaded off the Internet (See Paragraph 18.3 above).

18.8.5 Construction Equipment

TRACES does 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 manually-prepared or Excel Spreadsheet estimates, costs shall 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 shall be used as well for estimating construction equipment costs for manual or 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.

18.8.6 Subcontract Work

Estimates shall 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. Subcontractor quotations in lieu of detail are unacceptable. The subcontract estimate shall 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 his 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.

18.8.7 Mobilization and Demobilization Costs

These 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.

18.8.8 Indirect Costs

18.8.8.1 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 and then distributed logically to the various items in the bid schedule. Home office expense will normally be prorated to all bid schedule items.

18.8.8.2 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. **Exhibit 18-1** lists some items of field indirect cost. The list is not all-inclusive but is indicative of the type costs which are to be considered.

18.8.8.3 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.

18.8.9 Profit

The estimate shall 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 (**Exhibit 18-2**). For less significant subcontract work, experienced percentage rates may be used.

18.8.10 Bond

Costs for performance and payment bonds shall 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.

18.8.11 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 shall 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 Unit. A discussion with the Mobile District Military Cost Engineering Unit prior to preparation of the contract modification cost estimate is mandatory.

18.8.12 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.

18.8.13 Quality Assurance

See **Exhibit 18-3** Technical Quality Control Checklist. This checklist may be used by the cost engineer to ensure the cost estimate submittal is complete.

18.8.14 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.

18.8.15 Clarification

Should any question arise concerning the requirements, instructions, procedures, etc., described herein, the Mobile District Cost Engineering Branch (334-690-2626) should be contacted for explanation and clarification.

18.8.16 DD Form 1391

Military Construction Project Data, if available.

18.9 SCOPE

Estimates shall be based on the most recent and complete design information available and shall follow the format of the appropriate Work Breakdown Structure (WBS). There are three (3) separate Work Breakdown Structures: Military, Environmental Restoration, and Civil Works. The Military WBS shall be used for all vertical building construction whether Military, Environmental or Civil Works funded. Environmental Restoration projects shall use the Hazardous, Toxic, Radioactive (HTRW) WBS (funded by DERO, Superfund, DOE, etc.). The Civil Works WBS shall be used for large earth moving/dredging projects normally funded with non-military funds.

18.10 SPECIFIC INSTRUCTIONS MCACES 2nd Generation (MII).

The designer will be provided the following information.

18.10.1 MII User Manual, See Paragraph 18.3 above.

18.10.2 MII Software, Current Version. See Paragraph 18.3 above.

18.10.2.1 General

(a) The designer's computer will have to be configured properly and have sufficient disk space available (see MII User Manual) before installing the software.

(b) The MII software shall be installed as provided following all instructions. The designer shall work through the MII User Manual and become familiar with the program. The designer shall use the installation instructions provided in the manual. The Project Templates provided already have the structure set. THE DESIGNER MUST USE THE MII SOFTWARE SPECIFIED FOR USE BY THE MOBILE DISTRICT FOR THIS PROJECT.

(c) Note: Assemblies and models may not be used for Later-Than-Concept submittals. However, they may be used for Design-Build projects.

18.10.2.2 Labor Rates

If available, current wage rates to be used in preparing the construction cost estimate will be provided to the designer. The furnished wage rates will be generic and will normally reflect the Davis-Bacon minimum wage rate determination. The designer is responsible for addressing any abnormal circumstances required by the project and making corrections to the database wage rates provided. If no current wage rates are available, it is the designer's responsibility to fully investigate and determine proper wage rates. Using the localized labor rates, will put the correct labor and unit cost into the project. See Guide for Estimating Payroll Taxes & Insurance and Sales Tax Costs (Stateside Projects Only) - Reference Paragraph 18.3 above.

18.10.3 Sample Projects

Sample Projects are 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.

18.10.4 Templates

Templates shown below are used to start the respective project. For Military Estimates the "Project Template Military v2.mlp"(depending on the WBS specified) is to be used to create the estimate format. For Civil Estimates use a "User" template" defined by the estimator's requirements. Both templates are required to be used with applicable Cost Book, Equipment, Labor and User Cost Book Libraries.

18.10.5 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 Branch should be contacted for resolution.

18.10.6 Training

MII training is available through Project Time & Cost, 2727 Paces Ferry Road, Suite 1-1200, Atlanta, GA 30339, and telephone number (770) 444-9799.

18.11 TECHNICAL INSTRUCTIONS FOR MII COST ESTIMATES

Note: The following instructions are based on a Military Project. Civil and HTRW would be similar.

18.11.1 Estimate Format

The Military Work Breakdown Structure (WBS) as provided by the Mobile District, and as specified above, shall 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 shall 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 proportionately. Assemblies shall be created for building/construction systems as required by the project. In no case shall the WBS title descriptions be changed for levels 1 through 6. New titles for Subsystems or Assembly Categories shall be entered under the "Other" category. See the Military WBS. Note that the 01 through 15 Systems

are for the interior of the building (5-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 Support Facilities.

18.11.2 Military Estimate Hierarchy

When creating a MII cost estimate it is important to recognize that the construction project consists of the following hierarchical levels:

(a) 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.

(1) Project (Level 1). All cost of the Primary and Support Facilities are accumulated to obtain a total project cost. This shall 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.

(2) 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 shall also be located at this level if required.

(3) 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 shall be eight categories under Support Facilities of the DD Form 1391.

(4) 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 shall 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.

(5) 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 shall be identified using 90 through 99 under the appropriate System.

(6) 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.

(b) 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

(1) Project (Level 1). All cost of the Primary and Support Facilities are accumulated to obtain a total project cost. This shall 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.

(2) 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 shall also be located at this level if required.

(3) 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 shall be eight categories under Support Facilities of the DD Form 1391.

(4) 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 shall 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.

(5) 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 shall be identified using 90 through 99 under the appropriate System.

(6) 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 shall be identified using 90 through 99 under the appropriate subsystem. In addition, this level contains the Bid Items for the Supporting Facilities.

(7) Assemblies (Level 7). Assembly Titles shall be created at this level following the definitions contained in the WBS.

(8) 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.

(b) 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.

(1) Project Level (Level 0). All cost of the Primary and Support Facilities are accumulated to obtain a total project cost. This shall 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.

(2) 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 shall also be located at this level if required.

(3) 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 shall be items such as: Exterior Electrical Distribution, Water Supply System, Sanitary Sewer System, Site Improvements, Parking Lot, Landscaping, etc.

(4) 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.

(5) Optional levels. These levels could be used to further define the project features. Detail can be at level 4, 5, 6 or 7.

18.11.3 Design Stage Identification

All sheets of the cost estimate and quantity take-off shall be clearly marked as to the design stage (concept, preliminary, final, etc.) the cost estimate represents. The design stage identity shall be entered on the cover page of the estimate.

18.11.4 Prime Contractor Field Overhead

Itemized field overhead items for the Prime contractor shall be estimated in detail for all projects based on working knowledge of the

project and the anticipated construction period. A generic itemized overhead (contained in the project template) will be provided by the Mobile District, Cost Engineering Branch as a starting place for the designer. The designer shall edit this itemized overhead to fit the specific project conditions. Items not applicable to this project shall be deleted and new items added as required.

18.11.5 Profit

The designer shall use the "Weighted Guideline Method" in determining profit for the prime contractor and major subcontractors

18.11.6 Major MCACES 2nd Generation (MII) Menu Screens

18.11.6.1 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.

18.11.6.2 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.

18.11.7 Required Services

The designer shall supply the following Cost Engineering services:

(a) The overall project shall be analyzed by all disciplines involved in preparing the cost estimate to consider the following procedure before making the detailed quantity take-off. This shall be done before preparing the concept estimate as it will dictate the final estimate format needed in the preparation of the quantity take-off.

(b) 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 shall 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 shall prepare a separate facility for each building in the Primary Facility and separate Supporting Facilities for each building site. The designer shall prepare a proposed Bidding schedule based on the Primary facility and the Support Facilities for Site Work.

(c) When the number of buildings has been defined in the Primary Facility, each of the buildings shall follow the WBS of defined Systems, Subsystems, Assembly Categories, and Assemblies. The Site Work shall follow the DD Form 1391 and WBS format. The detail Quantity take-off shall follow this same format.

(e) When projects are funded by more than one funding source, all work related to each funding source shall be segregated

respectively. Funding sources shall be identified separately at Scope in the MII estimate and shall be identified separately on the Proposed Bidding Schedule.

FIELD INDIRECT COSTS

1. Supervisory and Administrative Personnel

   Field Project Manager
   General Superintendent
   Assistant Superintendents
   Construction Trade Superintendents
   Equipment Superintendent

2. Engineering Personnel

   Project Engineer
   Office Engineer
   Quality Control Engineers
   Surveyor and Surveymen
   Draftsmen

3. Office Staff

   Office Manager
   Payroll Clerk
   Clerk-Typists
   Purchasing Agent
   Janitor

4. Miscellaneous Staff

   Safety Engineer, Nurse, First-Aid Attendant
   Warehousemen
   Clerks
   Security Personnel

5. Job Expenses

   Office Facilities
   Shops, Warehouses, and Yards
   Laboratory and Testing Expense and Facilities
   Night Lighting Work Area
   Construction and Maintenance of Access and Haul Roads
   Office and Engineering Supplies and Equipment
   Water, Power, Telephone, Radios, Sanitary Facilities
   Project Sign and Bulletin Board
   Vehicles and Transportation Expenses
   Travel, Subsistence, Housing, etc. for Key Personnel
   Permits, Easements and Rights-of-Way
   Builder’s Risk Insurance
   Environmental Protection, Dust Control, and Restoration
   Progress Schedules and Reports
   Job Cleanup

EXHIBIT 18-1

WEIGHTED GUIDELINES METHOD FOR DERIVATION OF PROFIT FACTOR

PROCEDURES:

Based on specific project circumstances and considering the explanation of weights below, select appropriate weight values from the following table. For M-CACES GOLD estimates, enter the weights via Contractors' Overhead and Profit Entry Screens and the system will calculate profit. For manual estimates, multiply rates by weights. Add resulting values and round to the nearest tenth to obtain profit factor.

FACTOR	RATE		WEIGHT(.03-.12)		VALUE
Degree of Risk	20	x	_____	=	_____
Relative Difficulty of Work	15	x	_____	=	_____
Size of Job	15	x	_____	=	_____
Period of Performance	15	x	_____	=	_____
Contractor's Investment	5	x	_____	=	_____
Assistance by Government	5	x	_____	=	_____
Subcontracting	25	x	_____	=	_____
			TOTAL	=	_____

EXPLANATION OF WEIGHTS:

Degree of Risk. Weight within range of .03 for slight risk to .12 for highest risk. Consider lump sum items riskier than unit price items. Also, consider nature and location of work, amount subcontracted, ratio of labor to total cost and whether work has already been accomplished.

Relative Difficulty. Weight within range of .12 for most difficult and complex to .03 for simplest work.

Size of Job. Select appropriate weight below.

Size of Job		Factor	Size of Job		Factor
$ 0	$100,000	0.120	600,000	700,000	0.083
100,000	200,000	0.119	700,000	800,000	0.081
200,000	300,000	0.117	800,000	900,000	0.080
300,000	400,000	0.116	900,000	3,000,000	0.079
400,000	500,000	0.114	3,000,000	100,000	0.077
500,000	600,000	0.113	100,000	200,000	0.076
600,000	700,000	0.111	200,000	300,000	0.074
700,000	800.000	0.110	300,000	400,000	0.073
800,000	900,000	0.109	400,000	500,000	0.071
900,000	1,000,000	0.107	500,000	600,000	0.070
1,000,000	100,000	0.106	600,000	700,000	0.069
100,000	200,000	0.104	700,000	800,000	0.067
200,000	300,000	0.103	800,000	900,000	0.066

EXHIBIT 18-2 (Continued)

Size of Job		Factor	Size of Job		Factor
300,000	400,000	0.101	900,000	4,000,000	0.064
400,000	500,000	0.100	4,000,000	100,000	0.063
500,000	600,000	0.099	100,000	200,000	0.061
600,000	700,000	0.097	200,000	300,000	0.060
700,000	800,000	0.096	300,000	400,000	0.059
800,000	900,000	0.094	400,000	500,000	0.057
900,000	2,000,000	0.093	500,000	600,000	0.056
2,000,000	100,000	0.091	600,000	700,000	0.054
100,000	200,000	0.090	700,000	800,000	0.053
200,000	300,000	0.089	800,000	900,000	0.051
300,000	400,000	0.087	900,000	5,000,000	0.050
400,000	500,000	0.086	5,000,000	10,000,000	0.040
500,000	600,000	0.084	OVER	10,000,000	0.030

Period of Performance. Select appropriate weight below.

	Factor		Factor
OVER 24 MONTHS	0.120	12 TO 13 MONTHS	0.075
23 TO 24 MONTHS	0.116	11 TO 12 MONTHS	0.071
22 TO 23 MONTHS	0.112	10 TO 11 MONTHS	0.068
21 TO 22 MONTHS	0.109	9 TO 10 MONTHS	0.064
20 TO 21 MONTHS	0.105	8 TO 9 MONTHS	0.060
19 TO 20 MONTHS	0.101	7 TO 8 MONTHS	0.056
18 TO 19 MONTHS	0.098	6 TO 7 MONTHS	0.052
17 TO 18 MONTHS	0.094	5 TO 6 MONTHS	0.049
16 TO 17 MONTHS	0.090	4 TO 5 MONTHS	0.045
15 TO 16 MONTHS	0.086	3 TO 4 MONTHS	0.041
14 TO 15 MONTHS	0.082	2 TO 3 MONTHS	0.037
13 TO 14 MONTHS	0.079	1 TO 2 MONTHS	0.034
		UNDER 30 DAYS	0.030

Note: Weight @ 0.0 if change order work not requiring time extension.

Contractor's Investment. Weight from .03 to .12 for below average to above average. Consider amount subcontracted, frequency of progress payments, whether there is pay item for mobilization, etc.

Assistance by Government. Weight from .12 to .03 for average to above average. Consider use of Government facilities, expediting assistance, etc.

Subcontracting. Select weight below, based on % of work subcontracted.

		Factor
SUB -	80% OR MORE	0.030
	70% TO 80%	0.042
	60% TO 70%	0.055
	50% TO 60%	0.068
	40% TO 50%	0.080
	30% TO 40%	0.092
	20% TO 30%	0.105
	10% TO 20%	0.118
	0% -- --	0.120

EXHIBIT 18-2 (End)

TECHNICAL QUALITY CONTROL CHECKLIST

This checklist should serve as a tool to ensure that all areas of the cost estimate are properly prepared and adequately reviewed.

GENERAL

[ ] Has the reviewer been provided:

[ ] A complete detailed cost estimate?
[ ] All supporting backup?
[ ] All applicable design documents (plans, specifications, design analysis, etc.)?
[ ] Annotated Comments?

[ ] Has cost estimate been approved by the Chief, Cost Engineering Branch?

[ ] Does the reviewer have a clear Definition of Scope?

[ ] Has the estimator(s) visited the project site?

[ ] Is the Sign-thru Cover Sheet for the Government Estimate that discloses the overall project cost estimate stamped "FOR OFFICIAL USE ONLY"?

[ ] Has the Project Manager been notified of the estimated price verses the available funds?

CONTRACT REQUIREMENTS (A-E/COST CONSULTANT ONLY)

[ ] Has the Cost Estimate Submittal Checklist been provided?

[ ] Has the Cost Estimate been submitted in the required number of copies, suitably-bound, in landscape?

[ ] Was ENG Form 1354 provided?

[ ] Was AF Form 1178 provided (AF Projects Only)?

[ ] Were the specified diskette(s) provided?

[ ] Was all cost estimate supporting data provided?

BID SCHEDULE

[ ] Does the Bidding Schedule contain Bid items for the following work features, if applicable?

[ ] Each Building to the 5 ft line?
[ ] Major site features (e.g. Sanitary Sewer System, Exterior Electrical Distribution, Parking Lot, etc.)?
[ ] Design Costs?
[ ] Asbestos Abatement?
[ ] Unit Cost Items (e.g. Rock Excavation, Unclassified Excavation, etc.)?
[ ] Pre-Wired Work Stations?

EXHIBIT 18-3 (Continued)

[ ] Project Manager/Customer Requested Items?
[ ] Separately Funded Items (e.g. OMAR Equipment, etc.)?
[ ] Additive Alternates?
[ ] Options?

FORMAT

[ ] Has all required summaries been furnished?

[ ] Has the required detail been furnished?

[ ] Has the correct software been used?

[ ] Were the correct Cost Libraries used in preparing the cost estimate?

[ ] Is the cost estimate in the required Work Breakdown Structure (WBS) to Level 4 (Subsystem)?

[ ] Is the cost estimate structured according to the type contractor most likely to bid as prime?

[ ] Has a sufficient number of subcontractors been developed for the project?

[ ] Is a majority of the work selected to be done by the prime contractor or subcontractor(s) according to normal construction practice?

[ ] Does the cost estimate include escalation, construction contingency and SIOH?

[ ] Is the cost estimate so structured to be directly comparable to the project Bid Schedule?

[ ] Is the Scope-Of-Work adequately defined in the Project Notes?

[ ] Can the cost estimate be compared to the “1391”?

[ ] Is the cost estimate within the Construction Cost Limitation (CCL)?

[ ] If the cost estimate is more than the CCL, have Additive Alternates or Options been identified that bring the Base Bid within the CCL?

[ ] Have all amendments been acknowledged in the cost estimate?

[ ] Has the cost estimate been compared to the previous cost estimate?

[ ] If the cost estimate has changed more than 5% (+ or -) from the previous cost estimate, has reasons why been documented?

[ ] Have all “assumptions” been documented in the cost estimate?

[ ] Are all detail tasks in the cost estimate sufficiently described?

EXHIBIT 18-3 (Continued)

[ ] Have specialty construction tasks (e.g. scaffolding, noise & dust control, phasing, etc.) been included in the cost estimate?

[ ] Are "Units of Measure" proper?

MAGNITUDE OF DETAIL

[ ] Is the Level of detail commensurate with detail available from the design documents?

[ ] Does the cost estimate include all design amendments?

[ ] Have MII task overrides been sufficiently utilized?

[ ] Does the cost estimate contain any unsupported lump sums?

BACKUP

[ ] Has all Backup (Quantity Takeoff, Quantity Derivations and Quotations) been furnished?

[ ] Is all Backup traceable to the line item task in the cost estimate that it supports?

[ ] Is Backup clear and understandable?

[ ] Was sufficient quotations furnished?

[ ] Was Backup current?

[ ] Do quantities appear to be reasonable?

[ ] Is Quantity Takeoff sufficient?

[ ] Are Quantity Derivations clear and properly prepared?

[ ] Did the reviewer spot check critical cost items and quantities?

DIRECT COSTS - MATERIAL

[ ] Are all major material items supported by a current quotation?

[ ] Does quotation used include all applicable costs (e.g. manufacturer/supplier, location, person contacted, telephone number, date, freight to job site, etc.)?

[ ] Is Sales Tax in the cost estimate?

[ ] Is Sales tax shown correctly for project area?

DIRECT COST - LABOR

[ ] Have the wage rates been compared to the Davis-Bacon minimum wage rates?

[ ] Does the wage rates reflect the local prevailing wage rates?

EXHIBIT 18-3 (Continued)

[ ] Does the total wage rate shown include basic wage rate, fringes, OT, payroll taxes & insurance, etc.?

[ ] Do the labor productivities used consider project conditions, labor availability, market conditions, etc.?

DIRECT COST - CONSTRUCTION EQUIPMENT

[ ] Has Construction Equipment Cost for major items been included in the cost estimate?

[ ] Has small tools cost been included in the cost estimate?

[ ] Has any construction equipment been included using "rental" rates?

SUBCONTRACTED WORK

[ ] Has subcontractor work been included in the cost estimate?

[ ] Is all major subcontractor work detailed? Note: Minor work maybe unit priced.

[ ] Does the project contain any work that is normally done by a 2nd Tier
Subcontractor Work (e.g. Controls, Test & Balance, Insulation, etc.)?

[ ] Were subcontractor quotes obtained to verify the reasonableness of the of the estimate for the subcontractor work?

[ ] Were subcontractor markups reasonable?

PRIME CONTRACTOR OVERHEAD

[ ] Is all Prime Contractor Field Overhead detailed?

[ ] Has the Prime Contractor Field overhead been prorated to all Bid Items proportionally to the direct costs?

[ ] Have those items in the specification "Special Clauses" that are normally considered "Field Overhead Items" been incorporated into the cost estimate?

[ ] Is the Prime Contractor Field Overhead reasonable?

[ ] Has Mobilization/Demobilization costs been included in the cost estimate?

[ ] Do overhead salaries shown include an allowance for payroll taxes & insurance?

[ ] Are all overhead fixed costs included in the Base bid?

[ ] Is Prime Contractor Home Office Expense included in the cost estimate?

[ ] Is the Prime Contractor Home Office Expense reasonable?

EXHIBIT 18-3 (Continued)

PROFIT

[ ] Was Prime Contractor Profit included in the cost estimate?

[ ] Was Profit for the Prime Contractor determined using the "Weighted Guideline Method"?

[ ] Were the fixed cost (Size of Job, Period of Performance, Amount of Subcontracting) portion of the "Weighted Guideline Method" done correctly?

[ ] Were the judgmental factors (Degree of risk, Relative Difficulty of Work, Contractor's Investment, Assistance by Government) reasonable?

BONDS

[ ] Has Bond been included on the entire contract amount?

[ ] Has Bond cost been calculated?

[ ] Is Bond cost reasonable?

COST ESCALATION

[ ] Was Cost Escalation included in the cost estimate?

[ ] Were all construction costs escalated to the "Midpoint of Construction? Note: Army - Escalate from Midpoint of Estimate to Midpoint of Construction, AF - Escalate from Date of Submittal to Midpoint of Construction.

[ ] Have "indices" and "dates" been shown?

CONSTRUCTION CONTINGENCY

[ ] Was a Construction Contingency percentage shown in the cost estimate?

[ ] Is the percentage correct?

SUPERVISION & ADMINISTRATION COST

[ ] Was a SIOH or S&A percentage shown in the cost estimate?

[ ] Is the percentage correct?

MODIFICATIONS

[ ] Has field office/cost estimator discussion been held?

[ ] Has adequate information been received to reflect actual contractor rates?

[ ] Has the original scope and changed scope been clearly defined?

[ ] Is the net change in scope presented clearly?

[ ] Does the estimate include costs and time for the impact on the unchanged work?

EXHIBIT 18-3 (Continued)

[ ] Were current, actual labor rates utilized?

[ ] Is backup and support for the estimate pricing available?

DREDGING

[ ] Was CEDEP used to prepare the cost estimate?

[ ] Does the narrative document the decisions and selections made within CEDEP?

[ ] Has effective working time been calculated considering lost time, weather delays, etc.?

[ ] Have estimate results been compared against historic information and reconciled if necessary?

[ ] Has the estimate been compared against data from similar projects?

[ ] Have production rates been calculated considering pumping rate, travel time, line size, navigational delays, etc.?

[ ] Have environmental requirements (beach and offshore) been included?

[ ] Does the estimate reflect correct environmental windows for the project area?

EXHIBIT 18-3 (End)

CREATE A NEW PROJECT CHECKLIST

[ ] The correct libraries (Models, Assemblies, Unit Prices, Crews, Labor Rates,
Equipment Rates) are present in the Database Window.

[ ] The correct WBS Project Template has been selected.

[ ] The Project Template has been copied to new six characters ID for this project.

[ ] The New Project has now been selected, and name of project edited.

[ ] Prime and subcontractors have been edited.

[ ] The correct number of Facilities has been created.

[ ] The required Assembly Titles for all Primary and Support Facilities have been
created and detailed items entered into the Assemblies.

[ ] All System, Subsystem, and Assembly Category Titles not required in this project
have been deleted and the Project has been Packed.

[ ] All subcontractors not required in this project have been deleted.

EXHIBIT 18-4

PRINT SUBMITTAL REPORTS CHECKLIST

[ ] All cost and pricing is entered based on the Current Design Status.

[ ] Costs for Systems and Subsystems not shown in the design have been accounted for in the estimate.

[ ] Titles (Facility, System, Subsystem, etc.) at all levels not applicable to this project have been deleted.

[ ] Prime Contractor's Field Overhead has been itemized to reflect project requirements.

[ ] Prime contractor's Bond has been set to calculate a Class B Bond.

[ ] Prime Profit has been calculated by the Weighted guideline Method.

[ ] Subcontractor's Overhead has been set as a percentage.

[ ] Subcontractor's Profit has been set as a percentage.

[ ] Prime and Subcontractors have been assigned at the appropriate locations within the project.

[ ] Any Subcontractors not applicable to this project have been deleted.

[ ] Sales Tax has been entered.

[ ] Escalations, Construction Contingency and SIOH have been set.

[ ] Estimate Status (35%, 60%, 95% etc.) has been entered in the Report Title field or the Print Selected Reports Window.

[ ] Two hard copies of the Submittal Estimate have been made.

EXHIBIT 18-5

CONTINGENCIES AND SUPERVISION & ADMINISTRATION

(USE THESE VALUES UNLESS DIRECTED OTHERWISE)

	ARMY	AIR FORCE
CONTINGENCIES		
NEW WORK	5%	5%
ALTERATIONS & MODERNIZATION	10%	10%
ADDITIONS/ALTERATIONS	10%	5%-IF ADDITION IS LARGEST 10%-IF ALTERATION IS LARGEST
S&A (SIOH)		
NEW WORK	6.0% (CONUS) 6.5% (OCONUS)	6.0%
ALTERATIONS & MODERNIZATION	6.0% (CONUS) 6.5% (OCONUS)	6.0%
INSTALLATION SUPPORT	8.0% (CONUS) 8.5% (OCONUS)	N/A

EXHIBIT 18-6

CHAPTER 19

ANTITERRORISM/FORCE PROTECTION (AT/FP)

INDEX

CHAPTER 19

ANTITERRORISM/FORCE PROTECTION

19.1 GENERAL

19.1.1 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, shall be in accordance with Chapter 2 PRESENTATION OF DATA.

19.2 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 4-010-02	DOD Minimum Antiterrorism Standoff Distances for Buildings (For Official Use Only (FOUO))
UFC 4-023-03	Design of Buildings to Resist Progressive Collapse

19.3 PROJECT DEFINITION (10-15%)

19.3.1 General Considerations

AT/FP design shall be integrated into the overall facility design from the beginning of the project. At the Project Definition phase the designer shall investigate the AT/FP measures required for the project. The designer shall determine if the setback distances required for conventional construction can be provided within the project constraints or if further analysis and building hardening is likely to be required. In addition, any building elements requiring special design, such as mail rooms, equipment enclosures, progressive collapse, etc. shall be noted for use in preparing the cost estimate.

19.3.2 Narrative

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

(a) 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.

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

(c) Indicate the setback distances to be provided and describe the proposed construction to meet antiterrorism/force protection requirements.

(d) 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.

(e) 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 shall be noted for use in preparing the cost estimate.

19.4 CONCEPT DESIGN (30-35%)

19.4.1 General Considerations

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

19.4.2 Design Analysis

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

(a) 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.

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

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

(d) 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 shall reflect the level of a concept design, as described in this document for the structural discipline.

(e) 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 shall be developed to the level of a concept design, as described in this document for the discipline involved.

19.5 INTERIM DESIGN (50-65%)

The antiterrorism/force protection design shall 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 shall be to the Interim Design level required by the applicable design discipline. In addition, the designer shall incorporate or answer all comments received from the Concept Design submittal review.

19.5.1 Design Analysis

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

19.6 FINAL DESIGN (UNREVIEWED 100%)

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

19.6.1 Design Analysis

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

19.6.2 Specifications

Final edited or redlined marked up specifications shall be submitted in accordance with Chapter 3 SPECIFICATIONS. Specifications shall include all antiterrorism/force protection requirements such as loadings for window and door frames and special glazing.

19.7 READY-TO-ADVERTISE (REVIEWED 100%)

The comments generated concerning the Final submittal shall be incorporated in the design analysis, drawings, and final edited specifications before they are submitted as "Ready-to-Advertise."

19.8 TECHNICAL REQUIREMENTS

19.8.1 General Considerations

Project design shall incorporate mandatory DoD standards for new buildings and for existing inhabited buildings, when triggered, in accordance with UFC 4-010-01. To the extent possible within the project constraints, the “Recommended Additional Antiterrorism Measures for New and Existing Buildings” UFC 4-010-01, Appendix C, shall also be incorporated. Antiterrorism/force protection design shall be

integrated into the overall facility design from the beginning of the project through coordination of all disciplines. Antiterrorism/force protection requirements shall 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 shall be coordinated with all other applicable DoD building and design criteria and policies. Where other criteria mandates more stringent requirements, the provisions of those criteria will be followed.

19.8.2 Site

(a) The civil/site design shall incorporate applicable requirements for minimum standards for force protection from UFC 4-010-01. Specific instructions for the minimum setback distances that apply to all new and existing (when triggered) facilities are shown in Appendix "B", Table B-1 and Figure B-1 in the UFC.

(b) Additional antiterrorism measures that significantly enhance site security listed in Appendix "C" shall be incorporated into the site design for every new and existing (when triggered) facility to the maximum extent possible.

19.8.3 Landscape Architecture

The landscaping design shall incorporate applicable requirements from UFC 4-010-01. Specific instructions for specifying and locating planting materials and site furnishings within the “Unobstructed Space” are contained in that regulation.

19.8.4 Architectural

The following are requirements that shall be included in the architectural design for every new and existing, when triggered, inhabited building:

(a) Glazing and window, skylight, and glazed door frames shall be designed in accordance with the special provisions of UFC 4-010-10, Appendix B, paragraph 3.1.

(b) The main entrance to a new inhabited building shall not face an installation perimeter of other uncontrolled vantage point with direct line of sight to the entrance. If the main entrance to an existing inhabited building faces the installation perimeter, the main entrance shall be moved or screened to block the line of sight.

(c) All exterior doors into inhabited areas shall open outwards.

(d) Rooms to which mail is delivered or in which mail is handled in inhabited buildings shall be located on the perimeter of the building. Mailroom shall be as far as possible from heavily populated areas of the building and critical infrastructure, and shall be sealed to limit migration into building of airborne chemical, biological and radiological agents.

(e) External roof access shall not be used on new buildings. External roof access for existing buildings, shall be eliminated or secured with locked cages or similar mechanisms.

19.8.5 Structural

(a) The structural design shall incorporate applicable requirements for minimum standards for force protection from UFC 4-010-01. Conventional construction may be used for the buildings without a specific analysis of blast effects, if the specified minimum setback distances are provided. If the setback distances are not provided, an engineer experienced in blast-resistant design shall analyze the building and apply building hardening as necessary to provide an equivalent level of protection from the effects of the applicable explosives weights at the achievable standoff distances.

(b) For all buildings with three stories or more, progressive collapse shall be evaluated in accordance with UFC 4-023-03.

(c) All building additions shall be designed to be structurally isolated from the existing building. All uninhabited areas of buildings shall be designed to be structurally independent from the inhabited areas or verify through analysis that collapse of the uninhabited portions of the building will not cause collapse of the inhabited areas of the building. As an alternative, design the uninhabited areas of the building to meet the requirements for an inhabited building.

(d) Building overhangs with inhabited space above them shall not be used.

(e) All exterior masonry walls shall provide a minimum of 0.05 percent vertical reinforcement with a maximum spacing of 48 inches on center.

(f) Window and skylight frames, and glazed door frames shall be designed in accordance with the special provisions of UFC 4-010-10, Appendix B, paragraph 3.1.

(g) Supports for all overhead mounted architectural features and utilities or other fixtures weighing 31 pounds or more shall be designed for a minimum of 0.5 times the component weight in any direction and 1.5 times the component weight in the downward direction.

19.8.6 Mechanical

(a) Outdoor air intakes must be at least 10 feet above the ground for new buildings and as close as possible to 10 feet above the ground for existing buildings.

(b) There must be an emergency shutoff switch in the HVAC control system that can immediately shut down air distribution throughout the building.

(c) Chillers (and all major mechanical equipment) should be located outside the unobstructed space, at least 33 feet from the building. If they are located within the unobstructed spaces and have

an enclosure with more than 2 sides, the equipment shall be enclosed on all four sides and the top and shall be lockable. The top surface of the enclosure shall be visible to the casual observer.

19.8.7 Electrical

(a) The electrical design shall incorporate applicable requirements for minimum standards for force protection from UFC 4-010-01. Specific instructions for the location and protection of electrical equipment are shown in Appendix "B" to the UFC. It is not recommended that electrical equipment be located on the roof as allowed in Appendix "B".

CHAPTER 20

SUSTAINABLE DESIGN AND DEVELOPMENT (SDD)

INDEX

CHAPTER 20

SUSTAINABLE DESIGN AND DEVELOPMENT (SDD)

20.1 GENERAL

20.1.1 Scope

This chapter states criteria, requirements, and guidance for SDD. Specific requirements in this chapter supplement the requirements of Chapter 1, titled GENERAL INSTRUCTIONS. All required documents, including drawings and the design analysis, shall be prepared in accordance with Chapter 2, titled PRESENTATION OF DATA.

20.2 APPLICABLE PUBLICATIONS

Army

ECB 2003-20	Engineering and Construction Bulletin (ECB) 2003-20, Sustainable Project Rating Tool (SPiRiT)
ECB 2006-2	ECB 2006-2, Sustainable Design and Development (SDD)

Army SPiRiT and U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design - New Construction (LEED-NC) criteria for Army projects are located at this website.

https://eko.usace.army.mil/fa/sdd/

Air Force

Headquarters, U.S. Air Force Memorandum, subject: Sustainable Development Policy, dated 19 December 2001

Air Force guidance and procedures are located at the following website under the Heading "Sustainable Development Resources Menu". Use the link to the "Auditing Checklist" "LEED Rating System" for Air Force LEED projects.

http://www.afcee.brooks.af.mil/eq/programs/progpage.asp?PID=27

20.3 SDD CRITERIA

The project Statement of Work (SOW) issued by Mobile District will specify the required rating system, rating level, level of SDD to be achieved for the project, and U.S. Green Building Council (USGBC) registration and certification requirements.

20.3.1 Army

(a) SPiRiT will be used for designated FY07 Army projects documenting a Gold rating level. Designated Army projects may require use of the USGBC Leadership in Energy and Environmental Design - New Construction

(LEED-NC) rating tool. For FY08, all Army Military Construction Army (MCA) vertical climate-controlled facilities will be capable of achieving certification using LEED-NC documenting a Silver rating level unless exempt. At present registration and certification are not required. However, projects designed to be certifiable at LEED Silver will be subject to substantiation by the U.S. Army Corps of Engineers (USACE) headquarters.

(b) Army MILCON Transformation (MT) designated projects developed for Design-Build acquisition are required to use the Model Request for Proposal (RFP). See Chapter 24 MILCON TRANSFORMATION. The Model RFP contains specific requirements for Army SDD for those designated projects.

20.3.2 Air Force

Designated Air Force Military Construction (MILCON) projects are to be capable of LEED certification (26 point minimum). The Air Force goal is to have all FY09 projects and beyond capable of LEED certification. Certification is at the discretion of Air Force Major Commands.

20.3.3 Other Customers

SDD rating, rating system, and design development for other military services or customers will be determined by the Mobile District Project Manager (PM) prior to the pre-design meeting and issuance of the SOW.

20.3.4 Registration

Registration of projects with the USGBC, procedures to be followed to complete registration (in-house, Architect-Engineer (A-E), or Contractor), and related services required during construction will be determined by the Mobile District PM prior to the pre-design meeting and issuance of the SOW.

20.4 PROJECT DEFINITION SUBMITTAL (10% - 15%)

Submit the appropriate SDD rating tool and supporting narrative as part of the Design Analysis. The narrative shall 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.

20.5 CONCEPT DESIGN SUBMITTAL (30% - 35%)

20.5.1 Design Analysis

(a) Provide the SDD rating tool and narrative required at Project Definition.

(b) 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.

(c) For projects registered with the USGBC, initiate and submit LEED letter templates documenting project scope and responsibilities. Initiate individual letter templates with anticipated measures to fulfill point credits. Provide the project scope and responsibilities information, and draft LEED letter templates and as part of the narrative.

(d) Initiate information, coordination requirements, and Contractor and Government construction activities and substantiation required to document a certifiable project (or certification if required) as part of Chapter XIV-1 Notes to the Resident Engineer.

20.6 INTERIM DESIGN SUBMITTAL (50% - 65%)

20.6.1 Design Analysis

The Design Analysis shall include all items in the Concept Design Analysis narrative and any revisions made necessary by comments about the Concept Design submittal. For USGBC registered projects, continue development of the LEED letter templates, and submit as part of the narrative.

20.6.2 Specifications

Develop red-lined marked up specifications supporting SDD including Section 01 33 29 LEED™ Documentation. Incorporate the approved table for LEED credits as part of the specification.

20.6.3 Drawings

Continue development and coordination of discipline drawings incorporating anticipated achievable points.

20.7 FINAL DESIGN SUBMITTAL (UNREVIEWED 100%)

20.7.1 Design Analysis

The Final Design analysis narrative shall include all items in the Interim Design analysis narrative and any revisions made necessary by comments about the Interim Design submittal. For USGBC registered projects, complete the LEED letter templates, and submit as part of the narrative.

20.7.2 Drawings

SDD information shall be at Ready-To-Advertise level of completion.

20.7.3 Specifications

Develop red-lined marked up specifications supporting SDD including Section 01 33 29 LEED™ Documentation if not submitted as an Interim Design submittal. Incorporate the approved table for LEED credits as part of the specification. If an Interim Design submittal was made,

prepare final edited specifications. Coordinate and final edit discipline specific SDD paragraphs in other specifications sections.

20.8 READY-TO-ADVERTISE SUBMITTAL (REVIEWED 100%)

Answer and/or incorporate all comments generated during the Final Design submittal review in the design analysis, drawings and specifications.

CHAPTER 21

QUALITY MANAGEMENT

INDEX

CHAPTER 21

QUALITY MANAGEMENT

21.1 GENERAL

21.1.1 Scope

This chapter provides quality management criteria, standards, and practices for the delivery of quality products and services to Mobile District customers. This regulation applies to all in-house (I-H) and Architect-Engineer (A-E) members of the Project Delivery Team (PDT).

21.2 APPLIABLE PUBLICATIONS

Army Regulation (AR)	
AR 5-1	Total Army Quality Management
Engineer Regulation (ER)	
ER 11-1-321	Value Engineering
ER 415-1-11	Bidability, Constructability, Operability, and Environmental (BCOE) Review
ER 415-1-13	Design and Construction Evaluation
ER 1110-1-12	Quality Management
ER 1110-1-8159	Engineering and Design, DrChecks
ER 1110-1-8158	Corps-Wide Centers of Expertise Program
ER 1110-2-112	Required Visits to the Construction Sites by Design Personnel, 15 April 1992
ER 1110-2-1150	Engineering and Design for Civil Works
ER 1110-3-111	Lost Design
ER 1110-345-100	Design Policy for Military Construction
Engineer Circular (EC)	
EC 1110-1-105	Independent Technical Review
Engineering Technical Letter (ETL)	
ETL 1110-3-447	Engineer of Record and Design Responsibilities
Engineer Pamphlet (EP)	
EP 715-1-7	Architect-Engineer (A-E) Contracting
South Atlantic Division (SAD)	
CESAD-RBT	Memorandum, Subject: SAD Regional Quality Management, 27 April 2006

21.3 DEFINITIONS

21.3.1 Quality Control Plan (QCP)

The QCP is a written plan that defines how quality management will be executed for I-H products. The QCP is prepared by the PAE in coordination with the PDT.

21.3.2 Quality Assurance Plan (QAP)

The QAP is a written plan prepared in accordance with ER 1110-1-12 that defines how quality management will be executed on products that are completed by A-E firms, another District, or government agency for Mobile District customers. The design technical leader (A-E, other district, or government agency) will be the lead preparer of the QAP in coordination with the PDT.

21.1.3. 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.

21.1.4 Mobile District Project Architect Engineer (PAE)

The PAE 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 PAE is also the primary point of contact within Engineering Division for installations and Construction Division.

21.3 PROCEDURES

21.3.1 Pre-design Conference

Quality management procedures will be discussed and confirmed during the pre-design conference. Customer-directed changes to mandated procedures will be documented.

21.3.2 QCP and QAP Preparation

(a) These plans will be prepared, approved, and implemented prior to design start.

(b) The QCP will be prepared in accordance with project specific requirements and the format in **Exhibit 21-1**.

(c) The QAP will be prepared in accordance with A-E standard practice and the following instructions.

(1) Within 10 calendar days after award of the task order the A-E shall submit to the PAE for approval, the firm's QAP. The QAP shall effectively maintain a quality-control program which will assure that all services, designs, drawings, and specifications required by this

contract are performed and provided in a manner that meets professional architectural and engineering quality standards. The A-E's QAP shall require the organization's personnel to perform, or cause to be performed, reviews of the scope and character necessary to achieve the quality of design and to substantiate that all services conform to the contract requirements. As a minimum, all documents shall be reviewed by competent reviewers and computer media shall be scanned for all known viruses. Errors and deficiencies in the design documents shall be corrected prior to submitting them to the Government. The QAP shall include the names and telephone numbers for each involved senior design engineering and architect, including any specialty personnel and senior reviewers.

(2) The A-E shall include in the QAP a time-scaled bar chart or design schedule showing the sequence of events involved in carrying out the project tasks within the specific period of service. This should be at a detailed level of scheduling sufficient to identify all major tasks including those that control the flow of work. The bar chart or schedule shall include review and correction periods proper to the submittal of each item. This should be a forward planning, as well as a project monitoring tool. The bar chart or schedule reflects calendar days and not dates for each activity. When a modification to the contract occurs, the A-E shall submit a revised bar chart or schedule reflecting the change within one week of the receipt of the change. This bar chart or design schedule may include the requirements in paragraph 1.1.4(f)(1).

(3) The QAP shall be implemented by an assigned person within the A-E's organization who has the responsibility of being present during the times work is in progress, and shall be cognizant of and assure that all documents on the project have been coordinated. This individual shall be a person who has verifiable engineering or architectural design experience and is a registered professional engineer or architect. The A-E shall notify the PAE of the name of the individual and the name of an alternate person assigned to the position.

(4) The PAE will notify the A-E, in writing, of the acceptance of the DQC Plan. After acceptance, any changes proposed by the A-E are subject to the acceptance of the PAE and PM.

21.3.3 Project Management Plan (PMP)

Project specific QCP and QAP procedures will be included in the PMP prepared by the PM in coordination with the PDT.

21.3.4 Design Team Project Visits

(a) Design team member additional project visits shall 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.

(b) I-H and A-E design team members will coordinate all project visits through the Mobile District PM with the Base Civil Engineer or Directorate of

Public Works, and USACE Resident Engineer at, or responsible for, the installation prior to the visit.

21.3.5 Design Budget

(a) The design budget will be prepared following the pre-design conference. For A-E projects, the SOW will define project requirements.

(b) PAE's will prepare I-H design budgets in coordination with PDT design team members, coordinating the budget with the PM for approval, notifying the design team of the final budget individual amounts, tracking the budget, and modifying the budget as necessary during conduct of the project. It is recommended that PAE's contact Gary Whigham, Chief, Mechanical/Electrical/MEDCOM Section for the most recent budget format and assistance.

21.3.6 Installation Criteria

The PAE will maintain installation specific design criteria which shall be readily available to I-H and A-E PDT members. The PAE will update the installation criteria using installation specific lessons learned and evaluation of construction changes. The PAE will periodically provide the installation criteria to the executing Resident Engineer, and installation engineering office for comment.

21.3.7 Design Schedule

The PAE is responsible for developing the design schedule in coordination with the PDT. The PAE will enter and maintain I-H and A-E project schedules in the Mobile Districts Design Schedule program.

21.3.8 Value Engineering (VE)

(a) VE studies will be conducted at the Concept Design (30-35%) design phase or initial D-B RFP submittal for all projects with a total programmed amount of $2M or more unless specifically waived by organizations listed in ER 11-1-321, paragraph 7b(2).

(b) 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 shall 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.

21.3.9 Design Submittal Review and Independent Technical Review (ITR)

21.3.9.1 DrChecks

(a) DrChecks is the mandated review comment input and management software. PAE's establish projects in DrChecks and add PDT reviewers

and evaluators. Mobile District site administrators are available to provide assistance with DrChecks.

Danny Griffin	251-694-3743	danny.c.griffin@sam.usace.army.mil
Ed Hiles	251-690-3106	edward.c.hiles@sam.usace.army.mil
Hai Le	251-690-2672	hai.kim.le@us.army.mil

(b) The A-E is required to obtain the necessary rights to use DrChecks. For account registration and questions on use of DrChecks, contact Resource Center Enterprises at 1-217-367-3273 or 1-800-428-4357. For individual project access to respond to comments, contact the PAE for access.

21.3.9.2 Design Submittal Reviews

Comments shall be entered in DrChecks at project specific design submittal stages by all reviewers. All A-E submittals will be reviewed I-H. After each submittal, the A-E will be furnished design review comments from the various reviewers and agencies involved in the review process. The review comments will be supplied to the A-E using DrChecks.

21.3.9.3 Comment Annotations and Back Check

(a) Designers shall respond to all comments using DrChecks. Acceptable comment annotations indicate where and how the comment is completed in the design documents for back check purposes. Merely stating "concur" or "will comply" is not considered an adequate indication of actions taken. If the designer disagrees technically with any comment and does not intend to comply with it, the designer shall clearly outline, with ample justification, the reasons for noncompliance within seven days after receipt in order that the comment can be resolved. For comments that are not accepted, the designer will coordinate an acceptable solution through the PAE and PM with the customer.

(b) For I-H work, the PAE will ensure responsibility is assigned to design team members for annotation and incorporation in design documents, and will verify incorporation.

(c) The designer shall furnish the disposition of all comments in writing with the next scheduled submittal. The disposition will clearly indicate the specific actions taken in response to each comment.

(d) If the A-E believes the action required by any comment exceeds the requirements of the SOW, no action will be taken on the comment, the COR will be immediately notified in writing. No work or services shall be performed for which an additional cost of fee will be charged without prior written authorization of the Contracting Officer.

(e) Reviewers will conduct a back check of comment annotations.

21.3.9.4 ITR

ITR's will be conducted at specific design phases identified in the QCP or QAP. Reviewer comments will be entered in DrChecks. Designers will resolve the comments, incorporate as appropriate, and annotate them in DrChecks. Reviewers will complete a back check of annotations.

21.3.10 ITR Certification

ITR certification shall be completed in accordance with ER 1110-1-12.

21.3.11 Lessons Learned

(a) The Design Quality Lessons Learned module of DrChecks has been mandated for use in compiling lessons learned. Procedures for use of DrChecks for lessons learned, and any future certification requirements, will be announced when updated lessons learned are compiled and procedures finalized.

(b) Certification and use of the current lessons learned listing at the following website is suspended.

http://www.sam.usace.army.mil/leslrn/llhome.asp

The database of lessons learned at the website have been evaluated as no longer applicable, incorporated in this Manual, incorporated as changes to the guide specifications, or incorporated in installation criteria where appropriate.

21.3.12 Bidability, Constructability, Operability, and Environmental (BCOE) Review Certification

A BCOE review will be conducted by the executing Construction or Operations Division field office on all D-B-B and D-B projects. The BCOE review will be conducted at the Final (100% Unreviewed) submittal phase. EN-DW will provide the design documents to Construction Division. Comments will be entered in DrChecks. Designers will resolve the comments and annotate them in DrChecks for back check. After the PAE verifies that all comments have been annotated and resolved to the satisfaction of the BCOE reviewers, the PAE shall request that EN-DW create the BCOE certification letter. This letter will have annotated BCOE comments attached. The BCOE certification letter and attachments will then be sent from EN-DW to the Chief, Design Branch, Mobile District Engineering Division for signature. After signing, the BCOE certification letter will be forwarded to the responsible Resident Engineer for signature. The certification letter should reach the Resident Engineer on, or near, the day the project is to be advertised. After signing, the Resident Engineer will forward the letter to Contracting Division (CT) and copy furnished to EN-DW and the PM.

21.3.13 Project Files and Document Management

ProjectWise will be used during I-H design to manage the design documents including drawings, design analyses, and supporting information. SpecsIntact will be used to develop and manage I-H project specifications. ProjectWise will be used to archive completed projects including design analyses, plans, specifications, and as-built drawings.

21.3.14 As-Built Drawings

(a) 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.

(b) Digital contractor prepared as-built drawings on CD-ROM media will be provided by the responsible Resident Engineer through the PM and PAE to EN-DW.

IN-HOUSE DESIGN QUALITY CONTROL PLAN

FOR

(NAME OF PROJECT)

(LOCATION OF PROJECT)

U.S. ARMY ENGINEER DISTRICT, MOBILE
109 St. Joseph St
Mobile, Alabama

(DATE)

Exhibit 21-1 (Continued)

In-House Design Quality Control Plan

1. Purpose: The purpose of this document is to establish a Quality Control Plan (QCP) for accomplishing in-house engineering and design work.

2. Project Information:

a. Project: **(INPUT OFFICIAL PROJECT TITLE)**

b. Location: **(INPUT JOB LOCATION)**

c. CADD ID: **(INPUT CADD ID)**

d. Programmed amount: **(INPUT PROGRAMMED AMOUNT)**

e. Construction Cost Limitation: **(INPUT CCL)**

3. References:

a. CESAD-RBT Memorandum, Subject: SAD Regional Quality Management, 27 April 2006

b. ER 1110-1-12, Quality Management, 21 July 2006

c. Mobile District Quality Management Plan, SOP 5-1-1, 19 May 2004

d. EC 1110-1-105, Independent Technical Review, 31 December 2004

4. Responsibilities:

a. Design Team: The designers are responsible for the quality of their work and for the proper coordination of their work with the other disciplines. EN and PM members of the Project Delivery Team (PDT) follow:

(REVIEW AND EDIT AS REQUIRED)

PM-X	Project Manager: **(INPUT NAMES)**	(251) 69X-XXXX
EN-X	PAE:	(251) 69X-XXXX
EN-DA	Architect:	(251) 69X-XXXX
EN-DE	Electrical:	(251) 69X-XXXX
EN-DE	Electronics:	(251) 69X-XXXX
EN-DE	Cathodic Protection:	(251) 69X-XXXX
EN-DE	Mechanical:	(251) 69X-XXXX
EN-GE	Sanitary:	(251) 69X-XXXX
EN-DA	Site:	(251) 69X-XXXX
EN-DA	Structural:	(251) 69X-XXXX
EN-GG	Geotechnical:	(251) 69X-XXXX
EN-DW	Specification Engineer:	(251) 69X-XXXX
EN-E	Cost Estimator:	(251) 69X-XXXX

b. Project Manager (PM): The PM is responsible for providing funds for adequate quality control and for including this Quality

Exhibit 21-1 (Continued)

Control Plan (QCP) in the Project Management Plan (PMP) for the project.

c. Project Architect Engineer (PAE): The PAE is responsible for writing the QCP, scheduling, and documenting Quality Control milestones, and for insuring these events follow established procedures. The PAE will also lead QC conferences and insure design and review teams comply with the QC Plan.

d. Design Review Team (Senior Technical Leaders) (DRT): The DRT is responsible for providing the Independent Technical Review (ITR) and is comprised of the Senior Technical Leaders in each discipline of Engineering Division. The Senior Technical Leaders are as follows:

(REVIEW AND EDIT AS REQUIRED)

EN-DA	Architectural	Bill Thomas	(251) 694-4089
EN-DA	Structural	Don Smith	(251) 690-3489
EN-DE	Mechanical	Clay Thames	(251) 690-2671
EN-DE	Electrical	Larry Covert	(251) 694-3737
EN-DA	Site Development	Randy Goff	(251) 690-2788
EN-GE	Environmental/Utilities	Joe Findley	(251) 694-4012
EN-GG	Geotechnical	Mike McKown	(251) 690-2681

5. Design and Management Tools:

a. Design Tools:

(1) Computer Aided Drafting and Design Software (CADD): This job will be designed utilizing [AutoCAD 2005][Micro Station V8] CADD Software.

(2) Specification Software: This job will be designed utilizing SpecsIntact specification software.

b. Estimating Tools:

(1) Cost Estimating Software: This job will be estimated utilizing Micro Computer Aided Cost Estimating System (MCACES) Gold software.

c. Management Tools:

(1) "Dr. Checks" Review Comment Management System: DrChecks review comment management software will be utilized on the job to manage, and enter comments, annotations and back checks by the PDT.

(2) Engineering Divisions Project Design Schedules System (DSS): DSS software will be utilized on the job to track the schedule.

(3) Corps of Engineers Financial Management System (CEFMS) and EN Timekeeping System: CEFMS queries and the EN Timekeeping software will be used to manage the EN design budget and track expenditures.

(4) Document Management Software: ProjectWise will be utilized on this job to accurately manage the plans. ProjectWise will

Exhibit 21-1 (Continued)

be used to archive completed projects, plans and specifications and ultimately as-built drawings. SpecsIntact will be used to develop and manage the project specifications.

6. Procedures:

a. Routine Design Coordination Meetings: The PAE will establish a schedule for regular design coordination meetings. The frequency of these meetings will be determined by the PAE based on project complexity, but will generally be held regularly on a one or two week basis with the goal for duration less than 30 minutes.

b. Submittal Review: Each job is submitted to members of the PDT identified in the Project Management Plan (PMP) at each submittal stage for formal review. This job will have the following submittals: [Charrette Document,] [10%,] [35%,] [65%,] [65% Over-the-Shoulder,] [100% Unreviewed Final], and [Ready-to-Advertise (RTA)]. Review comments from all reviewers will be entered into and managed using the Web based DrChecks. All reviewers including the customer will utilize Dr. Checks for all submittals.

c. Schedules: A schedule for the job will be input, maintained and tracked using Engineering Division's Project Design Schedule System software. The PAE is responsible for keeping information in the schedule current. Schedules will be monitored and discussed on a weekly basis in Engineering Division's Monday Morning Meetings.

d. Design Budget: Through coordination with the PDT the PAE will prepare the design budget. Designers are responsible for tracking their individual budget expenditures and designing within their budget. EN PDT members are able to enter their design budget and monitor labor cost expenditures in the budget module contained in the EN timekeeping software. Through CEFMS queries the PAE will monitor EN budget performance. Funding issues will be discussed on a weekly basis in Engineering Division's Monday Morning Meetings or as required.

e. Document Management: Projectswise and Specintact will be utilized on this job to insure that the official working files for the plans and specifications are not duplicated. This insures that the latest version of the plans and specifications are edited and published.

f. Mobile District Engineering Division Standard Operating Procedures: This job will utilize all of the requirements identified in the current version of the Mobile District Design Manual.

g. Quality Control Conference (QC): There will be a Quality Control Conference held prior to each design submittal for each job. Each QC conference will include a formal, detailed drawing and specification review by the design team. The design team will also insure comments from previous submittals have been satisfactorily annotated and addressed in the design in accordance with the annotation. The PAE schedules and leads the QC conference.

Exhibit 21-1 (Continued)

h. Independent Technical Review (ITR): An ITR will be performed prior to each of the identified submittals by the individual designers listed in paragraph 4.d. The PAE will furnish copies of the submittals to the reviewers. Comments from the ITR will be entered in DrChecks and annotated by the designer.

i. Biddability, Constructability, Operability, and Environmental (BCOE) Certification: A BCOE review will be made at the 100% unreviewed final design stage by Construction Division. Comments will be input under a separate heading in Dr. Checks for accuracy of tracking. The BCOE certification of the design will be signed by both Engineering Division and Construction Division prior to contract bid opening.

j. Scope Changes: Since changes in project scope can impact project costs and well as design budget and schedule, changes will only be undertaken after approval by appropriate authority. The Project management Plan addresses the approval process for changes.

Exhibit 21-1 (End)

CHAPTER 22

DESIGN-BUILD (D-B) REQUEST FOR PROPOSAL (RFP) DEVELOPMENT

INDEX

CHAPTER 22

DESIGN-BUILD (D-B) REQUEST FOR PROPOSAL (RFP) DEVELOPMENT

22.1 GENERAL

22.1.1 Scope

The objectives of this chapter are to:

(a) Provide guidance to designers for preparation of Army designated Military Construction (MILCON) Transformation (MT) projects using the U.S. Army Corps of Engineers (USACE) developed Model RFP. (See Chapter 24 MILCON TRANSFORMATION.)

(b) Provide guidance to designers responsible for preparation of RFP technical performance requirements and bridging documents (if applicable) for any other D-B projects. The majority of this chapter (excluding paragraph 22.3.1 below) applies to development and documentation of project requirements in Sections 01 10 10 Design Requirements and 01 10 12 Design After Award Requirements.

22.2 APPLICABLE PUBLICATIONS

Unified Facilities Criteria (UFC)

UFC 1-300-07A Design Build Technical Requirements

USACE Technical Instructions (TI)

TI 800-01 TI-800-01 Design Criteria

USACE Model RFP

The following references and standard RFP sections are available at:

ftp://ftp.usace.army.mil/pub/hqusace/MILCON%20Transformation/

MT Model RFP Implementation Guide

MT Model RFP Field Execution Guide

22.3 D-B APPROACHES

22.3.1 MT D-B RFP

Projects acquired through this D-B acquisition method shall 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 shall 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) listed in Chapter 24 MILCON TRANSFORMATION for guidance and available lessons learned in development of project specific performance requirements.

22.3.1.1 MT D-B 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 shall be made through the Mobile District PM in coordination with USACE on the procedures to be followed in development of the D-B RFP. Assume that the projects will be developed meeting the goals of MT using the Model RFP.

22.3.1.2 Schedule for Use of the Model RFP

(a) USACE intent is to use the Model RFP to gain industry solutions for the product lines. Beginning in Fiscal Year (FY) 08, COS's will take these solutions and develop Army standard design adapt-build/continuous build designs approaching an 80% solution (within the area foot print of the product line). These designs are intended to be acquired through regional indefinite delivery-indefinite quantity contracts (IDIQ). For these projects, use of the Model RFP will end.

(b) Specific start dates for this adapt-build/continuous build program for each product line is not set at the time this manual is published. It is anticipated that the Model RFP will continue to be used beyond FY08 for some product lines. For Army projects, the Mobile District PM will determine the approach to be used prior to the acquisition strategy meeting and pre-design meeting.

22.3.2 D-B RFP Development for Other Than Army Customers

(a) UFC 1-300-07A includes guidance to allow for three different levels of RFP development. These are 'Nominal', 'Partial', and 'Full' project criteria development. Paragraph 22.4 provides both mandatory and specific criteria requirements that shall be used, in conjunction with UFC 1-300-07A in the development of Mobile District D-B 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 1-300-07A, this Design Manual will take precedence.

(b) 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.

22.4 MANDATORY AND SPECIFIC CRITERIA REQUIREMENTS

22.4.1 Site Work

22.4.1.1 Mandatory Requirements

The following are requirements and criteria that shall be included (as applicable) in the RFP for every project regardless of the level of RFP development:

(a) Provide a general overview of major site features planned, such as building orientation, drainage patterns, parking provisions, traffic circulation, provisions for the handicapped, security requirements, etc.

(b) Provide a discussion of wetlands, as defined by Federal and/or State criteria, historically significant areas, or areas with endangered species of wildlife within the project site area.

(c) Provide discussion of items requiring removal or relocation, method and location of the disposition of waste or salvage materials and demolition phasing requirements.

(d) 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 shall also be discussed.

(e) Provide discussion of storm drain design scheme and the impacts on the existing storm drain systems. Include minimum and maximum flow velocities, pipe materials, slopes, distance between inlets, minimum pipe size, types of structures, retention/detention requirements, outfall end treatment, etc. Describe intended plan for the design of sediment and erosion control for the project through implementation of current Best Management Practices during construction.

(f) 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, 25-year, and the 100-year storm frequency.

(g) 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, pipes, etc.

(h) Provide specific design values for pavement thickness including the number, type, and maximum weights of vehicles, traffic category, class of road or street, and resulting design index. Flexible pavement thickness shall be based on the design index and established subgrade CBR. Minimum required thickness of base and pavement shall be 7-1/2 inches. Rigid Pavement thickness shall based on a 28-day flexural strength concrete of 650 psi and the established modulus of subgrade reaction. Minimum required thickness of nonreinforced concrete pavement shall be 6-inches.

(i) Provide discussion of roads and streets to include listing of traffic volumes and 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, etc.

(j) Provide discussion of parking areas to include the 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.

(k) Provide discussion of the miscellaneous site work features such as emergency vehicle access, dumpsters, location and width of sidewalks, location and types of curb or curb and gutter, location and type of fencing, etc.

22.4.1.2 Specific Requirements

(a) 'Nominal' Project Criteria

(1) Provide project location plan showing location of project on base map.

(b) 'Partial' Project Criteria

(1) Provide conceptual site layout showing buildings, parking areas and other associated project features.

(2) Provide a listing of all site work related UFGS to be edited by the D-B Contractor for the project.

(c) 'Full' Project Criteria

(1) Provide a topographic survey of the project site and a detailed project layout with dimensions.

(2) Provide a listing of all applicable site work related permits.

22.4.2 Geotechnical

(a) This section provides the geotechnical requirements regardless of the level of RFP development. These are the minimum requirements for development of all RFP's.

(b) The Mobile District Geotechnical and Dam Safety Section (EN-GG) shall provide any existing geotechnical data at the project site and prepare the Geotechnical Design portion of specification Section 01 10 10. If no historical geotechnical data exists for the site, CESAM-EN-GG 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 designer for bidding purposes should be provided in Section 01 10 10. These minimum requirements should be established so as to provide adequate data to perform the analysis required by paragraph 6.4.2 GEOTECHNICAL REPORT. Section 01 10 10 should make it clear that the D-B 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 shall 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.

(c) If unforeseen subsurface conditions that will significantly impact the design and construction of the project are encountered and additional subsurface investigation is needed, the D-B Contractor should notify the government and submit a plan for additional subsurface investigation for the Government's approval. This additional subsurface investigation must be necessary, directly related to the unforeseen conditions and beyond that required by section 01010 or necessary for an adequate investigation of the site. If the plan is approved, cost should be negotiated and the contractor should be compensated for the cost of such additional subsurface investigations by change to the contract.

22.4.3 Landscaping, Irrigation, Planting and Turfing

22.4.3.1 Mandatory Requirements

(a) 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.

22.4.3.2 Specific Requirements

(a) 'Nominal' Project Criteria

(1) 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. The narrative shall 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.

(b) 'Partial' Project Criteria

(1) Provide conceptual site landscape layout and legend for planting materials showing buildings, parking areas and other associated project features.

(2) Incorporate and expand the 'Nominal' project criteria including plant material installation and maintenance requirements, and required UFGS to be edited by the D-B Contractor.

(c) 'Full' Project Criteria

(1) Provide drawings and narrative equivalent to an Interim design submittal (See Chapter 7 LANDSCAPING, PLANTING AND TURFING).

22.4.4 Water, Wastewater and Environmental Protection

22.4.4.1 Environmental

22.4.4.1.1 Mandatory Requirements

(a) The environmental protection aspect of an RFP shall 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 shall be protected during the entire duration of the contract.

(b) The D-B RFP guidance shall 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 shall be the responsibility of the D-B Contractor.

(c) The RFP shall include a comprehensive overview of known or potential environmental issues which the D-B Contractor must address during construction. The contractor shall address each topic at a level of detail commensurate with the environmental issue and required construction task(s). Topics or issues which are not identified, but which the contractor considers necessary, shall be identified and discussed after those items have formally been identified.

(d) For projects with asbestos abatement, the contractor shall specifically address the asbestos to be abated, the location of the asbestos, and the quantity. For projects with lead based paint, the contractor shall specifically address the lead paint to be abated (if necessary) or, if the building to be demolished contains lead based paint, the Contractor shall address proper waste debris characterization and disposal and proper worker protection while demolition of the building with the lead-based paint in place.

(e) If the proposed construction or demolition site is located on property with known contamination of either soil or groundwater, the contractor shall address protection of workers and correct handling, treatment (if necessary) and disposal of the soil and/or groundwater.

22.4.4.1.2 Specific Requirements

(a) 'Nominal' Project Criteria:

(1) Include a paragraph describing environmental issues including impact statement/assessment, special investigations, any agreements or permits with other agencies and mitigation work.

(b) 'Partial' Project Criteria:

(1) Include a paragraph describing environmental issues including impact statement/assessment, special investigations, any agreements or permits with other agencies and mitigation work.

(2) Identify who is responsible (the Government or the D-B Contractor) for removal of asbestos or lead paint.

(3) Include an outline and brief description of environmental consideration items such as the Environmental Protection Plan.

(4) Provide a listing of all site work related UFGS to be edited by the D-B Contractor for the project.

(c) 'Full' Project Criteria:

(1) Include all elements of paragraphs 22. 4.3.2 (a) & (b) above.

(2) Include information in the appropriate guide specification section for "Environmental Protection".

(3) In the RFP, include a list of all required construction permits, existing environmental permits, and new environmental permits. All permits obtained by the user or required to be obtained by the user or designer shall be listed by title, permit number or form number, permitting agency, effective date and expiration date. The list shall 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 (Florida - water wells)

A separate list in the same format as above will also be prepared for all permits to be obtained by the contractor.

22.4.4.2 Water and Wastewater, General

In addition, see paragraphs 22.4.4.3 through 22.4.4.5 for water treatment plant, wastewater treatment plant, and large sewage pumping station facility type requirements.

22.4.4.2.1 Mandatory Requirements

(a) The water and wastewater systems shall be designed and specified to the latest industry standards, codes, and Government regulations. The RFP shall ensure high quality, energy efficient equipment and systems with minimum maintenance. Design documents shall be submitted and reviewed prior to commencing work on any treatment system.

22.4.4.2.2 Specific Requirements

(a) 'Nominal' Project Criteria

(1) Include a paragraph describing the collection, distribution, and treatment system(s), any major features such as pumping stations, treatment systems for drinking water, domestic and industrial wastewater. Process flow diagrams shall be submitted including descriptions for proposal for any telemetry or remote monitoring requirements. A description of environmental permitting requirements shall also be submitted in accordance with the requirements herein. The information presented in Figure 8-1 shall be submitted at a minimum. For projects that have discharge or disposal requirements, a narrative or discussion shall be provided describing the final fate of such disposal and environmental regulatory impacts. Designer shall

provide a commissioning and acceptance plan to demonstrate compliance with the approved technical requirements.

(b) 'Partial' Project Criteria

(1) Include a paragraph describing the pumping stations, 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 shall 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.

(2) Describe the pumps and pipe materials, and required coatings to be used on all piping systems.

(3) Include an outline of the specifications to be edited. For specifications that are not available in the UFGS listing, an appropriate specification shall be written prior to the final project submittal for review and approval. The approved and revised as necessary equipment specification or other specification shall be included in the final unreviewed specifications submittal.

(c) 'Full' Project Criteria

(1) Final Plans (See Chapter 8 WATER, WASTEWATER AND ENVIRONMENTAL PROTECTION.)

(2) Final Specifications (See Chapter 8 WATER, WASTEWATER AND ENVIRONMENTAL PROTECTION.)

22.4.4.3 Water Treatment Plant

22.4.4.3.1 Mandatory Requirements

(a) The water treatment plant and related ancillary appurtenances shall be designed and specified to the latest industry standards, codes, and Government regulations. The RFP shall ensure high quality, energy efficient equipment and systems with minimum maintenance. Design documents shall be submitted and reviewed prior to commencing work on any water treatment plant design-build project.

(b) The design-build RFP guidance shall comply with all applicable Federal, State, and local codes, laws, and regulations. Any delays resulting from failure to comply with these laws and regulations shall be the responsibility of the D-B Contractor.

(c) The RFP shall 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 shall 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, shall be identified and discussed after those items have formally been identified.

(d) Detailed unit process tests and comparisons should be conducted under applicable federal, state, or local guidelines in order 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 should be considered to both simplify and reduce the cost of facility construction and operation. The contractor shall specifically address any issues as they arise during this process.

22.4.4.3.2 Specific Requirements

(a) 'Nominal' Project Criteria

(1) 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.

(2) Process flow diagrams shall 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.

(b) 'Partial' Project Criteria

(1) 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.

(2) Describe the pumps and pipe materials, and required coatings to be used on all piping systems.

(3) Include an outline of the specifications to be edited. For specifications that are not available in the UFGS listing, an appropriate specification shall be written prior to the final project submittal for review and approval. The approved and revised as necessary equipment specification or other specification shall be included in the final unreviewed specifications submittal.

(c) 'Full' Project Criteria

(1) Final Plans (See Chapter 8 WATER, WASTEWATER AND ENVIRONMENTAL PROTECTION.)

(2) Final Specifications (See Chapter 8 WATER, WASTEWATER AND ENVIRONMENTAL PROTECTION.)

22.4.4.4 Wastewater Treatment Plant

22.4.4.4.1 Mandatory Requirements

(a) The wastewater treatment plant and related ancillary appurtenances shall be designed and specified to the latest industry standards, codes, and Government regulations. The RFP shall ensure high quality, energy efficient equipment and systems with minimum maintenance. Design documents shall be submitted and reviewed prior to commencing work on any wastewater treatment plant design-build project.

(b) The design-build RFP guidance shall comply with all applicable Federal, State, and local codes, laws, and regulations. Any delays resulting from failure to comply with these laws and regulations shall be the responsibility of the design-build contractor.

(c) The RFP shall 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 shall 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, shall be identified and discussed after those items have formally been identified.

(d) Detailed unit process tests and comparisons should be conducted under applicable federal, state, or local guidelines in order 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 should be considered to both simplify and reduce the cost of facility construction and operation. The contractor shall specifically address any issues as they arise during this process.

(e) A wastewater treatment plant should 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 should 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.

22.4.4.4.2 Specific Requirements

(a) 'Nominal' Project Criteria

(1) 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.

(2) Process flow diagrams shall be submitted including descriptions for proposal for any telemetry or remote monitoring requirements. The process flow diagrams shall 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.

(3) A description of environmental permitting requirements shall also be submitted in accordance with the requirements herein. The information presented in Figure 8-1 shall be submitted as a minimum. For projects that have discharge or disposal requirements, a narrative or discussion shall be provided describing the final fate of such disposal and environmental regulatory impacts. Designer shall provide a commissioning and acceptance plan to demonstrate compliance with the approved technical requirements.

(b) 'Partial' Project Criteria

(1) 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.

(2) For projects that require a final discharge disposal, a submittal fully describing the final fate of the discharge and coordination with regulatory officials shall 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.

(3) Describe the pumps and pipe materials, and required coatings to be used on all piping systems.

(4) Include an outline of the specifications to be edited. For specifications that are not available in the UFGS listing, an appropriate specification shall be written prior to the final project submittal for review and approval. The approved and revised as necessary equipment specification or other specification shall be included in the final unreviewed specifications submittal.

(c) 'Full' Project Criteria

(1) Final Plans (See Chapter 8 WATER, WASTEWATER AND ENVIRONMENTAL PROTECTION.)

(2) Final Specifications (See Chapter 8 WATER, WASTEWATER AND ENVIRONMENTAL PROTECTION.)

22.4.4.5 Large Sewage Pumping Station

Per UFC 3-240-06N, a large sewage pumping station is defined as a pump station serving a large area that generates extreme peak sewage flow rates that are greater than 45 L/s (700 gpm).

22.4.4.5.1 Mandatory Requirements

(a) The large sewage pump station and related ancillary appurtenances shall be designed and specified to the latest industry standards, codes, and Government regulations. The RFP shall ensure high quality, energy efficient equipment and systems with minimum maintenance. Design documents shall be submitted and reviewed prior to commencing work on any wastewater treatment plant design-build project.

(b) The design-build RFP guidance shall comply with all applicable Federal, State, and local codes, laws, and regulations. Any delays resulting from failure to comply with these laws and regulations shall be the responsibility of the D-B Contractor.

(c) The RFP shall include guidance that leads to the development of important design factors that must be considered during the initial planning and design stages of a 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 shall 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, shall be identified and discussed after those items have formally been identified.

(d) 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.

22.4.4.5.2 Specific Requirements

(a) ‘Nominal’ Project Criteria

(1) Include a paragraph describing the large 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.

(2) Process flow diagrams shall be submitted including descriptions for proposal for any telemetry or remote monitoring requirements. The process flow diagrams shall 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.

(3) A description of environmental permitting requirements shall also be submitted in accordance with the requirements herein. The information presented in Figure 8-1 shall be submitted as a minimum. For projects that have discharge or disposal requirements, a narrative or discussion shall be provided describing the final fate of such disposal and environmental regulatory impacts. Designer shall provide a commissioning and acceptance plan to demonstrate compliance with the approved technical requirements.

(b) 'Partial' Project Criteria

(1) 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.

(2) For projects that require a final discharge disposal, a submittal fully describing the final fate of the discharge and coordination with regulatory officials shall 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.

(3) Describe the pumps and pipe materials, and required coatings to be used on all piping systems.

(4) Include an outline of the specifications to be edited. For specifications that are not available in the UFGS listing, an appropriate specification shall be written prior to the final project submittal for review and approval. The approved and revised as necessary equipment specification or other specification shall be included in the final unreviewed specifications submittal.

(c) 'Full' Project Criteria

(1) Final Plans (See Chapter 8 WATER, WASTEWATER AND ENVIRONMENTAL PROTECTION.)

(2) Final Specifications (See Chapter 8 WATER, WASTEWATER AND ENVIRONMENTAL PROTECTION.)

22.4.5 Architectural

22.4.5.1 Mandatory Requirements

(a) Determine and describe user, installation, and community (where applicable) criteria.

(b) Determine and describe requirements for code compliance.

22.4.5.2 Specific Requirements

(a) 'Nominal' Project Criteria

(1) 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.

(b) 'Partial' Project Criteria

(1) Develop a design meeting Concept design requirements in Chapter 9 ARCHITECTURAL.

(c) 'Full' Project Criteria

(2) Develop a design meeting Final design requirements in Chapter 9 ARCHITECTURAL.

22.4.6 Interior Design

22.4.6.1 Mandatory Requirements

(a) The Structural Interior Design (SID) and the Furniture Fixtures and Equipment Package (FFE) - formally known as the Comprehensive Interior Design (CID) for the D-B RFP project delivery process requires the project interior designer to edit two sections of the D-B RFP solicitation. See Chapter 10 INTERIOR DESIGN.

(b) 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 D-B RFP.

(c) When developing the SID design criteria in a D-B RFP title the paragraph "Interior Design". Narratives within this paragraph should discuss the following objectives.

- SID objectives for health safety and welfare
- SID Color Scheme objectives and aesthetic goals
- Project specific criteria
- The "Color Schedule" (**Exhibit 22-1**)
- Preliminary Room Finish Schedule (**Exhibit 22-2**)
- Interior Signage Requirements

(d) **Exhibit 22-1** Color Schedule provides guidance for the sequence of paragraphs for "Structural Interior Design". The project interior designer, project architect and other engineering disciplines that address finishes are to fully coordinate the SID selections and placement of materials, color, textures and patterns with the customer to ensure complete customer satisfaction. Compare and coordinate all SID information with the architectural and engineering design criteria to eliminate conflicts and/or redundant design criteria. Ensure that all exposed building related materials and fixtures requiring finishes are addressed.

(e) When edited UFGS are part of the D-B RFP solicitation the interior designer is to complete to the fullest extend possible UFGS Section 09 06 90 Color Schedule and supporting UFGS.

(f) When UFGS are not provided in the D-B RFP, list the UFGS by Section number and title and require the D-B Contractor to edit them during the design phase after award. Establish minimum quality and performance characteristics in a modified "Color Schedule" by adding quality minimums and included it in the Structural Interior Design criteria D-B RFP Section 01 10 10 "Design Criteria". (For example, add the minimum face weight, yarn type and carpet construction method in the Carpet paragraph to establish a basis for quality such as Carpet, CPT-1: 32 oz, tufted, graphic pattern, 100% solution dyed nylon; Manufacturer Shaw, Style number 6087, Color 800 Blue).

(g) A preliminary "Room Finish Schedule" is be provided in the D-B RFP Section 01 10 10 "Structural Interior Design" criteria and used in combination with the "Color Schedule" to further define the SID in the D-B RFP. Providing a preliminary "Room Finish Schedule" in a graphic form is more efficient than using narrative. The "Room Finish Schedule" shall be edited to establish minimum finishes for each room type within the facility. The "Room Finish Schedule" may be a "table" similar to **Exhibit 22-2** or it may be a typical schedule drawing. If a drawing is used, verify drawings are permitted as part of the D-B RFP solicitation package. To establish minimum finish requirements indicate floor, wall base, walls and ceiling finishes if a "table" is used. The "Color Schedule" may be used to include specific details needed to establish additional minimum finishes for casework, interior signage, crown moldings, tile patterns and other details.

(h) SID materials, finishes and colors not discussed or required in the D-B RFP Section 01 10 10 "Structural Interior Design" criteria may not be provided by the Construction Contractor during the construction phase of the project without additional funds and a "change order". Therefore, it is important that a edited version of the UFGS Section 09 06 90 Color Schedule and UFGS list be included in the RFP design criteria to ensure as much information about the quality, material, finish and color of interior finishes is provided in the solicitation. Project interior designers are to edit this schedule fully to ensure the SID is fully integrated in the D-B RFP solicitation.

22.4.6.2 Specific Requirements

(a) See Chapter 10 INTERIOR DESIGN for 'Nominal' (10-15% design development), 'Partial' (30-35% design development), and 'Full (100% design development) requirements.

(b) SID color boards are only required on D-B RFP projects using 100% project criteria. The interior designer will not develop SID color boards when nominal or partial criteria is used in the D-B RFP.

(c) For SID requirements, see the following table.

SID D-B RFP Section 01 10 10 "Design Criteria" Matrix * Hard Copy Presentation

** Digital Data Presentation				
ITEM	Description/sequence of information included in the RFP Section 01 10 10 Design Criteria"	NOMINAL PROJECT CRITERIA 10%-30%	PARTIAL PROJECT CRITERIA 35%-50%	FULL PROJECT CRITERIA 100%
1. * **	Full project criteria will include 100% SID Color boards and SID binders, drawings and specifications.			X
1. ** 1.a ** 1.b ** 1.c **	Interior Design Narrative. Provide D-B RFP SID narratives that address the following objectives in this sequence: x.1 The SID objectives and general description/parameters of the interior color scheme. x.2 Discussion of special spaces and finish requirements of these spaces; discussion of details of finishes required such as crown molding, chair rails, flush mounted corner guards etc. to further explain the Color Schedule and Room Finish Schedule. x.3 Discussion of interior signage plan that addresses the major signage categories (building directories, floor directories, room/office identification, safety signs, graphic symbols, visual communication and display boards, corridor numbering and other project specific interior sign requirements.	X	X	
2. **	x.4 Color Schedule. Completed UFGS 09 06 90 Color Schedule if specifications are included in the RFP. Reference this specification in the RFP "01 10 10" -Or- x.4 Edit **Exhibit 22-1** Color Schedule and include it after the Interior Design Narrative.	X	X	
3. **	x.5 Room Finish Schedule. To fullest extent possible complete a Room Finish Schedule to indicate the level of finishes for all rooms in the project. The Room Finish Schedule can be placed as a "table" in "Section 01 10 10 Design Criteria" after the Color Schedule or it can be a developed as a drawing.	X	X	

4. **	Insert the Standard FFE Clauses directly after the Room Finish Schedule Table. (See the following table).	X	X	

(d) 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.

FFE-RFP Section 01 10 10 Design Criteria Matrix Summary ** Digital Data Presentation				
ITEM	Standard clauses to use in the RFP "Section 01 10 10- Design Criteria"	NOMINAL PROJECT CRITERIA 10%-30%	PARTIAL PROJECT CRITERIA 35%-50%	FULL PROJECT CRITERIA 100%
STANDARD CLAUSE **	x.1 The FFE 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.			X
STANDARD CLAUSE **	X.1 The Contractor shall 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 10 INTERIOR DESIGN. The Government will provide the brand name(s) of furniture to use in the FFE package after award of the D-B contract. Furniture selected and specified shall have a current GSA contract or be from UNICOR.	X	X	

(d) The standard clause used in the D-B RFP Section 01 10 12 Design After Award is a "bridge" clause because is involves both the SID and FFE instructions to the D-B 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.

SID/FFE-RFP Section 01 10 12 Design After Award Matrix				
ITEM	The standard clause to use in the RFP Section 01 10 12 Design After Award	NOMINAL PROJECT CRITERIA 10%-30%	PARTIAL PROJECT CRITERIA 35%-50%	FULL PROJECT CRITERIA 100%
STANDARD CLAUSE	The Contractor shall provide the SID and FFE in accordance with Chapter 10 INTERIOR DESIGN of the Mobile District Design Manual.	X	X	X

22.4.7 Structural

22.4.7.1 Mandatory Requirements

(a) 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.

(b) List the wind speed, building classification category, and exposure category.

(c) List the seismic short period spectral acceleration value (Ss) and the one second period spectral acceleration value (S1) for a 2% probability of exceedance in 50 years, the building classification category and the seismic use group. Provide the seismic site classification or address the appropriate method to derive the seismic site classification.

(d) List any specific live loads such as vehicular loads, cranes, special equipment loads, hanging loads, etc. State locations, weights, and special support requirements.

(e) List any special structural requirements such as floor tolerances or deflection criteria, which deviates from IBC 2006.

(f) List any restrictions on types of structural systems.

22.4.7.2 Specific Requirements

(a) 'Nominal' Project Criteria

(1) Include specific technical criteria to include minimum material strengths.

(2) Include specific quality control items such as sample panels and inspection requirements.

(b) 'Partial' Project Criteria

(1) Include desired column locations on the architectural drawings.

(2) Include list of recommended structural systems.

(3) Include guide specifications.

(c) 'Full' Project Criteria

(1) Final Drawings (See Chapter 11 STRUCTURAL.)

(2) Final Specifications (See Chapter 11 STRUCTURAL.)

22.4.8 Plumbing

22.4.8.1 Mandatory Requirements

(a) Mandatory energy and water conservation criteria. Title 10 CFR, Subpart A, Part 435, Energy Conservation Voluntary Performance Standards for New Commercial and Multi-family High Rise Residential Buildings, Mandatory For New Federal Buildings Published January 30, 1989; Public Law 100-615, Federal Energy Management Improvement Act of 1988, November 5, 1988; Public Law 102-486, Energy Policy Act of 1992; Executive Order 12902, Energy Efficiency and Water Conservation at Federal Facilities, dated March 8, 1994;
and Department of Defense energy goal requirements.

(b) Codes and Standards. Water supply, backflow prevention, and drainage at Army installations will comply with the International Plumbing Code.

(c) Special Plumbing Requirements (handicap requirements, low flow requirements, maximum hot water requirements, dilution basins, grease separators, sewage ejection, etc.).

22.4.8.2 Specific Requirements

(a) 'Nominal' Project Criteria

(1) Include a paragraph describing the plumbing system, any major features such as pressure booster pumps, well requirements, etc. and any special plumbing requirements such as handicap requirements, low flow requirements, maximum hot water requirements, dilution basins, grease separators, sewage ejection, etc.

(b) 'Partial' Project Criteria

(1) Include a paragraph describing the plumbing system, any major features such as pressure booster pumps, well requirements, etc. and any special plumbing requirements such as handicap requirements, low flow requirements, maximum hot water requirements, dilution basins, grease separators, sewage ejection, etc.

(2) Describe the pipe materials to be used on all plumbing systems.

(3) Include an outline of the specifications to be edited.

(c) 'Full' Project Criteria

(1) Final Plumbing Plans (See Chapter 12 PLUMBING.)

(2) Final Specifications (See Chapter 12 PLUMBING.)

22.4.9 Heating, Ventilating and Air Conditioning

22.4.9.1 Mandatory Requirements

(a) The HVAC systems shall be designed and specified to the latest industry standards, codes, and Government regulations. The RFP shall ensure high quality, energy efficient HVAC equipment and systems with minimum maintenance. Design documents shall be submitted and reviewed prior to commencing work on the HVAC system.

22.4.9.2 Specific Requirements

(a) 'Nominal' Project Criteria

(1) Include a paragraph describing the HVAC system, any major features such as central equipment and any special HVAC requirements such as clean rooms, kitchens, humidity control, DDC Control System type, etc.

(b) 'Partial' Project Criteria

(1) Include a paragraph describing the HVAC system, any major features such as central equipment and any special HVAC requirements such as clean rooms, kitchens, humidity control, DDC Control System type, etc.

(2) Describe the duct and pipe materials, and insulation to be used on all plumbing systems.

(3) Include an outline of the specifications to be edited.

(c) 'Full' Project Criteria

(1) Final Plumbing Plans (See Chapter 13 HEATING, VENTILATING, AND AIR CONDITIONING.)

(2) Final Specifications (See Chapter 13 HEATING, VENTILATING, AND AIR CONDITIONING.)

22.4.10 Fire Suppression Requirements

22.4.10.1 Mandatory Requirements

(a) 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:

(1) Type of construction.
(2) Height and area limitation.
(3) Building separation.
(4) Fire resistive construction.

(5) Flame-spread and smoke-developed ratings.
(6) Means of egress.
(7) Special hazard protection.
(8) Automatic sprinkler and fire suppression systems.
(9) Water supplies for fire protection.
(10) Standpipe systems and fire extinguishers.
(11) Fire alarm and detection systems,
(12) Connection to the base fire reporting system.

(b) 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.

22.4.10.2 Specific Requirements

(a) 'Nominal' Project Criteria

(1) List areas Requiring Fire Protection or require the D-B Contractor to make selection of area fire protection requirements based upon applicable codes and standards for the use of the area. If fire protection system is preferred, indicate the type.

(b) 'Partial' Project Criteria

(1) List areas Requiring Fire Protection or require the Design-Build Contractor to make selection of area fire protection requirements based upon applicable codes and standards for the use of the area. If fire protection system is preferred, indicate the type.

(2) Describe the pipe materials to be used on all sprinkler systems.

(3) Include an outline of the specifications to be edited.

(c) 'Full' Project Criteria

(1) Final Fire Suppression Plans (See Chapter 14 FIRE SUPPRESSION SYSTEM.)

(2) Final Specifications (See Chapter 14 FIRE SUPPRESSION SYSTEM.)

22.4.11 Other Mechanical Systems and Equipment

22.4.11.1 Mandatory Requirements

(a) The mechanical systems shall be designed and specified to the latest industry standards, codes, and Government regulations. The RFP shall ensure high quality, energy efficient mechanical equipment and systems with minimum maintenance. Design documents shall be submitted, reviewed and approved prior to commencing work on the mechanical system.

22.4.11.2 Specific Requirements

(a) 'Nominal' Project Criteria

(1) Include a paragraph describing the mechanical systems and support utilities that will be needed.

(2) On central energy plants, list estimated capacities of equipment, types of equipment and number of each type of equipment.

(b) 'Partial' Project Criteria

(1) Include a paragraph describing the mechanical systems listing possible manufacturers and model numbers for unusual systems.

(2) 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.

(3) Include an outline of the specifications to be edited.

(c) 'Full' Project Criteria:

(1) Final Plans (See Chapter 15 OTHER MECHANICAL SYSTEMS AND EQUIPMENT.)

(2) Final Specifications (See Chapter 15 OTHER MECHANICAL SYSTEMS AND EQUIPMENT.)

22.4.12 Electrical and Electronic Systems

22.4.12.1 Mandatory Requirements

(a) All criteria that is 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 shall be referenced as mandatory. A link to a web site where the specific criteria can be obtained shall be provided.

22.4.12.1 Specific Requirements

(a) 'Nominal' Project Criteria

(1) Include all the information included in Chapter 16 ELECTRICAL AND ELECTRONICS SYSTEMS, paragraph 16.4 Concept Design (30%-35%)

(b) 'Partial' Project Criteria

(1) Include all the information included in Chapter 16 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.

(c) 'Full' Project Criteria:

(1) Final electrical/Electronic Plans (See Chapter 16 ELECTRICAL AND ELECTRONICS SYSTEMS.)

(2)Final Specifications (See Chapter 16 ELECTRICAL AND ELECTRONICS SYSTEMS.)

22.4.13 Corrosion Control and Cathodic Protection

RFP contract documents, as well as the subsequent designs based on those documents, shall strictly comply with Chapter 17 CORROSION CONTROL AND CATHODIC PROTECTION SYSTEMS.

22.4.13.1 Mandatory Requirements

(a) 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 should not be included by reference to the ETL.

(b) Cathodic Protection and protective coatings shall be provided for the following buried or submerged ferrous metallic structures regardless of soil or water resistivity:

(1) Natural gas and propane piping
(2) Liquid fuel piping
(3) Underground storage tanks
(4) Fire protection piping
(5) Steel, Ductile, or cast iron pressurized piping under floor (slab on grade) in soil
(6) Underground heat distribution and chilled water piping in ferrous metallic conduit in soils with resistivity of 30,000 ohm-cm or less
(7) Other structures with hazardous products
(8) Steel casing for underground hydraulic elevator jack
(9) Oxygen piping

Metallic components of non-metallic piping systems and other non-metallic systems listed in this paragraph shall 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).

(c) Require the D-B 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.

(d) Require in the RFP that the D-B Contractor provide training for each cathodic protection system.

(e) Codes and Standards. In addition to ETL 1110-3-474, referenced above, the RFP must require the Design-Build contractor to comply with all other relative corrosion control and cathodic protection system requirements as contained in all of 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.

(f) Require in the RFP, that all new metallic components that are connected to existing metallic piping systems or other existing metallic structures shall 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.

(g) 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.).

(h) 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.

22.4.13.2 Specific Requirements

(a) 'Nominal' Project Criteria

(1) 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.

(b) 'Partial' Project Criteria

(1) 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.

(2) 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.

(3) 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.

(4) Describe any other cathodic protection systems in the area of the new systems, which may conflict with the new systems.

(5) 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 should include such information as resistivity, pH, chloride content, etc.

(6) Include an outline of the specifications to be edited.

(C) 'Full' Project Criteria

(1) Final Corrosion Control and Cathodic Protection Systems Plans (See Chapter 17 CORROSION CONTROL AND CATHODIC PROTECTION SYSTEMS.)

(2) Final Specifications (See Chapter 17 CORROSION CONTROL AND CATHODIC PROTECTION SYSTEMS.)

(3) Design Narrative and other requirements not specifically included in above paragraph under this section. (See description included under Final Design (Unreviewed 100%) of Chapter 17 CORROSION CONTROL AND CATHODIC PROTECTION SYSTEMS.)

22.4.14 Antiterrorism/Force Protection

22.4.14.1 Mandatory Requirements

(a) 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.

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

(c) Define the setback distances to be provided.

(d) Describe any progressive collapse requirements.

(e) List any building elements such as mail rooms, equipment enclosures, etc. requiring special design to meet antiterrorism/force protection requirements.

22.4.14.2 Specific Requirements

(a) 'Nominal' and 'Partial' Project Criteria

(1) The D-B Contractor will be responsible for developing a design proposal that may be impacted by antiterrorism/ force protection standards. Sufficient information must be provided to support the proposal without providing information from UFC 4-010-02 (FOUO). Provide specific design loads or specify the required standoff distance and provide candidate structural systems that allow for mitigation of the applicable explosive if the standoff is less than the minimum. If the standoff distances will allow the use of conventional construction without analysis of blast effects, this shall be stated.

(b) 'Full' Project Criteria

(1) Final drawings, calculations, and design analysis (See Chapter 19 ANTITERRORISM/FORCE PROTECTION.)

(2) Final Specifications (See Chapter 19 ANTITERRORISM/FORCE PROTECTION.)

22.4.15 Sustainable Design and Development (SDD)

22.4.15.1 Mandatory Requirements

(a) Describe the rating tool, reference criteria, and methods of achieving the required SDD rating.

22.4.15.2 Specific Requirements

(a) 'Nominal' Project Criteria

(1) Provide a Project Definition narrative as defined in Chapter 20 SUSTAINABLE DESIGN AND DEVELOPMENT (SDD).

(b) 'Partial' Project Criteria

(1) Provide a Concept Design narrative as defined in Chapter 20 SUSTAINABLE DESIGN AND DEVELOPMENT (SDD).

(c) 'Full' Project Criteria

(1) Provide a Final Design submittal as defined in Chapter 20 SUSTAINABLE DESIGN AND DEVELOPMENT (SDD).

22.5 PROJECT DEFINITION (10-15%)

(a) 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.

(b) 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 23 CHARRETTES.

22.6 INTERIM DESIGN SUBMITTAL (50%)

(a) If a charrette is not conducted, the initial D-B RFP submittal shall be an Interim Design Submittal developed to an approximate 50% level as modified below.

(b) If the project is to be advertised as a two-step Design Build solicitation, then all of the technical requirements (drawings, specifications, etc.) shall be identified as an amendment. Amendments shall be prepared in accordance with the Chapter 2 PRESENTATION OF DATA. The PAE shall provide the A-E with the appropriate amendment number to be shown in amendment documents.

22.6.1 Model RFP

Follow the guidance contained in the MT Model RFP Implementation and Field Execution Guides for content and format.

22.6.2 Criteria Drawings

(a) If architectural criteria drawings are provided as part of the RFP, submit Concept Design level floor plans, roof plan, exterior elevations, and life safety analysis plan as defined in Chapter 9 ARCHITECTURE and the SOW.

(b) If site work criteria drawings are provided as part of the RFP, submit Concept Design level Project Location and Vicinity Maps, Geometric Layout Plan, and Existing Site Topographical Survey and Utilities Plan drawings as defined in the SOW.

22.6.3 Specifications

(a) All specifications, other than required UFGS prepared in SpecsIntact, shall be prepared in Microsoft Word. Specifications shall be prepared and submitted in accordance with Chapter 3 SPECIFICATIONS.

(b) Suggested Qualifications for the D-B Contractor. The PAE or A-E in coordination with EN-DW shall provide a recommended list of qualifications that the successful D-B Contractor should have on his design and construction team.

(c) Section 00 11 00. The PAE or A-E in coordination with EN-DW shall define format, extent of design, percentage of completion required, and specific technical information describing performance and key design features of the project to be submitted by the offerer at the Proposal stage, to verify that the offerer's design solution will

comply with the RFP and can be evaluated against the other proposals. Requirements shall reflect the evaluation factors and agree with the Project Criteria Approach. Evaluation will be performed by a government Source Selection Evaluation Board (SSEB) and will be based on evaluation of technical factors and price to select the "Best Value".

(d) Section 01 10 10 Design Requirements. **Exhibit 22-3** 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 shall be incorporated in the RFP when appropriate to the project.

(e) Section 01 10 12 Design After Award. **Exhibit 22-4** 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 shall be incorporated in the RFP when appropriate to the project.

(f) UFGS

(1) When edited UFGS are part of the D-B RFP solicitation designers are to complete them to the fullest extent in SpecsIntact possible ensuring consistency with Section 01 10 10 and 01 10 12 requiring that the D-B Contractor complete the editing in SpecsIntact during design after award.

(2) When edited UFGS are not provided in the D-B RFP but required to be issued by the D-B Contractor, list the UFGS by section number and title, and require the D-B Contractor to edit them in SpecsIntact during design after award.

(g) Nationally recognized and industry accepted commercial specifications other than SpecsIntact may be used in the preparation of technical specifications in the RFP. Government standards (ETL's, EC's, ER's, etc.) may be required in preparing the RFP, but may not be included by reference in the commercial specifications. These Government standards shall be extracted from the applicable standards and included in the RFP design and specification criteria, or the standards shall be included as an appendix to the RFP. When technical specifications are prepared in commercial specification format, the A-E will require that edited specifications be submitted by the D-B Contractor during design after award.

22.7 FINAL DESIGN SUBMITTAL (UNREVIEWED 100%)

The Final Design shall include all items in the Interim Design submittal advanced to a Final Design level, and any answers or revisions made necessary by comments about the Interim Design submittal.

Front-end contract clauses will be incorporated by EN-DW, or furnished to the AE for inclusion in the 100% Unreviewed Final Submittal.

22.8 READY-TO-ADVERTISE SUBMITTAL (REVIEWED 100%)

The RTA submittal shall include all items in the Final Design submittal and any answers or revisions made necessary by comments about the Final Design submittal.

Color Schedule for D-B RFP Section 01 10 10

x.x.1 Color Schedule

This section covers only the color of the exterior and interior materials and products that areas exposed to view in the finished construction. The word "color" as used herein includes surface color, pattern and texture. Requirement for quality and method of installation are covered in other appropriate sections of the specifications. Specific locations where the various materials are required or items not designated for color in this RFP shall be determined after the award of the Design-Build Contract.
The color schedule lists the colors, patterns, and textures required for exterior and interior finishes, including both factory applied and field applied colors.

x.x.2 Reference to Manufacturer's Color

Where color is shown as being specific to one manufacturer, an equivalent color by another manufacturer may be submitted as a deviation and acceptance is required. Manufacturers and materials specified are not intended to limit the selection of equal color from other manufacturers.

x.x.3 Exterior Walls

Exterior wall colors shall apply to exterior wall surfaces including recesses at entrances and projecting vestibules. Conduit shall be painted to closely match the adjacent surfaces color. Wall color shall be provided to match the colors listed as follows:

Brick: [___]
Mortar: [___]
Paint: [___]
Concrete Masonry Units (Integrally Colored): [___]
Metal Wall Panels, Hardware, and Associated Trim: [___]
Insulation and Finish System: [___]
Precast Concrete: [___]
Glass and Glazing: [___]

x.x.4 Exterior Trim and Miscellaneous Finishes

Exterior trim shall be provided to match the colors listed below.

Doors and Door Frames: [___]
Windows (million, sash. Trim, and sill): [___]
Wood Stain: [___]
Fascia: [___]
Downspouts, Gutter, Louvers, and Flashings: [___]
Handrails: [___]
Soffits and Ceilings: [___]
Signage: [___]
Overhangs: [___]
Caulking and Sealants: [___]
Stamped Concrete: [___]

Exhibit 22-1 (Continued)

x.x.5 Exterior Roof

Roof color shall apply to exterior roof surfaces including sheet metal flashings and coping, mechanical units, roof trim, pipes, conduits, electrical appurtenances, and similar items. Roof color shall be provided to match the colors listed below.

Metal: [___]
Shingles: [___]
EPDM: [___]
Terra Cotta Tiles: [% of colors]
Roof Penetrations: [Match roof color]

x.x.6 Interior Floor Finishes

Flooring materials shall be provided to match the colors listed below.

Carpet: [___]
Carpet Tile: [___]
Vinyl Composition Tile: [___]
Sheet Vinyl: [___]
Raised Pattern Rubber Tile: [___]
Stair Treads, Kick Strips, and Risers: [___]
Quarry Tile: [___]
Ceramic Tile: [___]
Porcelain Tile: [_____]
Terrazzo Tile: [___]
Grout: [___]
Plastic Laminate: [___]
Static [Dissipative] [Conductive] tile: [___]
Concrete: [___]
Raised Floor Manufacturer: [___]

x.x.7 Interior Base Finishes

Base materials shall be provided to match the colors listed below:

Resilient Base And Edge Strips: [___]
Quarry Tile: [___]
Ceramic Tile: [___]
Porcelain Tile: [___]
Grout: [___]
Coved Sheet Vinyl: [___]
Glazed Structural Units: [___]
Prefaced Concrete Masonry Units: [___]
Brick: [___]
Mortar: [___]
Painted: [___]
Wood: [___]

x.x.8 Interior Wall Finishes

Interior Wall color shall apply to the entire wall surface, including reveals, vertical furred spaces, grilles, diffusers, electrical and

Exhibit 22-1 (Continued)

access panels, and piping and conduit adjacent to wall surfaces unless other wise specified. Items not specified in other paragraphs shall be painted to match adjacent wall surface. Wall materials shall be provided to match the color listed below.

Paint: [___]
Vinyl Wall Covering: [___]
Fabric Wall Covering: [___]
Ceramic Tile: [___]
Ceramic Tile Grout: [___]
Acoustical Wall Covering: [___]
Brick: [___]
Metal Liner Panels: [___]
Glazed Structural Units: [___]
Prefaced Concrete Masonry Units: [___]
Mortar: [___]
Columns: [___]

x.x.9 Interior Ceiling Finishes

Ceiling color shall apply to ceiling surfaces including soffits, furred down areas, grilles, diffusers, registers, and access panels. Ceiling color shall also apply to joist, underside of roof deck, and conduit and piping where joists and deck are exposed and required to be painted. Ceiling materials shall be provided to match the colors listed below.

Acoustical Tile and Grid: [___]
Paint: [___]
Structural Framing: [___]
Metal Deck: [___]

x.x.10 Interior Trim

Interior trim shall be provided to match the colors listed below.

Doors: [___]
Door Frames: [___]
Windows (mullion, sash, trim and stool): [___]
Window Sills: [___]
Fire Extinguisher Cabinets: [___]
Handrails: [___]
Ladders: [___]
Metal Stairs: [___]
Wood Stain: [___]
Wood Base, Wood Chair rails, Wood Crown Molding: [___]

x.x.11 Interior Window Treatments

Window treatments shall be provided to match the color listed below.

Horizontal Blinds: [Wood/Metal [___]
Vertical Blinds: [___]
Drapery Hardware: [___]
Roller Shades: [___]

Exhibit 22-1 (Continued)

x.x.12 Interior Miscellaneous

Miscellaneous items shall be provided to match the colors listed below.

Toilet partitions and Urinal Screen: [___]
Casework: [___]
Reception Counter Tops and Base: [___]
Interior Signage Message Color: [___]
Interior Signage Background Color: [___]
Lockers: [___]
Corner Guards: [___]
Operable Partitions: [___]
Electrical Device Cover Plates and Panels: [___]
Casework: [___]
Shower Curtain: [___]
Auditorium Seating: [___]

Exhibit 22-1 (Continued)

x.x.x Preliminary Room Finish Schedule.

NOTE: This preliminary Room Finish Schedule provides a basis for material, finish and color placement. Further development of this schedule is required after the award of the contract. This Room Finish Schedule is to be used in conjunction with other design criteria and schedules in this contract.

ROOM NAME	FLOOR	BASE	WALLS	CEILINGS	REMARKS

Exhibit 22-2

Sample Section 01 10 10 Design Requirements

DESIGN-BUILD FY-0X Project Name
Contract Number
Project Location CADD File Name

SECTION 01 10 10

DESIGN REQUIREMENTS

TABLE OF CONTENTS

Exhibit 22-3 (Continued)

SECTION 01 10 10

DESIGN REQUIREMENTS

1. DESCRIPTION OF FACILITY

1.1 The Contractor shall design and construct the FY-0X [Project Name] at [Project Location] to result in a complete and usable facility based on Design Requirements and Technical Specifications contained within this solicitation.

1.2 This project is required to provide a [project description including facility type/s, intended occupancy, building code construction type, customer designation, user designation, gross square footage, any phasing requirements, basis of design – service standard or standard design, general demolition requirements, general site work requirements]. The Contractor shall design and construct these facilities in accordance with the design requirements and technical criteria established in this document.

1.2.1 Base Bid. The Base Bid includes design and construction of all work required for the [Project Name, facility type/s] and all required site work, landscaping, and utility systems. [The Base Bid includes demolition of existing site features as shown on the site plans or required for construction of the Base Bid.] [The Base Bid includes the design of all Bid Options.]

[1.2.2 Bid Option Number 1 includes [general description]. [Provide additional sub paragraphs as necessary to describe any additional bid options.]

1.3 Sustainable Design

The Contractor shall [define sustainable design criteria including rating level, point requirements, registration, and certification procedures] for [Sustainable Project Rating Tool (SPiRiT)] [or] [Leadership in Energy and Environmental Design (LEED)]

2. DESIGN REQUIREMENTS

2.1 The information provided in this Request for Proposal (RFP) is intended to guide design and construction by establishing existing conditions and desired character, appearance, and function of the [Project Name]. [List any documents and their purpose provided as appendices.] [Criteria drawings included in the solicitation include [summarize drawings provided]. 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 space 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 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, submittals, and design analysis as required in SECTION 01 10 12 DESIGN AFTER AWARD. The project shall be designed and constructed in accordance with the criteria 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 design requirements issued in this solicitation. In case of a conflict in design requirements, the most stringent requirements govern.

2.2.1 Unified Facility Guide Specifications (UFGS) are referenced in various sections below. The referenced specifications shall be edited by the Contractor and provided as submittals at the stages shown in Section 01 10 12. The referenced specifications are anticipated requirements - specifications shall be deleted and/or additional UFGS specifications shall be added by the Contractor as necessary to complete the design.

2.2.2 Operations and maintenance (O&M) portions of UFGS shall be edited by the respective Designers of Record in the design phase. O&M requirements and submittals 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 operation of the new facility on completion.

2.3 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.

2.4 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.

2.4.1 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.

2.4.2 Section 01 10 12 - DESIGN AFTER AWARD defines the format and submittal requirements in which the design and the construction documents shall be prepared by the Contractor.

2.5 Construction documents shall be sufficient to afford a clear understanding of the construction work required. The work shall be organized in a manner that will assure thorough coordination between the various details on the drawings, and between the drawings and the specifications. The Contractor shall 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 http://www.sam.usace.army.mil/en/guides/DesMan/desman.htm shall be used as the basis for format and preparation of construction documents.

2.6 Conflicts in RFP Criteria. Where the various elements of the RFP are in conflict, the following priority shall be used to establish precedence, unless specifically noted otherwise:

1. Section 01 10 10 - DESIGN REQUIREMENTS
2. Criteria Drawings

2.7 The architectural character of the building, interior design, siting, and landscaping shall be consistent with the [installation design guide and/or other references, list as an appendix or appendices if included in the RFP].

2.8 The Contractor's Designers of Record shall develop construction document technical specifications for all areas of work. The design of landscape architectural, architectural, interior, structural, mechanical, fire protection, electrical, environmental, civil, and other engineering features of the work shall be accomplished, reviewed, and approved by architects, engineers, and interior designers 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.

3. GENERAL REQUIREMENTS AND DEFINITIONS

3.1 Proposed Construction Description

[Summarize facility structural system/s and major exterior appearance elements.]

3.2 General Construction Requirements

3.2.1 Government Furnished Contractor Installed Equipment (GFCI) is as shown on the criteria plans [or listed below].

3.2.2 Contractor Furnished Contractor Installed Equipment (CFCI) is as shown on the criteria plans [or listed below].

3.2.3 Staging Area. The construction routes and potential Contractor staging areas are depicted on the Base Location and Vicinity Map.

Exhibit 22-3 (Continued)

3.2.4 Project Site Access. Access to the site is depicted on the Base Location and Vicinity Map.

3.2.5 Borrow and Spoil Areas. [Define availability, location and disposal in a legal and regulated manner.]

[3.2.6 Furniture, Fixtures and Equipment (FFE). Summarize intent.]

3.3 Definitions of Terms

The following frequently used terms are defined hereinafter to establish a common understanding when the term is used in this solicitation.

3.3.1 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.

3.3.2 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) loading docks, walks, terraces, porte-cocheres, balconies and patios shall be counted as one-half of the total square feet. Uncovered walks, terraces, balconies and patios shall not be counted.

4. PERMIT REQUIREMENTS

4.1 Permits. The Contractor shall thoroughly investigate the requirements for permitting of air quality, potable water, wastewater, stormwater discharge, NPDES, 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 list all permits that are to be obtained by the Contractor in specification section 01 57 20.00 10, Environmental Protection. The permits shall be listed by title, permit number, permitting agency, effective date and expiration date. 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 [installation engineering office – BCE or DPW] 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 [designate State]. 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. The Contractor shall submit the construction completion certificate on all permit applications received by the Contractor from local, state and federal agencies within 30 days of completion of the

Exhibit 22-3 (Continued)

permitted activity. The construction completion certificates shall be provided to the COR.

5. ANTI-TERRORISM FORCE PROTECTION REQUIREMENTS

5.1 Codes and References.

[Provide citation/s and publication dates]

5.2 The structure[s] shall be classified as [UFC 4-010-01 definition] for [define level of protection]. The structural design shall incorporate applicable requirements of UFC 4-010-01.

[5.2.1 Progressive Collapse. [Define requirements.] The facility shall be designed to resist progressive collapse using the guidance of UFC 4-023-03 and UFC 4-010-01 for a [level of protection].

5.3 Site Layout. All site work shall be in accordance with the criteria presented in UFC4-010-01 as defined by the approved risk and threat assessment. [For other than low risk and low threat, define and adjust the following.] The Contractor shall incorporate the following criteria into the site layout for the new facility:

-Eliminate potential hiding places near the facility.
-Provide an unobstructed view around the facility.
-Eliminate lines of approach perpendicular to the building.
-Minimize vehicle access points.
-Locate parking as far away from the new facility as practical, but at least 82 feet away.
-Locate public parking areas within view of occupied rooms or facilities.
-Illuminate building exteriors or sites where exposed assets are located.
-Where pavement is adjacent to the building, include visible “NO PARKING” paint markings and signage.

5.4 Windows and Glazed Doors. All glazing, window and glazed door frames shall meet the requirements of UFC 4-010-01 and the following:

5.6.1 Supporting Structural Elements. [Define requirements.]

5.6.2 Demonstrate that the design of each different size and type of window or glazed 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 either Design Analysis or Standard Airblast Test results, as described below:

[5.6.2.1 Design analysis prepared and signed by a registered professional engineer. The design analysis shall include calculations verifying the structural performance of each window or glazed 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.]

Exhibit 22-3 (Continued)

[5.6.2.2 Standard Airblast Test results. In lieu of a design analysis, Standard Airblast Test results may be submitted to demonstrate conformance with the minimum antiterrorism standards.] [Define requirements.]

5.7 Mass Notification System. See Electronic Systems.

6. SITEWORK

6.1 Codes and References:

[Provide citation/s and publication dates]

6.2 General Civil Design Requirements

6.2.1 Demolition, Grubbing and Removals. [Define criteria drawing/s provided (site survey), surveying and stakeout boundaries, Contractor marking of utility locations, damage to existing utilities, use of utilities during construction, relocation of utilities, disposal requirements, permits and fees, and erosion and sediment control approval].

6.2.2 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.

6.2.4 The following items shall be demolished by the Contractor [as part of the Base Bid of this contract]: [provide general listing].

[6.2.5 Demolition by Others. Identify any additional demolition performed by others, and any coordination requirements.]

6.3 Site Design and Construction

6.3.1 The criteria site geometry plan presents the general geometric layout for the site and facilit[y/ies]. The Contractor shall design the [drainage, sidewalks, landscaping, site grading, privately owned vehicle (POV) parking, concrete curbs and gutters, miscellaneous building access pavement areas, and utilities (including fire hydrants, irrigation and area lighting) for the [Project Name]].

6.3.2 Pavement and Parking Areas. [Define anticipated vehicle types influencing site and pavement design, performance requirements for asphalt and concrete pavements, and structures, use of PCASE, pavement widths, base course aggregate, etc.]

6.3.2.1 Parking areas shall be provided in the parking layout as generally indicated in the criteria site drawing[s]. [Define the number of handicap spaces and type, POV parking spaces, parking for larger vehicles or equipment, and motorcycle spaces.] [Define performance requirements including codes and standards, pavement widths, emergency vehicle access, efficiency and safety, lighting, accessibility including sidewalks in moving from parking areas to facilities, drainage, curb and bumper types, and signs and pavement markings]

6.3.2.2 [Emergency Access Drive] [and] [Dumpster Access Pavement]. [Define requirement including type of pavement, reinforcing, pavement life, width, curbing, and joint types/layout/spacing/grading/sealant

[6.3.2.3 [Pavement Designation.] [Define requirements for any street pavement outside the project boundaries.] [Define coordination requirements during construction.]

6.3.2.4 [Access Control [and] [Anti-terrorism/Force Protection] [Define requirements for any equipment or construction requirements.]

6.3.3 Dumpster. [Define requirements including size and number of dumpsters and any screening requirements.-

[6.3.4 Facility Sign. Define requirements.]

[6.3.5 Site Furniture. Define any requirements for bike racks, seating, etc.]

6.4 Storm Drainage

6.4.1 The site storm drainage system shall be designed for a [10]-year return storm frequency. [Define requirements including ponding restrictions, runoff calculations and control, verification at 100-year return event, etc.]

6.4.2 The storm drainage system shall consist of swales, curb cuts, storm drainage structures, piping, and storm water management ponds, as necessary. [Define requirements.]

6.4.3 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.

6.4.4 The allowable pipe types shall include [concrete pipe, type III or IV, as required. Pipe joints shall be water tight with gaskets.]

6.4.5 Concrete Inlets/Catch Basins. [Define requirements.]

6.4.6 Catch Basins and Grates. [Define requirements.]

6.4.7 All new facility downspouts shall [define requirements for facility and any connection to the storm drainage system.]

6.4.8 Permits. The Contractor shall obtain all necessary permits including [define requirements].

[6.4.8.1 National Pollutant Discharge Elimination Systems Permit (NPDES) Notice of Intent (NOI). Define requirements.]

[6.4.8.2 Stormwater Pollution Prevention Plan (SWPPP). Define requirements.]

Exhibit 22-3 (Continued)

6.5 Government Furnished Information

[6.5.1 Site/Topographic Survey. Define information and format.]

[6.5.2 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.]

6.6 Geotechnical Investigation and Design. [Define Government and Contractor roles and responsibilities. Define Contractor requirements.]

6.7 Soil Treatment. [Define requirements.]

6.8 Landscape Architectural Features.

6.8.1 The Contractor shall provide the design for a complete landscaping plan in the Base Bid.

6.8.1.1 Landscaping Compatibility. [Define general and specific installation requirements.]

6.8.3 Lawn and Landscaping Irrigation System. [Define requirements.]

[6.8.3.1 Landscape Irrigation Well. Define requirements.]

6.8.5 Sodding and Seeding. [Define requirements.]

6.9 Earthwork

6.9.1 Material Classification. [Define requirements.]

6.9.2 Borrow Material. [Define requirements.]

6.9.3 Disposal Areas. [Define requirements.]

6.9.4 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.

6.10 Utilities

6.10.1 General. Coordination of all site work on the project, including utility work, is the responsibility of the Contractor. [Define requirements.]

6.10.2 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. Coordination of all site work on the project, including utility work, is the responsibility of the Contractor. 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 buildings.

6.10.3 Device Location. Backflow prevention valves, post indicator valves, 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.

6.10.4 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

[6.10.5 Metering. Define requirements.]

6.10.6 Water and Wastewater. [Define general requirements.]

6.10.6.1 Codes and References.

[Provide citation/s and publication dates]

6.10.6.2 Wastewater. [Define requirements.]

6.10.6.3 Existing Wastewater. [Define requirements.]

6.10.6.4 Wastewater Piping. [Define requirements.]

6.10.6.5 Sanitary Sewer Manholes. [Define requirements.]

6.10.6.6 Connections to Manholes. [Define requirements.]

6.10.7 Water Supply. [Define requirements.]

6.10.7.1 Existing Water. [Define requirements.]

Exhibit 22-3 (Continued)

6.10.7.2 Water Supply Mains, Service Lines, and Appurtenances. [Define requirements.]

6.10.7.3 Piping. [Define requirements.]

6.10.7.4 Hydrant Flow Tests. [Define requirements.]

6.10.7.5 Meters. [Define requirements.]

6.10.7.6 Valves. [Define requirements.]

6.10.7.7 Post Indicator Valves. [Define requirements.]

6.10.7.8 Backflow Preventer. [Define requirements.]

6.10.8 Fire Protection Water. [Define requirements.]

6.10.8.1 Fire Hydrants. [Define requirements.]

6.10.8.2 Fire Protection System. [Define requirements.]

[6.10.8.3 Fire Pump. Define requirements.]

6.10.9 Water Permit. [Define requirements.]

6.11 Gas Distribution System. [Define system, drips, valves, main/service line, material, and testing requirements.]

6.12 Specifications. As a minimum, the Contractor shall edit and submit the following UFGS as defined in Section 01 10 12, Design After Award:

[List specific site work and utility specification sections]

7. NARRATIVES ON AREAS AND FUNCTIONAL REQUIREMENTS

7.1 The paragraphs in this section are included to aid the Contractor in understanding the requirements all the functional areas within the [Project Name]. To aid in the design, the net square footage totals shown on the criteria drawings, and general functional requirements given below shall be fully coordinated. All materials and equipment are Contractor Furnished and Contractor Installed (CFCI) unless otherwise indicated. General types of furnishings and equipment for each room are shown in the concept drawings to assist in establishing anticipated individual room areas.

[7.2 Room Name, Room Number. Describe requirements including but not limited to function, operating requirements, dimensional requirements, ceiling heights, furnishings and built in components establishing room size and organization, equipment and accessory requirements, any construction requirements for security, acoustics, and accessibility, finish materials in coordination with paragraph 9 below, and electrical or electronics requirements.]

8. ARCHITECTURAL DESIGN

8.1 Architectural Theme. [Define broad aesthetic and functional requirements including any facility standard and installation specific guidelines.]

8.2 Codes and References.

[Provide citation/s and publication dates]

8.3 Life Safety Code Analysis. The Contractor shall prepare and submit a code analysis documenting compliance with life safety codes and references.

8.5 Materials and Details

8.5.1 Exterior

8.5.1.1 Walls. [Define requirements.]

8.5.1.2 Roof. [Define requirements including those for fascia, soffit, and gutters.]

8.5.1.3 Exterior Doors. [Define requirements.]

8.5.1.4 Exterior Windows and Glazing. [Define requirements.]

8.5.1.5 Exterior Signage. [Define requirements building mounted and any free-standing signage.]

[8.5.1.6 Exterior Screens. Define any requirements for mechanical equipment and dumpster screens.]

[8.5.1.7 Exterior Pavement. Define any requirements for pavement, in coordination with site work paragraphs, at entrances or exterior spaces.]

[8.5.1.8 Other. Define any requirements not meeting preceding categories.]

8.5.2 Interior

8.5.2.1 Partitions. [Define general types and requirements at room types such as mechanical rooms, janitor rooms, electrical rooms, and communications rooms, and special partitions.]

8.5.2.2 Flooring. [Define types and requirements.]

8.5.2.3 Ceilings [and Exposed Structure Finish]. [Define types and requirements.]

8.5.2.4 Doors. [Define types and requirements.]

8.5.2.5 Windows. [Define types and requirements.]

8.5.2.6 Finish Hardware. [Define types and requirements including any special security requirements.]

Exhibit 22-3 (Continued)

8.5.2.7 Accessories. [Define types and requirements including restroom, fire protection, stair or ramp, expansion control, etc.]

8.5.2.8 Cabinetry. [Define types and requirements.]

8.5.2.9 Equipment. [Define types and requirements for GFGI and GFCI.]

[8.5.2.10 Other. Define any requirements not meeting preceding categories.]

8.6 Specifications. As a minimum, the Contractor shall edit and submit the following UFGS as defined in Section 01 10 12, Design After Award:

[List specific specification sections]

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 shall use this criteria and the drawings for the development of the SID exterior and interior finishes, materials, and colors. The SID submittals shall run concurrent with the architectural submittal. The Contractor shall 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) shall be the SID finishes installed during the construction phase of the project.

9.1.2 SID Room Finish Narrative. Each interior space shall 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 shall 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.

[9.1.2.1 Primary Facility Name if more than one building in the project.]

9.1.2.1.1 [Room Name/Interior Space Name][and Room Number]. [Define requirements.]

[9.1.2.1.2 [Room Name/Interior Space Name][and Room Number]. [Define requirements for all additional rooms/spaces.]

[9.1.2.2 Additional Facility Name if more than one building in the project.]

9.1.2.2.1 [Room Name/Interior Space Name][and Room Number]. [Define requirements for all additional rooms/spaces.]

9.1.2.3 Signage and Visual Communication Boards. The Contractor shall

Exhibit 22-3 (Continued)

submit a signage plan that shows the placement of all interior and exterior signage used in the project including [building directory, room identification plaques, work station plaques, emergency egress plaques, restroom signs, directional information signs].

9.1.2.3.1 [Room Name/Interior Space Name][and Room Number]. [Define requirements for room/space types.]

9.1.2.3.2 Permanent Building Systems Rooms. Provide a permanent room sign to all mechanical, electrical, communication, restroom, and storage rooms. [Define requirements.]

9.1.2.3.3 Visual Communication Boards. [Define location and requirements.]

9.1.2.4 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.

9.1.2.4.1 Interior Floor Finishes

9.1.2.4.1.1 [Finish Type and Abbreviation Designation. Define requirement.]

[9.1.2.4.1.2 Finish Type and Abbreviation Designation. Define requirement. List and define requirements for all additional interior floor finishes.]

9.1.2.4.2 Interior Base Finishes

9.1.2.4.2.1 [Finish Type and Abbreviation Designation. Define requirement.]

[9.1.2.4.2.2 Finish Type and Abbreviation Designation. Define requirement. List and define requirements for all additional interior base finishes.]

9.1.2.4.3 Interior Wall Finishes

9.1.2.4.3.1 [Finish Type and Abbreviation Designation. Define requirement.]

[9.1.2.4.3.2 Finish Type and Abbreviation Designation. Define requirement. List and define requirements for all additional interior wall finishes.]

9.1.2.4.4 Interior Ceiling Finishes

9.1.2.4.4.1 [Finish Type and Abbreviation Designation. Define requirement.]

[9.1.2.4.4.2 Finish Type and Abbreviation Designation. Define requirement. List and define requirements for all additional interior

ceiling finishes.]

9.1.2.4.5 Interior Trim Finishes

9.1.2.4.5.1 [Finish Type and Abbreviation Designation. Define requirements including but not limited to doors and frames, window components, window sills, chair rails, and handrails.]

[9.1.2.4.5.2 Finish Type and Abbreviation Designation. Define requirement. List and define requirements for all additional interior trim finishes.]

9.1.2.4.6 Interior Window Treatment

9.1.2.4.6.1 [Finish Type and Abbreviation Designation. Define requirement.]

[9.1.2.4.6.2 Finish Type and Abbreviation Designation. Define requirement. List and define requirements for all additional interior window treatment finishes.]

9.1.2.4.7 Interior Miscellaneous Finishes

9.1.2.4.7.1 [Finish Type and Abbreviation Designation. Define requirements including but not limited to toilet partitions, urinal screens, shower room benches, cabinetry, counter tops, vanity bowls, signage message and background, corner guards door protection, wall switches and plates, bulletin boards, etc.]

[9.1.2.4.7.2 Finish Type and Abbreviation Designation. Define requirement. List and define requirements for all additional interior miscellaneous finishes.]

[9. 3 Furniture, Fixtures and Equipment (FFE). The Contractor is responsible for developing a FFE package which is the furniture and equipment package based on [installation] guidance and customer [point of contact] in the Base Bid. The Customer will be responsible for providing a list of requirements to assist the Contractor's Interior Designer. Reference Mobile District Design Manual Chapter 10 Interior Design for the required format in the development of the FFE package. The Contractor shall show a line drawing of the furniture specified for [definition of specific area requirements]. Provide critical dimensions on the floor plan to verify the specified furniture and equipment fit within the design. The FFE package shall specify items such as [identify requirements] but not be limited to those items.

9.3.1 Procurement and Installation. Procurement and installation of the all moveable furnishings designed under the base price proposal shall be purchased by the Contractor and installed within the specified construction contract completion date for the building under Bid Option No. [X]. This is a non-evaluated fixed price bid option for [XXX] days.

9.3.2 Supplies/Services to be Obtained. The products required include all furniture and furnishings needed to provide a fully integrated,

Exhibit 22-3 (Continued)

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.

9.3.3 Estimated Value. The estimated furnishings cost is to be determined during the design phase of the project and is incidental to the total cost of construction. No mark-ups shall be allowed on the cost of the moveable furnishings. The budget figure shall include the following:

a. Cost of furnishings
b. Freight Cost
c. Installation cost of all moveable furnishings
d. 6% fee for the Contractor's complete administrative costs associated with the ordering and coordinating/managing the turnkey furnishings package.

For each submittal required during the design phase, each cost (totals for moveable furnishings, installation, freight, contractor's 6% administrative fee, etc) shall be reported as separate line items in the cost summary of the furniture package.]

9.4 Specifications. As a minimum, the Contractor shall edit and submit the following UFGS as defined in Section 01 10 12, Design After Award:

[List specific specification sections]

10. STRUCTURAL DESIGN

10.1 Codes and References.

[Provide citation/s and publication dates]

10.2 General Design Requirements

10.2.1 The Structural Engineer 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 [IBC], and the following requirements.

10.2.2 Acceptable structural systems are [define types]. [Define any special structural requirements including but not limited to column

free areas.]

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: [define requirements].

10.2.4 Where raised or depressed floors are provided, structural slab elevations shall be adjusted so that all finished floor levels are the same.

10.2.5 A minimum safety factor of 1.5 shall be provided against uplift, sliding, overturning, or flotation.

[10.2.6 Wood shall not be used for any structural members. Plywood shall not be used for wall sheathing or structural roof sheathing, or floor decking. Tilt-up panels shall not be used. Pre-engineered metal buildings shall not be used.]

10.3 Design Loads

10.3.1 Design dead, live, and wind loads, and load combinations shall be in accordance with the [IBC], unless specified otherwise herein.

10.3.2 Live loads, not given, shall be in accordance with Appendix B of UFC 3-310-01. The following floor areas shall be designed using the stated loads, as a minimum:

[Room Type	XX psf]
[All additional Room Types	XX psf]

10.3.3 Wind loads shall be based on a [XXX] miles/hr Basic Wind Speed, Building Occupancy Category [XX], and Exposure Category [X] as described in UFC 3-310-01. Wind loads shall be computed and applied in accordance with the [IBC]. 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 3-310-01, Building Occupancy Category [XX], and Seismic Use Group [X]. The short period spectral acceleration value (Ss) shall be taken as [XX]g and the one second period spectral acceleration value (S1) shall be taken as [XX]g, for a [X]% probability of exceedance in [XX] years. Seismic Site Classification [X] shall be used. Seismic loads shall be computed and applied in accordance with the [IBC].

10.4 Concrete

10.4.1 Specified minimum compressive strength. [Define requirements.]

10.4.2 Edge or spandrel beams. [Define requirements.]

10.4.3 Reinforcing of concrete walls, continuous footings, and tie and bond beams. [Define requirements.]

Exhibit 22-3 (Continued)

10.4.4 Building slabs-on-grade shall be placed on a minimum 15 mil vapor barrier and minimum 6-inch capillary water barrier.

10.4.5 In no case shall a slab-on-grade be less than 4 inches thick. Thickened slabs shall be required for walls and partitions which have a vertical load of 300 pounds/foot to 950 pounds/foot. A separate isolated wall footing shall be used for walls having a vertical load in excess of 950 pounds/foot. A minimum of 0.15 percent welded wire mesh shall be provided in each direction in slabs placed 1-1/2 inch from the top of slab. Deformed welded wire fabric in flat sheets, or deformed reinforcing bars shall be used.

Maximum Uniform Design Live Load	Slab Thickness	Wire Mesh Reinforcement
150 psf	4 inches	6x6 – W4.0 x W4.0
250 psf	5 inches	6x6 – W5.5 x W5.5
400 psf	6 inches	6x6 – W5.5 x W5.5

10.4.6 Slabs-on-grade shall be placed in lanes. [Define requirements.]

10.4.7 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.

10.5 Steel

10.5.1 Shop connections for structural steel shall be welded. Field connections shall generally be made with high strength bolts (ASTM A325) in bearing type connections. [Define requirements.]

10.5.2 Cold-formed steel framing systems. [Define requirements.]

10.5.2.1 Cold-formed steel trusses. [Define requirements.]

10.5.3 Joists. [Define requirements.]

10.5.4 Braced frames. [Define requirements if used.]

10.5.5 Structural steel frame. [Define requirements if used.]

10.5.6 The erection plan shall be reviewed, stamped and sealed by a structural engineer licensed by the State of [State].

Exhibit 22-3 (Continued)

10.5.7 Masonry steel lintel angles and relieving angles. [Define requirements.]

10.5.8 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.

10.5.9 All column base plates and anchor bolts shall be completely encased in concrete. All below grade steel shall be completely encased in concrete or coated with coal-tar epoxy.

10.5.10 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 Form deck. [Define requirements if used.]

10.6.2 Metal roof deck. [Define requirements if used.]

10.5.3 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.

10.6.4 Where galvanized metal deck is to be exposed and painted in finished work, the surface to be exposed will be cleaned and primed in accordance with the contract specifications in the fabrication plant prior to shipment

10.6.5 Net uplift resistance required will be specified in the Metal Deck specification in keeping with project design computations.

10.7 Masonry

10.7.1 Concrete Masonry Units and Concrete Masonry Veneer Units

10.7.1.1 Masonry walls shall be reinforced as required to resist all vertical and horizontal loads. All structural masonry walls (load bearing walls, shear walls, or exterior walls) shall be designed as reinforced masonry, neglecting the tensile strength of masonry.

10.7.1.2 Minimum thickness of structural masonry walls shall be 8 inches. Minimum reinforcement shall be as follows. [Define requirements.]

10.7.1.3 Horizontal reinforcement. [Define requirements.]

10.7.1.4 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.

10.7.1.5 Concrete masonry walls shall have vertical control joints as

Exhibit 22-3 (Continued)

follows.

a. Exterior and Interior Walls: 24 feet 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 and,
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.

10.7.1.6 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.

10.7.1.7 A pre-cast cap shall be provided on top of all masonry parapet end walls and masonry screen walls. Metal flashing shall be provided under the pre-cast cap.

10.7.1.8 Sample Masonry Panel. [Define requirements if used.]

10.8 Specifications. As a minimum, the Contractor shall edit and submit the following UFGS as defined in Section 01 10 12, Design After Award:

[List specific specification sections]

11. HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

11.1 Codes and References.

[Provide citation/s and publication dates]

11.2 Design. 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 shall include complete input and output summaries. Pre-approved computer load analysis programs are BLAST, Trane TRACE, or Carrier HAP. If the designer wishes to use a different load analysis program, this shall be specifically listed in the proposal and requires approval by the Contracting Officer's Representative. Design shall be based on the weather data shown in

Exhibit 22-3 (Continued)

Table I below. Cooling equipment shall be selected to meet the calculated load operating at [XX] deg F ambient.

TABLE I - WEATHER DATA

Heating	
Indoor Design Temperature	[XX] F DB
Outdoor Design Temperature	[XX] F WB ([XXX.X]%)
Annual Heating Degree Days(Base 65)	[XXXX]
Cooling	
Indoor Design Temperature	[XX] DB, [XX]% RH
Outdoor Design Dry Bulb Temperature	[XX] F ([X]%)
Outdoor Design Wet Bulb Temperature	[XX] F ([X]%)

11.2.1 The following table indicates the minimum thermal value for building composite sections. Minimum insulation values were taken from ASHRAE 90.1-2001.

Wall U Value	[0.XXX] BTU/hr*ft2*F
Roof U Value	[0.XXX] BTU/hr*ft2*F

11.2.2 Load Calculations. [Define requirements.]

11.2.3 Variable Air Volume Distribution System. [Define requirements.]

11.2.4 Mechanical Equipment. [Define requirements.]

11.2.5 VAV Terminal Units[Define requirements.]

11.2.6 Air Handling Units. [Define requirements.]

11.2.7 Chilled Water System. [Define requirements.]

11.2.8 Hot Water System. [Define requirements.]

11.2.9 Exhaust System(s. [Define requirements.]

11.2.11 Piping systems. [Define requirements.]

11.2.12 Diffusers, Registers, Grilles, and Louvers. [Define requirements.]

11.2.13 Corrosion control/cathodic protection. [Define requirements.]

11.2.14 Equipment such as penthouses, louvers, downspouts, and vent stacks. [Define requirements.].

11.2.15 Testing, Adjusting, and Balancing (TAB). [Define requirements.]

11.2.16 Controls. [Define requirements.]

11.3 Specifications. As a minimum, the Contractor shall edit and

submit the following UFGS as defined in Section 01 10 12, Design After Award:

[List specific specification sections]

12. PLUMBING

12.1 Codes and References.

[Provide citation/s and publication dates]

12.2 Plumbing Design Criteria. Plumbing system shall be designed and installed in accordance with the [IPC]. Inspection and testing of the plumbing system shall be performed as prescribed in the [IPC]. The plumbing system shall conform with the applicable rules of the [IPC], governing backventing of plumbing fixtures, clean outs, sizing of waste, vents, drains, and water systems.

12.1.1 Domestic Hot Water Temperatures. [Define requirements.]

12.2 Plumbing Materials, Equipment and Fixture Requirements.

12.2.1 Material for Domestic Water Lines. [Define requirements.]

12.2.1.1 Routing & Design. [Define requirements.]

12.2.2 Material for Waste Lines. [Define requirements.]

12.2.3 Gas Connections. [Define requirements.]

12.2.4 Plumbing Fixtures. [Define requirements.]

12.2.4.1 Plumbing Fixtures shall meet the following criteria. [Define requirements for each fixture type and connection.]

12.2.5 Domestic hot water supply boiler[/s. Define requirements.]

12.3 TABLE II – Piping Materials

See the following tables:

PLUMBING - WATER DISTRIBUTION PIPE

	APPLICATION	MATERIALS	SCHEDULE/RATING	STANDARD
[1	As required	As required	As required	]

Exhibit 22-3 (Continued)

PLUMBING - WATER SERVICE PIPE

	APPLICATION	MATERIALS	SCHEDULE/RATING	STANDARD
[1	As required	As required	As required	]

PLUMBING - SANITARY DRAINAGE PIPE

	APPLICATION	MATERIALS	SCHEDULE/RATING	STANDARD
[1	As required	As required	As required	]

12.4 Specifications. As a minimum, the Contractor shall edit and submit the following UFGS as defined in Section 01 10 12, Design After Award:

[List specific specification sections]

13. FIRE SUPPRESSION

13.1 Codes and References.

[Provide citation/s and publication dates]

13.2 General.

Provide a fire detection/suppression system for each facility that meets OSHA regulations, NFPA codes and UFC 3-600-01. Design of the sprinkler system shall be in accordance with UFC 3-600-01, NFPA 13, NFPA 13R, and as specified herein.

13.3 Equipment

13.3.1 Fire extinguisher cabinets. [Define requirements.]

[13.3.2 [Other Equipment]. [Define requirements.]]

13.3 Design.

The design of [sprinklered facilities] shall be in accordance with UFC 3-600-01, except were NFPA 13 criteria has been substituted and as specified hereinafter. [Define requirements.]

[Verify and revise the following as necessary. Fire flow test data from hydrants in the area where dorms are to be constructed showed static pressure of 50 psi, residual pressure of 20 psi and a flow of 2067 gpm. This flow test data is for information only and the

contractor shall perform a new flow test prior to design of sprinkler system. The preliminary flow data indicates that a fire pump would be required to meet the requirements of UFC 3-600-01.]

13.4 Drawings.

Detail drawings shall conform to the requirements established for working plans as prescribed in NFPA 13. All contract requirements that exceed the minimum requirements of NFPA 13 shall be incorporated into the design. The Contractor's submittal shall be prepared and sealed by a registered fire protection engineer or a registered professional Engineer with a fire protection background and who has had at least five years experience in fire protection\detection design. Qualifications shall be submitted to and approved by the Contracting Officer's Representative.

13.5 Specifications. As a minimum, the Contractor shall edit and submit the following UFGS as defined in Section 01 10 12, Design After Award:

[List specific specification sections]

14. ELECTRICAL SYSTEMS

14.1 Codes and References.

[Provide citation/s and publication dates]

14.2 Exterior Electrical Requirements

14.2.2 Distribution System. [Define requirements.]

14.2.2.1 Design of the primary electrical distribution system shall [define requirements.]

14.2.2.2 The Contracting Officer's Representative shall approve all outages required for connection of new services to existing systems.

14.2.2.3 Transformers. [Define requirements.]

14.2.3 Exterior Lighting. [Define requirements.]

14.2.4 Existing lighting fixtures, poles, and control equipment. [Define requirements.]

14.3 Electrical Interior. [Define requirements.]

14.3.1 Service Entrance/Equipment. [Define requirements.]

14.3.2 Voltage Characteristics. [Define requirements.]

14.3.3 Panel Locations. [Define requirements.]

14.3.4 Branch Circuits. [Define requirements.]

Exhibit 22-3 (Continued)

14.3.4.1 Separate Circuits. [Define requirements.]

14.3.5 Exterior Outlets/Lights. [Define requirements.]

14.3.6 Lighting Fixtures. [Define requirements.]

14.3.7 Bathroom Switches. [Define requirements.]

14.4 Lightning Protection. [Define requirements.]

14.5 Specifications. As a minimum, the Contractor shall edit and submit the following UFGS as defined in Section 01 10 12, Design After Award:

[List specific specification sections]

15. ELECTRONIC SYSTEMS

15.1 Codes and References.

[Provide citation/s and publication dates]

15.2 Exterior Electronic Systems. [Define requirements.]

15.3 Interior Electronic Systems:

15.3.1 Fire Detection and Alarm System. [Define requirements.]

15.3.2 Single Station Smoke Detectors. [Define requirements.]

15.3.3 Combination Audio/Visual Notification Appliances. [Define requirements.]

15.3.3.1 Maintenance Manuals. [Define requirements.]

15.4 Telephone and LAN Systems(Interior) . [Define requirements.]

15.4.1 Qualifications. [Define requirements.]

15.4.2 Minimum Manufacturer Qualifications. [Define requirements.]

15.5 Cable Television. [Define requirements.]

15.5.1 System Description: The Cable Television system shall be provided by MediaCom.

15.5.2 Cable Distribution System. [Define requirements.]

15.6 Mass Notification System. [Define requirements.]

15.7 Electronic Entry System. [Define requirements.]

15.8 Specifications. As a minimum, the Contractor shall edit and submit the following UFGS as defined in Section 01 10 12, Design After Award:

Exhibit 22-3 (Continued)

[List specific specification sections]

16. CORROSION CONTROL AND CATHODIC PROTECTION

16.1 Codes and References.

[Provide citation/s and publication dates]

16.2 General. [Define requirements.]

16.3 Cathodic Protection and Coatings. [Define requirements.]

16.4 Qualifications and Required Site Visits. [Define requirements.]

16.5 Criteria of Protection. [Define requirements.]

16.6 Coating. [Define requirements.]

16.7 System Design. [Define requirements.]

16.8 Specifications. As a minimum, the Contractor shall edit and submit the following UFGS as defined in Section 01 10 12, Design After Award:

[List specific specification sections]

17. ENVIRONMENTAL CONSIDERATIONS

17.1 Codes and References.

[Provide citation/s and publication dates]

17.2 Environmental Protection. [Define requirements.]

17.3 Existing Hazardous Materials. [Define requirements.]

17.4 Installation Restoration Program. [Define requirements.]

17.5 Hazardous Materials. [Define requirements.]

17.6 Contractor Generated Hazardous Waste. [Define requirements.]

17.7 Asbestos Materials and Lead Based Paints. [Define requirements.]

17.8 Specifications. As a minimum, the Contractor shall edit and submit the following UFGS as defined in Section 01 10 12, Design After Award:

[List specific specification sections]

Exhibit 22-3 (End)

Sample Section 01 10 12 Design After Award

DESIGN-BUILD FY-0X Project Name
Contract Number
Project Location CADD File Name

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/en/guides/DesMan/desman.htm

2. DESIGN SUBMITTAL

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.

2.1.1 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.

Exhibit 22-4 (Continued)

[2.1.2 Fast Tracking: The contractor may at his option, "fast track" the design and construction of site work, exterior utilities, and the building foundation. These items may be initially designed to the 100% Unreviewed stage, and submitted with the 50% Design Submittal. The slab including all utilities. An Intermediate Backcheck 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.]

2.2 PERMITTING

The Contractor is responsible for identifying and obtaining all necessary permits 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".

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. Inasmuch 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 [Installation] and Government personnel shall attend it. The purpose of the predefinition conference is to present 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 The Structural Interior Design (SID) includes selection, 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 Furniture, Fixtures and Equipment (FFE) Interior Design Description

The FFE includes the design 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 [define requirements].

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 Contractor's Interior Designer shall be required to conduct in-depth customer interviews to determine the actual and specific requirements of the FFE. Based on customer in-put, the FFE shall include 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 to

allow accurate procurement from sources that have current General Services Administrative (GSA) Federal Supply Schedule (FSS) contracts for the specified items. The FFE for movable furnishings shall demonstrate complete coordination with every aspect of the building related designs and finishes.

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 under the base bid 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.

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. (NOTE: The Government's current rough order of magnitude cost for the FFE package is estimated at $[XXX,XXX]. Please be advised that this estimated amount is not included in the Programmed Amount specified in the Notes to the Bidding Schedule.) The Contractor shall not add any additional mark-ups to the FFE. 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 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
(e) 6% fee for the Contractor's complete administrative costs associated with ordering and coordinating/managing the turnkey FFE package.

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 Quality Standards for FFE Items

Customer preferences shall be considered making product recommendations, in addition to product quality. The Contractor's Interior Designer shall also considered the factors below to choose the item(s) which overall will provide the best value, to insure a "best value determination" has been made for this project. Items selected and currently listed on a GSA contract have been determined to be the quality level acceptable by the Government. FFE items not currently on

a GSA contract have no basis for determining quality and cost and will be not acceptable for this project. The following best value determination checklist shall be edited and used to evaluate a GSA contract source and shall be submitted in the FFE package to justify the FFE selections.

BEST VALUE DETERMINATION CHECKLIST

(a) Special features, which are required in effective program performance that are not provided by a comparable item.
(b) Trade-in considerations
(c) Probable life of the item selected as compared with a comparable item
(d) Warranty considerations
(e) Maintenance availability
(f) Past performance (i.e. experience)
(g) Environmental and energy efficiency considerations
(h) Comfort/suitability of the item
(i) Delivery time
(j) Administrative costs
(k) Training needed or provided
(l) Technical qualifications
(m) Compatibility with existing furniture/product/technology (circle one)
(n) Other specify):_____

6.3.7 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.

Criteria 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.

6.3.8 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.

6.3.9 FFE Installation Requirements

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. The Contractor shall furnish one complete module as a prototype. The Government shall approve the prototype unit prior to installation of other units.]

6.4 50% SUBMITTAL

Exhibit 22-4 (Continued)

6.4.1 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.

6.4.2 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 for fire protection drawings and design analysis will be 100% complete by the 50% submittal.]

6.4.3 [Underground Sprinkler System

(a) Provide drawings, narrative and supporting documentation incorporating work as shown for an interim submittal in the Mobile District Design Manual.

(b) Provide redlined specifications supporting work in this category.]

Exhibit 22-4 (Continued)

6.4.4 Environmental

The Contractor shall provide a marked-up UFGS 01 57 20.00 10, Environmental Protection specification. The Contractor shall provide a list of all permits that are required to be obtained and any associated fees. The Contractor shall ensure that required environmental permits are obtained prior to start of construction and/or installing or operating any new or modified equipment or processes. In addition to Environmental Permits, based upon information provided by the [Installation Engineering Office], the Contractor will determine when Installation specific permits are required, such as digging, communications, and security.

6.4.5 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.

6.8.6 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.

6.8.7 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.

6.8.8 SID [and FFE]

The Contractor shall submit five (5) complete sets of the initial SID[/FFE] package. All SID[/FFE] proposals shall be reviewed and approved by the Government. The Government shall return the SID[/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[/FFE] package. The Submittals shall be side marked and distributed as follows: 1. EN-DA Mobile District Office; 2. CD-[XX] 3. [Installation] 4. [User] and 5. [Installation] Contracting.

6.8.9 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.

6.8.10 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
Compressed air 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.

(4) Catalog cuts of equipment such as water heaters, backflow preventers, and plumbing fixtures.

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.

6.8.11 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 will 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.

Exhibit 22-4 (Continued)

i. Fire protection will be 100% complete by the 50% submittal.

6.8.12 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 manufacturers whose equipment meets project requirements for each item. The design analysis shall include catalog cuts of all major equipment (e.g., air handlers, coils, chillers, condensing units, boilers, pumps, fans, unit heaters, etc.) 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.

(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, where necessary for balancing purposes. 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

Exhibit 22-4 (Continued)

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.

6.8.13 Electrical Systems

6.8.13.1 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.

Exhibit 22-4 (Continued)

(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) Provide a lightning risk analysis and describe the lightning protection system to be installed.

(7) Describe the type of grounding system planned.

(8) Describe the basic characteristics of panel boards, switchboards, motor control centers, 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, switchboards, motor control centers, 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.

6.8.13.2 Exterior Electrical Distribution System:

Exhibit 22-4 (Continued)

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) State the electrical characteristics of power supply from the service point to the main service equipment (voltage, phase, number, and size of conductors).

(3) Indicate the type, number, voltage rating, and connections, and kV A rating of all transformers provided whether Contractor provided or Government furnished (existing).

(4) State the type of conductor and location of proposed use and provide a justification for its use.

(5) 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.

(6) 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.

(7) 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.

6.8.14 Electronic Systems

Exhibit 22-4 (Continued)

6.8.14.1 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

(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 telephone outlets, telephone backboard arrangement, and other pertinent items required by criteria.

6.8.14.2 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.

Exhibit 22-4 (Continued)

(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.

6.8.15 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.

6.8.16 Sustainable Design

Using [SPiRiT] [the LEED-NC v 2.2 Rating System], the Contractor shall submit a sustainable design narrative that includes a "Summary Table" of points earned at this phase of the project. The narrative supporting the point shown in the "Summary Table" shall briefly describe the feature used to obtain the point and how the point is or will be earned. For each point earned that requires calculations and documentation provide this information to the level of design at this phase. Provide references to drawings and specifications for location of applicable features.

6.9 100% UNREVIEWED SUBMITTAL

6.9.1 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.

6.9.2 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.

(a) Underground Sprinkler System: Provide drawings, specifications, narrative, and supporting documentation revised to comply with comments resulting from 50% submittal.

[6.9.3 Irrigation System

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.]

6.9.4 Environmental

The Contractor shall provide a final UFGS 01 57 20.00 10, Environmental Protection specification. Where environmental permits are required, the Contractor shall prepare technical documentation for the permit application and submit the permit application(s) including payment of all fees to the Contracting Officer's Representative. All payment checks should be made out to [State Agency]. The Contracting Officer's Representative shall forward all permit applications and fees to the [Installation Engineering Office] for review. The [Installation] will sign the applications and forward them to the appropriate regulatory authority.

6.9.5 Landscape Work

Provide drawings, final specifications, narrative, annotated comments, and supporting documentation revised to comply with comments resulting from 50% submittal.

6.9.4 Geotechnical Investigation and Design

Provide Geotechnical Report, final specifications, narrative, annotated comments, and supporting documentation revised to comply with comments resulting from 50% submittal.

6.9.5 Architectural Design

Provide drawings, final specifications, narrative, annotated comments, and supporting documentation revised to comply with comments resulting from 50% submittal.

6.9.6 SID [and FFE]

The Contractor shall submit five (5) complete sets of the approved and final SID[/FFE] package. Once the Contractor has submitted the SID[/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[/FFE] has been approved.

6.9.7 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.

6.9.8 Fire Protection

Submit the complete 100% unreviewed final submittal revised to comply with comments resulting from 50% submittal.

6.9.9 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.

6.9.10 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.

6.9.11 Electrical Systems

6.9.11.1 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.

6.9.11.2 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.

6.9.11.3 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.

6.9.11.4 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.

6.9.12 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.

6.9.16 Sustainable Design:

Exhibit 22-4 (Continued)

Provide updates sustainable design narratives, "Summary Table" of points and supporting calculations and documentation. Highlight any changes and describe the reason for the change. Provide references to drawings and specifications for location of applicable features.

6.10 FINAL SUBMITTAL

Completed drawings, specifications, design analysis, and supporting documentation for all previous submissions and disciplines per the Mobile District Design Manual with all comments incorporated.

7. QUANTITY OF SUBMITTAL ITEMS

The documents which the Contractor shall submit to the Government for each submittal are listed and generally described below.

8. 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.

8.1 ADDRESSES FOR SUBMITTAL DISTRIBUTION

a. [Customer: Individual, organization, street address and telephone number]
b. [Installation Engineering Office: Individual, organization, street address and telephone number]
c. Mobile District Resident Office [Office designation, individual street address and telephone number]
d. Mobile District Commander U.S. Army Engineer District, Mobile ATTN: [Individual, organization] 109 St. Joseph Street Mobile, AL 36628-0001 [telephone number]

Exhibit 22-4 (Continued)

8.2 SUBMITTAL DISTRIBUTION

The following table lists the number of copies of design submittal requirements for this project [sample only, adjust numbers as required]:

	# Items 50% Submittal	# Items 100% Unreviewed	# Items Final Submittal
[Customer]	1 Design Anal. 1 Drawings 1 Specifications	1 Design Anal. 1 drawings 1 Specifications 1 Ann. Comments 1 Framed Rendering	1 Design Anal. 1 Drawings 1 Specifications 1 Ann. Comments
[Installation Engineering Office]	10 Design Anal. 10 Drawings 10 Specifications 3 Permit Appl. 3 SID/FFE Binder	10 Design Anal. 10 Drawings 10 Specifications 10 Ann. Comments 3 Permit Docum. 3 SID/FFE Binder 2 Framed Renderings 8 Rendering Photos	10 Design Anal. 10 Drawings 10 Specifications 10 Ann. Comments 3 Permit Docum. 3 SID/FFE Binder 1 CD Rom containing Plans, Specs, and Design Analysis
Mobile District Resident Office	2 Design Anal 2 Drawings 2 Specifications 2 Permit Appl. 1 SID/FFE Binder	2 Design Anal 2 Drawings 2 Specifications 2 Ann. Comments 2 Permit Docum. 1 SID/FFE Binder	2 Design Anal 2 Drawings 2 Specifications 2 Ann. Comments 2 Permit Documents. 1 SID/FFE Binder 1 CD Rom containing Plans, Specs, and Design Analysis
Mobile District	7 Design Anal. 7 Drawings 7 Specifications 2 Permit Appl. 1 SID/FFE Binder	7 Design Anal. 7 Drawings 7 Specifications 7 Ann. Comments 2 Permit Docum. 1 SID/FFE Binder 1 Lessons Learned 4 Rendering Photos	7 Design Anal. 7 Drawings 1 Drawings Full Size 7 Specifications 7 Ann. Comments 2 Permit Documents. 1 SID/FFE Binder 1 Lessons Learned 1 Drawing Full Size 1 Original Specifications 2 CD Rom containing Plans, Specs, and Design Analysis.

9. 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

unreviewed 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 [Installation]. The Contractor shall bring the 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 Design Complete 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.

Exhibit 22-4 (Continued)

10. 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.

11. DESIGN ANALYSIS

11.1 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.

11.2 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.

11.3 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.

11.4 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.

12. DRAWINGS

12.1 General: All drawings shall be Computer-Aided Design and Drafting (CADD) in [AutoCad Version 2005] format. The Contractor shall prepare the drawings in such a manner that the Mobile District could construct the facility without any additional assistance from the Contractor. 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.

12.2 50%, 100%, and Final Submittals: Drawing submittals shall be half size 11" x 17" blue/black lines.

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".

13. SPECIFICATIONS

The Contractor shall submit marked-up specifications at the 50% submittal, and final specifications at the 100% unreviewed and final submittals. The specifications shall be Unified Guide Specifications (UFGS). These specifications are available on the Internet at:

Exhibit 22-4 (Continued)

http://www.wbdg.org/ccb/

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.

14. 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 00 13 30 SUBMITTAL PROCEDURES (DESIGN BUILD) for submittal and submittal register definitions and procedures.

15. DESIGNER OF RECORD

The Contractor shall identify and have on his staff 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 submittals they are responsible for prior to submittal to the Government.

16. RENDERING AND PRINTS

16.1 Submit professionally prepared, 24" x 36" framed renderings for the facility showing main entry in a slightly elevated perspective view. The size shall include matting and frame. Frames shall be metal or wood, 3/4-inch to 1-inch deep. Matting shall be a single mat that is neutral in color to complement the rendering. The Contractor shall consult the [Installation point of contact] for frame and matting preference.

16.2 Submit 8" x 10" color photographic prints of rendering. Total number shall be in accordance with SUBMITTAL DISTRIBUTION LIST.

Exhibit 22-4 (End)

CHAPTER 23

CHARRETTES

INDEX

CHAPTER 23

CHARRETTES

1.1 GENERAL

1.1.1 This chapter applies to planning and design charrettes conducted by in-house and A-E personnel in support of Mobile District Army and Air Force customers. Charrettes conducted for other customers may vary in detail but will follow the general guidelines established in this chapter.

1.1.2 Planning charrettes are critical activities essential to the scope definition and programming at adequate funding levels of planned facilities.

1.1.3 Design charrettes similarly are critical to confirm scope and funding authorization at design start. Within the constraints of design funding and time, the importance of the conduct of design charrettes will be emphasized with customers and users.

1.2 APPLICABLE PUBLICATIONS

1.2.1 Army

1.2.1.1 ECB 2003-8, DD Form 1391 Preparation Planning Charrette Process, 11 April 2003 at

http://www.wbdg.org/ccb/ARMYCOE/COEECB/ecb_2003_8.pdf.

1.2.1.2 ECB 2002-13, Design Charrette Guidance for Army Military Construction (MILCON) Programs, 6 September 2004 at

http://www.wbdg.org/ccb/ARMYCOE/COEECB/ecb_2002_13.pdf.

1.2.1.3 For Army efforts conducted as part of MILCON Transformation, see Chapter 24.

1.2.2 Air Force

1.2.2.1 The United States Air Force Project Manager's Guide for Design and Construction, 1 June 2000, chapters 1, 2 and 4 at

http://www.wbdg.org/ccb/AF/AFDG/pmguide.pdf.

1.3 DEFINITIONS

1.3.1 Planning Charrette

The purpose of a planning charrette is to generate a DD Form 1391 with supporting documentation that can broadly and conservatively serve as a basis for design in the future. The final product will normally consist of a narrative document, conceptual site and building plans,

and parametric cost estimate. A DD Form 1391 may be a product if required by the customer.

1.3.2 Design Charrette

The purpose of a design charrette is to validate previous programming information contained in the DD Form 1391 and any other programming documents (such as a requirements analysis or RAMP). The intent of a design charrette is to develop a document that clearly sets project design requirements for budget and scope. The final product will normally be a narrative document, preliminary site drawings, preliminary architectural floor plans and elevations, and a revised DD Form 1391 or parametric cost estimate.

1.3.3 Level of Design

The completed charrette report represents a typical Project Definition (10-15%) design as referenced elsewhere in this manual. See individual chapters for additional considerations for this level of design.

1.4 PROCEDURES

1.4.1 Documentation of Failure to Conduct Design Charrette

Design charrettes are essential to future project health and success. If a charrette is not conducted, the reasons supporting that decision will be documented, and retained by the design team.

1.4.2 Pre-Charrette Activities

1.4.2.1 Pre-Charrette Installation Visit

The PM and selected design team members shall conduct a preliminary meeting at the supported installation. Attendees should include installation major command (MACOM), customer, and user representatives. (When an installation visit cannot be conducted, this same information must be communicated, sought and received from the designated customer point of contact.) The purposes of this meeting are to:

(a) Establish the objectives for the charrette;

(b) Explain the concept of charrettes emphasizing the participation and support required from the customer and user for completion of a successful charrette;

(c) Explain the purpose of the questionnaire and date for receipt of completed questionnaires;

(d) Gain an initial understanding of customer and user needs;

(e) Gather any available information (site information, installation design standards, preliminary facility criteria, etc.)

(f) Determine customer point of contact for transfer of information and decisions prior to and following conduct of the charrette;

(g) Determine questionnaire requirement, how it will be provided to users, and when it will be returned to the design team;

(h) Determine decision-making process during the charrette – who will make the decisions required when customer and user criteria conflict, or exceed any funding or scope constraints;

(i) Verify location for the charrette;

(j) Determine the required schedule and funding for completion of the charrette; and

(k) Verify the product to be produced to complete the charrette.

1.4.2.2 Questionnaire Preparation, Submittal and Return

The questionnaire will be developed with design team input based on the type facility to be programmed or designed. The questionnaire will be provided to the PM for submittal to the designated installation POC. Questionnaire responses will be distributed to the design team prior to conduct of the charrette. A sample questionnaire is at **Enclosure 23-1.**

1.4.2.3 Charrette Agenda

With the assistance of the designated installation point of contact, develop a charrette agenda outlining a daily and hourly accounting of meetings, site visits, interviews of user and various installation personnel, design team work time, interim user briefings, and final out briefing.

1.4.2.4 Pre-Charrette Design Team Meeting

Conduct pre-charrette design team meeting to establish travel requirements; coordinate lodging and transportation needs (hotel reservations, rental cars, GSA vehicles, flight arrangements); review product requirements and questionnaire returns; discuss format for conducting the charrette (i.e. who facilitates, takes notes, use of digital projector to display acquired information/wall cards); formalize agenda; and share cell phone numbers.

1.4.2.5 Sample Projects and Supplies

Collect electronic and hard copies of floor plans previously designed for projects of similar scope and function to facilitate discussions with the user during the interviewing process. Gather equipment and supplies such as digital projector, lap-tops, memory sticks, butcher paper, 5"x7" index cards, tape, tracing paper, scales, digital cameras, and colored pencils/ markers to be used for documenting User interviews and making Out-Brief presentation.

1.4.3 Conducting the Charrette

Exhibit 23-2 is a checklist of considerations for conduct of the charrette.

(a) Initial Charrette Meeting. Conduct initial meeting on-site with MACOM, customer, and user representatives. Make introductions,

provide overview briefing of purpose of charrette (what it is, why it's being used, need for information, expected outcomes), identify installation POC who will coordinate interviews with installation and customer participants (and call backs when needed), coordinate interview schedules and design team work time, schedule interim briefings with decision-maker, schedule final out-brief. Discuss comment review process and use of Dr. Checks.

(b) Site Visit. Visit site with MACOM, customer, and user representatives during the early stages of the charrette to spur questions and design considerations by design team members.

(c) Conduct user interviews. Record information gathered digitally or long hand. Display information acquired digitally or long hand. Recommend that samples of similar types of facilities be displayed for command/installation/customer reference – these will promote discussion. See **Exhibit 23-3** for a checklist of information required for preparation of the parametric cost estimate/draft DD Form 1391.

(d) Design team work time. Team researches design requirements, consolidates information developed during interviews, and develops initial facility and site design concepts. Develop preliminary LEED or SPiRiT assessment. Develop preliminary cost information. Coordinate visits by decision maker periodically to review work and adjust. Prepare design information and out-briefing.

(e) Out Brief. Purpose of briefing is to gain concurrence on initial design concepts. Prepare formal briefing, usually in digital format, and present to MACOM, customer, user representatives, and decision maker. Request comments. Request/receive concurrence, or record any changes required for concurrence. Leave copy of out brief with MACOM, customer, and user representatives.

1.4.4 Post-Charrette Activities

(a) Draft Charrette Document Development. Return to home station. Revise concept designs if necessary based results of out brief. Finalize concept designs. Develop preliminary parametric cost estimate or draft 1391. Develop draft narrative. Submit draft charrette report for review. See **Enclosure 23-4** for a sample charrette report format.

(b) Receive MACOM, customer, and user comments. Annotate comments and return to MACOM, customer and user representatives. Resolve comments via conference call or return visit to installation. Revise and finalize charrette report. Submit final charrette report.

(c) Final Charrette document Preparation. Revise and finalize charrette report as applicable to comments received from the MACOM, customer, and user representatives. Prepare and submit final planning or design charrette document to the MACOM, customer, and user representatives. Include CD-Rom containing final charrette document and cost estimate files.

Sample Questionnaire. Items in red are to be edited to meet project requirements. Adjust as necessary for the intended facility type. Add space as necessary for responses.

Planning or Design Charrette Questionnaire

Project Name, Location

The purpose of this questionnaire is to request your input for, and needs/concerns regarding the design and construction of the proposed facility. Your information will be very important for the designers conducting this Charrette. Please take the time to consider the questions asked here, and provide as complete responses as possible. Your responses will be used during the Charrette to be held at location which is currently scheduled for dates. Please do not feel limited by the space provided for your information. Please type or print your responses.

Please return the completed questionnaire by fax to Name at fax number, or by email to Name at email.address by suspense date, If you have any questions about this questionnaire, please contact Name at telephone number.

Thank-you for your help.

1. Background Information:

Please answer the following questions about yourself.

a. Name and rank: _____

b. Title or Position: _____

c. Office telephone number: _____

d. Office fax number: _____

e. Email address: _____

f. Organization Name: _____

g. Office Mailing Address: _____

2. Organizational Information:

a. In the space provided below, draw or describe your organizational structure as it will look when you move into the new facility (i.e., sketch and fill in your organization chart - what subordinate elements will work for yours, and who your organization will work for). Or, attach an organization chart or diagram highlighting where your organization is.

b. Organization: List the staff your organization will require when you move into the new facility. Show staff requirements by position, shift, and type office space required (describe physical type of room, i.e., single/enclosed office, shared/enclosed office, systems furniture office, shop, etc.)

Exhibit 23-1 (Continued)

Organization:
_____

Position/Title/Rank	Office Type	Personnel per Shift 1	2	3
_____	_____	___	___	___

3. Facility Requirements:

a. Space Requirements: List the types of work areas, offices, etc. that your organization will need in the facility. (Please coordinate this table with the preceding organizational chart.)

Space / Room Name	Number of Personnel	Area Req'd (Room Size)	Remarks/Special Equipment Needs
_____	_____	_____	_____

b. Internal Space Organization: In the space provided below, sketch or describe how your organization should be arranged in the new facilities (i.e., which offices should be located where, and special physical separations between spaces - doors, sound barriers, security, etc.). If other organization(s) will be housed in the new facility, please indicate how your organization should be arranged in relation to the tenant organization(s) using the facility.

4. Other space requirements:

a. Will your organization need a dedicated conference area? Yes No
(Circle one.)

For how many personnel: _____

Equipment needs (audio-visual, computer, other): _____

b. Will your organization need access to a common conference area? Yes No

For how many personnel: _____

Equipment needs (audio-visual, computer, other): _____

c. List any other space needs not already described above required to support your organization (i.e., lobby, waiting area, storage, copy rooms, common file rooms, central administrative storage, mail/distribution room, kitchen, break area, sleeping area, personal lockers, etc.)

Space / Room Name	Number of Personnel	Area Req'd (Room Size)	Remarks/Special Equipment Needs
_____	_____	_____	_____

Indicate the type of special doors required to support your operations (other than 3'x7' personnel doors). Use the following codes in the table below.

Exhibit 23-1 (Continued)

SOH - solid overhead doors, motorized or manual, approximate size, location.
GOH - grill/open link overhead doors, motorized or manual, approximate size, location.
COH - countertop overhead doors, solid or grill, motorized or manual, size, location.
DD - double 3'x7' personnel doors, location.
VD - vault door, size, location.
SAD - sound attenuation door, size, location.

Door Type	Location		Size	Special Requirements
	From	To		
_____	_____	_____	_____	_____

d. Will your organization require that any walls around operating areas limit sound transmission (open storage, SCIF, counseling, etc.)? Please describe what you will need and locations. Does your organization have a security person we can talk to when we have questions?

_____

e. Assuming most rooms will have a 9' ceiling height, are there any spaces in your organization that will require a higher ceiling height? Please describe your needs below.

_____

f. If the complex is designed with two floors, can any of your organization's spaces be located on the second floor? Please describe any special needs related to splitting your organization on two floors (i.e., service elevator, proximity to stairs, etc.)

_____

5. Furnishings/Equipment Requirements: The following section will be used to determine physical elements of the new facilities needed to support your organization and its operations.

g. Equipment Requirements. Please identify any equipment needs, and anticipated sources of the equipment (i.e., copiers, kitchen unit, audio-visual equipment, etc.) for your organization. Procurement codes are: GF/GI (government furnished, government installed), GF/CI (government furnished, contractor installed).

Space / Room Name	Equipment Type	Quantity	Procurement Method	Remarks
_____	_____	_____	_____	_____

h. Identify any existing equipment your organization will want moved to the new facility (i.e., radios, power converters, etc.). Describe who should relocate and install the equipment if it is to be moved (i.e. Government or Contractor).

_____

i. Identify any new equipment that your organization will require for the new facility. Please identify the funding source for the new equipment.

_____

Exhibit 23-1 (Continued)

j. Indicate any new furnishings that your organization will require for the new facility. Please identify the funding source for the new equipment.

---

5. Civil/Site and Utility Requirements:

a. Demolition: Please identify any demolition requirements.

---

b. External Space Organization. In the space below, graphically describe your vision of how your new facility should be located on the proposed site. (Please consider access to the facility by vehicles and supply trucks, installation of the LMPTT, parking areas, landscaping requirements, etc.)

c. Indicate special exterior site requirements for your organization (amount of parking for occupants, visitors, military vehicles; large commercial vehicles; exterior utiltity requirements - i.e., hydrants; vehicle turning radius requirements; exterior access to interior activities; etc.)

---

6. Structural Requirements:

a. Please describe any special floor loading requirements in your organization (i.e., map storage, safes, vehicle servicing, fork lift operation, parking, etc.).

---

7. Mechanical Requirements:

a. Heating, Ventilating and Air Conditioning Requirements. Please describe HVAC needs to support your organization's operations (i.e., special temperature or humidity considerations, after hours operations, zoning requirements, etc.).

---

b. Plumbing Requirements. Please describe any special plumbing needs (i.e., eye wash stations, floor drain requirements, special sinks, compressed air, or natural gas requirements, etc.).

---

c. Fire Protection Requirements. Please describe any special Fire Protection needs. (i.e. type of sprinkler system, need for a fire pump, etc.)

---

d. Special Mechanical Equipment. Please identify any special mechanical equipment (i.e. cranes, monorails, vehicle exhaust system, dust collection system, etc.)

---

8. Electrical Requirements:

a. Electrical Service Requirements. Please describe any special power or lighting requirements (i.e., service, transformers or uninterrupted power supply, dedicated circuits, emergency generators or back-up power, special lighting, indirect office lighting, digital clocks, etc.).

_____

9. Electronics/Communications Requirements:

a. In the table below, list rooms or spaces that will require communications support.

Space / Room Name	Telephone # Jacks Req'd	LAN # Drops Req'd	Tempest Requirement	Other Needs (i.e. Intercoms, Closed Circuit Monitors, etc.)
_____	_____	_____	_____	_____

b. Please list any rooms / spaces that will require raised access flooring.

_____

c. Identify any other special communications needs.

_____

10. Environmental Requirements:

a. Does your organization handle or use any type of hazardous material? Please identify the materials, where they will be used or stored, and any special needs in the areas they will be used (i.e., special ventilation, safety needs such as eye washes, requirements for resistant finishes on the floor/walls/ceiling, special sinks or equipment, waste removal requirements, etc.)

_____

b. Identify any known Wetland or IRP Sites in the vicinity of the proposed site.

_____

11. Miscellaneous Requirements:

a. In the space below, please describe any Miscellaneous need(s) not covered so far in the questionnaire. Also, provide any comments about how you believe the new facilities should be designed that would improve your ability to perform your missions.

_____

Thanks … for taking the time to complete this questionnaire. Your information will help the designers begin to understand your needs for the new facility.

Exhibit 23-1 (End)

Charrette Checklist.

☐ Determine whether preliminary meeting can be held at installation.

☐ If yes, coordinate funding with PM, develop agenda, identify and coordinate with participants, conduct meeting. Discuss items in paragraph 1.4.2.1.

☐ If no, work through PM to talk by phone/email to MACOM, customer and user representatives to discuss resolve items in paragraph 1.4.2.1.

☐ Identify and meet with design team to set requirements for successful charrette, provide background and available information, determine additional information requirements, develop questionnaire, discuss charrette agenda, discuss charrette budget.

☐ Prepare and submit questionnaire for return prior to conduct of charrette.

☐ Establish charrette document management system: CADD Code, ProjectWise set-up.

☐ Formalize budget and submit to PM.

☐ Funds available and set up in P2.

☐ Notify design team of charge numbers and individual budgets.

☐ Receive and distribute questionnaire returns to design team.

☐ Design team meeting – set travel requirements, coordinate transportation, identify rental car requirements. Review product requirements. Review questionnaire returns. Discuss format for conduct of charrette – who facilitates, takes notes, use of digital projector to display acquired information/wall cards. Formalize agenda. Share cell phone numbers.

☐ Initiate TDY orders and overtime requests.

☐ Establish hotel location and coordinate reservations.

☐ Coordinate with installation: verify command/installation/customer participant names and positions, charrette location, work hours, communications and computer access, printer/plotter access, agenda for interviews/out-brief.

☐ Identify tools to take to charrette: digital projector, lap tops, memory sticks, butcher paper, 5”x7” index cards, felt tips, tape, tracing paper, scales, digital cameras, colored pencils/markers for presentations, etc.

☐ Ensure digital tools work and work together.

Exhibit 23-2 (Continued)

☐ Design team preparation prior to charrette: study/consolidate questionnaire returns, begin facility space summary, identify and prepare samples of similar types of facilities for display, identify and begin research into facility type, code requirements, and known installation requirements.

☐ Travel to charrette location.

☐ Check in with installation point of contact. Determine and resolve last-minute crises. Check meeting and work rooms. Check communications and computer access, access to rooms, and printer/ plotter access. Set up meeting room for initial overview briefing.

☐ Conduct charrette.

☐ Return to Mobile. Prepare and submit draft programming charrette document, or prepare and submit revised design charrette design documents. If necessary, for the design charrette, selected design team members return to installation to brief revised design for concurrence.

☐ Establish DrChecks accesses for reviewers and designers – communicate access to reviewers and designers.

☐ Receive comments. Annotate comments. Make revisions. Submit final planning or design charrette document.

☐ Distribute copies of final document to design team members.

☐ Ensure final document is stored in document management system.

☐ Consider conducting an after action review with the design team to discuss what happened, and what worked and what didn't, and possible improvements.

Exhibit 23-2 (End)

Parametric Cost Checklist

In order to provide a quality parametric cost estimate, the following checklist is offered as a guide.

Quantity Parameters:
Gross area of building
Number of stories
Floor to floor height and eave height
Basement
Number of stairwells
Number of elevators
Loading dock
Cooling load
Heating load

Descriptive Parameters:
Shallow footings or pilings
Structural frame(wood, steel, reinforced concrete, masonry)
Roof structure(bar joists, steel frame, etc)
Roofing type(standing seam, membrane, tile, shingle, etc)
Exterior wall(concrete block, brick veneer, EIFS, etc)
Heating/Cooling system

Functional Space Areas:
Need scaled drawings or list of rooms with net areas
Need special areas identified such as auditorium, kitchen/dining areas, high bay, secure areas, vaults, etc.

Special Building Requirements:
Is the project to be design-build or in-house?
What level of Sustainable Design is to be achieved?
How much Force Protection is to be provided?
What is the acquisition strategy(IDIQ, RFB, 8a sole source, etc)
Is this project going to be phased?

Site Work Parameters:

Electric service
Distance to connect overhead or underground
Size of transformers
Concrete ductbank

Communications
Distance to connect
Number of pair of wires

Water
Distance to connect
Size & type of piping

Gas
Distance to connect
Size & type of piping

Exhibit 23-3 (Continued)

Sewer
Distance to connect
Size & type of piping

Lift stations
Capacity
Number of manholes
Size & type of piping

Pavements
Thickness & area of asphalt paving
Thickness & area of concrete paving
Thickness of base material

Site Improvements
Quantity of excavation and fill
Amount of clearing and grubbing,
Landscaping
Fencing

Demolition & Relocations:
Square footage and type of buildings to be removed

HTRW:
Amount of asbestos and lead based paint abatement
Contaminated soils
Underground tanks removals

Exhibit 23-2 (End)

Sample Charrette Report. Adjust as the following outline as necessary for the intended facility type

COVER PAGE. Incorporate graphics, MACOM, customer and user insignia, Mobile District logo (and A-E logo when appropriate), project title, project number, date of report.

TABLE OF CONTENTS

Exhibit 23-4 (Continued)

1 INTRODUCTION

Purpose
Charrette conduct

2 PROJECT DESCRIPTION

GENERAL DESCRIPTION

Project overview
Summary project statistics

Table 1. Project Statistics

3 USER AND FACILITY REQUIREMENTS

3.1 LEED (or SPiRiT) ASSESSMENT

Level/points summary
Certifiable or certification

3.2 SITE DEVELOPMENT

General.
Site Layout.
Grading.
POV Parking Area.
GOV Parking Area.
Anti-terrorism/Force Protection.
Storm Drainage.
Demolition and Removals.
Clearing and Grubbing.
Erosion control and dust control.

3.3 LANDSCAPING

3.4 UTILITIES

General.
Water Distribution.
Sanitary Sewer.
Natural Gas.

3.5 SPACE REQUIREMENTS

General.
Design considerations.
Functional/narrative description of required spaces.

Table 2. Listing of all the functional spaces identified during the charrette and the net square footage allocated for the space.

Exhibit 23-4 (Continued)

3.6 ARCHITECTURAL

General
Criteria
Life Safety Analysis
Building Component Definition

3.7 STRUCTURAL (AND FFE – if required) INTERIOR DESIGN

General.
SID
FFE

3.8 STRUCTURAL

General.
Criteria.
Design Loads.

3.9 MECHANICAL

General.
Heating, Ventilation, and Air Conditioning.
Plumbing.
Fire Protection.

3.10 ELECTRICAL

General.
Primary Power.
Services.
Metering.
Lighting.
Receptacles.
Hazardous Areas.
Lightning Protection.
Emergency Generator.

3.11 ELECTRONICS

Outside Plant.
Telephone System.
LAN System.
Fire Alarm System.
Mass Notification System.
Public Address (PA) System.
Antennas.
Cable Television System.
Closed Circuit Television (CCTV) System.
Intrusion Detection.
Entry Control System.
Cathodic Protection.

3.12 ENVIRONMENTAL

Exhibit 23-4 (Continued)

3.13 PARAMETRIC COST ESTIMATE (AND/OR DRAFT DD FORM 1391)

4 CONSTRUCTION SCHEDULE

5 PHOTOS

APPENDICES

Exhibit 23-4 (End)

CHAPTER 24

MILCON TRANSFORMATION (MT)

INDEX

CHAPTER 24

MILCON TRANSFORMATION (MT)

24.1 GENERAL

(a) The Army is pursuing the most comprehensive transformation of its forces since World War II. USACE has an important role to play in the success of this transformation. As the Army's construction agent, USACE must ensure the Army has the quality facilities and infrastructure it needs to meet future capabilities and missions at significant cost and time savings.

(b) Standardization of Army facilities is one of the tenets of Army transformation. Army Standardization under MT applies to the Army's Military Construction Program including BRAC actions.

(c) Specific implementing methods are being developed for this program at the time that this chapter was written.

24.2 APPLICABILITY

This program applies to all Army military construction (MILCON) (including BRAC) with the following exceptions. The program does not apply to projects which have received a specific exemption. Army projects that do not meet the facility types designated in paragraph 2.1.2.1 below are not required to be completed using MT procedures. This program does not apply to the Air Force or other Mobile District customers including DoD tenants at Army installations.

24.3 APPLICABLE PUBLICATIONS

Army Regulation (AR) 415-15, Army Military Construction Program Development and Execution

Engineering Regulation (ER) 5-1-11, USACE Business Process

ER 5-1-10, Corps-Wide Areas of Work Responsibility (AOR)

ER 1110-1-8158, Corps-Wide Centers of Expertise Program

ER 1110-3-113, Department of the Army Facilities Standardization Program

United States Army Corps of Engineers (USACE), Operations Order 2006-16, FY07 MILCON/BRAC Execution OPORD, Annex U Realignment/Establishment of Centers of Standardization

USACE, US Army COS Program, Program Management Plan (PgMP) and Appendix, Mobile District COS Management Plan

CEMP-M/CERM-P Memorandum, 26 March 2003, subject: Clarification of USACE Policy on Planning and Design (P&D), Construction Supervision

and Administration (S&A) and Post-Award Engineering and Design Services (DDC)

CECW-CE Memorandum, 6 March 2006, subject: Realignment/ Establishment of Centers of Standardization (COS)

24.4 DEFINITIONS

24.4.1 Army Standard

Criteria developed to meet Army functional facility requirements. This will include (but not be limited to) a compilation of technical requirements, adjacency diagrams, and space criteria. The ultimate intent is to prepare this information for incorporation in design-build request for proposals (RFP). Army Standards will be applicable to facility types that cannot be definitively designed.

24.4.2 Army Standard Design

Adapt-build drawings (ultimately to an 80% level of completion) and specifications incorporating Army Standards.

24.5 PROGRAM PROCEDURES

24.5.1 Implementation

This program is being implemented over a three year period through FY08 with all COS at initial operational capability in FY08.

24.5.2 Program Responsibilities

(a) Each COS serves within the Department of the Army as the definer of Army Standards and Army Standard Designs. The COS develops, maintains, and provides Army Standard technical criteria or the Army Standard Design for each designated facility type. A waiver system has been implemented that requires COS evaluation and USACE approval of deviations from either the Army Standard or Army Standard Design. Each COS will receive funding for development and maintenance of their respective facility type Army Standard or standard design from USACE. Each COS participates on a COS Management Board for development of policy and processes; assuring consistent application of the program; and monitoring execution.

(b) Geographic Districts (GD) are defined as the executing district responsible for MT project site design, construction, project reporting, and contract close out. A COS may be a GD. The GD maintains the Project Manager function. It is anticipated that the GD will receive MT project funding (design and construction funds), and distribute an appropriate share to each COS with facility type responsibilities on that specific project. (In some cases, several COSs and facility types may be involved on one project, and the GD is responsible for integrating these multiple building activities in one project.)

24.5.2.1 Facility Types

(a) A variety of facility types have been designated for Army Standardization. Where these facility types are to be designed and/or constructed through Army MILCON/BRAC in the Mobile District AOR, the

individual COS listed below will be contacted for participation in design and construction. POC's for specific facility types are listed at the following website (requires AKO login):

https://secureapp2ako.hqda.pentagon.mil/acsimnews_secure/army_fac_poc.cfm

(b) The USACE Center of Expertise program in ER 1110-1-8158 defines separate mandatory requirements for application of USACE technical guidance and review applicable in addition to an COS facility type standard.

Huntsville Center
Physical Fitness Facility
Outdoor Sports Facility
Child Development Center - Infant/Toddlers
Child Development Center - School-Age
Youth Activity Center
Consolidated Fire, Safety & Security Facility
Fire Station
Army Community Service Center
Bowling Center
Hazardous Material Storage Facility
Close Combat Tactical Trainer
Military Operations Urban Terrain Facility
Training Ranges
Battle Command Training Center
Training Support Center
Medical Facilities

Louisville District
Army Reserve Center
Operational Readiness Training Complex (ORTC)

Norfolk District
General Instruction Building (GIB)
Classroom XXI
Dining Facility
Military Entrance Processing Station (MEPS)
Family Housing
Information Systems Facility
Troop Issue Subsistence Activity Center
Criminal Investigation Command Facility

Omaha District
Religious Facility
Access Control Building

Mobile District
Aviation - Vertical Construction
4-Star HQ Facility (in coordination with Savannah District)

Savannah District
Company Operations Facility
Tactical Equipment Maintenance Facility
Deployment Facilities
Brigade Operations Complex
Brigade/Battalion HQ

Command and Control Army (UEy) & Corps (UEx) HQ

Ft Worth District
Unaccompanied Enlisted Personnel Housing (Barracks)
Basic Combat Training Complex (BCT) / One Station Unit Trainee (OSUT)
Advanced Individual Training Complex (AIT)
General Purpose Warehouse
Central Issue Warehouse

Honolulu District
Unaccompanied Officers Quarters
Transient Officers Quarters

24.5.2.2 MT Model RFP

The MT Model RFP will be used for Army Transformation projects in FY 06 and 07. This MT Model RFP is being used to develop Army Standards by facility type relying on industry input. No changes are authorized in the MT Model RFP during this period except for incorporation of technical criteria by the COSs identified above. This RFP is updated monthly, is intended to be a repository for technical criteria during these years, and is found at the following web site. See Chapter 22 DESIGN-BUILD REQUEST FOR PROPOSAL DEVELOPMENT for additional information.

ftp://ftp.usace.army.mil/pub/hqusace/MILCON%20Transformation/

24.5.2.3 MT Adapt-Build

Results and lessons learned from construction awards, and construction, using the MT Model RFP will be used by the COSs to develop adapt-build facility designs. These designs will be prepared to the 5-foot line including functional site elements (such as pavement, fencing, etc.) authorized for the facility type. These adapt-build designs will be prepared to up to an 80 percent level of completion. The GD will prepare the site design outside the 5-foot facility type foot print.

24.5.2.4 MT Acquisition

(a) GDs are currently, successfully using the MT Model RFP to contract Army MT facilities in cooperation with the COSs.

(b) Regional indefinite delivery-indefinite quantity (IDIQ) contracts may be in place in approximately July 2007 for construction of specifically designated facility types. Or, GD contracting capacities may be used for construction of individual facility types. For designated facility types, projects will be advertised and awarded by the COS responsible for that facility type.

(c) When COS facility types are not designated for advertisement and award through this regional IDIQ program, the USACE intent is that the COS will advertise and award construction contracts. The COS and GD will mutually agree on acquisition methods in these cases.

(d) When the COS awards a project, it is anticipated that Administrative Contracting Officer authority will be transferred to the GD which will construct, report, and close out the project.

24.5.2.5 Building Information Modeling (BIM)

It is the USACE intent that BIM be used in the submittal of Contractor-developed MT designated construction documents, and preparation of future adapt-build Army Standard Designs. In FY08, contractor MT submissions will be required to be submitted in BIM format. BIM submissions prior to that year are voluntary. A USACE BIM standard is being developed by the Engineering Research and Development Center (ERDC).

24.5.2.6 Installation Design Guide (IDG)

The Army Assistant Chief of Staff for Installation Management (ACSIM) has directed that prescriptive criteria (equivalent to specific methods and materials, and specifications) be deleted from IDGs. It is a COS responsibility to determine what installation desires exceed the criteria established in Army Standards or Army Standard Designs. Installations desiring changes to the Army Standards or standard designs will submit waiver requests.

24.6 PROCEDURES

The following paragraphs identify Mobile District responsibilities.

24.6.1 COS Definitions

24.6.1.1 4-Star Headquarters

(a) The following projects will be completed under MT:
Redstone Arsenal, AL: Army Materiel Command (AMC)/U.S. Army Security Assistance Command (USASAC) Headquarters
Fort Bragg, NC: Forces Command (FORSCOM)/U.S. Army Reserve Command (USARC) Headquarters
Fort Eustis, VA: Training and Doctrine Command (TRADOC) Headquarters

(b) Army Standards will be developed by A-E.

(c) The GD will prepare the design-build RFP for these projects incorporating Army Standard criteria provided by Mobile District.

(d) Mobile District Project Management is the primary POC for this effort.

24.6.1.2 Aviation (Vertical Construction)

(a) TI 800-01, Appendix K defines aviation facility types by category code. These include the following facility types and category codes which compose the Aviation (Vertical Construction) COS facility types.

Navigation Building, Air: 13320
Radar Building, 13340
Aircraft Lighting Equipment Vault: 13640
Airfield Operations Buildings: 14110
Aviation Unit Operations Building: 14112
Representative Weather Observation Station: 14115

Ready Building: 14132
Simulator Building (Motion-Based): 17210
Simulator Building (Non-Motion Based): 17211
Simulations Center: 17213 (Aviation related)
Aviation Maintenance Hangar: 21110
Aircraft Parts Storage: 21113
Aircraft Maintenance Bay: 21114
Tactical Unmanned Aerial Vehicle Hangar: 21115
Hangar Shop Space: 21116
Avionics Maintenance Shop, Installation: 21117
Aircraft Component Maintenance Shop: 21120
Aircraft Paint Shop: 21130
Aircraft Engine Test Building: 21140
Aircraft Engine Test Structure: 21141
Avionics Maintenance Shop, Depot Level: 21740
Aircraft and Flight Equipment Building: 31110

(b) Army Standards will be developed by in-house personnel and A-E. There is some potential that an Army Standard Design will be prepared for combined Aviation Maintenance Hangars and Aviation Unit Operations Buildings based on results of FY07 and FY08 MT Model RFP results from GDs.

(c) The GD will prepare the design-build RFP for these projects incorporating Army Standard criteria provided by Mobile District.

(d) Mobile District Engineering Division is the primary POC for this effort.

24.6.2 Workload

Mobile District has been granted access in the PAX system to view future MILCON and BRAC projects related to COS responsibilities. It is a mutual responsibility of the COS and GD to initiate discussions on projects requiring COS involvement for MT projects.

24.6.3 Army Standard

24.6.3.1 Develop functional (building, site, furniture, furnishings) and technical requirements of the Standard Design for the assigned facility type.

24.6.3.2 As applicable, develop land area adjacencies, site plans or layouts in support of area development or real property master plans.

24.6.3.3 Conduct studies, analyses or assessments directed by the Facility Design Team (FDT) (including Department of the Army (DA), Assistant Chief of Staff for Installation Management (ACSIM), and USACE representation) during the development of Army Standards.

24.6.3.4 Support the ACSIM approval process for Army Standards.

24.6.3.4.1 Work in conjunction with the FDT co-chairs to arrive at Army Standards for FDT staffing leading to review and approval of the Army Standard by ACSIM.

24.6.3.4.2 When life-cycle investment requirements are identified, conduct analyses and implement innovations to mitigate or reduce implementation cost. Where mitigation by market analyses, constructability, or other engineering factors (for similar functions or facilities in private sector or other areas of Government) cannot achieve design cost impacts, identify courses of action or alternatives for consideration by the FDT.

24.6.3.5 Ensure consideration and inclusion of appropriate sustainable design considerations to consistently and successfully achieve sustainable design objectives.

24.6.3.6 Analyze installation design guides for locations where a standard design will be constructed and develop information on architectural theme, colors, exterior/interior signage, furniture, and landscape materials. Determine proper application of “preferences” in the development of Army Standards as substantiated by the approved IDG.

24.6.3.7 Consider safety features (e.g. fall protection tie-off points) that may be included in the Army Standard to enhance the safe operation and maintenance of the facility. Perform a Facility Systems Safety Assessment on the design if the risks merit it.

24.6.3.8 Prepare cost estimates for the facilities. Provide market surveys or analyses to ascertain appropriate unit cost consistent with the functional requirements and operational objectives of the standard design. Develop rationales and recommend unit cost changes to the USACE Program Coordinator (PC) for the Army Facilities Standardization Program (HQUSACE/CECW-CE-D)

24.6.4 Army Standard Design (if warranted)

24.6.4.1 Develop the standard design of the building to an 80% solution including regional climate and structural requirements. The 80% solution will be predicated on Army Standard criteria, and will be developed in consultation with the FDT. It may be developed using contract or district resources. This requirement is to be phased into the program as discussed below.

24.6.4.1.1 FY-08 program: Develop a basic floor plan for use in a design build Request for Proposals (RFP). Where a standard design has already been completed with little or no changes expected, this standard design will be developed to the 80% solution and utilized in an adapt build contract to the maximum extent possible.

24.6.4.1.2 FY-09 program: Incorporate best designs from the FY-07 model RFP packages and proceed further toward the 80% solution.

24.6.4.2 Maintain cost estimates for the facilities.

24.6.4.3 Develop template DD1391s for use in identifying, defining, and validating facility requirements and assessing potential facility impacts associated with materiel fielding. This requirement requires coordination with the HQUSACE (CRST), CEMP-DA.

24.6.4.4 Coordinate with the Technology Standards Group (TSG) (TSG reports to DAIM-FDF) or technology evaluation teams for identification and incorporation of technology standards and criteria as appropriate.

24.6.4.5 Coordinate with USACE Communities of Practice (COPs) as necessary for technical support.

24.6.4.6 Develop and maintain the Army Standard Design in BIM. Attend BIM meetings and training designed to foster implementation of BIM deployment.

24.6.4.6.1 Identify COS BIM team to facilitate BIM usage for planning, design, construction and O&M of facilities and grounds.

24.6.4.6.2 Maintain COS/district expertise in BIM to perform QA of A-E prepared electronic files and insure conformance with BIM-CADD standards, policies and procedures including data base, file and naming conventions, and defined file data sets.

24.6.4.6.3 Designate COS facility type BIM manager to act as technical subject matter expert (SME) leading activities including establishment, distribution and retrieval of BIM data, files, libraries.

24.6.4.6.4 Provide technical assistance during A-E scope negotiations regarding BIM requirements and deliverables.

24.6.5 Program Certification

24.6.5.1 Participate in planning charrettes to ensure consistent implementation and compliance with Army standards and standard designs. (Geographic districts will lead the planning charrette).

24.6.5.2. Assist OACSIM/DAIM-FDC in review of DD1391/ENG 3086 scope and cost for consistent implementation and compliance with Army standard.

24.6.5.3 Ensure use of template DD1391s (when available) as basis for developing project scope and cost.

24.6.5.4 Ensure that the DD1391 documents include only customer “preferences” (as substantiated by the approved IDG) that have been reviewed and approved in accordance with the established approval or waiver requirements.

24.6.5.5 When a waiver request to an Army standard is submitted, ensure geographic district and IMA region affected by the waiver are aware of the waiver process and are advised that the project development will be held in abeyance pending AFSC approval. Ensure concurrent notification to OACSIM/DAIM-FDC, HQIMA and HQUSACE of pending waiver submission in order to expedite review process.

24.6.5.6 When a waiver to an Army standard design is approved by HQUSACE, ensure DD1391 is properly annotated and notification of scope and cost waiver results are provided to OACSIM/DAIM-FDC.

24.6.6 Project Definition and Design Development

24.6.6.1 Support the execution district PM as an integral member of project development team.

24.6.6.2 Provide building and interior design and contracting services to the GD. (HQUSACE will identify the mandatory use of the COS in the design directive)

24.6.6.3 Review and approve user requests prior to the inclusion in the adapt-build design (or MT Model RFP).

24.6.6.4 Identify and advise IMA garrison when a waiver to either the Army Standard or Standard design is.

24.6.6.4.1 For Army Standards, review of waivers shall include scope and cost implications, assessment, and recommendation of CONCURRENCE or NON-CONCURRENCE to USACE. Analyses, assessment, and staff/coordination of waivers to Army Standards shall be completed in accordance with the Army Facilities Standardization Program charter dated 24 May 2006. All projects requiring waiver to Army Standards will be held in abeyance pending ACSIM approval.

24.6.6.4.2 For Army Standard Designs, determine technical and functional implications of waiver requests and determine potential implication to Army standards. Coordinate potential impacts with FDT and where no Army Standard implication exists, recommend CONCURRENCE or NON-CONCURRENCE to PC AFSP (HQUSACE/CECW-CE-D). Analyses, assessment, and staffing/coordination of waivers to Army Standard Designs shall be completed in accordance with the Army Facilities Standardization Program charter dated 24 May 2006.

24.6.6.4.3 USACE (when applicable) will coordinate waivers to Army Standard Designs with the Program Coordinator for Readiness and Modernization Support (PC RMS) (HQUSACE/CEMP-DA) for any implications on Army strategic objectives, priorities, or plans prior to approval and notification to the Army Facilities Standardization Committee (AFSC).

24.6.7 Design/Construction Execution

24.6.7.1 Ensure consistent implementation and compliance with Army Standards and Standard Designs.

24.6.7.2 Participate in design charrettes to ensure the Army Standard and Army Standard Design intent is maintained through design development. (Geographic districts will lead the design charrette)

24.6.7.3 Coordinate with the geographic district on:

24.6.7.3.1 Integration of projects where more than one COS is involved to ensure commonality of engineering support systems and aesthetic expressions.

24.6.7.3.2 Geotechnical investigation and report. (Facility foundation design is by COS.)

24.6.7.3.3 Site survey data and utility layouts.

24.6.7.3.4 Environmental permitting requirements or any other permitting requirements specific to the building execution. (The geographic execution district will obtain permits.)

24.6.7.3.5 LEED points and strategies needed in the site development in relation to the facility.

24.6.7.4 Develop site specific standard design for contract or prepare an RFP package to reflect approved IDG architectural theme, colors, exterior/interior signage, furniture, and plant materials.

24.6.7.5 Execute the following compliance checks and conformance reviews for projects:

24.6.7.5.1 Conformance with RFP document as modified by the awarded Contractor proposal

24.6.7.5.2 Gross/net area allowance

24.6.7.5.3 Functional adjacencies

24.6.7.5.4 AT/FP

24.6.7.5.5 Building and fire code (checklist is in the template RFP)

24.6.7.5.6 Sustainable (SDD) points/strategies

24.6.7.5.7 Structural Interior Design (SID) and FF&E (furniture-related interior design) layout compliance [The term Comprehensive Interior Design (CID) is used to describe the provision of both building-related and furniture-related interior design.]

24.6.7.5.8 Seismic strategies

24.6.7.5.9 Footing and foundations design

24.6.7.5.10 Utilities interface

24.6.7.5.11 Communications

24.6.7.5.12 Approved IDG compliance

24.6.7.6 Perform/review VE analysis on projects as needed or requested.

24.6.7.7 Coordinate field technical assistance necessary (RFIs, claims, modifications, EDC) for the facilities.

24.6.7.7.1 Ensure that changes during construction are justified/ approved

24.6.7.7.2 Ensure that lessons learned from design changes are communicated to the appropriate authority. (Execution districts will implement a process to monitor engineering and user changes and to provide feedback to the COS and ACSIM.)

24.6.8 Life-cycle Design Sustainment

24.6.8.1 Attend selected construction and post occupancy evaluations to obtain user feedback and lessons learned. COS leads; include the GD, and invite IMA, ACSIM, and HQDA proponents.

24.6.8.2 Maintain lessons learned in Dr Checks as required. Maintain historical database of standard design use by FY, PN and location.

24.6.8.3 Explore, adopt, and implement new technologies (processes, materials, equipment, and methods) that support standards and improve facility management.

24.6.8.4 Maintain market surveys or analyses to ensure unit cost stays abreast of technology and constructability.

24.6.8.5 Adjust template DD Forms 1391 (where applicable) based on execution lessons learned, trends, and actual project execution.

24.6.8.6 Conduct periodic reviews of Army Standard Designs to ensure currency.

24.6.8.7 Consolidate lessons learned from project development and execution. Assess lessons learned for trends or programmatic adjustments to policies, processes, procedures, or standards and criteria to improve program implementation and project execution. Apply lessons learned to the Army Standard or Army Standard Design.

24.6.8.8 Maintain currency with applicable specifications, codes, and industry standards

24.6.8.9 Provide quality assurance oversight of all assigned standard designs

24.6.8.10 When applicable and directed, conduct independent compliance assessments of projects to monitor effectiveness of Army Standard and Army Standard Design policies, directives, processes, and procedures.

24.6.8.11 Maintain coordination with related technical (i.e., US Army Safety Center) and functional activities (i.e., US Army Aeronautical Services Agency for aviation facility types).

CHAPTER 25

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
BICSI	Building Industry Consulting Service International
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
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
D-B	Design-Build
D-B-B	Design-Bid-Build
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
EM	Engineer Manual
EMCS	Energy Management and Control System
EMI	Electromagnetic Interference
EN-DA	Architectural/Structural/Civil Engineering Section, Mobile District
EN-DW	Project Support Section, Mobile District
ENG	Engineer Form designation
EN-GG	Geotechnical and Dam Safety Section, Mobile District
EPA	Environmental Protection Agency
ER	Engineering Regulations
ETL	Engineering Technical Letter
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
HTW	Hazardous and Toxic Waste
HVAC	Heating, Ventilating and Air Conditioning
IBC	International Building Code
ICC	International Code Council
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
MACOM	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
PAE	Project Architect-Engineer
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
PVC	Polyvinyl Chloride
PVD	Power, Voice and Data
QCP	Quality Control Plan, Qualified Credentialed Professional
RA	Requirements Analysis
RFP	Request for Proposal
RFQ	Request for Quote
RTA	Ready-To-Advertise
SABER	Simplified Acquisition of Base Engineering Requirements
SDI	Steel Deck Institute
SID	Structural Interior Design
SIOH	Supervision, Inspection and Overhead
SGML	Standard Generalized Markup Language
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SOW	Statement of Work
SPiRiT	Sustainable Project Rating Tool
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