

**US Army Corps
of Engineers**
New York District

Design Submission Requirements Manual

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CHAPTER 1

GENERAL INSTRUCTIONS

1.1 GENERAL

1.1.1 Purpose

This New York District Design Submission Requirements 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 (Army and Air Force, including Medical projects), Support For Others Projects. 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.

1.1.2 Proponent

The Chief, Design Branch, Engineering Division, New York District is responsible for maintaining this Design Submission Requirements Manual (Design Manual). Comments on, proposed corrections or improvements to, or discrepancies in the Design Manual should be addressed to: Thomas Dannemann, thomas.r.dannemann@usace.army.mil, 917-790-8363.

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 on "standard" MT designated projects are described in the chapter on 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 New York 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 Design Manual. Samples are provided in Exhibit 1-1.

(b) 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.

(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 New York District Technical Manager (TM) or Project Engineer (PE) for projects in the design phases and to the Resident Engineer for D-B projects that have been awarded.

(d) The A-E shall accept directions only from the New York District Contracting Officer (CO) or the authorized Contracting Officer Representative (COR). Requests or desires of the users or using agency made directly to the A-E will be immediately brought to the attention of the TM or PE, and CO. Any changes to the project scope or other provisions of the SOW must be authorized in writing by the CO.

(e) 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 instructions provided in the Request for Proposal letter issued by C, Engineering Division.

(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. The progress chart may incorporate the requirements of paragraph 21.3.2(c).

(f) 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.

(g) 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. Information and instructions regarding the use of this form can be found on the Internet at the following address along with Engineering Division's NYD Contract/Task Order Administration and Management Guide:

<http://www.nan.usace.army.mil/business/buslinks/contract/ae/index.htm>

(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 SF330 submission. If any of these individuals are changed, New York 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 TM/PE 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 New York 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 (PA), 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 - Building Pad				X	X
3	Foundation	X	X	X	X	X
4	Underslab Utilities				X	X
5	Slab on Grade				X	X
6	Structural Fram	X	X	X	X	X
7	Roof Framing - Deck				X	X
8	Roofing		X	X	X	X
9	Exterior Walls and Windows			X	X	X
10	Building 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	Mechanical/Electrical Rough-in		X	X	X	X
16	Plumbing				X	X
17	Mechanical/Electrical above Ceiling				X	X
18	Flooring (VTC/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	Mechanical/Electrical Systems		X	X	X	X
24	Site Work - Utilities/Pavement				X	X
25	Carpet				X	X
26	QC System test - Debugging		X	X	X	X
27	QA System Test - Acceptance				X	X
28	CQC Inspection		X	X	X	X
29	HVAC Test and Balance			X	X	X
30	Landscape/Grassing				X	X
31	Pre-Final Inspection	X	X	X	X	X
32	Commissioning HVAC	X	X	X	X	X
33	Final Inspection/Acceptance BOD	X	X	X	X	X

d. Construction Duration Targets. Construction durations shall be developed based on the specific requirements of the project. SF1391 will have an estimated construction duration which is provided for guidance. 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, are provided in the event that no duration is provided in the guidance documents. 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	
Less than \$5M	365 Calendar Days or less	
PA > \$5M and PA < \$20M	540 Calendar Days or less	
Greater than \$20M	730 Calendar Days or less	

(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 corrector 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 New York 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.

1.1.4 Acronyms and Abbreviations

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

1.1.5 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) The chapter "PRESENTATION OF DATA" includes requirements for Antiterrorism/Force Protection, Sustainable Design and Development, 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 Engineer will initiate these chapters and ensure input by appropriate discipline members.

1.1.6 Metric Design Policy

(a) The current USACE metric policy for Military Construction is consistent with Executive Order 12770 which requires the use of the metric system in Federal acquisitions except when such use is "impracticable or is likely to cause significant inefficiencies or loss of markets to United States firms."

(b) Generally, design and construction of new or renovated facilities shall use the metric system of measurement, unless such use leads to inefficiencies or would be otherwise impractical. Increased initial cost or life cycle cost is certainly an indicator of inefficiencies. The C, Design Branch or Project Manager is responsible for making the determination on whether or not to use the metric system of measurement on a project-by-project basis. Customer preferences or limited designer experience are not adequate justifications on their own for eliminating metric use, but may be part of the decision process. Decisions to not use the metric system must be justifiable and documented in the permanent project files and maintained by the Technical Manager.

(c) Where Request for Proposals (RFP) or similar alternatives to the design-bid-build process are used, the RFP may be issued in dual units (inch-pounds and metric) with the requirement that each proposal indicate the system of units to be used by the contractor throughout. Drawings will not be accomplished in dual units on any type of project.

(d) Where the metric system of measurement is used the Designer shall strive to use as many hard metric products as possible in the design. Only where hard metric products are determined to be unavailable or uneconomical should soft metric products be used.

1. Hard Metric - a measurement that indicates a non-interchangeable SI value and is based on SI values that change in size and properties from inch-pound (IP) values.

2. Soft Metric - a measurement is a mathematical approximation or equal unit conversion of an IP product.

1.1.7 Ownership of Project Documents

The clauses set forth in DFAR 252.227-7023, Drawings and Other Data to Become Property of Government, DFAR 227.71, Rights in Technical Data, and DFAR 227.72 Rights in Computer Software and Computer Software Documentation, apply to all project design documents.

1.2 APPLICABLE PUBLICATIONS

1.2.1 Construction Criteria Base and Whole Building Design Guide

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/ccb.php>

Additional Criteria are available from the Whole Building Design Guide web site:

http://www.wbdg.org/references/docs_refs.php

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.

1.2.2 CADD Standards

The Designer's drawings shall conform to the A/E/C CADD Standards (latest release). The following information is provided as a guide to the Designer.

A/E/C CADD Standard are available at:

http://www.wbdg.org/ccb/browse_lib.php?l=07

CENAN CADD Standard Standards

<https://intranet.nan.usace.army.mil/cad/index.htm>

<http://www.nan.usace.army.mil/business/buslinks/contract/ae/index.htm>

1.2.3 BIM Standards

If the Designer's Scope of Work requires the application of BIM technology, all design drawings will be created using Building Information Modeling (BIM) technology and shall conform to the A/E/C CADD Standards (latest release). The version of Bentley Building must be compatible with version used by the New York District, incorporating specific USACE workspace and data sets, Model Files and all relevant design files. The Designer will provide the Building Information Model (BIM) and the supporting data set/library that supports the BIM to the Government in electronic format as a contract submittal requirement.

CENAN CADD Standard Standards

<https://intranet.nan.usace.army.mil/cad/index.htm>

<http://www.nan.usace.army.mil/business/buslinks/contract/ae/index.htm>

1.3 INSTRUCTIONS

1.3.1 Pre-design Conference

The TM/PE 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 TM/PE 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 pre-design conference, the A-E designer shall receive a request to furnish a fee proposal for accomplishing the work agreed upon during the conference. The TM/PE will develop a government estimate for anticipated A-E costs prior to 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. For A-E Designs the A-E is responsible for performing developing QCP and performing a QC review on their products prior to submission. See the chapter "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, New York 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. The chapter, "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 PE 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. The "SURVEYING AND MAPPING" chapter 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 Geotechnical Investigation

Unless otherwise determined during the pre-design conference, geotechnical 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 stormwater detention 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 the chapter, "SUSTAINABLE DESIGN", for specific requirements.

1.3.11 Anti-Terrorism/Force Protection

Anti-Terrorism/Force Protection is an inherent part of all projects. See the Chapter, "ANTI-TERRORISM/FORCE PROTECTION", 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.

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 the Chapter, 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, 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

The Value Engineering requirements apply to all Corps of Engineers' construction project with a current construction estimate of \$2 million or more unless a waiver has been obtained.

(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 appointed by the New York District VE Officer. The VE Team Leader shall be headed by an architect or engineer with no prior input/knowledge of the design. Architecture 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 or 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 TM/PE 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 (60-65%)

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 (90% Design Submission/Unreviewed 100% Design)

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. Final edited specifications. The contract front-end (boiler plate) with the exception of Section 00800 and portions of 0090 will be completed by the New York District 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.

EXHIBIT 1 - Sample Architect-Engineer (A-E) Task Order (TO) Statement
of Work (SOW)

Samples of Scope of Works for the following installations, including
installation specific requirements, are included for Picatinny Arsenal
and USMA.

**Sample Scope of Work
Picatinny Arsenal, New Jersey**

**Development of Final Design Documents for the
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1.0 Project Description:

Title: Packaging, Handling, Storage and Transportation (PHS&T) Center

Project Number: 65425

Location: Picatinny Arsenal, New Jersey

Program Amount (PA): \$26,000,000 (per Design Directive CENAD-COF-BAA (ER) dated 06 Nov 2007, calculated as follows)

Estimated Contract Cost (Contract for Construction): \$22,930,000

Scope: Per DD Form 1391 dated 18 August 2007

Construction Cost Limit (CCL): \$21,083,930 ⁽¹⁾ (Base Bid Only)

Notes:

1. The CCL is the Government's desired maximum or target cost for the base bid (and base bid only) at the time of award of the construction contract. It is formulated by multiplying the PA (see above*) x 90% and then dividing the results by (1.05 x 1.057) which results in a total in the amount of \$21,083,930. The CCL may also be expressed as a Base Bid CWE (or construction cost plus other government cost for construction which, in this instance, is the CCL (Base Bid Construction Cost Limit) x 1.05 (construction cost contingency) x (1.057) CoE SIOH or \$21,083,930 x 1.05 x 1.057 = \$23,400,000.
2. CWE equals the estimated cost prior to award or actual construction cost of any given item or unit of construction plus all government costs. A CWE is determined as follows; CWE = Estimated (or actual) Construction Cost x 1.05 (construction cost contingency) x (1.057) CoE SIOH.

2.0 Scope of A-E Services

2.1 General Description of Facility to be Designed & Constructed: This facility will provide new administrative space and high bay lab space for the BRAC mission. Special features include High bay space, engineering work space, storage, an Outdoor Covered Test Area and spaces that satisfy SIPRNET and Secret Compartmentalized Information Facility (SCIF) requirements, information systems, fire protection, and Anti-terrorism (AT) measures. In addition to engineering office space, the new facility will have conference rooms with video teleconferencing capability, restrooms, break rooms, laboratory spaces and mechanical rooms. Supporting Facilities include site work, paving, site improvements and utilities. Emergency generator system will be provided as a back up power. Comprehensive building and furnishings related interior design services are required. Access for individuals with disabilities will be provided. Demolish 1 Building (2,610 Total SF). Air Conditioning (Estimated 150 Tons). The design will include Sustainable Design and Development (SDD) and Energy Policy Act of 2005 (EPA05) features.

2.2 The work includes, but is not specifically limited to, studies, investigation, and concept and final design or studies of supporting utilities and/or facilities, such as,

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water supply, sewer, natural gas, HVAC, electric service, exterior and/or security lighting, storm drainage, communications and information systems, fire protection, force protection, and general site improvements. The project work also includes parking areas, walks, and utility service connections. Additionally, this work may require demolition of sub grade utilities and foundations, structure or equipment. The work shall proceed based upon the DD FORM 1391. The design shall address the probable presence of Radon gas and TCE in the ground water and soil including means to mitigate the migration of the Radon gas and TCE vapor into the facility. The measures employed for the protection against TCE entering the facility shall be supported by analysis or accepted standard and shall be prepared in a manner suitable for submission by Picatinny to NJDEP for review and approval. The A-E is responsible for the coordination of the work and other requirements with the Picatinny Garrison Offices.

2.3 General Description of Professional Services and Phase of Work: The A-E services under this contract will be accomplished in two (2) phases: Phase I –30% Concept Design Submission. Phase II – 60%, 65% (DDESB), 90%, and 100% Design Submissions. All of the construction work, identified within the DD form 1391 must be accomplished within a Current Working Estimate (CWE) for the base bid at or below ninety percent (90%) of the project's Programmed Amount; i.e., a contract estimate for the base bid at or below the CCL established above. If the CWE for the entire work at any time exceeds 90% of the Programmed Amount or the project CCL, the A-E shall provide recommendations for the Government's consideration for reducing the project cost (CWE) to within the target goals of 90% of PA and/or within the CCL, either by identifying possible scope reductions, establishing additive or optional bid items, or changes to design elements or products.

The Phases of Work are as follows:

The Phases of Work (Architectural and Engineering Services) for this project under this contract are as follows:

PHASE I - 30% Concept Design Submission
Participation in Value Engineering Conference

PHASE II – 60%, 65% (DDESB), 90%, and 100% Design
Submissions

3.0 NOT USED

4.0. PHASE I - 30% Concept Design Submission

4.1 Based on the Final Parametric Design (program and design validation) prepared under a previous contract, the A/E will prepare a 30% design in accordance with criteria listed in paragraph 9.0 below and in accordance with (IAW) all applicable Unified Facilities Criteria (UFC). This includes, but will not be limited to, the preparation of 30% design analysis, design drawings, design cost estimates and listing of UFGS specifications. In addition the design shall address handicapped requirements in

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accordance with the "Uniform Federal Accessibility Standards and/or ADA requirements".

4.2 The A-E shall prepare this submission inclusive of studies, schematics, cost estimates (Enclosure 8), drawings, and outline specifications IAW the "MANUAL OF STANDARD PROCEDURES FOR PLANNING AND DESIGN", NANP 1110-1-1 (Should this contact conflict with NANP 1110-1-1, this contract shall govern). The submittal shall include, but are not specifically limited to, the following material or content:

4.2.1 Drawings presented shall include existing site conditions, proposed utility plan, demolition plan, if required, proposed site plan including building and test range orientation, parking, lighting and fencing, proposed elevation illustrating exterior finish and proposed floor plans illustrating functional areas in SF. Site plans should include topographical detail, parking spaces with traffic flow and floor plans should show door locations and swing.

4.2.2 Prior to the Concept Review meeting, the A-E shall prepare and submit to the Environmental Affairs Office (EAO) a permit listing for the subject project and the status of each permit group. The A-E shall coordinate with Tom Solecki, Chief of the EAO, and request a signed letter from him that the permit listing is complete. The A-E shall assume that the EAO will review our permit listing and respond with 14 calendar days. The A-E shall then submit the documentation required for the approved permit listing.

4.2.3 Preparation of complete concept or preliminary Current Working Estimate (CWE) including construction cost estimate with appropriate design contingency commensurate with the concept level of development, identifying costs by building systems and escalated to the midpoint of construction in programming document format. All escalation factors shall be identified. The construction cost estimate will be performed using MII and have a summary format corresponding to the cost estimate shown on the DD Form 1391. The cost estimate shall include both Primary and supporting facility costs. Primary Facility costs include everything within 5 ft. of the building line. Supporting facility construction costs shall include everything outside 5 ft. of the building line. The cost estimate will identify complete project costs including those not shown on the contract drawings (i.e., work performed by other contractors, telecommunications and other set aside costs, NYD contingency costs, bid market saturation effects, etc. The estimator shall develop area escalation factors as appropriate and use a 5% construction cost contingency and 5.7% CoE S&A factor. These factors shall be clearly identified in the cost estimate with proper explanatory back-up data. See Enclosure 8 for additional requirements.

4.2.4 The concept submission, if necessary, shall have additives/options identified by the A-E for all construction costs in excess of the Construction Cost Limit (CCL). If the CWE exceeds 90% of the PA, A-E will propose base bid and optional items addressing the entire scope of work included in the DD FORM 1391. The Government shall review and approve any optional/additives items identified by the A-E and, if necessary, prioritize additives. The cost estimate shall include a breakdown of costs for each additive or optional item. The construction cost estimate shall be subject to the review and concurrence of the Government. The CCL for the projects have been determined

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by the Government and is indicated in the preceding (see paragraph 1.0.).

4.2.5 Table of functional space allocations, in square feet, reflecting authorized and proposed allocations for new buildings, including existing space areas in case of expansion projects.

4.2.6 Pertinent data concerning site accessibility, utilities and existing streets and road, energy audit, and handicapped requirements. The A-E shall contact where/when necessary Sussex Rural Electric Corporation (SREC), Rockaway Sewage Authority, Violila Water, and Chevron for Heating/Air-Conditioning regarding existing systems, proposed interfaces and any specific requirements beyond those required by the Picatinny DPW or Army criteria and or standards. A-E shall provide electronic copy of all meetings or discussions within five (5) calendar days of the conclusion of the meeting. Minimally the COE TM, Picatinny PM and TM and US Navy End-Users shall be included on the distribution of these minutes/records. Copies of same shall be included in the submission as well.

4.2.7 Drawings including existing site conditions, proposed utility plan, demolition plan, if required, proposed site plan including building orientation, parking, lighting and fencing, proposed elevation illustrating exterior finish and proposed floor plans illustrating functional areas in SF. Site plans should include topographical detail, parking spaces with traffic flow and floor plans should show door locations and swing.

4.2.8 Soil and foundation analysis and report should be included in the Concept Submission, otherwise a detailed statement, based on work completed to date and anticipated outcomes, on best available information will be included in the submission.

4.2.9 Preparation of preliminary study and report for utilities and major structures. The existing utilities shall be investigated and evaluated to determine if those portions of the systems can support the proposed facilities with or without alteration. The A-E shall develop the construction cost for this alternative. The submission shall discuss: the pro's and cons of this alternate; make a clear recommendation as to whether the project budget can bear the cost of this alternate, and; recommend the direction design development should take for the next scheduled submission.

4.2.10 Telecommunication Requirements; The A-E is required to provide the design criteria and requirements for the telecommunications. The criteria shall be the basis for a complete detailed design (to be developed for future design submittals) in accordance with paragraph 7.8.

4.2.11 Radon Gas; The A-E is advised that the new facility is in an area that is prone to contamination to Radon gas and the designer shall address this issue during the study/design of the facilities.

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4.2.12 Economic analysis of major types of building systems. (Analysis may be based upon work, studies, etc. developed for other projects or equipment of the same or similar nature.) The A/E shall discuss energy savings and sustainable design issues with the Picatinny Utility Office, Mr. Nick Stecky, prior to is coordinated with regarding incorporation of potential energy savings criteria

4.2.13 The A-E shall identify and include in his concept submission the Energy Use Goals in accordance with ASHRAE 90.1, 2004.

4.2.14 Handicapped requirements shall be included in accordance with the "Uniform Federal Accessibility Standards" and ADA.

4.2.15 Seismic Analysis shall be prepared IAW TM-5-809-10, TM-5-809-10-1, TM-5-809-10-2.

4.2.16 A Preliminary Fire protection analysis and plan IAW UFC 3-600-0, Fire Protection Engineering for Facilities shall be submitted, the primary purpose being to determine fire separation, exiting, pump requirement, if any, and capture costs for same.

4.2.17 A-E shall develop the concept or preliminary design for the electrical, mechanical and structural aspects, which have particular importance to specific project functions IAW the "MANUAL OF STANDARD PROCEDURES FOR PLANNING AND DESIGN", NAMP 1110-1-1 (applicable to preliminary/concept analysis and/or calculations).

4.2.18 A-E shall develop the concept or preliminary landscape design for the facility.

4.2.19 A-E Prepared CPM Schedule. The A-E shall submit with the preliminary submission, a Bar Chart or CPM schedule for the project indicating construction milestones and long lead items, including risks involved in achieving the 2011 BRAC Deadline. The CPM schedule will be in sufficient detail to accurately estimate the proper construction duration of the facility. The A-E may use the more detailed NAS described in Enclosure 3 for additional requirements.

4.2.20 30% Design submission shall be distributed by the A-E in accordance with the attached Contract Deliverables and Distribution (Enclosure 4) and shall include all deliverables; i.e., mapping, minutes, reports.

4.3 Value Engineering Study

4.3.1 The A-E shall participate in a Value Engineering (VE) study along with the Corps of Engineers, the installation and Major Command representatives. The VE study will be conducted concurrently with the review of the A-E's Concept Submission. The A-E Project Manager, Project Architect, Civil Engineer, Structural Engineer, Mechanical Engineer, Electrical Engineer, Fire Protection Engineer, and Cost Engineer shall attend and participate in the VE study. The A-E shall fully cooperate with the Corps VE team in developing, assessing and implementing the VE options proposed by the team. The A-E shall assist the VE team in developing costs for the VE options. Upon acceptance and

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approval of the VE options by the installation, the design will incorporate the findings of the VE study with the next submission.

4.3.2 If the VE study requires changes to the design, which the A-E considers outside the scope of the contract, the A-E shall inform the Contracting Officer or his designated representative, in writing, along with a proposal for the required changes and impacts to the design schedule. If the Contracting Officer deems that the changes are outside the contract scope, a modification shall be issued to the A-E in accordance with the "Changes Clause".

4.4 30% Design Review Meeting

The A/E will attend a design review meeting subsequent to completion of the government review period (30 Days). Representatives will attend the meeting from the complete design team and all government reviewers. Comments will be managed via Dr Checks and will be reviewed prior to the meeting by the A/E. Each comment will be addressed at this meeting and the reasons for non-compliance will be presented. See Para. 6.0

4.5 NOT USED

4.6 NOT USED

4.7. 60% and Final Design Services

4.7.1. 60% Design Submittal:

Prepare drawings, draft "red-line" specifications, design analysis (update) and cost estimate including all comments and revisions from the previous submissions in accordance with NANP-1110-1-1.

The AE as part of the 60% design submittal shall prepare and submit for review an Explosives Site safety plan – 65% submittal - per the requirements of DA Pamphlet 385-64 and. DA Explosive Safety Site Plan Developer's Guide dated February 2006

4.8 90% Design Submittal:

Prepare drawings, specifications, update design analysis and cost estimate including all comments and revisions from the previous submission in accordance with NANP-1110-1-1. This submittal shall be complete in every respect and shall be ready for advertising, from the AE's perspective. All previous comments shall be resolved and incorporated into the 90% submittal. The design analysis shall be updated, revised as required. The drawings shall show the name of the reviewer and signature of the Principal of the firm responsible for the design as testimony that this submittal has been reviewed and found to be suitable for bidding. The specifications shall be typed, and shall include the completed SECTION 0800-CONTRACT REQUIREMENTS (NYD and Picatinny standard sections). A shop drawing submittal list on ENGINEERING FORM 4288 (Submittal Register) shall also be included in the specifications. Preparation of DD

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Form 4288 "Submittal Register" regarding shop drawing/submittals & samples to be reviewed as shown in Appendix A of NANP-1110-1-1 and "Instructions to A/E's For Preparation of Submittal Register and Review And Processing of Shop Drawings For The Corps of Engineers."

4.9 100% Design Submittal:

Prepare 100% drawings, specifications and cost estimate including all comments and revisions from the previous submissions for review and bidding. The corrected final (100%) design submittal shall incorporate all back check and BCO review comments or a response indicating the reasons for not incorporating the comments. The A/E shall submit a response to all previous review comments in a separate brochure.

The A/E shall also submit two electronic copies of the drawings and specifications with all amendments incorporated. One CD in AutoCAD/Word format for USMA and another in the COE Electronic Bid Set (EBS) format are required for advertising purposes.

The AE shall prepare and submit a final Explosives Safety Site Plan. The final plan shall incorporate all comments made at the 60% design submittal.

4.10 Building Information Modeling (BIM)

A/E Document production software and 3-Dimensional (3-D) Building Information Modeling shall be Autodesk Architectural Desktop based and converted to Microstation in the final submission to the USACE. (See Enclosure 7 for further design requirements).

4.10.1 Intelligent (i.e. Smart) 3-D Architectural objects shall include:

- a. Walls, Windows, and Spaces. (Other disciplines shall have similar objects, comprised of major elements and systems).
- b. Basic minimum data of smart objects shall include:
 - 1) Walls: Dimensions, ratings, style, and buildings components.
 - 2) Doors: Dimensions, the number of the space that they are attached to, door style, and material(s).
 - 3) Windows: Dimensions, the number of the space that they are attached to, window style, and material(s).
 - 4) Spaces: Geometry (length, width, height, square and cubic footages) Finishes, Room Names and Room Numbers.

5.0 Project Management, Meetings and Presentation:

The A/E will provide overall project management for the project. This includes, but is not limited to, management of sub consultants, management of CADD files, use of DrChecks system and overall quality control. The A/E will attend meetings with Corps of

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Engineer, Picatinny Arsenal, US Navy and other Federal, State and Local Government personnel as required. The A/E will attend design review, coordination meetings, and perform site visits as required

6.0 Review Comments and Compliance

All review comments either made during the review conference or in Dr. Checks during the review period require a response from the A-E. In general, corrective action and revisions to the documents contained in the submission will be incorporated in the next phase of the project development. In some instances the comments may require revision and re-submittal of a particular aspect of the submission (e.g.; cost estimate; reports; design analysis; survey mapping, etc.). Prior to the review meeting the A-E shall respond to all comments with an explanation for non-compliance via Dr. Checks comments review system. The A-E shall adhere to the following Dr. Checks review process and those instructions contained in SOP Picatinny Arsenal/NYD, Design Reviews and Use of Dr. Checks:

- a. The A-E shall provide initial response to Dr. Check's comments, in Dr. Checks, no later than 2 calendar days before the conclusion of the design review period. However, response shall be inserted in Dr. Checks prior to the schedule design review conference for that submittal.
- b. Next design submission will not be accepted unless initial response has been entered in Dr. Checks to all items from the previous design review. Meeting discussions will generally focus on comment that the A-E has not concurred or viewed as such and clarifications of comments and responses.
- c. For design review meeting purposes, items that have not had initial evaluation entered into Dr. Checks will be considered the same as non-concur items, requiring discussion by the group.
- d. Design review meetings are scheduled for 2-day period.
- e. A Memorandum for the Record (MFR) shall be distributed within five (5) calendar days of a meeting's conclusion. The MFR shall prepare a typewritten and distributed per enclosure 4. At a minimum, the MFR shall address: Comments not included in DrChecks, clarifications, summary of discussions pertinent to the A-E's work, direction received; attendees list; action items, if any, and to whom they were assigned. The MFR is intended to augment rather than duplicate the review comments and responses provided in Dr. Checks.
- f. The A-E shall provide 10 books that containing a compilation of the design review comments at each design review meeting. The A-E shall furnish a projector at each design review meeting for the purpose of projecting each design review comment.

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7.0 General Clauses and Requirements pertaining to the A-E Services herein

7.1 If at any stage of performance hereunder, the A-E finds that the Base Bid CCL, as set forth in paragraph 1.0 of this agreement, for the project being designed exceeds, or is likely to exceed the Base Bid CCL, the A-E will promptly report this fact to the Contracting Officer or designated representative and the COE PM. The A-E shall perform such redesign and other services as reasonably may be required to reduce construction cost, without further expense to the Government, when bids or proposals exceed the estimated base bid construction contract price (Base Bid CCL) established in this scope of work. The A-E shall not be required to perform such re-design and other services at no cost to the Government where unfavorable bids or proposals are the result of conditions beyond the reasonable control of the A-E. Where bids or proposals are not taken or are unreasonably delayed, the approved Government Estimate will be used in lieu of bids or proposals to determine compliance with the estimated base bid contract price requirement.

7.2 Prior to negotiation of the Architect-Engineer contract, and in order to avoid any possible conflict of interest, the designing firm for a proposed facility, including its subsidiaries, affiliates and associates, is hereby notified that it will not be permitted to construct the facility it will design under this contract.

7.3 All supporting data shall be properly labeled and submitted with each design submission.

7.4 Coordination. Coordination is required with the NY District, DPW (See table below), and Resident Engineer. In addition, all site visits must be coordinated with NY District, DPW office representative or Resident Engineer.

Utility Contact	Installation Primary Contact	Telephone	Contract Entity	Telephone
Electrical	Tom Struble	973.724.7926	SREC; Tim McCormack	973.875.5101
			SREC; Jim Siglin	973.875.5101
Nat'l Gas:	Ed Brice	973.724.3448	NJNG; Craig Swaylik	732.919.8133
	Nick Stecky	973.724.6098		
HVAC	Mick Unick	973.724.4683	Chevron (HVAC Maintenance)	
Water:	Bob Canning	973.724.7448	Violila Water; Robert Smith	973.366.9339
			Mick Unick	973.724.4683
Communication	Gary Gnidziejko, DOIM	973-724-6665		
	Steve Iannacone	973.724.3278		
Sanitary Sewer	Mick Unick	973.724.4683	Rockaway Valley Regional Sewer Authority;	973.263.1555

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			Ed Ho	
Environmental:	Tom Solecki	973.724.5818		
NEPA	Gil Myers	973.724.5957		
Air Quality	Bob Smith	973.724.5949		
Water Quality	Carol McLaughlin	973.724.2878		
CERCLA (groundwater & soil remediation)	Ted Gabel	973.724.6748		
Fire Dept./Water	Robert Tunis	973.724.4690		
	Matthew Denico	973.724.7730		
Sustainable Design	Nick Stecky	973.724.6098		
UXO/Explosive Safety	Bob Canning	973.724.7448		
	Ed Pinson	973.724.2877		
Record Drawings:	Jack Lyons	973.724.5991		
Notes: The names and entities listed above are subject to change without prior notification.				

7.5 Meetings and Conferences. Meetings and conferences initiated by the A-E or U.S. Agencies shall be held only with the approval of and/or in the presence of the COE PM. For each and all meetings and conference the A-E attends in conjunction with the project, the A-E shall prepare a typewritten Memorandum for the Record (MFR) of the matters discussed during the meetings and conferences and forwarded to the design project engineer within three (3) calendar days. See paragraph 6.0 for additional requirements, specific to submittal design review conferences.

7.6 Guide specifications (UFGS) may not be revised except as indicated by its accompanying instructions or by formal request for waiver.

7.7 Check and verify condition and capacity of existing utility systems that are to be used in this project. Report findings in Design Analysis. If a serious problem or issues is found or suspected report details of finding to COE PM and Picatinny Master Planner.

7.8 Telecommunications Requirements

The A-E is required to provide a complete detailed design (plans, specs, design analysis) of the telecommunications systems CAT 6 (telephone, data, LAN, PA) within the facility and associated work outside the building perimeter required to connect the facility into the base-wide telecommunications systems. The following support facilities for these systems are to be included in the construction documents as a part of the basic services of this contract.

a. A raceway tray system with associated outlet boxes and signals wiring will be designed by the A-E. Telephone handsets and other associated telecommunications equipment will not be included in the design. The size of the raceway system and wiring

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will be determined by the A-E.

b. A telecommunications equipment room with associated HVAC, power and lighting will be provided in support of the telecommunications requirement.

c. The A-E will provide a location plan for all signal outlet boxes and coordinate with Facility End-User requirements. Power outlet boxes will be shown as well as the signal outlet locations on a common location plan and will be coordinated with the signal outlet location and signal equipment (i.e., data, modems, TV's, printers, PC's, etc.) that will require power. For Range 647, the AE shall coordinate the location of range cameras, sirens, etc, with the Facility End-User.

d. The A-E shall clearly identify in the cost estimate, project funds that are to be set aside for telecommunications construction.

e. The A-E shall coordinate the telecommunications requirements with the installation's DOIM and DPW.

f. Incorporate Picatinny standards into the project drawings and/or specifications.

7.9 Full size drawings shall be required for all sets provided for Picatinny, inclusive of review, advertising, solicitation, construction, as-built, and any final drawings. However, all contract drawings shall be prepared with the understanding that when printed to half-size, they are completely legible. Pertinent criteria to assure this result are as follows:

a. Drafting will have sufficient line density to provide uniform photographic quality.

b. Legends and symbols as well as size, spacing and location of notes, dimensions, etc. shall be such as to produce legible half-size reproductions.

c. No lettering, shading or marking on the reverse side is acceptable.

d. Clearly distinguish between new work and existing work.

e. Graphic scale shall be provided on all drawings.

7.10 The Architect-Engineer agrees that if the surveys, studies or work prepared under the proposed contract comes under question, he will justify such work to the degree necessary to assure their correctness.

7.11 The Architect-Engineer shall prepare the project specifications using Unified Facilities Guide Specifications (UFGS). UFGS guide specifications are for use with SPECSINTACT Version 3.1.270 or later software. The Architect-Engineer shall prepare the specifications in SPECSINTACT, unless otherwise directed herein. In some instances, NYD has tailored UFGS specifications to suit its and its client needs or has created specification sections to meet the needs of the military construction program. The sections, which are listed below, with instructions to the Architect-Engineer, are available from the project TM in Word, unless otherwise indicated.

a. Section 00700. This section is entirely NYD's responsibility; therefore, the A-E is not responsible for this section.

b. Section 00800, Contract Special Provisions. NYD standard section 00800 is available in 'Word.' Editing instructions for the A-E are provided with this document. In some instances (e.g.; Picatinny Arsenal, NJ), NYD standard section 00800 must be edited to reflect installation specific requirements. The Picatinny 00800 supplements, also in Word and with editing instructions shall be incorporated into the NYD standard section by the A-E.

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- c. Section 01XXX, Warranty Management. The A-E shall change the section number to 01453 or other non-conflicting number of his choice. No further editing is required.
- d. Section 01310, Project Schedule: NETWORK ANALYSIS SYSTEM. Use for military work greater than \$2 Million or very large scale Civil works projects or complex HTRW remediation projects. Add "Standard Data Exchange Format" (SDEF) from ER 1-1-11 to the end.
- e. Section Sec 01311, Project Schedule- Bar Chart. Use for projects other than as indicated above.
- f. Section 01330, Submittals (Two standard sections are available. One for Design-Bid-Build (D-B-B) and one for Design Build (DB). Little editing is required in either. For DB projects, the A-E shall with the assistance of the TM, add to the list of submittals, items or specifications sections that the Government will retain the right to review and approve, if any (Available in SPECSINTACT only).
- g. Section 01312, Resident Management System. No editing required. Unless otherwise directed, use for all projects (Available in Word and SPECSINTACT).
- h. Section 01420, Safety. No editing required. Use for all NYD projects (Available in Word and SPECSINTACT).
- i. Section 01451, Contractor Quality Control. (Three standard versions of this section are available. Only one version is need for this project. Some minor editing may be required depending on the size of the project. COE PM TM will advise the A-E as to which version should be used and Instructions for editing will be provided.
- j. Section 01452, Testing for Mechanical and Elec. Systems. Use for all projects containing HVAC or any complex mechanical or electrical systems (Available in SPECSINTACT only).

7.12 In addition to DOD and Army criteria, the Architect-Engineer will employ safety and health standards promulgated under the Occupational Safety and Health Act (OSHA) of 1970 as published in the Federal Register, October 18, 1972, Volume 37, Number 202, Part II (Title 29, Chapter 17, Part 1910) and subsequently issued OSHA standards or standards consistent therewith in the design of this facility. In those cases where an identified inconsistency appears to be necessary, the Architect-Engineer will notify the New York District of the inconsistency for review and decision. In those cases where there are unique military requirements for which no applicable OSHA standards exists, Army standards currently employed will continue to apply.

7.13 As-Built Drawings - The A-E will be responsible for reviewing existing drawings, files and related design information for the existing structures that will be demolished, impacted or renovated by the new construction. The A-E shall perform field measurements and record the actual conditions of the existing structures; and preparing as-built drawings of the existing structures.

7.14 Delivery Media and Format for Final CADD Plans & Specifications; See Enclosure 5, STANDARD OPERATING PROCEDURE FOR CADD DELIVERABLES

7.15 DRAFT DD FORM 1354 – NOT USED

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7.16 Unless otherwise indicated the government has up to thirty (30) calendar days to review each accepted submittal. Within thirty (30) calendar days from the date the Government receives the A-E submission, comments concerning the submission will be entered by the Government into Dr. Checks. The A-E shall follow the procedures and respond to comments in Dr. Checks in accordance with the SOP Picatinny Arsenal/NYD, Design Reviews and Use of Dr. Checks and provide the deliverables described therein for each review meeting. The A-E shall provide initial comment to each item entered into Dr. Checks no later than two (2) calendar days before the comment closure and completed prior to that submission's design review meeting. Review meetings are expected to begin no later than thirty- seven (37) calendar days from Government's receipt of the acceptable design submission,

7.17 The A-E will provide within 30 calendar days of NTP a design management work breakdown structure (CPM). This will be used to manage A-E payment estimates and project progress.

7.18 SPECIAL DOCUMENTATION AND PARTICIPATION – Not Used

7.19 Partnering Meetings - Not Used

7.20 System Commissioning – Not Used

7.21 Engineering Considerations and Instructions – Not Used

7.22 COORDINATION OF PLANS AND SPECIFICATIONS AND QUALITY CONTROL

The A-E is required to provide the Government with a high quality design, products or work, shall assume full responsibility for quality control of his work under this contract, and shall thoroughly review his plans and specification and/or work at each submission to insure that the professional quality of the final work shall be such that review by the Government will be at a minimum. The A-E shall provide proper review and coordination among all disciplines including but not limited to architectural, mechanical, structural and electrical disciplines. Furthermore, the A-E shall provide a copy of their quality control procedures within thirty (30) calendar days of receipt of notice to proceed. The A-E is required to perform a formal independent quality control (IQC) check/review of his design/work prior to delivery of each submittal. This formal IQC shall be in addition to other quality controls measures employed by the A-E. The A-E shall notify the COE PM at least seven (7) calendar days prior to holding the formal IQC check/review, so that the COE PM and/or other District personnel may participate. The A-E shall submit with each scheduled submission a letter certifying that the quality control check has been performed, name of participants and shall also provide a copy of all comments and marked drawings generated by his own quality control check/review in accordance with Enclosure 4. Failure to do so may be cause to reject the submittal.

7.22.1 ADDITIONAL QUALITY CONTROL REQUIREMENTS FOR PICATINNY PROJECTS

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For all on-going and future projects at Picatinny, the A/E will implement the following additional quality control measures to ensure that critical errors committed on past Picatinny projects do not occur again. These corrective actions will be implemented for the Design Submittals.

a) Design Phase:

The Design A/E team has internal QC processes in place for all design deliverable. In addition to the existing processes, following additional measures will be implemented on on-going and future projects.

1) Project key discipline leader names will be submitted to COE PM and DPW POC for approval. If desired, resumes of the personnel will also be submitted.

2) Internal QC check list prepared by independent QC reviewers will be submitted with each submission. These QC lists will include the following key disciplines.

- Architecture
- Site Civil and Utilities
- Structural
- Mechanical
- Electrical
- Any other project specific key discipline (Fire, Explosiive Safety, Range Development, etc.)

3) Submit QC Check List Certification signed by the AE's Project QC officer and the AE's Project Manager. This will include resolution of all client comments on Dr. Checks (or other comments received in writing).

4) Included a comparison table of DD1391 vs. the current design on the cover of the drawings.

5) Include comparison table of CWE vs. programmed amount (PA) on the cover of each cost estimate submission. Also, if CWE exceeds the PA, identify options to bring costs to PA that meets DD1391 scope.

7.23 SUSTAINABLE DESIGN AND DEVELOPMENT

References:

1. ECB No. 2007-5 Leadership in Energy and Environmental Design, Accredited Professional (LEED-AP)
2. U.S. Green Building Council (USGBC) LEED for New Construction & Major Renovations Version Version 2.2.
3. ACSIM Sustainable Design Policy Letter dated 27 April 2007

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This project is to be designed with the intent of maximizing the use of sustainable design and development practices. Sustainable Design and Development is a concept and engineering approach to planning, designing, building, renovating and operating innovative, environmentally compatible, energy efficient, cost effective and people friendly facilities. Provide systematic consideration of current and future impacts of an activity, product or decision on the environment, energy use, natural resources economy and quality of life. Guidance on sustainable design for the design and construction of all new Army facilities and the rehabilitation/renovation of existing facilities is contained in Reference 1, above. The goal for this project is to incorporate sustainable design features where life cycle cost effective to achieve a **minimum** of the certified level of the LEED Building rating system. The Installation and USACE Engineer District, with the AE will jointly verify the final LEED score and rating. The USGBC certification is not required. The A/E shall score the project for each submission for sustainable design achievement utilizing the LEED® Rating System Tool, Reference 2. In addition to submitting the LEED® score sheet, the A/E shall also submit a detailed description of points received for each category. The A/E is encouraged to strive to achieve the highest sustainable design rating possible; however, at a minimum, this project must receive the **Silver** rating.

7.24 PRECEDENCE

The direction herein to the Architect-Engineer provides specific instructions for the design of the subject project. In case of conflict this document takes precedence over the requirements of those found in NYD Manual of Standard procedures for Planning and Design, dated March 1990, and other referenced materials and attachments named herein, except Enclosure 4, Contract Deliverables and Distribution. The A-E is responsible for preparations and delivery of items listed in this enclosure. Exclusion of items contained within this scope of work or by references herein, but not specifically indicated in enclosure 4 does shall not relieve the A-E of their responsibility to provide these items.

7.25 PROSECUTION OF WORK

The Architect-Engineer shall furnish sufficient, qualified technical, supervisory, and administrative personnel to insure the expeditious prosecution of the work.

7.26 DRAWING NUMBERS

Refer to Enclosure 5, Standard Operating Procedure for CADD Deliverables and Current version of A-E/C CADD Standards.

7.27 INGRESS OR EGRESS

Should it become necessary for the Architect-Engineer to secure the right of ingress and egress to perform any of the work required herein on properties not owned or controlled by the Government, the Architect-Engineer shall, secure the consent of the owner, his representative, or agent prior to entering the property.

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7.28 CONFIDENTIALITY

The Architect-Engineer agrees that his contract with his sub-consulting engineer(s), who is preparing cost estimates and quantities, will specifically state that all estimates and related data prepared by the sub-consultant, are considered to be of a classified nature and are not to be furnished to any outside personnel and/or agency without obtaining prior authorization from the Contracting Officer. All such estimates and data shall be furnished to authorized Government personnel on a "need-to-know" basis only subsequent to receipt of authorization from the Contracting Officer. The Architect-Engineer agrees that when the cost estimates and quantity take-offs prepared by his consultants or subcontractors, the aforementioned control and criteria for handling these data, will be incorporated into their respective subcontracts.

7.29 METRIC DESIGN - Not Used

7.30 FORCE PROTECTION

The A-E shall design in accordance with UFC 4-010-01, DOD Minimum Antiterrorism Standards for Buildings. The A-E is required to coordinate project specific site design and related force protection project features with the Picatinny Arsenal Master Plan (currently being updated).

7.31 Required Submissions: A transmittal letter shall accompany each submission identifying the contents of the submission and all the recipients. See Enclosure 4, Contract Deliverables and their Distribution for the names, addresses specific deliverable to be received by each recipient.

8.0 PROJECT CRITERIA

8.1 The applicable portions of the Engineering Manual, Army Regulations, and other applicable publications shall govern the design and preparation of plans, specifications, cost estimates and design analysis. Particular attention is invited to the following engineering manuals, which establish minimum requirements for plans, specifications, cost estimates and design analysis. Note that any clauses in this scope override the below listed criteria. The below listed, as well as, most other Army criteria with the exception of some Command and Installation produced criteria, are available from the Whole Building Design Guide (WBDG) <http://www.wbdg.org/> and Construction Criteria Base (CCB) at the WBDG website or via the following US Army COE websites: <http://www.hnd.usace.army.mil/techinfo/index.aspx> or <http://www.usace.army.mil>. This includes but not limited to the following publications:

- a. NANP1110-1-1, US Army Corps of Engineers, New York District (NAN), Manual of Standard Procedures for Planning and Design, dated March 1990 (For submittal content only)
- b. SOP Picatinny Arsenal/NYD, Design Reviews and Use of Dr. Checks Revision 1 dated 21 Feb 2007

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- c. COE Engineering Regulations, Manuals, Engineering Technical Letters (ETL) and Pamphlets (current editions); including, but not limited to the following:
 - TI 800-01 Design Criteria (A-Es' are to pay special note to this TI)
 - EM 385-1-1, U.S. Army COE Safety and Health Requirements Manual.
 - ER 414-1-10, Contractor Submittal Procedures.
 - ER-1110-1-263, Chemical Data Quality Management for HTW Remedial Activities.
 - ER-1110-345-122 Interior Design, dated 31 October 1989
 - ER 1110-345-700, "Design Analysis".
 - ER 1110-345-710, "Drawings, Military Construction".
 - ER 1110-345-720, "Specifications, Military Construction"
 - TM 5-785-1, "Engineering Weather Data"
 - TM 5-800 Series of Technical Manuals/UFC series of Facilities Criteria
 - EM 1110-2-1906 "Laboratory Soils Testing"
- d. UFC 3-600-0: Fire Protection for Facilities, Engineering, Design, and Construction.
- e. Unified Facilities Guide Specifications. UFGS guide specifications are for use with SPECSINTACT latest software.
- f. Standard Specifications for Subsurface Exploration and Field Testing dated October 1980.
- g. Current version of A-E/C CADD Standards (See web page: <http://tsc.wes.army.mil> for latest version).
- h. NYD Picatinny Supplement to Section 00800, dated June 2006 (Available from NYD TM or RE).

8.2 The following letters, documents, publications and other listed items shall be incorporated into the design of this project:

- a. DES-2009-BCA5-065425-PICATNY ARS-AMC-09 Design Directive dated 27 July 2007: Description: Weapons & Handling Eng Ctr; Project Number: 65425; Picatinny Arsenal, NJ.
- b. DD Form 1391 dated 18 August 2007 PHST Center, Picatinny Arsenal, NJ, (accompanying item a, above).
- c. Unified Facilities Guide Specifications. UFGS guide specifications are for use with SPECSINTACT Version 3.1.270 or later software.
- d. Current version of Tri-Service A-E/C CADD Standards, Spatial Data Standards, and A-E Deliverable Standards. See web page: <http://tsc.wes.army.mil> for latest version.
- e. Installation Information Infrastructure Architecture (I3A) Implementation Guide, Version 3 dated April 2001. See web page: <http://akea-cio.army.mil/i3a/i3a.asp>.
- f. Picatinny Arsenal Installation Design Guide, dated December 1994.
- g. DAPAM, 385-64 DA Safety Requirements, December 1999
- h. AR 190-11, DA Security Requirements.
- i. UFC DoD Minimum Antiterrorism Standards For Buildings.
- j. Army Engineering Technical Letters (ETL's). (These are available on the CCB and at the respective web sites: <http://www.hnd.usace.army.mil/techinfo>.)

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- k. AMC 385-100, Safety.
- l. DCID 6/9 Manual – Physical Security Standards for SCIF (Sensitive Compartmented Information Facilities) dated 23 December 2002.
- m. DA Explosive Safety Site Plan Developer’s Guide dated February 2006.
- n. AR 350-19 Army Sustainable Range Program dated 30 August 2005

8.3 Other Applicable (non-Government) Publications and References (latest editions):

- a. International Building Code
- b. International Plumbing Code
- c. National Fire Protection Association (NFPA)
- d. National Institute of Occupational Safety and Health (NIOSH) Standards (latest editions)
- e. Occupational Safety and Health Administration (OSHA) Standards (latest editions). All Government furnished items will be provided or a source will be given by the COE project manager upon request from the A-E.

9.0 SUBMISSIONS:

All submissions will be accompanied by a letter of transmittal identifying the contents of the submission.

<u>Submission</u>	<u>Elements</u>
30% Design	Design Package (Plans, Listing of Specifications, & Design Analysis and MII Cost Estimate Sustainable Design Report CPM Schedule
60% Design	60% Design Package (Plans, draft “red-line” specifications, design analysis and MII Cost Estimate. Incorporated Review Comments Incorporated VE Study findings and decisions. Sustainable Design Report CPM Schedule Draft Explosives Safety Site Plan
65% Design	Explosives Safety Site Plan
90% Design	90% Design Package (Plans, revised specifications, design analysis and MII Cost Estimate. Incorporated 60% Review Comments Sustainable Design Report CPM Schedule Final Explosives Safety Site Plan

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100% Design	100% Design Package (Plans, revised specifications, design analysis and MII Cost Estimate. Incorporated 90% Review Comments Sustainable Design Report CPM Schedule CD with EBS Submission
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10.0 COMPLETION SCHEDULE

The following schedule will be adhered to for the receipt of contract deliverables:

A/E Quality Control Plan	30 Calendar days after receipt of written notice to proceed
Meeting minutes or record of direction or information received.	All minutes shall be completed within five (5) calendar days of closing of the meeting.
Close out of DrChecks comments.	All comments and subsequent review comments shall be responded to in Dr. Checks within 10 calendar days unless specifically indicated otherwise in the preceding.
Progress Report	All progress reports shall be submitted every two weeks.
30% Concept Design	The Concept Design will be submitted within 120 calendar days after receipt of written notice to proceed and approval of design charrette report.
60% Design	The 60% design will be submitted within 90 calendar days after receipt of written notice to proceed and approval of the 35% Concept Design.
65% Design	The 60% design will be submitted within 90 calendar days after receipt of written notice to proceed and approval of the 35% Concept Design.
90% Design	The 90% Design will be submitted within 60 calendar days, respectively, after completion of the 60% design review conference and 90% design review conference.
100% Concept Design	The 100% Design will be submitted within 30 calendar days after completion of the 90% design review conference.

The government will have a 21-day review period for each submission.

11.0 REQUESTS FOR PAYMENT

The A/E shall include a progress report along with the Payment Estimate – Contract Performance, ENG Form 93 as justification for the amount of payment requested. The progress report shall include in narrative form a Summary of Activities, Estimated Percentage Complete, Project Schedule Evaluation, Action Items, and Problems and Recommended Solutions. Progress payments along with progress report will be submitted to:

US Army Engineer District, NY

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Attn: CENAN-EN-M/Mr. Steve DiBari
26 Federal Plaza, Room 2037
NY, NY 10278

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12.0 LIST OF ENCLOSURES

The following attached items are appended to this scope of work:

Enclosure 1	Not Used
Enclosure 2	Not Used
Enclosure 3	A-E Prepared Network Analysis System /CPM Scheduling
Enclosure 4	Contract Deliverables and Distribution
Enclosure 5	Standard Operating Procedure for CADD Deliverables
Enclosure 6	Topographic and Utility Verification Survey
Enclosure 7	Building Information Modeling (BIM) Requirements.
Enclosure 8	Construction Cost Estimating Requirements
Enclosure 9	Visitor Notification/Registration Form, Camera Pass and Instructions for Entering Picatinny Arsenal
Enclosure 10	Not Used
Enclosure 11	Not Used
Enclosure 12	Not Used
Enclosure 13	Not Used

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Enclosure 3

A-E PREPARED NETWORK ANALYSIS SYSTEM/CPM SCHEDULING

The A-E shall submit with the concept submission, a CPM schedule for the project indicating construction milestones and long lead items. The CPM schedule will be in sufficient detail to accurately estimate the proper construction duration. The A-E shall retain the services of a construction-scheduling consultant if not staffed to provide this service. The CPM schedule will conform to the following requirements:

1. The progress schedule to be prepared by the A-E shall consist of a network analysis system (NAS) as described below. In preparing this system, the scheduling of construction is the responsibility of the A-E. The requirement for the system is included to assist the Government in appraising the reasonableness of the proposed schedule. Additionally, the network system will form the basis for the evaluation of the A-E prepared cost estimate.
2. The development and updating of the NAS will be by the critical path method and will be computer generated using MS Project or Primavera software (to be determined by government representative) on IBM PC compatible equipment. Other computer software will be considered subject to the approval of the Contracting Officer provided that the Contractor can provide input data that can interface with the above software and IBM PC computers.
3. The NAS shall consist of logic diagrams, mathematical analysis, and other data specified herein. Each facility shall be separately identifiable in the network system, and a summary network system shall be provided which shows each facility as a separate item. Facility completion dates shall be shown in the detailed system as well as in the summary.
 - a. Logic diagrams shall show the order and interdependence of activities and the sequence in which the work is to be accomplished as planned by the A-E. The basic concept of the network analysis diagram will be followed to show how the start of a given activity is dependent on the completion of preceding activities and its completion restricts the start of following activities. The description duration shall be shown for each activity. The critical path shall be clearly indicated and the required completion dates shall be accurately shown.
 - b. Each facility shall be shown in the network system in sufficient detail to show how the major features of work such as but not limited to: layout, site preparation, footings, below grade plumbing, masonry, structural steel, roofing, electrical, mechanical, carpentry, painting, flooring, etc. In addition, procurement of critical long lead items including the submittal approval and delivery times shall be included in detail when affecting progress and facility required completion dates. The number of activities assigned and the degree of detail will be subject to the approval of the Contracting Officer. It shall be such that the progress of work on each activity can be measures and reported separately.

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- c. A summary network system shall be provided for the entire contract. It shall show each facility as the one or more activities as necessary to reflect their interdependence. Each activity in the summary network shall have durations that are consistent with the detailed work. The summary network shall reflect the overall progress of each project and the overall progress of the contract.
 - d. A separate mathematical analysis shall be provided for each facility and for the summary diagram. The mathematical analysis shall include a tabulation of each activity shown on the network diagrams. The following information will be furnished as a minimum for each activity:
 - i. Preceding and following event numbers,
 - ii. Activity description, Estimated duration of activities,
 - iii. Earliest start and finish dates (by calendar date),
 - iv. Latest start and finish date (by calendar date).
 - e. The analysis shall list the activities in sorts of groups as follows:
 - i. By the preceding event number from the lowest to the highest and then in order of the following event number.
 - ii. By the amount of slack, then in order of preceding event and then in order of succeeding event numbers,
 - iii. In order of the latest finish dates and,
 - iv. Then in order of preceding event and then in order of succeeding event numbers.
 - f. In addition to the logic diagrams and mathematical analysis an early finish and late finish for each facility shall be provided.
4. Review: The A-E shall participate in a review and evaluation of the proposed NAS by the Government. Any revision necessary as a result of this review shall be re-submitted for approval by the Government within ten (10) calendar days after the conference. The schedule will then be again reviewed as a completely new submission and necessary revision again made within ten (10) calendar days. The approved schedule shall then be the schedule to be used by the A-E for planning, organizing and phasing the work. If the A-E thereafter determines that major changes are required to the approved schedule, the A-E shall notify the Government in writing of the cause of the change and the anticipated schedule impact.

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5. Definitions:

- a. A change may be considered of a major nature if the time estimated to be required or actually used for an activity or the logic of sequence of activities is varied from the original plan to a degree that there is reasonable doubt as to the effect on the contract completion date(s). Changes which affect activities with adequate slack time shall be considered as minor changes, except that an accumulation of minor changes may be considered as a major change when their cumulative effect might affect the contract completion date(s).

- b. Float or slack is defined as the amount of time between early start date and the late start day, or the early finish date and the late finish date, or any of the activities in the NAS schedule. Float or slack is not the time for the exclusive use of or benefit of either the Government or the Contractor.

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Enclosure 4

Contract Deliverables and their Distribution

Office	AE Quality Control Report	30% Design Submittal	35% Design Submittal	60% Design Submittal	65% Design Submittal	90 % Design Submittal	100% Design Submittal
U.S. Army Engineer District, New York ATTN: CENAN-EN-M (Rodney Abrams, P.E.) Room 2037 26 Federal Plaza New York, NY 10278-0090 (917)790-8289	1 RT	10 HS 1 FS 2 ES 6 ECS 1 RT 2 QC	10 HS 1 FS 2 ES 6 ECS 1 RT 2 QC	10 HS 1 FS 2 ES 6 ECS 1 RT 2 QC	1 HS	10 HS 1 FS 2 ES 6 ECS 1 RT 2 QC	10 HS 1 FS 2 ES 6 ECS 1 RT 2 QC 1CD
U.S. Army Engineer District, New York ATTN: CENAN-PP-M (Richard Mandra, P.E.) Room 21-100 26 Federal Plaza New York, NY 10278-0090 (917)790-8225		1 HS 1 ES	1 HS 1 ES	1 HS 1 ES	1 HS	1 HS 1 ES	1 HS 1 ES
Picatinny Arsenal Directorate of Public Works ATTN: Chief, Master Plans and Programs Office (Saleem Mithwani, P.E.) B-3002 Bldg 3002, Picatinny, NJ 07806-5000 (973)724-4365		12 FS 2 ES 1 CD 1 RT 2 QC	12 FS 2 ES 1 CD 1 RT 2 QC	12 FS 2 ES 1 CD 1 RT 2 QC	8 FS	12 FS 2 ES 1 CD 1 RT 2 QC	12 FS 2 ES 1 CD 1 RT 2 QC
Resident Engineer (Picatinny) U.S. Army Engineer District, New York ATTN: Sal Chiommio B-3002 Picatinny, NJ 07806-5000 (973)989-9265		1 FS 1 HS 1 ES	1 FS 1 HS 1 ES	1 FS 1 HS 1 ES		1 FS 1 HS 1 ES	1 FS 1 HS 1 ES
US Army Information Systems Engineering Command (USAISEC) Fort Detrick Eng'g Directorate ATTN: AMSEL-IE-DE-IN-CO (Tina M. Reed) Fort Detrick MD 21702-5047 (301)619-6501		1 FS	1FS	1FS		1FS	1FS
US Army Engineer District, Baltimore ATTN: CENAB-EN-DM Christopher Giordano 10 South Howard Street Room 9700-I Baltimore, MD 21201 (410) 962-3716		1 FS	1FS	1FS		1FS	1FS
David Rogers, Navy BRAC Coordinator Picatinny Arsenal 07806-5000		1 FS	1 FS	1 FS		1 FS	1 FS

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973-724-7017							
Richard Cellary Naval PHS&T Center Earle NWS, NJ 732-866-2804		2 FS	2 FS	2 FS		2 FS	2 FS
Vicky Naujokas Picatinny ARDEC BRAC Coordinator Picatinny Arsenal 973-724-6010		1 FS	1FS	1FS		1FS	1FS

Key for above table:

- FS = Full size plan sets plus specifications, narrative, and design analysis
- HS = Half size plan sets plus specifications, narrative, and design analysis
- SITE = Specs-in-tact in Adobe Acrobat (all specifications in one merged bookmarked file.
- ES = Cost Estimate
- ECS = Cost estimate included on computer disc in MCACES/MII format.
- EBS = Electronic Bid Set
- CD = CD ROM containing the plans, specifications, narrative, and design analysis in PDF Format
- CDR = CD ROM, containing the plans in Microstation Format, latest revisions as of construction contract award with Specifications and amendments in .pdf format.
- RD = Rendering
- RT = Reports (i.e., hydrant flow tests, topographic survey, geotechnical report, water quality tests)
- QC = Notes, comments and marked drawings of the A-E's internal quality control review.
- DD54 = DD Form 1354 & Checklist, hard copy and electronic copy via email
- ECl = Engineering Considerations and Instructions
- QC = A-E quality control comments and marked drawings

Notes for above table:

- a. Each submission set will consist of the design submission package and the cost estimate.
- b. The names and entities listed above are subject to change without prior notification.

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Enclosure 5

STANDARD OPERATING PROCEDURE
FOR
CADD DELIVERABLES

A. GENERAL.

Project Code: PICA_SYSTECHDATAFAC

Drawing Size: ANSI D (22"x 34")

Working Units: English

All design work; surveying work, drawings, maps, details, and similar products to be provided under this contract shall be accomplished and developed using computer-aided design and drafting (CADD) software and procedures conforming to the following criteria.

B. GRAPHIC FORMAT.

All CADD files and data shall be supplied in **MicroStation V8** native format (i.e., .dgn, .cel).

If the Contractor generated the CADD data using software other than Microstation V8, the Contractor shall also submit the data in the format that it was generated in. (For example, if the Contractor used AutoCAD to create the files he must submit the AutoCAD (.DWG) files in addition to Microstation V8 (.DGN) files)

C. CADD STANDARDS.

CADD drawings shall be prepared in accordance with the "Architectural/Engineering/Construction (A-E/C) Computer-Aided Design and Drafting (CADD) Standard, Release 2.0." Standard drawing size and working units shall be as specified in Paragraph A, above.

All model files and sheet files shall include the project code specified in Paragraph A in their A-E/C CADD Standard file-name.

The Contractor must submit a written request and obtain written approval from the Government for any deviations from the Government's established A-E/C CADD standard.

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D. DELIVERY MEDIA AND FORMAT.

All CADD data and files developed under this contract shall be delivered to the Government on CD-ROM with each submittal as required in the Schedule of Work. Each disc shall be in a separate jewel case.

Model files, sheet files, and other associated files shall not be device-dependent, nor shall the directory structure of the CD-ROM require any reconfiguration or other manipulation on the Government's part to view, print, and plot the files directly from the CD-ROM. The directory structure of the CD-ROM shall be configured such that a *complete* download of the CD-ROM's contents to an electronic folder on a Government computer's hard drive will not require any reconfiguration or other manipulation on the Government's part to view, print, and plot the files.

A portable document format (.pdf) file containing the set of full-sized plotted Sheet Files shall be included on each CD-ROM.

Each CD-ROM shall be labeled with, as a minimum, the following information:

- (1) The Project's Name, Contract Number (and Delivery Order Number if applicable), date, and version and/or submission number.
- (2) The format and version of operating system software.
- (3) The name of the preparer's firm and the name and phone number of the preparer's Point-of-Contact for the project.
- (4) The name and office symbol of the Government's Point-of-Contact for the project.
- (5) The sequence number of the digital media.
- (6) A description of the contents of the CD-ROM (e.g., "Architectural Plans," etc.).

An .html file named README_**[insert project code]**.html containing the CD-ROM's labeling information indicated above as well as any other information as required shall be included on each CD-ROM.

The jewel case label for each CD-ROM shall be printed and shall contain, as a minimum, the following information:

- (1) The Project's Name, Contract Number (and Delivery Order Number if applicable), date, and version and/or submission number.
- (2) The name of the preparer's firm and the name and phone number of the preparer's Point-of-Contact for the project.
- (3) The name and office symbol of the Government's Point-of-Contact for the project.
- (4) The sequence number of the digital media.
- (5) A description of the contents of the CD-ROM (e.g., "Architectural Plans," etc.).
- (6) A tabular listing of all files on the CD-ROM.
- (7) A chart clearly showing the directory structure of the CD-ROM.
- (8) For multiple-CD-ROM packages, a tabular listing of all files in the package with clear indication of the total number of CD-ROMs in the package, and a listing of the contents of, as per item (5) above, of each of the CD-ROMs.
- (9) A complete listing of the project's version and/or submission history.

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E. DRAWING DEVELOPMENT DOCUMENTATION.

The following information for each model file shall be included in the nonplot level, *-ANNO-NPLT:

- (1) How the data were input (e.g., keyed in, downloaded from a survey total station instrument (include name and model)).
- (2) Brief drawing development history (e.g., date started, modification date(s) with brief description of item(s) modified, author's name).
- (3) The names of the reference files, cells, symbols, details, tables, and schedule files required for the finished drawing.
- (4) Level assignments and lock settings.
- (5) Text fonts, line styles used, and pen settings.

F. HARD COPY TRANSMITTALS.

A transmittal letter shall accompany each electronic digital media submittal to the Government. The transmittal letter shall be dated and signed by the appropriate Contractor's representative. An electronic copy of the transmittal letter in .pdf format shall also be provided on the CD-ROM submitted to the Government. The transmittal letter shall contain, as a minimum, the following information:

- (1) The information included on the external label of each CD-ROM, along with the total number being delivered, and a list of the names and descriptions of the files on each media unit.
- (2) Brief instructions for transferring the files from the media.
- (3) Certification that all delivery media are free of known computer viruses. A statement including the name(s) and release date(s) of the virus-scanning software used to analyze the delivery media, the date the virus scan was performed, and the operator's name shall also be included with the certification. The release or version date of the virus-scanning software shall be the current version, which has detected the latest known viruses at the time of delivery of the digital media.
- (4) A statement indicating that the A-E will retain a copy of all delivered electronic digital media (with all files included) for at least one year and, during this period of time, will provide additional copies of each, as described in the Scope of Work, to the Government, if requested, at no additional cost.

In addition, the Contractor shall provide the following "Plot File Development and Project Documentation Information" as an enclosure or attachment to the transmittal letter provided with each electronic digital media submittal. An electronic copy of this information in .pdf format shall also be provided on the electronic digital media submitted to the Government.

- (1) Documentation of the plot file for each drawing that will be needed to be able to duplicate the creation of the plot file by the Government at a later date. This documentation shall include the plotter configuration (e.g., name and model of plotter), pen settings, drawing orientation, drawing size, and any other special instructions.
- (2) Instructions concerning how to generate plotted, or hard copy, drawings from the provided plot files.
- (3) List of any deviations from the Government's standard level scheme and file-naming conventions and a copy of the Government's signed and dated approval letter allowing these exact deviations from the A-E/C CADD Standards.
- (4) List of all new symbol cells, created for the project, that were not provided to the Contractor with the Government-furnished materials.
- (5) List of all new figures, symbols, tables, schedules, details, and other cells, created for the project, which were not provided to the Contractor with the Government-furnished materials, and any associated properties.
- (6) List of all database files associated with each drawing, as well as a description and documentation of the database

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format and schema design.

- (7) Recommended modifications which will be necessary to make the data available for GIS use.

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G. OWNERSHIP.

The Government, for itself and such others as it deems appropriate, will have unlimited rights under this contract to all information and materials developed under this contract and furnished to the Government and documentation thereof, reports, and listings, and all other items pertaining to the work and services pursuant to this agreement including any copyright. Unlimited rights under this contract are rights to use, duplicate, or disclose text, data, drawings, and information, in whole or in part in any manner and for any purpose whatsoever without compensation to or approval from the Contractor. The Government will at all reasonable times have the right to inspect the work and will have access to and the right to make copies of the above-mentioned items. All text, electronic digital files, data, and other products generated under this contract shall become the property of the Government. By reference, the following DFAR clauses are included in this contract as a part of the requirements herein:

- (1) DFAR 252.227-7013, "Rights in Technical Data - Noncommercial Items."
- (2) DFAR 252.227-7017, "Identification and Assertion of Use, Release, or Disclosure Restrictions."
- (3) DFAR 252.227-7020, "Rights in Special Works."
- (4) DFAR 252.227-7028, "Technical Data or Computer Software Previously Delivered to the Government."
- (5) DFAR 252.227-7037, "Validation of Restrictive Markings on Technical Data."
- (6) DFAR 252.227-7025, "Limitations on the Use or Disclosure of Government-Furnished Information Marked with Restrictive Legends."
- (7) DFAR 252.227-7014, "Rights in Noncommercial Computer Software and Noncommercial Computer Software Documentation."

H. GOVERNMENT-FURNISHED MATERIALS.

1. Electronic (.pdf) copy of latest version of A-E/C CADD Standard.
2. Model files containing the Government's standard border sheets.

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Enclosure 6

TOPOGRAPHIC AND UTILITY VERIFICATION SURVEY

1. PROJECT: PHS&T Center
2. LOCATION: Picatinny Arsenal, NJ
3. GENERAL DESCRIPTION: Perform field utility verification surveys for use in developing a Design-Build Request for Proposal as detailed in this scope of work. The survey shall be performed on the ground by crews under the general supervision of a Licensed Professional Surveyor. The area to be surveyed is indicated on the enclosed.
4. SPECIFIC REQUIREMENTS:
 - A. FIELD SURVEY
 - 1) Horizontal accuracy for the project shall comply with Corps of Engineers Third-Order standards as outlined in EM 1110-1-1005.
 - 2) Vertical accuracy shall be Fourth-Order per EM 1110-1-1005.
 - 3) Contractor shall establish horizontal and vertical control in project area. The control shall be tied to the North American Datum of 1983 (NAD'83) and the National Geodetic Vertical Datum of 1988 (NGVD'88). Control points shall be semi-permanent (re-bar w/cap) or permanent and set in a manner that they can be used for layout during construction. The coordinates and elevation of each control point shall be shown. Locating ties to control points are required.
 - 4) From said control points, the Contractor shall acquire topographic field to be used for 1:400 scale mapping with a 1 foot contour interval. Density of field elevations shall support 1:400 mapping and shall be provided as necessary to show all breaks in grade or changes in terrain. All elevations shall be taken to the nearest tenth (0.1) of a foot.
 - 5) Planimetric survey information shall include as a minimum buildings, roads, parking areas, sidewalks, fence lines, structures, drainage, etc. The final topographic maps will show location and finished floor elevations of existing buildings, type of pavement and locations of changes in pavement material, pavement striping, location type and sizes of trees and shrubs, extent of ponded water and the coordinate grid at 50 foot spacing. Utility information is required for the following:
 - (a) Water - Locate all valves, standpipes, regulators, etc. Locate all fire hydrants. Provide an elevation on top of valve box. Provide size of pipe and distance above ground for standpipes.

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- (b) Sanitary Sewer - Locate all manholes and provide top of rim elevation along with an invert elevation of all pipes connected to the manhole. Identify type, size, and direction of each pipe.
- (c) Storm Drainage - Locate manholes and all other storm drainage structures such as culverts, headwalls, catch basins, and clean-outs. Provide top of manhole or top of catch basin elevation along with an invert elevation of all pipes connected to a manhole or catch basin and bottom elevation. Identify type, size, and direction of each pipe. Provide type, size, and invert elevation for all culverts.
- (d) Electrical - Locate all power poles, guy wires, vaults, manholes, meters, transformers, electrical boxes, and substations. Obtain type and height of poles, number and size of transformers, number of cross-arms, number of wires (electrical and communication), direction and low wire elevation at each pole. Provide top of rim or top of vault elevation, top of wire or conduit elevation, direction and bottom elevation of manholes and vaults. Provide size for all electrical vaults and boxes.
- (e) Gas and Liquid Fuels - Locate all valves, meters, and gas line markers. Provide elevation on top of valve box valve.
- (f) Telephone Communications and Data - Locate all poles, manholes, boxes, etc. Provide top of rim elevation, top of wire or conduit elevation, direction and bottom of manhole elevation. Obtain type and height of poles, number of cross-arms, number of wires and low wire elevation at each pole.
- (g) Street Lighting - Locate all poles and provide type and height of poles. Identify number and type of lights on poles. If connected by wires, show direction and low wire elevation.
- (h) Heating - Locate all steam and high temperature hot water manholes and vaults, filler pipes, underground fuel tanks, etc. Provide top of rim or top of vault elevation, top of pipe elevation, direction and bottom of pit elevation. Provide size of vault and all pipe sizes within manhole or vault.
- (i) Fire Alarm - Locate any fire alarm systems (box with number), telephones (box with number), etc. in project.
- (j) Foundation remnants of buildings previously located on site.

4. SURVEY CRITERIA

This data shall be in compliance with the latest revisions of the following:

- a. EM 1110-1-1002 Survey Markers and Monumentation
- b. EM 1110-1-1005 Topographic Survey
- c. EM 1110-1-2909 Geospatial Data and Systems
- d. Spatial Data Standards for Facilities, Infrastructure and Environment (SDFIE), Release 2.20
- e. Current version of Tri-Services A/E/C CADD Standards, Spatial Data Standards and A/E Deliverable Standards

Refer to <http://tsc.wes.army.mil> for latest version
EM's can be found at www.hnd.usace.army.mil

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Enclosure 7

Building Information Modeling (BIM) Requirements

Section 1 - Submittal Format

1.1 Design Development Drawings.

All drawings will be developed using Building Information Modeling (BIM) software and CAD software. Design submittal drawings shall be ARCH D (24"x36") size and shall be suitable for half-size reproduction. All BIM submittals shall comply with the requirements of NANP-1110-02-01, "New York District Manual for Building Information Projects."

Section 2 – Design Requirements

2.1 Drawings.

All CAD files used for the creation of the construction documentation plan set shall comply with previously specified SOW for Phase II, 35% design contract.

2.2 Building Information Modeling (BIM).

BIM software will be utilized as a superset of CAD during the Design phase and the BIM model will be used to produce Construction Documents. The Design Project Team ("the Team") will create all Building Information Models and Facility Data in Autodesk Revit Ver 2008.

2.2.1 The BIM product specified is certified in the IFC Coordination View (2x3 or better). The A-E is required to submit any deviations from or additions to the IFC property sets for all new spaces, systems, and equipment for approval by the Contracting Officer.

2.2.2 Refer to Section 4 for BIM submittal requirements.

Coordinate any BIM application-specific requirements with the USACE New York District BIM Manager.

2.2.3 The Design-Build Project Team BIM implementation plan.

2.2.3.1 The Team will provide a plan on leveraging BIM modeling, design and analysis technologies using a common data model (integrated with the A/E/C CADD Standard) from concept development through Drawings of Record as a design, production, coordination, construction, and documentation tool.

2.2.3.2 The plan will include how BIM will be used to extract quantities and systems data, based on the level of development of the design input and documentation, to be used in cost analysis, value management, estimate validation, project scheduling, interference management and design-change tracking.

2.2.3.3 The plan will state how the BIM data will be managed and interoperate (data storage, sharing, and viewing) among all Team members.

2.2.3.4 Prior to Project Continuation ("Kickoff"), a BIM charette will be conducted to review the BIM scope for clarification and to demonstrate the technology workflow and processes to verify functionality. The New York District BIM manager or assigned government representative will determine the acceptability of the data management plan.

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2.2.4 Major elements in the BIM Scope include:

2.2.4.1 Project Specific BIM Facility Data – a set of intelligent objects (e.g., Doors, Air Handlers, and Electrical Panels, etc.). The Facility Data shall include all material definitions and other data that may be associated with facility design.

2.2.4.2 Project Specific Building Information Model – The BIM model will include, but not be limited to, the requirements of Section 4. Any variation will be submitted for approval to the Contracting Office.

2.2.4.3 Output From Project Specific BIM Facility Data – Each submittal will require a list of construction documents (i.e., Plans, Elevations, Sections and Schedules, Details, Quantity/Material take-off data) and COBIE requirements (see paragraph 2.5) that will be Produced from the Facility Data for approval by the Contracting Officer.

2.2.4.4 Models may vary in level of detail for individual elements within a model, but at a minimum must include Page all features that would be included on a ¼-in to 1-ft, 0-in. scaled drawing.

2.2.5 The BIM model will provide a common estimating material take-off basis to provide validation for quantities, and support a single quantity basis for all parallel estimating activities.

2.2.5.1 Estimates during the project execution:

2.2.5.1.1 Early M2 estimates will employ solely parametric data, rather than model quantity take-off data; this parametric method will be necessitated by the preliminary completeness of the BIM model during the early project design stages.

2.2.5.1.2 As the model begins to mature in development throughout the design, the Team will use a combination of M2 parametrics and detailed quantity take-off information to support subsequent cost estimating activities, (e.g., in a simplified model, cable tray lengths would be provided, but individual cable counts would not since individual cables would not be modeled).

2.3 The Team will include in the Quality Control (QC) plan the following:

2.3.1 Standards Check – This checking is performed to ensure that the fonts, dimensions, line styles, levels and other contract document issues are followed per the A/E/C CADD Standard.

2.3.2 Model Integrity – This validation is used to ensure that the project facility dataset has no undefined, incorrectly defined or duplicated elements. Non-compliant elements will be reported and require justification.

2.4 BIM will be used to perform Design and Construction Reviews.

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- 2.4.1 Visual Check – The purpose for this check is to ensure the design intent has been followed and that there are no unintended elements in the model.
- 2.4.2 Interference Management – Interference management is used to locate problems in the model where two objects are occupying the same physical space. Hard interferences and soft interferences (service access, fireproofing, insulation, etc.) will be reported. Examples of hard interferences include mechanical vs. structural and mechanical vs. mechanical.
- 2.5 Construction Operations Building Information Exchange (COBIE). The BIM model(s) and project specific BIM facility data shall be required to fulfill the COBIE requirements.
- 2.5.1 The National Building Information Model Standard (NBIMS) COBIE format shall be required for this electronic exchange. The COBIE standard specifies requirement for the indexing and submission of Portable Document Format (PDF) and other appropriate file formats that would otherwise be printed and submitted in compliance with project operations and maintenance handover requirements. The COBIE index shall be a Microsoft Excel Spreadsheet as provided by the NBIMS organization through their web site: www.nbims.org. Unless otherwise noted, the Team shall be required to provide information identified in the COBIE Pilot Implementation Standard worksheets.
- 2.5.2 The Team shall provide two (2) electronic copies of handover documents in lieu of the standard requirement to provide binders of Operations and Maintenance paper documents. The two (2) copies shall be submitted on DVD/CD-ROM and checked for read errors prior to submittal. One (1) copy shall be labeled as the “Designer of Record File Copy”. The other copy shall be labeled as the “Designer of Record Working Copy.” The name of the project, contract number, and contact information for the person creating the disk will also be included on the disk label.

Section 3 – Submittal Requirements

3.1 60% Design Submittal .

3.1.1 BIM Submittal requirements. The Building Model and all associated Project Specific Facility Dataset files will be provided on DVD/CD-ROM in native format for each deliverable. The Building Model will include items referenced in Section 2, Paragraph 2.2.4, as applicable.

3.1.1.1 The Team will certify that the CAD/BIM Model/Project Specific Facility Data consistency checks have been completed and a copy of the resulting report will be provided as a "team certified" submittal. Submittal reports will indicate no unresolved cross-discipline interferences. Reference Section 2, paragraph 2.3 and 2.4.

3.1.1.2 An IFC Coordination View in IFC Express format shall be provided for all deliverables. Exported property set data will be provided for all IFC supported named building elements.

3.1.1.3 Following approval of each design deliverable the Team will provide a 3D visualization of the building model in 3D .pdf or equivalent format. Other formats may be requested as needed.

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3.1.1.4 Cost estimate from the BIM Model showing supporting quantities of initial M2 cost estimate.

3.2 90% Design Submittal.

3.2.1 BIM Submittal requirements. Reference Section 3, paragraph 3.1.1.

3.3 95% Design Submittal.

3.3.1 BIM Submittal requirements. Reference Section 3, paragraph 3.1.1.

3.4 100% Design Submittal.

3.4.1 BIM Submittal requirements. Reference Section 3, paragraph 3.1.1.

Section 4 – BIM Model Minimum Requirements and Output

4.1 General Provisions. The deliverable model(s) shall be modeled to include the systems described below as they would be built to get complete and accurate quantity takeoffs of relevant construction materials, to satisfy COBIE requirements, and to reflect as-built conditions.

4.2 Architectural

The Architectural systems models may vary in level of detail or individual elements within a model, but at a minimum must include all features that would be included on a ¼-in to 1-ft,0-in. scaled drawing. Additional minimum requirements are:

- Spaces – The model shall include spaces defining accurate net square footage and net volume per client standard, and holding data for the room finish schedule to include room names and numbers. Include Programmatic Information linked to 1390/91 or validated program to verify design space against programmed space. This information will be used to validate area quantities for cost.
- Walls and Curtain Walls - Each wall shall be to the exact height, length, width and ratings to properly reflect wall types. The model(s) shall include all walls, both interior and exterior, and the necessary intelligence to produce the floor plans, sections and elevations.
- Doors, Windows and Louvers – Doors, windows and louvers shall be modeled to represent the actual size, type and location. Doors and windows shall be modeled with the necessary intelligence to produce schedules.
- Roof – The model shall include the roof configuration, drainage system, major penetrations, specialties, and the necessary intelligence to produce the roof plan, building sections and generic wall sections.
- Floors – The floor slab shall be modeled in the structural model and then referenced by the architectural models for each floor.
- Ceilings –All ceilings, including soffits, ceiling heights or other special conditions shall be in the model with the necessary intelligence to produce the reflected ceiling plan, building sections and generic wall sections.
- Vertical Circulation – Represents continuous vertical components (i.e., shafts, stairs, handrails and guardrails). Vertical Circulation elements shall be included with the necessary intelligence to produce plans, elevations and sections.

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- Architectural Specialties and Woodwork – All architectural specialties (i.e. toilet room accessories, toilet partitions, grab bars, lockers, display cases) and woodwork (i.e. cabinets and counters) shall be included with the necessary intelligence to produce plans, elevations and sections.
- Fixtures and Equipment – Represents components for Fixtures/Equipment layout requirements. Shall be included as required with the necessary intelligence to produce plans, elevations and sections.
- Schedules – Provide door, window and room finish schedules from the model indicating the materials and finishes used in the design.

4.3 Furniture

The furniture systems models may vary in level of detail for individual elements within a model, but at a minimum must include all features that would be included on a ¼-in to 1-ft, 0-in. scaled drawing. Additional minimum requirements are:

- Furniture – The model(s) shall include all relevant office and system furniture layouts, with necessary intelligence to produce the plans, sections, perspectives and elevations.

4.4 Structural

The Structural systems models may vary in level of detail for individual elements within a model, but at a minimum must include all features that would be included on a ¼-in to 1-ft, 0-in. scaled drawing. Additional minimum requirements are:

- Foundations - The model(s) shall include all relevant foundation elements with necessary intelligence to produce the foundation plans and elevations.
- Floor Slabs – The model(s) shall include the structural floor slabs with recesses, curbs, pads and major penetrations.
- Structural Framing – The model(s) shall include all columns, primary and secondary framing members, and bracing for the roof and floor systems (including decks), with necessary intelligence to produce the framing plans and building/wall sections.
- Cast-in-Place Concrete – The model(s) shall include all cast-in-place walls, columns, beams with necessary intelligence to produce plans and building/wall sections.
- Stairs – The structural model(s) shall include all framing members for the stairs with necessary intelligence to produce plans and building/wall sections.
- Elevators – The structural model(s) shall include the shaft, pit, door openings with necessary intelligence to produce plans and building/wall sections.

4.5 Mechanical

The Mechanical systems models may vary in level of detail for individual elements within a model, but at a minimum must include all features that would be included on a ¼-in to 1-ft, 0-in. scaled drawing. Additional minimum requirements are:

- HVAC -The model(s) shall include all relevant pieces of heating, ventilating, and air-conditioning equipment. Include the air distribution duct layouts for supply, return, ventilation, exhaust ducts, with necessary intelligence to produce the plans, elevations, building/wall sections and schedules. All piping larger than 1.5" diameter shall be modeled.
- Plumbing – The model(s) shall include all relevant fixture layouts, floor and area drains, and plumbing equipment, with necessary intelligence to produce the plans, elevations, building/wall sections and schedules. All piping larger than 1.5" diameter shall be modeled.
- Equipment clearances shall be modeled for use in interference management and maintenance access requirements.

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4.6 Electrical/Telecommunications

The Electrical systems models may vary in level of detail for individual elements within a model, but at a minimum must include all features that would be included on a ¼-in to 1-ft, 0-in. scaled drawing. Additional minimum requirements are:

- Interior Electrical / Power and Lighting Model– The model(s) shall include all relevant interior electrical components (i.e. lighting, receptacles special and general purpose power receptacles, special systems and lighting fixtures). with necessary intelligence to produce the plans. Cable tray routing will be modeled without detail of cable contents.
- Communications Model – The model(s) shall include all relevant existing and new communications service connections, both above ground and underground with necessary intelligence to produce the plans.
- Conduit larger than 1.5" shall be modeled.
- Exterior Building Lighting Model – The model(s) shall include all relevant locations of proposed exterior lighting with necessary intelligence to produce the plans and elevations.
- Electrical Site Model – The model(s) shall include all relevant existing and proposed support utility lines and equipment required with necessary intelligence to produce the plans.
- Equipment clearances shall be modeled for use in interference management and maintenance access requirements.

4.7 Fire Protection

The Fire Protection system model(s) may vary in level of detail for individual elements within a model, but at a minimum must include all features that would be included on a ¼-in to 1-ft, 0-in. scaled drawing. Additional minimum requirements are:

- The model(s) shall include all relevant fire protection components (i.e., branch piping, sprinkler heads, fittings, drains, pumps, tanks, panels) with necessary intelligence to produce the plans, elevations, building/wall sections and schedules. All fire protection piping shall be modeled.
- Indicate fire alarm/mass notification devices and detection system with necessary intelligence to produce the plans.

4.8 Civil

The Civil models may vary in level of detail for individual elements within a model, but at a minimum must include all features that would be included on an appropriately scaled drawing. Additional minimum requirements are:

- Terrain (DTM) – The model(s) shall include all relevant site conditions with necessary intelligence to produce the plans and cross sections.
- Drainage – The model(s) shall include all relevant existing/new piping conditions with necessary intelligence to produce the plans and profiles.
- Storm and Sanitary – The model(s) shall include all relevant sewer structures and piping conditions with necessary intelligence to produce the plans and profiles.
- Utility – The model(s) shall include all relevant new utilities from the building to the existing utilities and all existing above ground and underground utility conditions with necessary intelligence to produce the plans and site-sections.
- Road and Parking – The model(s) shall include all relevant roadway and parking lot facilities, with necessary Intelligence to produce the plans, profiles and cross-sections.

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5.0 BIM Ownership and Rights in Data

The Government has ownership of and rights to all Building Information Models, Facility Data, and associated electronic data.

Applicable "Rights In Data" clauses:

- FAR 52.227-1 Authorization And Consent (Jul 1995).
- FAR 52.227-2 Notice And Assistance Regarding Patent And Copyright Infringement (Aug 1996).
- FAR 52.227-3 Patent Indemnity (Apr 1984).
- FAR 52.227-17 Rights In Data - Special Works (Jun 1987).

Enclosure 8

CONSTRUCTION COST ESTIMATING REQUIREMENTS

1. The cost consultant will assure an adequate response to all of the cost estimate review comments and proper representation at review meetings.
2. The cost consultant is responsible for the accuracy of the cost estimate and assuring proper estimating support to the NYD Cost Engineering Branch (CEB).
3. The cost consultant shall assure the scope of work is properly addressed in the cost estimate while providing scope validation.
4. The A-E will provide a quality control certificate with each estimate indicating that an independent review was conducted. The comments from this action will be submitted for NAN review.
5. Estimating package submittal for each submission to include:
 - a. Narrative description of project scope, cost estimate.
 - b. Variance reports (tracking cost changes by WBS thru-out life of the design including footnotes denoting reasons for cost changes by WBS).
 - c. Quantity take-offs package.
 - d. Quote package.
 - e. Risk analysis (contingency during the budgeting phase).
 - f. Discussion of forward pricing, if included.
 - g. Catalog cuts
6. Submit MCACES electronic files. The electronic submittal shall include the project, UPB, crew, labor, and equipment files.
7. The MCACES shall include productivity, crew, labor and equipment to be used throughout the estimate and based on the most current information available.
8. General contractor and subcontractor markups will be spelled out in the MCACES, including General Condition (Field office overhead) expenses.
9. During course of conducting material price survey, the following should be considered:
 - a. Prices good for how long.
 - b. Minimum requirements for quotes shall include POC, Company, City, State, Telephone, Description, Quantity, Unit Price, Unit of Measure, FOB to jobsite, etc.
 - c. Minimum 3 quotes (deviation are allowed with reasons) and preferably from the vicinity nearest to the jobsite (deviation are allowed with reasons).
10. The MCACES shall follow the WBS (if an electronic copy of the template is required, request can be made thru the Corps POC), which serve as a checklist to ensure that all items required are included in

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the estimate

11. The MCACES Unit Price Book (UPB) is used solely for the purpose of generating crews & productivity. The costs in the UPB do not reflect the project location.
12. The MCACES Region 1 equipment database dated 1999 shall be used. Appropriate application of index can be applied at the "price adjustment" tool of MCACES, where applicable. Such adjustments shall have supporting documentations to support the index used.
13. The MCACES labor database shall reflect the latest prevailing wages for the project location and if applicable, future pricing due to the timing of the expiration date of each trade.
14. Notes will be extensively used thru-out the estimate to include quoted item and sources & calculation if more than 1 quote was obtained, any deviation from standard productivity used, etc.
15. QTO will be cross-referenced to drawings, design narrative, and specification.
16. Risk assessment (develop a list of items, in coordination with the designer, and take into account union hall agreement expiration, in-directs, job constraints, economic conditions, etc. all of which could be potential major cost drivers).
17. Designer will maintain close coordination with the cost consultant, including submittal of pertinent design requirements (once known) so estimator has specific information available to ascertain pricing.
18. Cost consultant to attend all scoping or design meetings critical to determining the construction cost.
19. Cost consultant shall have periodic conference calls with design team to learn what new issues arise.
20. A-E will provide quality control review of the construction cost estimate prior to submittal to the Corps.
21. The Corps reserved the right to request for additional supporting documentations, clarifications, additional references that it deems lacking from the estimate package.
22. The A-E shall provide 1 final update to the cost estimate past the 100% phase and prior to bid opening, to ensure the estimate contain the latest up-to-date information at time of bid opening.
23. The construction cost estimate must comply with the following Corps Regulations (where appropriate) are:
 - a. EI 01D010 Construction Cost Estimate <http://www.hnd.usace.army.mil/techinfo/ei.htm>
 - b. ER 1110-1-1300 Cost Engineering Policy and General Requirements <http://www.usace.army.mil/inet/usace-docs/eng-regs/cecw.htm>
 - c. ER 1110-3-1300 Military Programs Cost Engineering <http://www.usace.army.mil/inet/usace-docs/eng-regs/cemp.htm>
 - d. TI -802-01 Code 3 Parametric <http://www.usace.army.mil/inet/usace-docs/armytlm/>
 - e. EP1110-1-8 Equipment Manual <http://www.usace.army.mil/inet/usace-docs/eng-pamphlets/cecw.htm>

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Enclosure 9

Visitor Notification/Registration Form, Camera Pass and Instructions
for Entering Picatinny Arsenal

**Visitor Notification/Registration Form
(Form must be transmitted to Corps of Engineers via *email*, only –
Robert.T.Moran@usace.army.mil)**

Visitor's Name(s): May indicate additional visitors here if <u>all</u> information below is the same for each visitor. Otherwise, submit new form (i.e. submit separate forms for Drivers and Passengers, etc.).	1. 2. 3.	
Visitor's Employer:		
Employer's Address:		
Employer's Tel. #:		
Purpose of Visit:		
U.S. Citizen?	Yes:	No:
Enclosure Access Needed?	Yes:	No:
Duration of Visit: (Arrival date to end date)		

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Will visitor have a vehicle? (If yes, fill-in vehicle info below)	Yes:	No: (passenger)
* Vehicle Make:		
* Vehicle Model:		
* License Plate No: (Indicate State i.e. NJ, NY)		
Prime Contractor POC:		
Government POC:		
Location of Work/Visit:		

Please note that all visitor requests must be submitted to the Corps of Engineers office 24 business hours prior to the person(s)' scheduled visit to Picatinny Arsenal. Failure to adhere to all requirements shall be cause for the Security Division to deny entrance the base.

Status change in any information previously provided (including change in vehicle) to obtain a Visitor Pass/ID Badge shall render that Visitor Pass/ID Badge invalid, and shall require re-notification as indicated above, and re-processing at the Visitor Control Center.

* If vehicle is a Government Vehicle or rental vehicle, just indicate this in the vehicle info blocks.

Government personnel with Government ID, need not register. Government personnel with Government ID; but, using their POV, must pre-register their POV as indicated above.

Note: Visitors and/or vehicles will not be permitted access to Picatinny Arsenal without prior registration and the following: Employment Eligibility Form, INS Form I-9 (if not a US citizen), Driver's license or other type of approved photo identification.

Vehicle operators must possess current vehicle registration, insurance, DMV inspection sticker, and driver's license.

Cameras of any type are prohibited within Picatinny Arsenal without prior authorization via email (3 business days in advance). **(Info required: Name of person operating camera, location and purpose of photos, camera make, model #, and serial #).**

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For visits to Range 647, the Enclosure Access Required box will always be checked off "Yes"

Directions to Picatinny Resident Engineer Office

Phone: 973-989-9265, (or if using a Picatinny Arsenal phone: ext 44439)

Route 80 West

Take Exit 34B (Route 15 North)

Go to 1st traffic light

Make right into Picatinny main entrance just beyond traffic light

Make left into Visitor Center parking area to obtain visitor and/or vehicle pass, if necessary

Note for Government personnel: You can use your CAC card for identification. You can bypass the Visitor Center and proceed directly to guard house if you have a CAC card and Government vehicle.

Proceed to 1st guardhouse for initial ID check

Proceed though to right lane under vehicle inspection tent, and stop for vehicle inspection

Proceed straight on Parker Road to 1st traffic light

Bear right onto Buffington Road and proceed to fork in road

Bear right onto Bott Road and proceed to Stop Sign

Go straight through Stop Sign and continue on Bott Road to another Stop Sign

Bear right and proceed uphill on Main Road

Proceed approximately a quarter-mile and turn left into Bldg 3002 parking lot

(There is a brown Corps of Engineers sign at the parking lot entrance).

The Corps of Engineers exterior entrance is at the far end of the building

Park there and proceed down the stairs to the Corps of Engineers exterior entrance

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Camera Pass Request Form**

Cameras of any type, including video recorders and/or cell phone cameras, are prohibited within Picatinny without prior authorization via email at least five (5) business days in advance to **Robert.T.Moran@usace.army.mil and Heather.Durr@usace.army.mil**. Contact Robert or Heather for an electronic copy of the form. The following information must be provided on the form.

PURPOSE FOR CAMERA: Explain reason for the camera; e.g., "The person identified below is required to take pictures of the project site at Picatinny as part of proposal development for the G&W Systems Tech Data Facility and Development of Range 647 contract solicitation and will be using the camera at the 600 Area of the Installation."

Request the following person be issued a camera pass for the period of **DATE to DATE**.

INDIVIDUAL'S NAME:

The camera information is as follows:

MAKE:

MODEL:

SERIAL NUMBER:

Note:

Approved camera pass will be available on the day of the visit and must be picked up by the person who is listed above as the camera operator at the Picatinny Police Headquarters building. Picture ID must be shown. It's suggested that directions to Police HQ be secured at Visitor Control when picking up visitor pass.

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Instructions for Entering Picatinny Arsenal

The following is an excerpt to the NYD Picatinny Supplement To Section 00800, dated June 2006. The entire supplement includes a number of design related issues that the A-E firm must integrate/coordinate in his/her work and/or design. The entire supplement will be provided to the A-E by the NYD TM.

“1.4 All contractor employees working on the U.S. Army installation, Picatinny in the State of New Jersey, in connection with this contract, shall conform to all applicable federal or state laws, and published rules and regulations of the Departments of Defense and Army, as well as any applicable regulations promulgated by RDECOM-ARDEC and/or Picatinny, including but not limited to traffic regulations. Personnel and vehicles entering Picatinny are subject to search, and this may result in a wait of 15-30 minutes on if traffic is heavy. Additionally, all contractor employees working on classified contracts shall comply with the requirements of the National Industrial Security Program (NISPO) and Army Regulation 380-5, Department of the Army Information Security Program. The term "contractor employee" includes employees, agents, or representatives and all employees, agents or representatives of all subcontractors and suppliers. Contractors are responsible for obtaining/returning identification badges /passes and vehicle decals/passes for each contractor employee who will work on the contract or enter Picatinny. The badges/passes/decals are required for the term of the contract until completion or until release of the employee. Procedures are subject to change. Prior to bidding, the contractor(s) shall consult with the Security Division of ARDEC and be fully cognizant of any and all security requirements, which may be in addition to those listed herein. Prior to entering, and while on ARDEC, the contractor(s) shall be subject to random identification checks of personnel and searches of personnel, vehicles, and their content. The contractor should also be cognizant that if the Base implements heightened security measures, up to two hour delays should be anticipated for entry and deliveries to ARDEC, or areas within ARDEC.

(a) To obtain proper identification, contractor employees requiring recurring access (more than 90 days), must complete an application identification form (SMCAR Form 3058) for access to the installation. The form can be obtained from the Contracting Officer Representative (COR). The form must be signed by the COR and also identify the contract number and expiration date before the badge can be issued. This form is brought to the Security Division, Badge and Identification Section, Visitor Control Center, for processing of proper identification required per terms of the contract. Badge & ID Office operating hours every Tuesday and Thursday, 0700 - 1200 hrs. Mondays, Wednesdays, and Fridays the operating hours are 0700 - 1200 hrs and 1300 - 1530 hrs. Vehicle Decals shall also be obtained and displayed as required. Contractors requiring access for less than 90 days will be required to obtain a pass (Visitor Registration Form) from the Visitor Control Center at the Main Gate. Passes will be issued for dates access is required, not to exceed 90 days. The contractor must notify the COR between 8:00 AM and 11:00 AM on the business day that precedes the day of arrival of any contractor employee without a valid badge/pass, seeking access to Picatinny (Notification outside of this timeframe is not acceptable). The notification shall be submitted via email and Fax Memo, and with an attached electronic visitor notification form (MS Word file). One visitor notification form per contractor employee. The visitor notification form shall include basic identification information, and shall be obtained from the COR. Some of the basic identification information required includes: Name, US Citizenship status, Employer name, address, telephone #, Vehicle make, model, license plate #. Status change in any information provided to obtain a visitor pass/ID Badge will render that visitor pass/ID Badge invalid, and require re-notification, and re-processing at the Visitor Control Center. The subject header of the email shall include the contract title, "visitor notification", and the arrival date of the visitors. Only one arrival date is permitted per email message and vice versa.

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(b) For the performance of this contract, the contractor shall employ only employees who are U.S. Citizens or Lawful Permanent Residents.

(c) Before contractor employees and vehicles will be granted a vehicle decal, badge or pass, and be allowed to access/work on Picatinny, the contractor shall, at his own expense, furnish the COR and the Picatinny Security Division the following at the time of processing:

- i. Evidence of compliance with paragraph 1.4b above, including but not limited to supplying a copy of each employee's Employment Eligibility Form, INS Form I-9.
- ii. A completed background check (including fingerprinting) by the New Jersey (NJ) State Police for NJ Residents, or a completed background check (including fingerprinting) by the State Police of the State that the contractor employee resides, or a completed background check (including fingerprinting) by the Federal Bureau of Investigation for Lawful Permanent Residents.
- iii. Driver's license with photo, or other type of approved photo identification.
- iv. Compliance with subparagraph 1.4a.
- v. Current vehicle registration, insurance, DMV inspection sticker, and driver's license.
- vi. Paper copy of the notification email and notification form, described above.

(d) Any delay in the furnishing of the above, including any delay in the obtaining of the background checks, is at the sole risk of the contractor and will not be the basis of any equitable adjustment or other change to the contract."

Scope of Work
Preparation of a Design-Build Request for Proposal Package
FY09/10 BCA PN- 64082 Relocation of US Military Academy Preparatory School,
at West Point, NY
06 November 2007

1. Project Description: Construct a US Military Academy Prep School (USMAPS). Facilities include general instructional and administrative space, dining facility, student barracks, athletic facilities, athletic fields, and parking areas. Supporting facilities include mechanical, electrical service, exterior lighting, fire protection and alarm systems, anti-terrorism (AT) measures (laminated glass, rated exterior doors, vehicular site restrictive features, and setbacks), telecommunications and building information systems, surface parking areas, exterior building signage and site improvements. Heating will be provided by connecting to existing distribution lines or furnaces. Air conditioning will be provided by centrifugal chillers. Access for individuals with disabilities will be provided. Comprehensive building and furnishings related interior design services are required. Demolish 6 Buildings (73,224 Total SF). Air Conditioning (Estimated 725 Tons).

Itemized List of Facilities (per DD1391)

Barracks, Advanced Skills	77,137 GSF
Physical Education Training	65,469 GSF
Dining Facility	13,298 GSF
Administrative, Academic & Auditorium Facility	53,483 GSF
Indoor Athletic Facility	20,450 GSF
Organizational Parking	
NCAA Football Athletic Field	
NCAA Soccer Athletic Field & Running Track	
NCAA Lacrosse Athletic Field	
Packaged Industrial Waste Water Treatment Plant	20,000 GPD
Elevated Water Storage	250,000 USG

Construction Cost Limitation: \$122,689,782
Programmed Amount: \$142,737,292

The values above are exclusive of the associated costs furniture, furnishings and athletic equipment to be specified by the A/E.

2. Scope of A/E Services

The Architect-Engineer (A/E) shall provide the necessary architectural and engineering services for the preparation of a Design-Build Request for Proposal (RFP) to obtain a separate Contract with a Design-Build Contractor for the Design and Construction of the FY09/10 BCA PN-64082 Relocation of US Military Academy Preparatory School at West Point, NY. The A/E shall perform site investigations as required during the preparation of the RFP to field verify Government furnished drawings/data and obtain all necessary information & details required to develop each RFP submittal. The design must be accomplished within the Construction Cost Limitation (CCL) indicated above. If the cost estimate, at any submission, exceeds this amount, the A/E shall provide recommendations to reduce the project cost to within the CCL. In addition, the AE will coordinate with New York District Design Branch, which will be preparing the RFP package for the DOL portion of the project. The AE will attend coordination meetings with New York District Design Branch, and be responsible for incorporating the DOL RFP package into one comprehensive RFP package for the entire project. The drawings, specifications, and all other submittal items for this contract will be prepared using English units of measurement.

2.1 Initial Phase.

2.1.1 Attend a one-day site visit at West Point, New York and USMAPS. The A/E representatives will be: Project Manager, Project Architect, Civil Engineer, Landscape Architect, Mechanical Engineer, Electrical Engineer, Fire Protection Engineer, and Structural Engineer additional representatives shall include the Cost Estimator and IWTP Engineer.

2.1.2 Conduct one site visit.

The A-E shall conduct a site visit during the Initial Investigation phase, in conjunction with the charrette. The purpose of this visit is to observe and evaluate existing field conditions and to gather supplemental site data necessary for performing the design. Reports summarizing the conditions observed, personnel contacted, and data gathered during the visits shall be prepared and included in the Basis for Design Report. The following A-E representatives shall be: Project Manager, Project Architect, Landscape Architect, Civil Engineer, Mechanical Engineer, Electrical Engineer, Fire Protection Engineer, and Structural Engineer.

2.2 Site Work, Topographic Survey and Borings

Prior to any investigations, the A/E shall provide a site map indicating all proposed boring locations for Government approval.

2.2.2 Geotechnical Testing

Soil Boring and testing program for buildings, pavement, retaining walls and athletic fields. All testing shall be done in a coordinated fashion with the DHPW and the Garrison.

Preparation of a draft geotechnical report outlining findings and recommendations for engineering methods and solutions suitable for foundation, paving and athletic field design.

Meeting to review the findings of the draft report which shall be published in advance to facilitate appropriate review and evaluation of same.

Revise and finalize report suitable for distribution.

The A-E will perform soil and rock borings at a sufficient number of locations to accurately determine the soil and rock conditions.

During drilling, standard penetration resistance testing (SPT) and split-spoon sampling will be performed at regular intervals (semi-continuous sampling to 10 feet) {4 samples} and every 5 feet thereafter.

2.2.3 Topographic Survey

The A-E will be provided with current topographic survey information. A utility verification survey will be done per attachment #3.

2.2.4 Water Flow Test

Conduct water flow test for the new facilities. Static pressure will be reported, as will flow rate (gpm) and residual pressure (psi) under flowing conditions. The location of the tests shall be determined by the A/E using his best judgment. The A/E shall notify the West Point Fire Department and Project Manager as to the time and date of the tests. The A/E will make a determination on the need for a fire pump, but should explore and make recommendations on all feasible methods of design to avoid the use of a fire pump.

2.2.5 **15% Parametric Design Validation Assessment**

2.2.5.1 Select members of the project team shall review and evaluate the most current 15 % submission documents in advance of the pre-charrette and charrette activities. This review shall cover the project in general and specifically to each organizations respective discipline and area of expertise.

2.2.5.2 Deliverable: Summary memorandum outlining issues, questions and apparent successes of note. Each memorandum is to be sent to the A/E's Project Manager for compilation and forwarding to the US Army Corp of Engineers in advance of the Charrette.

2.2.5.3 Pre-Charrette Preparation

Select members of the project team shall organize the necessary agendas, client questionnaires, additional information required in addition to any sketches and program data that will be utilized at the Client / User Charrette.

A pre-meeting and organizational session shall be conducted by the A/E in their offices prior to the Charrette where the structure, organization and delivery of the Charrette materials in addition to confirmation of the sought after take aways are confirmed.

2.2.5.4 Client / User Charrette

An architect led two day design charrette at Ft. Monmouth with a tour of the existing facilities and grounds as a component of the site visit in 2.1.1 above. Topics and tasks to include but not limited to the following:

- Pre-Charrette Activity per 2.1.1 – One Day Site Visit to USMA prior to traveling to USMAPS

- Review and Confirm Agenda

- Presentation by USMAPS and US Army Corp of Engineers of overarching Goals, Concepts, Known Revisions in thinking / approach to current Master Plan.

- Presentation by AE and Campus Planning Consultant on trends and issues within the Industry.

- Project Critique and Pin-Up

- Engineering / Construction

- Concurrent Break-Out Sessions (by program and discipline inclusive of Project Management)

- Reconvene to review findings and recommendations

- Assemble Outbrief and Summary Documents

- Wrap Up / Outbrief

Deliverable: Within seven business days the A/E shall issue a report that is an organized compilation of the charrette documents with a corresponding cover memorandum summarizing the outcome of the charrette.

2.2.5.5 Assessment and Charrette Report

As noted in 2.2.5.4 within the Validation Phase Activities the A/E shall issue a Charrette Report.

2.2.6 Value Studies

Preparation of Cost Value Matrix organized by system and building – this will be on an order of magnitude square foot basis. This will be organized with a low, medium and high range facilitating a menu selection for review and evaluation.

After consultation with the US Army Corp of Engineers, preparation of Systems Narratives suitable for Costing Purposes:

- Foundation
- Structural Systems
- HVAC Systems
- Power and Distribution Systems
- Value Engineering
- Identification of Bid Alternates

Decision Tree Analysis Presentation where appropriate to demonstrate recommended solutions.

Deliverables: Cost Matrix and Value Study Report(s)

2.3 RFP Development Phase

2.3.1 The AE shall be responsible for the following General Requirements:

- a. A Fire protection analysis and plan IAW NANP1110-1-1 and UFC 3-600-01.
- b. All prior review comments & letters of compliance/responses shall be attached to the design analysis.
- c. The A/E shall identify in the RFP the tie-in point for all utilities or service connections (electrical, water, sewer, gas, cable TV, and communication lines) and confirm with West Point DHPW these locations are satisfactory and capable of supporting the need of these facilities.
- d. The A/E shall specify in the RFP package structural design codes and criteria to be used for design, minimum strengths and basic design loads. Identify structural systems, which are acceptable, and those, which are not.
- e. The A/E shall specify in the Direct digital controls (DDC) in the RFP documents.
- f. The A/E shall specify in the RFP, a fire alarm system, communications system, security requirements; and separate electrical closet and communications closets.

g. The A/E shall include in the RFP package a requirement that the Design/Build Contractor prepare the submittal register (ENG Form 4288).

h. The A/E shall specify guidance for the Design/Build Contractor to prepare the DD1354 (submittal register) and instructions for using the Resident Management System (RMS) (Written instructions for the use of RMS will be provided by NYD for the A/E to incorporate into the RFP).

i. A/E will be provided the 15% Parametric Design prepared by Parsons which includes layouts, elevations, and project design details.

j. A/E will be provided Standard 01010 Section for editing and tailoring to these facilities.

2.3.2 Attend a one-day draft RFP submittal review conference at West Point, New York. The A/E representatives will be: Project Manager, Project Architect, Civil Engineer, Mechanical Engineer, Electrical Engineer, Fire Protection Engineer, Structural Engineer, and Cost Estimator.

2.3.3 Prepare draft, pre-final and final RFP packages.

2.3.4 Attend a one-day Pre-Final RFP submittal review conference at West Point, New York. The A/E representatives will be: Project Manager, Project Architect, Civil Engineer, Mechanical Engineer, Electrical Engineer, Fire Protection Engineer, Structural Engineer, and Cost Estimator

2.3.5 35% RFP DESIGN DOCUMENTS

2.3.5.1 General Design Requirements: Preparation of concept design analysis, drawings, cost estimates, and outline specifications IAW the "MANUAL OF STANDARD PROCEDURES FOR PLANNING AND DESIGN", NANP-1110-1-1. Handicapped requirements will be included in accordance with the "Uniform Federal Accessibility Standards and/or ADA requirements".

Sample Scope of Work
USMA

2.3.5.1.1 List of Deliverables

Civil Engineering and Landscape Architecture

Existing Conditions Survey

35 % Preliminary Site Plan(s):

Overall Site Plan(s) indicating rough parking layout with space count tabulated and spot grades inclusive of drainage / subsurface storm water (if required) management recommendation:

Overall Site Plan
Site Demolition
Grading Plans
Storm water Management Plans
Utility Services Plans
Paving, Curbing and Walks Plan
Landscape
Typical Construction Details

Reports and Narratives:

Updated Narrative of basis of design, existing conditions survey, concepts considered, goals and objectives, exterior lighting (by AE), regulatory permitting, demolition, regulatory permitting and Next Steps / Path Forward

Pavement Design Analysis

LEED / Sustainable Design

Outline Technical Specifications (inclusive of all site work items including paving sections, earthwork, storm water management & utilities.)

QA / QC Report inclusive of Interference Detection

Architectural and Comprehensive Interior Design

Site Plan

Driveways, Parking areas, Service areas and Entrances With Spot elevations

Plans 1/16" = 1'-0" minimum

Functional arrangement of areas:

Core elements

Column grid

Circulation routes

Layout of "determining" rooms

Position of principle mechanical elements on Roof Plan

Building Elevations: 1/16" = 1'-0" minimum

Building form, Fenestration patterns (solid and void), Materials, Visible mechanical equipment

Furniture and Athletic Equipment Program

Table of Spaces – Measurement of Actual Design to Program

Finish Types – By Building / Program

Entrance / Building Close-Up

Update Written Fundamental Design Reports / Narratives (starting point by Parsons 15%

Parametric Design) - include room definition sheets inclusive of LEED Scorecard consistent with NANP Guidelines and Scope of Work (SOW) requirements.

Fire Protection Engineering and Life Safety

Life Safety Concept Plans

Life safety Drawings at 1/8" scale that are essentially 100% complete and that indicate:

Rated barriers

Exit paths and travel distances

Fire hazard of contents and occupancy

Occupant loads

Means of egress capacity

Fire extinguishers

Location and description of sprinkler systems

Standpipes

Smoke detector locations

Manual pull stations

Special fire protection features

Update Written Fundamental Design Reports / Narratives (starting point by Parsons 15% Parametric Design) – inclusive of the following:

Applicable Codes and Standards

Design Criteria

Fire Alarm, Suppression and Life Safety Concepts

Fire Department Access

Detailed Design Analysis for all buildings that covers the requirements of UFC 3-600-01.

Hydraulic Analysis and supporting calculations for the fire protection water supply.

Structural Engineering

Updated Written Fundamental Design Report / Narratives (starting point by Parsons 15% Parametric Design) - consisting of text and 8-1/2" x 11" sketches of schemes studied, with data suitable for parametric estimating. Describe each system (foundation, floor and superstructure alternatives by building type) with its provisions and the effect of other trades and corresponding premium cost, if applicable.

HVAC / Plumbing Engineering

Site drawing (if required).

Detailed Block equipment room layouts, . Show method of running building systems to site systems (storm, sanitary, steam and the like)

Update Written Fundamental Design Reports / Narratives (starting point by Parsons 15% Parametric Design) - include consistent with NANP Guidelines and Scope of Work (SOW) requirements and studies, pros and cons of alternatives, basis of design, system descriptions and recommendation.

Electrical Engineering and Telecommunications

Alternative Site Power Distribution Concept Drawings.

Typical lighting and power layouts for selected areas or rooms and any details required for presentation planned by the architect.

Typical Dorm / Barrack Suite

Typical Classroom

Typical Office

Updated Written Fundamental Design Report / Narrative - consisting of text and 8-1/2" x 11" sketches of alternative schemes studied, with data suitable for parametric estimating. Describe each system with its provisions and the effect of other trades and corresponding premium cost, if applicable.

Telecommunications Narrative to include information on telephone, IDF and data requirements as well as premise distribution system, CATV, public address and security.

Industrial Waste Water Treatment Plant and Above Ground Water Storage Tank

Industrial Waste Water Treatment Plant

Process Flow Diagram

Hydraulic Profile

Site Plan (Reference)

Supporting Documents for Narrative and Permits

List of Specifications

Updated Written Fundamental Design Report / Narrative

Site Adapt (where possible) of above ground water storage tank

Site Plan (Reference)

Supporting Documents for Narrative and Permits

Preliminary Tank Profile Drawings

Performance Specifications for any required SCADA equipment

Preliminary Piping and Instrumentation Diagram (P& ID) to cover valving, SCADA and water quality / disinfection process (if any)

Sample Scope of Work
USMA

Updated Written Fundamental Design Report / Narrative

Food Service and Equipment

Spatial Allocation Table

Preliminary cost allocation by CFCI and GFGI

Conceptual Major Equipment List

Updated Written Fundamental Design Report / Narrative

2.3.5.2 Preparation of preliminary design analysis and report for utilities and major structures. For rehabilitation projects, the existing utilities shall be investigated to determine if those portions of the systems to be left in place can support the rehabilitated portion of the facility.

2.3.5.3 Revisions to plans, report, cost estimate and design analysis, as required for approval and an explanation for non-compliance with comments will be submitted prior to the comment compliance meeting.

2.3.5.4 A/E will make all distribution IAW with the enclosed distribution list for review.

2.3.5.5 Telecommunications Requirements –

A narrative shall be provided describing the following:

- a. All telecommunications systems and material proposed such as but not limited to:
 - 1) House Distribution and Fiber Optics Cable.
 - 2) Associated Station Installation Equipment.
 - 3) Premise Cable System.
 - 4) Indoor Conduit System.
 - 5) Connector Blocks.
 - 6) Testing.
 - 7) Cable Support System.
 - 8) Telephone Service Entrance.
 - 9) Outside Plant Cable Entrance.
 - 10) Inside Wire and Cable.
 - 11) Communication Outlets.

The A/E is required to provide a complete narrative description in the RFP documents of the telecommunications systems (Voice, TV, data, video and PA system) within the facility and associated work outside the building perimeter required to connect the facility into the base-wide telecommunications systems. The following support facilities for these systems are to be included in the construction documents as a part of the basic services of this contract.

1. The narrative description in the RFP documents shall describe a cable pathway system with associated outlet boxes and signals wiring. The number of telephone handsets and other associated telecommunications equipment will be included in the RFP documents. The size and type of conduit and cable trays, and wiring will included in the RFP documents. be determined by the AE. The telecommunications system specified in the RFP documents will insure that the telecommunications system is in accordance with Telecommunications Industry Association (TIA), COE Guide Specifications and PAX Newsletter #34. The RFP documents shall insure that all new systems will be compatible with existing equipment and systems at USMA. The RFP documents shall insure that telecommunications systems shall be design for easy expansion and flexibility.
2. The RFP documents shall describe in the narrative, all telecommunications entrance rooms and telecommunications closets with required HVAC, power and lighting required to support the telecommunication equipment/systems requirements.
3. The A/E shall clearly identify in the cost estimate, project funds that are to be set aside for telecommunications construction. The A/E shall list certain telecommunications equipment IAW PAX Newsletter #34 in his cost estimate as separate bid items
4. The A/E shall coordinate the telecommunications requirements with the installation's DOIM office and the US Army Information Systems Command.
5. The A/E shall clearly identify in the cost estimate, project funds that are to be set aside for telecommunications construction in accordance with the DD1391

2.4 Prepare Project Performance Specifications

The Architect-Engineer will be responsible for reviewing the Standard RFP Section 01010. The Architect-Engineer shall prepare the RFP for this project on the premise that the Design/Build contractor shall submit final design specifications using Unified Facilities Guide Specifications (UFGS). UFGS guide specifications are for use with SPECSINTACT Version 3.1.270 or later software. In some instances, NYD has tailored UFGS specifications to suit its and its client needs or has created specification sections to meet the needs of the military construction program. These sections, which are underlined in the list below, are available from the project engineer in Microsoft Word format, unless otherwise indicated, and with further instructions to the Architect-Engineer in italics. The Architect-Engineer and Government responsibilities for preparing the DB RFP for this project are listed below by Specification Division. The Architect-Engineer is responsible for all of the below listed unless noted otherwise:

The Government shall prepare and provide the A/E with all specification sections from Division 00 except for Section 00901 and the information included in the Appendices.

2.4.1 Division 00 - Proposal Requirements, and Conditions of Contract

Section 00010 SF 1442 and Bid Schedule; *Government will prepare this section; however, the A/E shall provide a draft bid schedule only.*

Section 00110 Submission Requirements and Instructions; *Government will prepare this section.*

Section 00120 Proposal Evaluation and Contract Award; *Government will prepare this section.*

Section 00600 Representations and Certifications and Other Statements of Bidders; *Government will prepare this section.*

Section 00700 Contract Clauses; *Government will prepare this section.*

Section 00800 Contract Special Provisions; *NYD standard section 00800 is available in 'Word.' Editing instructions for the A/E are provided with this document. In some instances (e.g.; West Point, NY), NYD standard section 00800 must be edited to reflect installation specific requirements.*

Section 00900 Wage Rates/Determinations; *Government will prepare this section.*

Section 00901 Appendices [*The Architect-Engineer shall provide the following information in the appendices or in another portion of the RFP documents*]:

Appendix A - Subsurface Exploration and Test Results

Appendix B - Hydrant Flow Tests

Appendix C - Sustainable Design - LEED Rating (Contract minimum objectives)

2.4.2 Division 01 - General Requirements

Section 01000 - General Requirements; *Government will prepare this section.*

Section 01010 Design Requirements: A/E shall prepare narrative description to include project requirements, intended use of each item with specific requirements (if any), minimum requirements of design, materials, and construction codes. Design intent of the project shall be conveyed in the RFP to the offeror. Customer needs, expectations, and latitude of design shall be made clear in the RFP. The A/E shall develop design criteria including code analysis (state, design manuals, accessibility)

Section 01012 Design After Award: The A/E shall prepare a one paragraph narrative description of the project, including the basic functional, technical and other project requirements. The A/E will also prepare a list of specification that will be required during design.

Government will provide front end specifications for the development of the RFP including sections: 01310, 01312, 01330, 01415, 01420, 01451, 01453, and UFGS-01 33 29.

Divisions 02 through Division 16: The Government estimates no specifications from Divisions 02 – Division 16 will be required.

2.5 Develop the Design Analysis

The AE shall prepare a two-part written document in which the design team identifies all project requirements and clarifies how the proposed facility design satisfies those requirements. The first part, the Basis for Design, discusses applicable criteria, stated user needs, design, and construction considerations by discipline. The second part, Studies and Calculations, provides all appropriate supporting calculations. Any changes to the basis for design or supporting calculations shall be added to the design analysis and identified as being additions to the original document.

2.6. MCACES Construction Cost Estimate.

Preparation of complete preliminary cost estimate, identifying costs by building systems and escalated to the midpoint of construction in programming document format. All escalation factors shall be identified. The cost estimate shall include both primary and supporting facility costs. Primary Facility costs include everything within 5 ft. of the building line. Supporting facility construction costs shall include everything outside 5 ft. of the building line. Preparation of the cost estimate shall include a review of the programming documents. The cost estimate will identify complete project costs including those not shown on the contract drawings (i.e., work performed by other contractors, telecommunications and other set aside costs, COE S&A and contingency costs, bid market saturation effects, etc.. The estimator shall develop area escalation factors as appropriate. These factors shall be clearly identified in the cost estimate with proper explanatory back-up data.

The RFP submission will have additives/options identified by the A/E for all construction costs in excess of the Construction Cost Limitation (CCL). The Government will prioritize the additives/options. Final construction bid documents will have all additives/options clearly identified, on the drawings and in the cost estimate, for all work in excess of the CCL. The cost estimate shall include a breakdown of costs for each additive item. The construction cost estimate shall be subject to the review and concurrence of the Government.

- 2.6.1 The cost consultant will assure an adequate response to all of the cost estimate review comments and proper representation at review meetings.
- 2.6.2 The cost consultant is responsible for the accuracy of the cost estimate and assuring proper estimating support to the NYD Cost Engineering Branch (CEB).
- 2.6.3 The cost consultant shall assure the scope of work is properly addressed in the cost estimate while providing scope validation.

Sample Scope of Work
USMA

- 2.6.4 The A/E will provide a quality control certificate with each estimate indicating that an independent review was conducted. The comments from this action will be submitted for NAN review.

- 2.6.5 Estimating package submittal (Draft, Pre-Final, Final) for each submission to include:
- Narrative description of project scope, cost estimate.
 - Variance reports (tracking cost changes by WBS thru-out life of the design including footnotes denoting reasons for cost changes by WBS).
 - Quantity take-offs package.
 - Quote package.
 - Risk analysis (contingency during the budgeting phase).
 - Discussion of forward pricing, if included.
 - Catalog cuts.
- 2.6.6 Submit MII electronic files. The electronic submittal shall include the project, UPB, crew, labor, and equipment files.
- 2.6.7 The MII shall include productivity, crew, labor and equipment to be used throughout the estimate and based on the most current information available.
- 2.6.8 General contractor and subcontractor markups will be spelled out in the MII, including General Condition (Field office overhead) expenses.
- 2.6.9 During course of conducting material price survey, the following should be considered:
- Prices good for how long.
 - Minimum requirements for quotes shall include POC, Company, City, State, Telephone, Description, Quantity, Unit Price, Unit of Measure, FOB to jobsite, etc.
 - Minimum 3 quotes (deviation are allowed with reasons) and preferably from the vicinity nearest to the jobsite (deviation are allowed with reasons).
- 2.6.10 The MII shall follow the WBS (if an electronic copy of the template is required, request can be make thru the Corps POC), which serve as a checklist to ensure that all items required are included in the estimate.
- 2.6.11 The MII Unit Price Book (UPB) is used solely for the purpose of generating crews & productivity. The costs in the UPB do not reflect the project location.
- 2.6.12 The MII Region 1 equipment database dated 1999 shall be used. Appropriate application of index can be applied at the “price adjustment” tool of MII, where applicable. Such adjustments shall have supporting documentations to support the index used.
- 2.6.13 The MII labor database shall reflect the latest prevailing wages for the project location and if applicable, future pricing due to the timing of the expiration date of each trade.
- 2.6.14 Notes will be extensively used thru-out the estimate to include quoted item and sources & calculation if more than 1 quote was obtained, any deviation from standard productivity used, etc.

- 2.6.15 QTO will be cross-referenced to drawings, design narrative, and specification.
- 2.6.16 Risk assessment (develop a list of items, in coordination with the designer, and take into account union hall agreement expiration, indirects, job constraints, economic conditions, etc. all of which could be potential major cost drivers).
- 2.6.17 Designer will maintain close coordination with the cost consultant, including submittal of pertinent design requirements (once known) so estimator has specific information available to ascertain pricing.
- 2.6.18 Cost consultant to attend all critical scoping meetings.
- 2.6.19 Cost consultant shall have periodic conference call with design team to learn what new issues arise.
- 2.6.20 A/E will provide quality control review of the construction cost estimate prior to submittal to the Corps.
- 2.6.21 The Corps reserved the right to request for additional supporting documentations, clarifications, additional references that it deems is lacking from the estimate package.
- 2.6.22 The construction cost estimate must comply with the following Corps Regulations (where appropriate) are:
- EI 01D010 Construction Cost Estimate
<http://www.hnd.usace.army.mil/techinfo/ei.htm>
 - ER 1110-1-1300 Cost Engineering Policy and General Requirements
<http://www.usace.army.mil/inet/usace-docs/eng-regs/cecw.htm>
 - ER 1110-2-1302 Civil Works Cost Engineering
<http://www.usace.army.mil/inet/usace-docs/eng-regs/cecw.htm>
 - ER 1110-3-1300 Military Programs Cost Engineering
<http://www.usace.army.mil/inet/usace-docs/eng-regs/cemp.htm>
 - TM 5-800-4 Programming Cost Estimates for Military Construction
<http://www.usace.army.mil/inet/usace-docs/armytm/>
- 2.6.23 If an initial kick-off meeting with the Corps Cost Engineering Dept is desired, it is recommended that this take place in the early stage of design, to ensure the estimate follows protocol.

2.7 DESIGN AND CONSTRUCTION CPM SCHEDULING

CPM Schedules: The A/E shall submit draft, pre-final and final CPM schedule for the project indicating construction milestones and long lead items. The CPM schedule will be in sufficient detail to accurately estimate the proper construction duration.

The AE will also develop a CPM schedule for the design RFP effort to include both the effort for development of the RFP for the USMAPS and DOL portions of the work. The CPM schedule will also show the coordination and interface of both projects. The AE will receive input from NY District Design Branch for development of the CPM schedule for the DOL portion of the project.

2.8 Pre-Proposal Conference

Attend a one-day Pre-proposal meeting at West Point, New York. The A/E representatives will be: Project Manager and Project Architect

2.9 Value Engineering Study

The AE shall participate in a value engineering study along with the Corps of Engineers (NYD and OVEST), the installation and MACOM representatives will be held and based on the Draft RFP. The AE shall fully cooperate with the Corps VE team in developing, assessing and implementing the VE options proposed by the team. The AE shall assist the VE team in developing costs for the VE options. Upon acceptance and approval of the VE options by the installation, the Draft RFP will be modified to incorporate the findings of the VE study. If the VE study requires changes to the Draft RFP, which the AE considers outside the scope of the contract, the AE shall inform the Contracting Officer or his designated representative, in writing, along with a proposal for the required changes and impacts to the design schedule. If the Contracting Officer deems that the changes are outside the contract scope, a modification shall be issued to the AE in accordance with the "Changes Clause". The following A-E representatives shall be: Project Manager, Project Architect, Civil Engineer, Mechanical Engineer, Electrical Engineer, Fire Protection Engineer, Structural Engineer, Cost Estimator. In addition, to participation in the 5-day study, the AE shall allocate 10 man-hours per discipline to answer or address issues that arise as a result of the value engineering study.

2.10 Issue RFP amendments for clarification, and errors or omissions to answer offerors questions.

2.11 Coordination Meetings

The AE will attend coordination meetings, every bi-weekly, from contract award till the project is ready to advertise (RTA) with telephone conferences during the "off weeks", a minimum of 24 meetings, with New York District Design Branch personnel to review the DOL portion of the RFP, discuss any issues that will impact either portion of the project and to insure that the DOL portion of the RFP is properly integrated into the USMAPS RFP package. The following A-E representatives shall be: Project Manager, Project Architect, Civil Engineer, Mechanical Engineer, Electrical Engineer, Fire Protection Engineer, Structural Engineer, Cost Estimator. The A/E can assume each discipline's attendance is not required at each and every meeting and / or teleconference throughout the length of the contract with the exception of the Project Manager and Project Architect (notwithstanding customary absences due to illness and / or family matters). The A/E shall allocate a suitable number of hours per discipline for meetings and teleconferences to ensure the work progresses at the required contractual schedule and quality standards defined herein.

2.12 A/E's Review Service of Design/Build Contractor's Design (Optional)

- 2.12.1 Review and back-check design/build Contractor's design submittals at 60%, 90% and provide written comments incorporating all USACE requested design revisions. The 100% design submission will be back-checked. The Dr. Checks system will be used to generate review comments. The AE shall allocate 30 man-hours (in the aggregate – 10 hours per phase) per discipline per submittal for the work. (See list of disciplines in paragraph 2.12.2).
- 2.12.2 Attend two (2) design review meetings with USACE and the Contractor at West Point and provide minutes of the meeting. Design review meeting (one day conference) to be held at West Point, New York. The A/E representatives will be: Project Manager, Project Architect, Civil Engineer, Mechanical Engineer, Electrical Engineer, Fire Protection Engineer, and Structural Engineer.
- 2.12.3 Answer Contractor questions concerning the design requirements and provide interpretation of RFP documents as necessary. The A/E shall allocate 10 man-hours per discipline for this work.

2.13 Project Management, Meetings and Presentations

The A/E will provide overall project management for their services on this project. This includes, but is not limited to, management of sub consultants, management of CADD files, use of Dr. Checks system and overall quality control. The A/E will attend meetings as defined herein. The A/E will attend review comment conferences, coordination meetings, and perform site visits as defined herein. The A/E shall provide minutes of all meetings not more than 7 days from the conclusion of the meeting.

2.14 Quality Control

- 2.14.1 Quality Control Plan. The A/E shall prepare a Quality Control Plan (QCP) which includes the following as a minimum.
- 2.14.1.1 Identification and discussion of all organizational and technical interfaces.
 - 2.14.1.2 Design team members and their areas of responsibility
 - 2.14.1.3 Team members responsible for checking the design
 - 2.14.1.4 Independent Technical Review (ITR) team and an explanation of how they will perform their duties.
 - 2.14.1.5 Project Schedule showing key milestones and review periods.
- 2.14.2 Independent Technical Reviews (ITR). The A/E shall perform an ITR during each phase of design development. These ITRs will be conducted by qualified engineers (one per discipline) who are not part of the design team. Formal written comments will be generated by each member of the ITR team and annotated by designers to indicate the intended corrective action. These corrective actions will be incorporated into the design during the same phase in which the review is conducted, prior to submission to the Government. Copies of all annotated ITR review comments and certification statements shall be furnished as an appendix to the Basis of Design Report. ITR certifications shall be certified by one of the firm's principles or authorized representative.

Sample Scope of Work
USMA

2.14.3 The Corps of Engineers will perform or have another firm perform a technical review of all A/E work during each phase of design and return comments using the Dr Checks System.

2.15 Sustainable Design

References:

1. ECB No. 2007-5 Leadership in Energy and Environmental Design, Accredited Professional (LEED-AP)
2. U.S. Green Building Council (USGBC) LEED for New Construction & Major Renovations Version 2.2.
3. ACSIM Sustainable Design Policy Letter dated 27 April 2007

This project is to be designed with the intent of maximizing the use of sustainable design and development practices. Sustainable Design and Development is a concept and engineering approach to planning, designing, building, renovating and operating innovative, environmentally compatible, energy efficient, cost effective and people friendly facilities. Provide systematic consideration of current and future impacts of an activity, product or decision on the environment, energy use, natural resources economy and quality of life. Guidance on sustainable design for the design and construction of all new Army facilities and the rehabilitation/renovation of existing facilities is contained in Reference 1, above. The goal for this project is to incorporate sustainable design features where life cycle cost effective to achieve a **minimum** of the certified level of the LEED Building rating system. The Installation and USACE Engineer District, with the AE will jointly verify the final LEED score and rating. The USGBC certification is not required. The A/E shall score the project for each submission for sustainable design achievement utilizing the LEED® Rating System Tool, Reference 2. In addition to submitting the LEED® score sheet, the A/E shall also submit a detailed description of points received for each category. The A/E is encouraged to strive to achieve the highest sustainable design rating possible; however, at a minimum, this project must receive the Silver/Gold/Platinum rating.

2.16 Preparation of DD1354

The AE shall prepare a draft DD1354 in accordance with UFC 1-300-08 dated 30 June 2004.

2.17 Preparation of Storm Water Pollution Prevention Plan (SWPPP)

The AE shall prepare a SWPPP per NYSDEC requirements for the entire development site and coordinate with USMA-DHPW Environmental, NY District Design Branch.

2.18 Comprehensive Interior Design

The A/E shall prepare a Comprehensive Interior Design and furniture related interior design inclusive of major athletic equipment for this project in accordance with the requirements of ER-1110-345-122 and UFC 3-120-10. All interior and exterior signage will adhere to the U.S. Military Academy Installation Design Guides."

3.0 Project Design Criteria

3.1 The applicable portions of the Engineering Manual Army Regulations and other applicable publications shall govern the design and preparation of plans, specifications, cost estimates and design analysis. Particular attention is invited to the following engineering manuals that establish minimum requirements for plans, specifications, cost estimates and design analysis. This includes but not limited to the following publications:

a. NANP-1110-1-1, US Army Corps of Engineers, New York District (NAN), Manual of Standard Procedures for Planning and Design, dated March 1990.

b. COE Engineering Regulations, Manuals, Technical Letters and Pamphlets (current editions); including, but not limited to the following:

EM 385-1-1, U.S. Army COE Safety and Health Requirements Manual.

ER 414-1-10, Contractor Submittal Procedures.

ER 415-345-42, Construction Costs, Cost Estimating and reserves for contingencies.

ER-1110-1-263, Chemical Data Quality Management for HTW Remedial Activities.

ER-1110-345-122 Interior Design, dated 31 October 1989

ER 1110-345-700, "Design Analysis".

ER 1110-345-710, "Drawings, Military Construction".

ER 1110-345-720, "Specifications, Military Construction"

TM 5-785-1, Engineering Weather Data.

TM 5-800 Series of Technical Manuals.

TM 5-800-2, Preparation of Cost Estimates, Military Construction"

EM 1110-2-1906 Laboratory Soils Testing

c. UFC 3-600-01, Fire Protection for Facilities, Engineering, Design, and Construction.

d. TI 800-01, "Design Criteria", 20 July 1998

e. Standard Specifications for Subsurface Exploration and Field Testing dated October 1980

f. DD Form 1391, FY 09/10 BCA PN-64082, USMAPS Relocation, dated 27 July 2007.

g. USMA EMCS Systems

h. USMA Energy Design Guide

i. USMA Installation Design Guide

j. UFC 4-010-01 , UFC 4-010-02, AT/FP Criteria

k. ETL 1110-3-502 Telephone and Network Distribution System Design

and Implementation Guide.

I. UFC 1-200-01 General Building Requirements

m. TI 800-03 Technical Instructions – Technical Requirements for Design-Build

n. Installation Information Infrastructure Architecture (I3A) Implementation Guide, Version 3 dated April 2001, or latest edition. See web page: <http://akea-cio.army.mil/i3a/i3a.asp>.

o. Army Engineering Technical Letters (ETL's). (These are available on the CCB and at the respective web sites <http://www.hnd.usace.army.mil/techinfo>)

p. 15% Parametric Design prepared by Parson dated 15 June 07.

3.2 Other Applicable (non-Government) Publications and References (latest editions):

a. National Standard Plumbing Code

b. National Fire Protection Association (NFPA)

c. National Institute of Occupational Safety and Health (NIOSH) Standards (latest editions)

d. Occupational Safety and Health Administration (OSHA) Standards (latest editions) All Government furnished items will be provided or a source will be given by the COE project manager upon request from the A/E.

e. National Electric Code

3.3 In addition to DOD and Army criteria, the Architect/Engineer will employ safety and health standards promulgated under the Occupational Safety and Health Act (OSHA) of 1970 as published in the Federal Register, October 18, 1972, Volume 37, Number 202, Part II (Title 29, Chapter 17, Part 1910) and subsequently issued OSHA standards or standards consistent therewith in the design of this facility. In those cases where an identified inconsistency appears, the Architect/Engineer will notify the New York District of the inconsistency for review and decision. In those cases where there are unique military requirements for which no applicable OSHA standards exists, Army standards currently employed will continue to apply.

3.4 A/E is responsible for Contractor Manpower Reporting based on the following: CONTRACTOR MANPOWER REPORTING - Application (CMR-A) Requirement. The Office of the Assistant Secretary of the Army (Manpower and Reserve Affairs) operates and maintains a secure Army data collection site where the contractor will report ALL contractor manpower (including subcontractor manpower) required for performance of this contract. The web address for the data collection site is: <https://cmra.army.mil>. This web site address includes links to a helpdesk and a user's manual. The contractor is required to completely fill in all the required information. The required information includes:

(1) Contracting Office, Contracting Officer, Contracting Officer's Technical representative;

- (2) Contract number, including task and delivery order number;
- (3) Beginning and ending dates covered by the reporting period (Reporting period will be the period of performance not to exceed 12 months ending September 30 of each year)
- (4) Contractor name, address, phone number, e-mail address, identity of contractor employee entering data;
- (5) Estimated direct labor hours (including sub-contractors);
- (6) Estimated direct labor dollars paid this reporting period (including subcontractors);
- (7) Total payments (including sub-contractors);
- (8) Predominant Federal Service Code (FSC) reflecting services provided by contractor (and separate predominant FSC for each sub-contractor if different);
- (9) Estimated data collection cost;
- (10) Organizational title associated with the Unit Identification Code (UIC)
For New York District contracts, the contractor shall use:

UIC: Organizational title:
W912DS U.S. Army Engineer District, New York
ATTN: CENAN-CT
26 Federal Plaza
New York, NY 10278
- (11) Locations where contractor and subcontractor perform the work (specified by zip code in the United States and nearest city, country, when in a overseas location, using standardized nomenclature provided on website);
- (12) Presence of deployment or contingency contract language; and
- (13) Number of contractor and sub-contractor employees deployed in theater this reporting period (by country). Reporting period will be the period of performance not to exceed 12 months ending September 30 of each government fiscal year and must be reported by 31 October of each calendar year.

4.0 General Clauses

4.1. Prior to negotiation of the Architect-Engineer contract, and in order to avoid any possible conflict of interest, the designing firm for a proposed facility, including its subsidiaries, affiliates and associates, is hereby notified that it will not be permitted to construct or work for the contractor that has the facility designed.

4.2. The Architect-Engineer agrees that if the surveys, studies or work prepared under the proposed contract comes under question, he will justify such work to the degree necessary to assure their correctness.

4.3 It is understood that the Architect-Engineer assumes full responsibility for quality control of his work under the contract and that he will thoroughly review his Request for Proposal package after completion to ensure that the professional quality of the final work shall be such that review by the Government will be at a minimum. The A/E is required to provide the Corps with a high quality design/RFP. The A/E is required to provide a copy of their quality control procedures at the project kick off meeting. The A/E is required to perform an independent quality control check of his design before each schedule submittal. The A/E along with his scheduled design submission will submit a letter certifying that the quality control check has been performed and will also provide a copy of all comments generated by the quality control check. Failure to do so, maybe cause to reject the submittal.

4.4 All supporting data shall be submitted with each design submission.

4.5 Delivery Media and Format for Final RFP Package

1. Format: A copy of all files developed under this project shall be delivered to the Government in digital format. A "Readme.txt" file must be included with the delivered digital media that includes normal transmittal information. The RFP package shall be submitted in MS Word format and PDF format.

2. Label. The external label for each digital media shall contain the following information:

- a. Contract Number and date.
- b. Format and version of operating system software, name and version of utility software used for preparation and copying files to media.
- c. Sequence number of digital media.
- d. List of file names on the digital media

3. Quality Assurance/Quality Control. Before a file is placed on the delivery digital, media the following shall be performed:

- a. Remove all extraneous graphics outside of the border area and set the active parameters to a standard setting.
- b. Check to ensure that all reference files are attached without device or directory specifications.

- c. All digital files shall be delivered to the Government uncompressed.
- d. Include all files both graphic and non-graphic required for the project (i.e. color tables, pen tables, font libraries, symbol libraries, user command files, plot configuration files, AML plot routines, etc.).
- e. Make sure that all support files such as those listed above are in the same directory and that reference to those files does not include device or directory specifications.
- f. Include any standard sheets (i.e. abbreviation sheets, stand symbol sheets, etc.) necessary for a complete project.
- g. Document any fonts, tables, symbols, cells/blocks, line styles/types, details, reference drawings, etc., developed by the contractor, or not provided among the Government furnished materials. The contractor shall obtain Government approval before using anything other than the Government standards.
- h. Each finished CADD drawing or map shall have its own separate plot file. The plot file for each finished drawing shall be provided to the Government in a specified plotter configuration.

4.6 Review periods will be completed by government personnel per the schedule in paragraph 6.0. If review is not indicated, the government has up to 30 calendar days to review each submittal.

4.7 If at any stage of performance hereunder, the A/E finds that the estimated construction cost of the project RFP being developed exceeds, or is likely to exceed the construction cost limitation (CCL) as set forth herein, the A/E will promptly report this fact to the Contracting Officer. The A/E shall not be required to perform such RFP changes or other services at no cost to the Government where unfavorable bids or proposals are the result of conditions beyond the reasonable control of the A/E. Where bids or proposals are not taken or are unreasonably delayed, the approved Government Estimate will be used in lieu of bids or proposals to determine compliance with the estimated contract price requirement

5.0 Submissions

5.1 All submissions will be accompanied by a letter of transmittal identifying the contents of the submission.

<u>Submission</u>	<u>Elements</u>
Quality Control Plan	See paragraph 2.13
Soil boring/test pit location Plan	Drawings
Draft Submittal	RFP Package MCACES Cost Estimate Annotated Review Comments Design Analysis Other supporting documents Draft SWPPP Draft CPM
Pre-final Submittal	RFP Package MCACES Cost Estimate Annotated Review Comments Design Analysis Other supporting documents Draft DD1354 Pre-final SWPPP Pre-Final CPM
Final Submittal	RFP Package MCACES Cost Estimate Annotated Review Comments Design Analysis Other supporting documents Final SWPPP Final CPM

Sample Scope of Work
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The Architect-Engineer shall provide for reproduction and delivery of all design submissions of material under this contract as follows:

Office	<u>Draft Submittal</u>	<u>Pre-final Submittal</u>	<u>Final Submittal</u>
Commander U.S. Army Engineer District, New York ATTN: CENAN-EN-M (Jose Diaz) 26 Federal Plaza Room 2037 New York, NY 10278	8 HS 2 ES 1 ECS 1 CD	8 HS 2 ES 1 ECS 1 CD	8 HS 2 ES 1 ECS 1 CD 2 EBS
US Military Academy DHPW, ATTN: Bob O'Dell Bldg. 667A West Point, NY 10996	5 HS 2 ES 1 CD	5 HS 2 ES 1 CD	5 HS 2 ES 1 CD
Commandant COL T. Rugenstein U.S. Military Academy Prep School Fort Monmouth, NJ 07703	2 HS 2 ES 1 CD	2 HS 2 ES 1 CD	2 HS 2 ES 1 CD
Resident Engineer (West Point) U.S. Army Engineer District, New York ATTN: CENAN-CO-WP/Steve DeNardis Bldg. 667A West Point, NY 10996	1 HS	1 HS	1 HS
Director, USAISEC-FDEO ATTN: AMSEL-IE-DE-IN-CO Suite 228, MCA Cell 1435 Porter Street Fort Detrick, Maryland 21702-5407	1 HS	1 HS	1 HS
US Army Engineer District, Mobile ATTN: Joseph Findley, CESAM-EN-GE P.O.BOX 2288 Mobile, AL 36628	1 HS	1 HS	1 HS
US Army Engineer District, Norfolk ATTN:Terry Deglandon, CENAN-TS-EA 803 Front Street Norfolk, VA 23510	1 HS	1 HS	1 HS

FS= Full size plan sets plus specifications, narrative, and design analysis

HS= Half size plan sets plus specifications, narrative, and design analysis

ES= Cost Estimate

ECS = Cost estimate included on computer disc in MCACES format.

EBS = Electronic Bid Set

CD= Original Electronic Files of plans, spec, narrative, and design analysis on CD

Sample Scope of Work
USMA

As it pertains to color copies of reports and the like for the submissions noted above, USACE, USMAPS and the like shall receive a total of four color copies in the aggregate with the balance in B/W.

Each submission set will consist of the RFP package and the cost estimate. In addition the final submission plans (*In AutoCAD Format*) and specifications will also be submitted in EBS format to USACE (see appendix I). Each submittal will include three volumes as follows. Volume I shall contain the RFP documents. Volume II shall contain the basis of design report, narratives; annotated Dr. Checks review comments, sustainable design, and minutes of meetings. Volume III shall contain the construction cost estimate, project schedule, ITR comments and certification statements, documentation of QC reviews.

5.2 Request for Payment

The A/E shall include a progress report along with the Payment Estimate – Contract Performance, ENG Form 93 as justification for the amount of payment requested. The progress report shall include in narrative form a Summary of Activities, Estimated Percentage Complete, Project Schedule Evaluation, Action Items, and Problems and Recommended Solutions. Progress payments along with progress report will be submitted to:

US Army Engineer District, NY
Attn: CENAN-EN-M/Mr. Steve DiBari
26 Federal Plaza, Room 2037
NY, NY 10278

6.0 Completion Schedule

The following schedule will be adhered to for the receipt of contract deliverables:

Quality Control shall be submitted, for review and approval, at the kick-off meeting.

Kick-off meeting to be conducted 5 Calendar Days after NTP.

Soil boring and test pit location plan shall be submitted, for review, 10 Calendar Days prior to drilling.

Draft RFP Submittal inclusive of MII Estimate due 92 Calendar Days after receipt of written notice to proceed (NTP) with a unchecked version 76 Calendar Days after NTP.

Pre-final RFP Submittal due 60 Calendar Days after receipt written notice to proceed with the preparation of the Pre-Final RFP. This phase shall be initiated with the Value Engineering Task.

Final RFP Submittal due 29 Calendar Days from NTP with the preparation of the Pre-Final RFP.

The government will have a 30-day review period for each submission, which time is not included within the calendar days noted above.

If exercised, Optional Services under Paragraph 2.12 will be awarded within 90 calendar days after the award of the Design- Build Construction Contract. The submission review services shall be completed within 30 calendar days from completion of the design phase of the Design-Build Construction Contract.

Soil borings shall be completed 30 calendars days after NTP with an allowance of an additional 3 calendar days for mobilization.

7.0 Coordination

Meetings and conferences initiated by the A-E or U.S. Agencies shall be held only with the approval of and/or in the presence of the design project engineer. A Memorandum for the Record (MFR) of the matters discussed during the meetings and conferences regarding the project will be prepared and typewritten by the A-E and forwarded to the technical manager within 5 calendar days for review by all parties present at the meeting.

APPENDIX I

ELECTRONIC BID SETS (EBS) REQUIREMENTS

Final deliverables, including plans and specifications, shall be delivered in Electronic Bid Set (EBS) format, on compact disk (CD), in addition to any other deliverables required elsewhere in this document. All file names in the CD must be compatible with ISO 9660 file naming conventions. EBS deliverables may be provided, in a separate subdirectory, on the same CD as CADD and SpecsIntact deliverables.

Specifications will be provided in Adobe Acrobat '.PDF' files. The entire specification shall be a single PDF file with bookmarks at the beginning of each individual specification section. The PDF file will include all forms, sketches, standard drawings, or other documents needed to provide the complete project specification package.

A quality control check shall be made to insure that all files are complete, correct and virus free. The A-E is responsible for ensuring that the EBS documents are in compliance with the design documents.

ADDITIONAL ITEMS FOR DESIGN BUILD

Provide all Specifications sections in SPECSINTACT (.sec) format.
Provide all Drawings in AutoCAD format.

APPENDIX 2

Subsurface Explorations – Geotechnical (Rev 14 March 2004)

Subsurface investigation by the Architect-Engineer is a requirement for this work. The contractor/A-E shall furnish the required personnel, material and equipment necessary to accomplish the work including, but not limited to a qualified drilling contractor for borings, a qualified licensed Geologist, Engineering Geologist or Geotechnical Engineer experienced in subsurface exploration and a surveyor licensed in the state of New York to establish drill hole locations and elevations. The contractor/A-E shall comply with all applicable Federal, State and local laws, regulations, and ordinances relating to the performance of this work. The contractor/A-E shall procure all required permits, certifications and licenses required by Federal, State and local law for execution of this work. A qualified drilling contractor shall drill the borings. Within ten (10) days after receipt of NTP, the A/E will submit to the Project Engineer a boring/test program for review & approval.

The total number of borings from a base contract definition is 125.

The A/E shall establish an estimated average cost per boring based on an average depth of 23.5' boring. This value shall include driller fees, oversight cost and living/travel expenses, and is based upon the installation of 75' of borings per day.

It is understood that this cost value does not include items which would remain constant regardless of the number of borings within the range of 125-150, including meetings, brush clearing, specification and geotechnical report preparation, and lab fees.

Borings: The actual location of drill holes will be established in the field prior to start of work and shall be surveyed prior to start of work. Survey control shall be in accordance with EM 1110-1-1004 and per fourth order survey control for construction layout/grade control. All borings shall be advanced to a maximum depth of 32 feet, using Standard Penetration Testing (SPT) methods and procedures. Continuous samples shall be collected to a depth of twelve feet (12') and intermittent samples collected every five feet (5') from fifteen feet (15') to total depth. Soil samples will be described according to the Unified Soil Classification with minor constituents quantified according to the Berminster method using the terms trace (0-10%), little (10-20%) and some (20-40%). If bedrock is encountered a five-foot (5') long, two inch diameter (nx) core will be cut and recovered. The rock type will be identified and the degree of weathering and fracturing noted. Rock quality designation (RQD) and percent recovery will be noted on the log.

Laboratory Testing Adequate testing shall be performed to identify or index each discrete soil strata that is encountered in each boring. All testing shall be conducted at a soil laboratory that has been validated by the Corps of Engineers. Each sample selected for testing shall be visually examined and classified. Physical property tests shall be performed on selected representative samples to aid in classification and determination of stratigraphic continuity, and to serve as indices to soil behavior. Physical testing shall include sieve and hydrometer analysis, moisture content, specific gravity, dry unit weight (or density), and Atterburg Limits. Other testing such as compaction, consolidation and unconfined compressive strength may be conducted at the discretion of the Geotechnical Consultant.

Ground Water: Ground water level shall be determined in each boring approximately 24 hours

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after borings are completed. A groundwater observation well (piezometer) shall be installed at one of the five boring locations.

PRELIMINARY SUBSURFACE INVESTIGATION REPORT: The accumulated field and laboratory data will be analyzed relative to the influence of the subsurface conditions upon the proposed construction. At the conclusion of the analysis, a comprehensive report shall be submitted, presenting the field and laboratory data obtained, together with conclusions and recommendations for the design and construction of foundations for the proposed building, and associated earthworks. The subsurface investigation report shall be preliminary in nature and include but not necessarily be limited to the following elements:

1. An evaluation of the feasibility of using shallow foundations
2. A range of probable bearing pressures
3. Narrative of soil identification and classification
4. laboratory test results
5. Brief discussion on engineered fill recommendations
6. Cut and/or excavation consideration
7. Frost susceptibility
8. Plot plan, drawn to scale, with north arrow, showing test borings or pits. Borings shall be numbered and located dimensionally (include surface elevations)
9. Any other geotechnical information that the geotechnical engineer believes, in his professional opinion, to be important to the design of foundation and pavement systems for this project.
10. A minimum of six (6) completed geotechnical reports shall be furnished to the Contracting Officer.

BORING LOGS: Logs of each boring shall be drawn to scale and include the following heading information,

- a. Boring number Project name and contract identification
- b. Location (x and y) coordinates
- c. Surface Elevation
- d. Name of driller and/ foreman in charge of field operation

The standard penetration test portion of the log should clearly record the following information,

1. Soil or rock description and classification (as noted above)
2. Strata breaks (top and base of soil or rock units)
3. Sample number
4. Blow counts (blows per six inches)
5. Samples selected for soil or rock testing.
6. Elevation of groundwater table
7. Cored interval

SPECIAL REQUIREMENTS:

- a) Coordination & assistance with West Point PW-PM in obtaining **Dig Safe Permit** is required.
- b) Coordination with West Point PW-PM in locating known utilities and properly marking prior to drilling.
- c) There will be no cutting of trees and brush cutting will be kept to a minimum.
- d) Special precautions to limit ground damage shall be employed or restoration to original condition may be required.
- e) The Contractor will contact the West Point PW-PM and the New York District (**Mr. Jose Diaz**) a minimum of five days prior to mobilization for notification & coordination of all geotechnical work.
- f) A minimum of six (6) completed geotechnical reports shall be furnished. USACE-NY attention **Mr. Jose Diaz** (5 copies) and USMA DHPW attention **Mr. Bob O'Dell** (1 copies)

APPENDIX 3

UTILITY VERIFICATION SURVEY

1. PROJECT: USMAPS PROJECT
2. LOCATION: West Point, New York
3. GENERAL DESCRIPTION: Perform field utility verification surveys for use in developing a Design-Build Request for Proposal as detailed in this scope of work. The survey shall be performed on the ground by crews under the general supervision of a Licensed Professional Surveyor. The area to be surveyed is indicated on the enclosed.
4. SPECIFIC REQUIREMENTS:
 - A. FIELD SURVEY
 - 1) Horizontal accuracy for the project shall comply with Corps of Engineers Third-Order standards as outlined in EM 1110-1-1005.
 - 2) Vertical accuracy shall be Fourth-Order per EM 1110-1-1005.
 - 3) Contractor shall establish horizontal and vertical control in project area. The control shall be tied to the North American Datum of 1983 (NAD'83) and the National Geodetic Vertical Datum of 1988 (NGVD'88). Control points shall be semi-permanent (re-bar w/cap) or permanent and set in a manner that they can be used for layout during construction. The coordinates and elevation of each control point shall be shown. Locating ties to control points are required.
 - 4) From said control points, the Contractor shall acquire topographic field to be used for 1:400 scale mapping with a 1 foot contour interval. Density of field elevations shall support 1:400 mapping and shall be provided as necessary to show all breaks in grade or changes in terrain. All elevations shall be taken to the nearest tenth (0.1) of a foot.
 - 5) Planimetric survey information shall include as a minimum buildings, roads, parking areas, sidewalks, fence lines, structures, drainage, etc. The final topographic maps will show location and finished floor elevations of existing buildings, type of pavement and locations of changes in pavement material, pavement striping, location type and sizes of trees and shrubs, extent of ponded water and the coordinate grid at 50 foot spacing. Utility information is required for the following:
 - (a) Water - Locate all valves, standpipes, regulators, etc. Locate all fire hydrants. Provide an elevation on top of valve box. Provide size of pipe and distance above ground for standpipes.
 - (b) Sanitary Sewer - Locate all manholes and provide top of rim elevation along with an invert elevation of all pipes connected to the manhole. Identify type, size, and direction of each pipe.

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- (c) Storm Drainage - Locate manholes and all other storm drainage structures such as culverts, headwalls, catch basins, and clean-outs. Provide top of manhole or top of catch basin elevation along with an invert elevation of all pipes connected to a manhole or catch basin and bottom elevation. Identify type, size, and direction of each pipe. Provide type, size, and invert elevation for all culverts.
- (d) Electrical - Locate all power poles, guy wires, vaults, manholes, meters, transformers, electrical boxes, and substations. Obtain type and height of poles, number and size of transformers, number of cross-arms, number of wires (electrical and communication), direction and low wire elevation at each pole. Provide top of rim or top of vault elevation, top of wire or conduit elevation, direction and bottom elevation of manholes and vaults. Provide size for all electrical vaults and boxes.
- (e) Gas and Liquid Fuels - Locate all valves, meters, and gas line markers. Provide elevation on top of valve box valve.
- (f) Telephone Communications and Data - Locate all poles, manholes, boxes, etc. Provide top of rim elevation, top of wire or conduit elevation, direction and bottom of manhole elevation. Obtain type and height of poles, number of cross-arms, number of wires and low wire elevation at each pole.
- (g) Street Lighting - Locate all poles and provide type and height of poles. Identify number and type of lights on poles. If connected by wires, show direction and low wire elevation.
- (h) Heating - Locate all steam and high temperature hot water manholes and vaults, filler pipes, underground fuel tanks, etc. Provide top of rim or top of vault elevation, top of pipe elevation, direction and bottom of pit elevation. Provide size of vault and all pipe sizes within manhole or vault.
- (i) Fire Alarm - Locate any fire alarm systems (box with number), telephones (box with number), etc. in project.
- (j) Foundation remnants of buildings previously located on site.

4. SURVEY CRITERIA

This data shall be in compliance with the latest revisions of the following:

- a. EM 1110-1-1002 Survey Markers and Monumentation
- b. EM 1110-1-1005 Topographic Survey
- c. EM 1110-1-2909 Geospatial Data and Systems
- d. Spatial Data Standards for Facilities, Infrastructure and Environment (SDFIE), Release 2.20
- e. Current version of Tri-Services A/E/C CADD Standards, Spatial Data Standards and A/E Deliverable Standards

Refer to <http://tsc.wes.army.mil> for latest version
EM's can be found at www.hnd.usace.army.mil

APPENDIX 4
CADD DELIVERABLES

A. GENERAL.

Project Code: WESTPT_USMAPS_CAMPUS_RFP

Drawing Size: ANSI D (22"x 34")

Working Units: English

All design work; surveying work, drawings, maps, details, and similar products to be provided under this contract shall be accomplished and developed using computer-aided design and drafting (CADD) software and procedures conforming to the following criteria.

B. GRAPHIC FORMAT.

All CADD files and data shall be supplied in AutoCAD latest version native format (i.e., .dgn, .cel).

If the Contractor generated the CADD data using software other than Microstation V8, the Contractor shall also submit the data in the format that it was generated in.

C. CADD STANDARDS.

CADD drawings shall be prepared in accordance with the "Architectural/Engineering/Construction (A/E/C) Computer-Aided Design and Drafting (CADD) Standard, Release 2.0." Standard drawing size and working units shall be as specified in Paragraph A, above.

All model files and sheet files shall include the project code specified in Paragraph A in their A/E/C CADD Standard file-name.

The Contractor must submit a written request and obtain written approval from the Government for any deviations from the Government's established A/E/C CADD standard.

D. DELIVERY MEDIA AND FORMAT.

All CADD data and files developed under this contract shall be delivered to the Government on CD-ROM with each submittal as required in the Schedule of Work. Each disc shall be in a separate jewel case.

Model files, sheet files, and other associated files shall not be device-dependent, nor shall the directory structure of the CD-ROM require any reconfiguration or other manipulation on the Government's part to view, print, and plot the files directly from the CD-ROM. The directory structure of the CD-ROM shall be configured such that a *complete* download of the CD-ROM's contents to an electronic folder on a Government computer's hard drive will not require any reconfiguration or other manipulation on the Government's part to view, print, and plot the files. A portable document format (.PDF) file containing the set of full-sized plotted Sheet Files shall be included on each CD-ROM.

Each CD-ROM shall be labeled with, as a minimum, the following information:

- (1) The Project's Name, Contract Number (and Delivery Order Number if applicable), date, and version and/or submission number.
- (2) The format and version of operating system software.
- (3) The name of the preparer's firm and the name and phone number of the preparer's Point-of-Contact for the project.
- (4) The name and office symbol of the Government's Point-of-Contact for the project.
- (5) The sequence number of the digital media.
- (6) A description of the contents of the CD-ROM (e.g., "Architectural Plans," etc.).

An .html file named README_**[insert project code]**.html containing the CD-ROM's labeling information indicated above as well as any other information as required shall be included on each CD-ROM.

The jewel case label for each CD-ROM shall be printed and shall contain, as a minimum, the following information:

- (1) The Project's Name, Contract Number (and Delivery Order Number if applicable), date, and version and/or submission number.
- (2) The name of the preparer's firm and the name and phone number of the preparer's Point-of-Contact for the project.
- (3) The name and office symbol of the Government's Point-of-Contact for the project.
- (4) The sequence number of the digital media.
- (5) A description of the contents of the CD-ROM (e.g., "Architectural Plans," etc.).
- (6) A tabular listing of all files on the CD-ROM.
- (7) A chart clearly showing the directory structure of the CD-ROM.
- (8) For multiple-CD-ROM packages, a tabular listing of all files in the package with clear indication of the total number of CD-ROMs in the package, and a listing of the contents of, as per item (5) above, of each of the CD-ROMs.
- (9) A complete listing of the project's version and/or submission history.

E. DRAWING DEVELOPMENT DOCUMENTATION.

The following information for each model file shall be included in the nonplot level, *-ANNO-NPLT:

- (1) How the data were input (e.g., keyed in, downloaded from a survey total station instrument (include name and model)).
- (2) Brief drawing development history (e.g., date started, modification date(s) with brief description of item(s) modified, author's name).
- (3) The names of the reference files, cells, symbols, details, tables, and schedule files required for the finished drawing.
- (4) Level assignments and lock settings.
- (5) Text fonts, line styles used, and pen settings.

F. HARD COPY TRANSMITTALS.

A transmittal letter shall accompany each electronic digital media submittal to the Government. The transmittal letter shall be dated and signed by the appropriate Contractor's representative. An electronic copy of the transmittal letter in .PDF format shall also be provided on the CD-ROM submitted to the Government. The transmittal letter shall contain, as a minimum, the following information:

- (1) The information included on the external label of each CD-ROM, along with the total number being delivered, and a list of the names and descriptions of the files on each media unit.
- (2) Brief instructions for transferring the files from the media.
- (3) Certification that all delivery media are free of known computer viruses. A statement including the name(s) and release date(s) of the virus-scanning software used to analyze the delivery media, the date the virus scan was performed, and the operator's name shall also be included with the certification. The release or version date of the virus-scanning software shall be the current version which has detected the latest known viruses at the time of delivery of the digital media.
- (4) A statement indicating that the A-E will retain a copy of all delivered electronic digital media (with all files included) for at least one year and, during this period of time, will provide additional copies of each, as described in the Scope of Work, to the Government, if requested, at no additional cost.

In addition, the Contractor shall provide the following "Plot File Development and Project Documentation Information" as an enclosure or attachment to the transmittal letter provided with each electronic digital media submittal. An electronic copy of this information in .PDF format shall also be provided on the electronic digital media submitted to the Government.

- (1) Documentation of the plot file for each drawing which will be needed to be able to duplicate the creation of the plot file by the Government at a later date. This documentation shall include the plotter configuration (e.g., name and model of plotter), pen settings, drawing orientation, drawing size, and any other special instructions.
- (2) Instructions concerning how to generate plotted, or hard copy, drawings from the provided plot files.
- (3) List of any deviations from the Government's standard level scheme and file-naming conventions and a copy of the Government's signed and dated approval letter allowing these exact deviations from the A/E/C CADD Standards.
- (4) List of all new symbol cells created for the project, which was not provided to the Contractor with the Government-furnished materials.
- (5) List of all new figures, symbols, tables, schedules, details, and other cells created for the projects, which were not provided to the Contractor with the Government-furnished materials, and any associated properties.
- (6) List of all database files associated with each drawing, as well as a description and documentation of the database format and schema design.
- (7) Recommended modifications which will be necessary to make the data available for GIS use.

The Contractor shall also provide hard copies as described in the Scope of Work.

G. OWNERSHIP.

The Government, for itself and such others as it deems appropriate, will have unlimited rights under this contract to all information and materials developed under this contract and furnished to the Government and documentation thereof, reports, and listings, and all other items pertaining to the work and services pursuant to this agreement including any copyright. Unlimited rights under this contract are rights to use, duplicate, or disclose text, data, drawings, and information, in whole or in part in any manner and for any purpose whatsoever without compensation to or approval from the Contractor. The Government will at all reasonable times have the right to inspect the work and will have access to and the right to make copies of the above-mentioned items. All text, electronic digital files, data, and other products generated under this contract shall become the property of the Government. By reference, the following DFAR clauses are included in this contract as a part of the requirements herein:

- a. DFAR 252.227-7013, "Rights in Technical Data - Noncommercial Items."
- b. DFAR 252.227-7017, "Identification and Assertion of Use, Release, or Disclosure Restrictions."
- c. DFAR 252.227-7020, "Rights in Special Works."
- d. DFAR 252.227-7028, "Technical Data or Computer Software Previously Delivered to the Government."
- e. DFAR 252.227-7037, "Validation of Restrictive Markings on Technical Data."
- f. DFAR 252.227-7025, "Limitations on the Use or Disclosure of Government-Furnished Information Marked with Restrictive Legends."
- g. DFAR 252.227-7014, "Rights in Noncommercial Computer Software and Noncommercial Computer Software Documentation."

H. GOVERNMENT-FURNISHED MATERIALS.

1. Electronic (.PDF) copy of latest version of A/E/C CADD Standard.
2. Model files containing the Government's standard border sheets.

Sample Scope of Work
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CHAPTER 2

PRESENTATION OF DATA

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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-06-X A/E/C CADD Standards (Architect/Engineer/Contractor
Computer Aided Design and Drafting Standards)

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

http://www.wbdg.org/ccb/browse_lib.php?l=07

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 Project Code, the official title of the project and the sheet size for the project will be established for I-H projects by the TM/PE after discussion with the Design Team prior to the start of work. For A-E designed projects this information shall be provided to the A-E within the SOW or before work begins by the TM/PE.

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 provided 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. 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 (90% Design Submission/Unreviewed 100%)

The Design Analysis, Bidding Schedule, Cost Estimate, etc. shall be 8 ½" x 11", 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 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", and bound. Drawings shall include the solicitation number and advertising date which will be provided by the TM/PE with the final review comments. CADD files and a full size set of PDF files 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.

(b) The New York District requires that a project be submitted in only one type of CADD system. The SOW will designate the submittal requirements of MicroStation files. Drawings developed using another CADD system or a mix of 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 TM/PE 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 the chapter, "SPECIFICATIONS", for the Ready-To-Advertise specifications submittal requirements.

2.3.4 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 the Chapter, "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 currently in use by New York 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 specified in the A/E/C CADD Standards. The Project Code shall be provided by the TM/PE

2.5.2 Drawing Package Assemblage

Sequencing of disciplines in the drawing set shall follow the order specified in the A/E/C CADD Standards.

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

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

(b) The TM/PE in cooperation with the Design Team shall provide the official CADD title blocks, Project codes, and borders to I-H and A-E designers. The TM/PE will also provide the official project name and location. The drawing's title assigned by the designer should clearly define the information contained on that sheet. 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. 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 Standard, Chapter 3, Graphic Concepts, Table 11, are allowed in the creation of CADD files. Preferred text usage shall be font # 1 "Working" for MicroStation. No fonts created by third parties or the designers are permitted. Monotext Font #0 (MicroStation) is 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 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.

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 TM/PE 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 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 for management and archiving purposes. For I-H projects, each designer shall submit a report to the TM/PE 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 TM/PE 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 TM/PE.

2.5.9.1 Flagging Drawing Revisions

All Amendments and Change Order revisions shall be flagged by a "triangle" symbol. The designer should use sound judgment concerning the location of the "triangles". The "triangle" symbol should be positioned adjacent to the revision with the tip of the triangle pointing towards the revision. The "triangle" symbol shall be sequentially numbered with 1, 2, 3, etc. for each revision. The first time a drawing is revised, the triangle shall be given a letter "A" within each "triangle" 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" "triangle" etc. The total number of triangles for each revision and a short description shall be noted within the revision block.

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 "triangle" 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.

2.5.9.3 Added Drawings

When drawings are added to an existing advertised/awarded contract project, a "triangle" 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 triangle symbol adjacent to the title block.

Example:	<u>SHEET Ref. No.</u>
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, in accordance with CADD contract language.

(b) The New York District's FTP (File Transfer Process) site. Contact TM/PE 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 8½" 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

Geotechnical Conditions

- II-1 Geotechnical 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)

CHAPTER 3

SPECIFICATIONS

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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 TM/PE.

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 TM/PE.

(c) The New York 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) Updates to the UFGS 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 New York District point of contact be contacted for updates to specific New York specifications.

(e) 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. The New York District (NAN) will prepare the non-technical portion of the specifications (i.e., boiler plate or front-end) using input provided by the designer. Although NAN will prepare the Special Contract Requirements, the designer will be expected to furnish pertinent information that NAN 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. In the event of a conflict between the specifications and the drawings, the specification will govern. 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.

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 designer developed 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**
 - o for activity or project specific use

- o for multiple contracts or alternate systems.
- o for very unique narrow scope UFGS (minimal)
- Level 5 - 31 41 16.11 10 Designation for non-unified sections
 - o 10 Army
 - o 20 Navy
 - o 30 Air Force
 - o 40 NASA
 - o 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 New York District maintaining a local master at the 5th level is "18". For example, a local master maintained by New York District would be 01 50 05.00 18. Any questions concerning a designer developed specification or the numbering system should be addressed to the New York District TM/PE

(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 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 cover the majority of circumstances for a variety of projects. Not all Shop Drawings listed in the specification need to be included in every project. During the editing of the Shop Drawing Submittal portion of each specification, the designer should carefully consider which Shop Drawing Submittals are 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 "RO" for "Construction Division Resident Office" or "AE" for "AE Designs" OR "DO" for "Design Office: Engineering Division, Design Branch in-house designs." "AE" or "DO" should be used for all submittals that are an extension of Design. For example, a submittal that requires Government Approval by Engineering should be listed as "G, DO". Note the ", " between the "G" and "DO" which is required in order for the Automated Submittal Register feature found in the SPECSINTACT software to function properly. Recommendations for labeling Shop Drawing Submittals requiring Government Approval are provided below. See UFGS specification Section 01 33 00 SUBMITTAL PROCEDURES for further information.

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

(2) Shop Drawings and Product Data Submittals for major pieces of

equipment or systems requiring review by the designer should be labeled "G, AE" for AE Designs OR "G, DO" for in-house designs.

(3) Submittals involving "Samples", or "Color" selection should be labeled "G, RO" 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, RO".

(5) "For Information Only (FIO)" Submittals: For Shop Drawing Submittals not requiring Government Approval, the "G" and "RO" or "AE" OR "DO" 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) 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 through the TM/PE 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 to the TM/PE.

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. An example of a Submittal Register will be provided by the TM/PE.

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

(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 New York 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" will be provided by the TM/PE. 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" will be provided by the TM/PE. Bid items will be "lump-sum job" items or "unit price" items as coordinated with the TM/PE and the Resident Office. 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 TM/PE. 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.

(c) Table of Contents

The designer shall prepare and submit a "Table of Contents". An example is will be provided by the TM/PE

(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 TM/PE 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. If an entire new section is to be added to the project, 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 will be provided by the TM/PE.

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

CHAPTER 4

SITE DEVELOPMENT

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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 Installation Restoration Program (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 Civil Engineering Section 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 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 PDT member, for required material investigations and specification requirements. Notification of the proposed pavements should be given Geotechnical PDT member 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, derailleurs, 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'(1:400), unless otherwise approved.
- (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' (1:400), 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) The design shall be in accordance with Drainage in Areas Other Than Airfields, 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 on 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" = 3' 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) Show new and existing underground utilities and 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 utility 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 exceeding 1 acre provide a Best Management Practices Plan (Sediment and Erosion Control Plan). The plan shall be prepared by a Professional Engineer registered in the State of the project and shall also meet the minimum State specific qualifications requirements as a "Qualified 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 Intent" Application

(a) The A-E shall prepare and submit to the New York District, the State specific "Notice of Intent" (NOI) application. The "NOI" 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 New York 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 final edited 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 AREAS OTHER THAN AIRFIELDS

4.8.1 References

(a) UFC 3-230-17FA, Drainage for Areas Other Than Airfields.

4.8.2 General

(a) For the design of areas other than airfield storm drainage systems, the procedure that follows and, as appropriate, UFC 3-230-17FA shall be utilized. Design compilation sheets 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 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 UFC 3-230-17FA, 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 UFC 3-230-17FA.

(c) The storm runoff design procedure presented in Steps 1 through 12 in 4.8.5 applies to both the closed storm drainage system and individual culverts. The pipe sizing procedure presented in Steps 13

through 19 applies to closed storm drainage systems only. Individual culverts shall be sized using procedures contained in UFC 3-230-17FA.

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 10-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 10 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 12 inches for closed drainage systems and 12 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.

CHAPTER 6

GEOTECHNICAL

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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 Section shall evaluate any existing subsurface data for the site and identify the need for additional subsurface investigation at the site. 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 Design Team a comprehensive Geotechnical Report as early in the design as practicable but not later than the Interim Design (50-65%) submittal. This chapter 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 commonly 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/ft ³) (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/>

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:

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
TM 1110-2-1901	Seepage Analysis
TI 800-01	Design Criteria

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.

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 location survey measurements shall be made 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, tide level, 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 drilling inspector for drilling performed in-house 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.

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 the Geotechnical PDT member if the Geotechnical Report was not prepared internally. The Geotechnical Report should be submitted for review one week prior to the conventional submittal dates. The designer should contact Geotechnical PDT member 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.

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, frost depths, 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.

6.4.2.5 Permanent Water Well Design and Construction

If required by the scope of work, the designer shall coordinate with the Civil PDT member 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. 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 Civil PDT member. 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.

6.4.3 Boring Logs

(a) Logs of borings shall be provided as an appendix to the Geotechnical Report, design analysis, and contract specifications.

(b) Boring log data obtained for all subsurface investigations conducted for New York District projects, including Design-Build and A-E designed projects as well as in-house-designed projects, shall be stored and maintained for future use.

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 or on the civil site plans. Boring location maps shall be clearly legible when printed at 8.5 in. x 11-in. size.

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.

(b) Laboratory test data obtained for all subsurface investigations conducted shall be stored and maintained for future use.

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 PDT member 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 or on the Subsurface Exploration Plan sheet.

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 Subsurface Exploration Plan Sheet." and reference the appendix that includes boring logs and test data.

6.7.4 Specifications

The designer for A-E designed projects or the Geotechnical Team Leader for in-house design shall provide specifications required for geotechnical aspects of the project.

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 in the plans or 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 - 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

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

NOTE: DUAL CLASSIFICATIONS, E.G. SP-SM, GP-GM, ML-CL AND SM-SC, ARE SHOWN BY PLACING BOTH SYMBOLS SIDE BY SIDE.

Sample

Boring Log - Rock Classification Legend



SANDSTONE



RHYOLITE



SILTSTONE OR CLAYSTONE



BASALT



SHALE



GRANITE



CEMENTED SHALE



GNEISS



LIMESTONE



CONGLOMERATE



DOLOMITE



CHERT



SCHIST



COAL



PHYLLITE



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



QUARTZITE



VOID (CAVITY,
OPEN JOINT, ETC.)



NOT SAMPLED OR
SAMPLE NOT RECOVERED

Geotechnical Report Checklists

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.

Geotechnical Report Checklists

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. 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

i. Results of all boring log and laboratory test data

j. Detailed Dewatering design, if it is to be a major foundation cost.

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.
6. 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.

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.

CHAPTER 8

WATER, WASTEWATER AND ENVIRONMENTAL PROTECTION

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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 supersede 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
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	
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 1005/17	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 Standards for Wastewater Treatment Works, New York State Department of Environmental Conservation

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 Hardy 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 UFC 3-240-04A. 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.

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 rationale 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.

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 may 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

(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 UFC 3-240-04A.

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 UFC 3-240-04A 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 if possible. Design is to conform to the applicable requirements of UFC 3-240-04A. 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. Force mains are generally installed below frost depth unless otherwise directed. Force mains and sewage lift stations shall conform to the applicable requirements of UFC 3-240-04A. The capacity of the lift station shall be sufficient to handle peak rates of sewage flow, determined in accordance with UFC 3-240-04A. 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 Design Standards for Wastewater Treatment Works 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 TL 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 will be provided 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; UFC 3-230-03A and applicable State Public Health Department criteria for public water supplies. Specification for water wells shall be based on current UFGS specification provided.

(b) The designer through the New York 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 UFC 3-230-04A and UFCs 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 TM 5-813-3 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, UFC 3-230-03A, 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 10 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 3 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 10 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 disinfected with chlorine solution and tested to ensure they are 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. 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:

(1) 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 2-1/2 times the GPM capacity of the pump and a low-water level of not less than 10 percent of total tank capacity or 3 inches above top of tank outlet, whichever is higher. Table 1 indicates high water levels and withdrawals for efficient operation of tanks with bottom outlets and a 10 percent residual. Using the table, the tank capacity may be determined as per Example 1:

Example 1: 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.

$$\text{Total tank capacity} = 2.5 \times 150 \text{ GPM} = 1,562 \text{ gallons or } 0.24$$

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 UFC 3-240-02N. 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 UFC 3-410-01FA for determining pumping rates.

(5) Overflows shall not be provided.

(6) A complete design analysis is required.

(7) Force mains shall constructed below the frost depth unless otherwise directed.

(8) Systems head curves are required for all pumping systems.

(e) Wastewater treatment plant designs shall conform to UFC 3-240-02N and UFC 3-240-13FN; 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 phenomena and take any appropriate actions required.

CHAPTER 9
ARCHITECTURE
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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 LEED 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

Army 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.

TI 800-01	Technical Instructions (TI), Design Criteria
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9.2.3 Community Criteria

Requirements of state and local governmental agencies (zoning, buildings, 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 3, titled CIVIL.

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.

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, 1/8" = 1' scale as a minimum, however, 1/4" = 1' scale is preferred to match the floor plans. 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. Provide at least one (1) longitudinal and one (1) transverse section through the entire building. 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 will be included in the specifications or shown on the drawings.

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.

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 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 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 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 permance as coordinated with the project Mechanical Engineer.

9.8.6 Roof Systems

(a) When roof top equipment is installed that will require maintenance, ensure that roof hatches are provided for multi-story buildings and access ladders or roof hatches are provided for single story buildings. Hatches and ladders 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) Standing seam metal roofs installed over a structural metal deck and rigid insulation shall include a 40 mil, self-sealing, secondary water barrier.

(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) Roof penetration flashing, curbs, gutters, and flashing shall be the product of the roofing manufacturer.

(g) All laps shall be in the direction of water flow.

(h) Full length, job fabricated panels are recommended. Individual roof panels less than 50 feet in length with joints are not permitted.

(i) Ensure that roof penetrations occur in the center of individual roof panels rather than at edges.

(j) Roof edge gutters shall be installed with gutter hangars. The front edge of the gutter shall be below the back edge at least 1 inch below the roof edge

(k) 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.

(l) 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. Each door shall be assigned a number.

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.

(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.

9.8.7.8 Room Numbering

Every room shall be assigned a separate room number and this number will be clearly indicated on the plans. This number will be generally assigned as follows:

Basement	001 thru 099
First Floor	100 thru 199
Second Floor	200 thru 299

Room numbers shall be clearly as consecutive as possible, beginning with the principal, entry area and progressing counter-clockwise through the plan. Spaces added by revision should be given the number of the primary office nearest room followed by the letter "A", or if more than one (1) additional space, "B", and so forth.

9.8.8 Windows

(a) Window schedules and types shall be indicated in the drawings. Each window shall be assigned a number.

(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 11

STRUCTURAL

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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)

AASHTO LRFD Bridge Design specifications 4th Edition Dated 2007
(for bridge designs after 2007)

HB-17 Standard Specifications for Highway Bridges (for bridge designs prior to 2007)

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 Institute of Timber Construction (AITC) Construction Manual

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)

325-05 Steel Construction Manual, Thirteenth Edition

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
MBMA	Metal Roofing System design 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

(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 the 2006 International Residential Code (IRC).

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 or LRFD 2007.

(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 and UFC 3-310-04.

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 3/4 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 Metal Building Systems

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 ACI 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 Concrete

Precast 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 Timber

Timber structures and structural elements, including plywood structures and elements, shall be designed in accordance with the IBC. The structural engineer of record shall be responsible for the design of all structural timber elements, including all connections, unless otherwise noted. Design analyses shall include timber species, grade and design stress values utilized in the particular design. Design stress values shall be taken from the latest version of the supplement to the AF&PA National Design Specification for Wood Construction.

- (a) Metal plate connected wood trusses. Metal plate connected wood trusses shall conform to the requirements of the latest version of ANSI/TPI 1. The structural engineer of record shall design all truss members, permanent lateral bracing, anchorage, bearings, connections between non-truss and truss components. A separate specification section shall be prepared for metal plate connected wood trusses. Final design of metal plate connected wood trusses, including truss connection plates, shall be the responsibility of the truss manufacturer's truss designer. The truss manufacturer shall submit truss design drawings and truss placement plans for approval. The truss manufacturer shall have a minimum of

three years experience in the production of metal plate connected wood trusses.

- (b) Glue-laminated lumber (glulam). Design of timber structures utilizing glulam shall be in conformance with the latest edition of the AITC Timber Construction Manual.

11.8.13 Antiterrorism/Force Protection

Antiterrorism/Force Protection design shall be in accordance with Chapter 19 ANTITERRORISM/FORCE PROTECTION (AT/FP).

11.8.14 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

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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 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 New York 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 8 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 and rooms requiring floor drains shall not be 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 which would compromise its' potability. 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 or other fluctuations in the hot and cold water supplies to these fixtures.

(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 120 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)

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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 mandatory 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 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 mandatory 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 mandatory and prescriptive HVAC features to be included in the design as required by ASHRAE 90.1, UFC 3-400-01 and EPACK 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 identify rooms and be sufficiently complete to show the location, arrangement, approximate capacities of all major items of equipment, and space allocated for servicing and maintenance. Include the following items:

(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, e.g. kitchens, labs, welding shops, etc.)

(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 New York 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 New York 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 New York 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 New York 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)
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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 30 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.

(1) 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 or mineral fiber insulation meeting ASTM C547, with an integral wicking material designed to remove condensed water.

(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

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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 safety and 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, minimum 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 drawings 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

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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 and 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 double wall 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.

15.8.4.3 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

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16-2 Lighting Fixture Schedule

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16-4 Typical Telephone System Riser Diagram (Not shown at this time)

16-5 Fire Alarm Riser Diagram (Not shown at this time)

16-6 Typical Public Address System Riser Diagram (Not shown at this time)

16-7 Design Review Checklist (Not shown at this time)

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
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 Industry Association (TIA)/Electronic Industries Alliance (EIA)

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/browse_cat.php?o=3&c=6

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 used.

(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.

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, (if available).
 - (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 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 statement that Arc Flash Hazard analysis, calculations, labels and other information will be provided if specified by Users requirements.
- (k) List UFGS that will be used. 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.
- (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.
- (c) Provide a complete 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 INTERIM DESIGN (50%-60%)

16.5.1 Design Analysis

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) Provide calculations to show 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) Indicate type of conductor, such as copper or aluminum, and location of proposed use and a justification for the choice made.

(e) Describe 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 500 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 5-811-3 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.

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.

(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 short circuit analysis of the electrical system shall be provided as stated herein below. This requirement depends on the complexity of the project. Projects that are served by a transformer 300 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) Ascertain that major or special types of equipment are available commercially.

(e) 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.

(f) 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. All projects shall be provided with revenue and monitoring metering as required. Each building service shall be provided with an electronic multifunction electrical meter having cumulative Kw-hr, Kw demand, VLL, VLN, Amp ph, % THD (V,I), etc.

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 and local DOIM 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 5-811-3 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 5-811-3 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 DVR 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. The designer shall provide generator transient load analysis using a commercial software package available from a generator manufacturer.

16.10 POST/BASE SPECIFIC 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 than 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 WIREAIC	
								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		20/2				20/2		42	
		TOTAL	0	0	0				
CONNECTED KVA:		0 KVA							
CONNECTED AMPS:		0 AMPS							
DEMAND KVA:		KVA							
DEMAND AMPS:		0 AMPS							

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
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.

- o 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.
- o 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.
- o 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.
- o 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 by the National Electrical Code. See also additional requirements from UFC 3-520-01.
 - Insure that 15%-25% spare breakers are shown.
- o 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.

- o Insure that receptacles are located at the TBB, LAN backboard and at DDC controls.
 - o Insure that there is at least one outlet on every wall.
 - o 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)
 - o Insure that boundaries of any hazardous classified location and identification of this location(s) are shown clearly.
- Fire Alarm Plans
- o 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 than 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.

- 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.
 - o Notification Appliances
 - Audible Appliances
 - Locate to provide sufficient sound level
 - o 15 dB above ambient
 - o 5 dB above maximum 60 second sound level
 - o Double the distance loses 6 dB
 - o Lose 25 dB through walls
 - o Lose 10 dB through doors
 - o UFGS states that bells/horns have 85 dBA at 10 feet
 - o Provide devices on every floor
 - o Provide devices in noisy areas (e.g. mechanical rooms, etc.)
 - o Devices shall have a temporal sound pattern in accordance with NFPA 72
 - Visual Appliances
 - o Space in accordance with NFPA 72 and ADAAG.
 - o 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 of devices for a zone.
 - Annunciator: use a graphic annunciator if one is required.
 - Specify transceiver to be compatible with the base/post system

- 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
 - o Coordinate that receptacles are located at the TBB
 - o Verify that phone outlets are located as desired by the user
 - o Provide telephone outlets at the DDC panel location
 - o Verify that the telephone room complies with EIA/TIA standards
 - o Insure that CAT 5 circuits have not exceeded the 90-meter limit in length.
- Mass Notification System
 - o Insure that audible and visual devices are shown
 - o Insure that the system is shown interconnected with the FACP
- Site Plan
 - o Verify that the electrical site plan agrees with the civil site plan
 - o Coordinate with the landscaping plans to avoid conflicts between electrical equipment (transformers, lighting fixtures, etc.) and planting materials
 - o Coordinate with the mechanical plans to avoid conflicts in location between transformers and chillers, etc.
 - o Verify the lighting layout meets design lighting level prescribed in IES and the TI; support with calculations
 - o Verify that required details are shown; these include pole details, pad details, manhole/handhole details, duct bank sections, etc.
 - o 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

- o Verify that manholes/handholes have been located in accordance with pulling calculations
 - o Verify that overhead line clearances meet IEEE C2 (verified with sag calculations where required)
 - o Verify that guy leads and guy sizes are shown and supported by calculations.
 - o Verify that cathodic protection is provided where required and that all appropriate details are shown and that the current specifications have been used.
 - o 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
 - o Verify that all symbols are included in the legend (use Triservice standard symbols)
 - o Verify that enlarged plans of electrical and/or mechanical rooms are included if necessary
 - o Insure that the size of large items of equipment can be provided by at least three manufacturers
 - o Verify that NFPA 70 clearances have been obtained
 - Miscellaneous
 - o Insure that Customer Specific Criteria has been incorporated
 - o Insure that all design techniques for nonlinear loads have been incorporated
 - Design Analysis
 - o Calculations included
 - Demand load analysis
 - Lighting Calculations
 - Zonal cavity for interior
 - Exterior
 - Short circuit calculations
 - Voltage drop calculations
 - o Coordination study provided (as required in the design manual)
 - o Arc Flash Hazard Analysis has be performed and results presented
 - o Design narrative
 - o Interior, exterior narratives
 - o Catalog cuts
 - Lessons Learned
 - o Verify that all applicable lessons learned from the district database have been incorporated (at each design/review submittal).

CHAPTER 18

COST ESTIMATING

A. PURPOSE

To establish uniform guidance in the methods, procedures, and format for the preparation of "Fair and Reasonable" construction cost estimates for USACE projects (FAR Part 36).

B. GENERAL DEFINITIONS FOR MILCON PROJECTS

Current Working Estimate (CWE):

CWE is the sum of the Estimated Construction Cost plus allowance for Construction Contingencies and Construction Management (SIOH). A CWE is prepared at each stage of the design process to monitor funding and to control design alternatives that will affect overall project costs. All phases of the MILCON estimate must follow the Corps military WBS. A library of the MWBS is included as part of the MII software. Table C-1 of the above UFC shows the 1st level MWBS. The Supporting Facility WBS should follow that of the DD1391 format (this is included in the MII MWBS library).

15% CWE (Code 3)

When required by this contract, a 15% estimate is a parametric estimate based on limited conceptual project information. This document, once approved by the using agency, installation, and MACOM, may become the basis for the new budget. Detailed information on the development of a parametric construction estimate can be found in UFC 3-710-01A Code 3 Design with Parametric Estimating. In most instances, the latest PACES (USACE approved) software shall be used to develop the construction estimate. For additional information & purchase of this software, please visit <http://talpart.earthtech.com/>.

30% CWE (Code 2)

When required by this contract, an early design, concept or preliminary type estimate will be developed. Detailed information on the development of concept construction estimate can be found in UFC 3-700-02A Construction Cost Estimates. The Corps latest MII software shall be used to develop the construction estimate.

65% CWE

When required by this contract, this submission is an in-progress design review. The level of detail will be somewhere between a Code 2/3 and Code 6 estimate.

100% CWE (Code 6)

This is a final design construction cost estimate. Detailed information on the development of concept construction estimate can be found in UFC 3-700-02A Construction Cost Estimates. The Corps latest MII software shall be used to develop the construction estimate. Refer to paragraph 2-5 of the above UFC, for the degree of details required at this phase. Complete quantity take-off computation shall be furnished. Indirect costs shall include overhead broken out into its detailed elements, percentage profit used, bond class and cost. Insurance and taxes on

labor should be a part of the labor cost. Back-up data shall be furnished to include pertinent information such as vendor quotation, cost reference books used, judgments applied, sequencing, phasing, productivity calculations, and other associated items that supports the cost estimate. Only one set of this information shall be furnished in a separate envelop addressed to Chief, Cost Engineering Branch or the material can be in PDF format.

C. GENERAL INSTRUCTIONS

Degree of Detail:

The level of detail in each stage of the estimate will be commensurate with the level of detailed design or better. Basically, construction cost estimate consists of three parts: (1) descriptions of work to be accomplished (tasks), (2) a quantity of work required for each task, and (3) a cost for each tasked quantity. This is commonly referred to as unit pricing. Lump sum pricing is not acceptable without description and quantification and will not be acceptable in the final construction estimate.

Safeguarding/security of estimates:

CWE's should be handled by the estimator in a discretionary manner. Access to each estimate and its contents will be limited to those persons whose duties require knowledge of the estimate. All CWE's will be designated "**FOR OFFICIAL USE ONLY**" unless a higher security classification is warranted. Each final estimate submitted to the Government must be accomplished by an "Estimate Cover Sign-off Sheet." A sample of this cover sheet is shown toward the end of this section. The signature should be those who have had access to the total amount of the estimate.

Quantity Takeoff:

When the construction tasks are identified, a quantity survey is taken. This quantity take-off should include, as accurately as possible, all facts and judgments that the cost engineer gathers from the engineering and design data and relate this takeoff in standard units of measurement. The amount of quantitative detail that can be calculated into each task is commensurate with the detail of design. Calculations beyond detail in design are often necessary to determine a price or complete the overall scope of work within the estimate. In such cases, (1) the basis for the calculations should be documented, (2) any contingency calculations clearly shown, and (3) quantities determined by engineering judgment noted (either in the MII or as separate backups) for later reconciliation upon design refinement. During construction, there is a certain quantity of materials that is normally wasted and lost as a result of cutting, fitting, handling, or contamination. All these and other reasonable losses should be considered. For uniformity, and to preserve the unit pricing structure, it is recommended that waste and loss be considered in the quantity & not in the unit cost. Lump sum pricing is not allowed in the final estimate because it is neither conclusive nor persuasive. Specific information can be found in UFC 3-700-02A Construction Cost Estimates.

Types of Costs:

All estimates based on detailed design will be developed showing separately the direct cost of labor, construction equipment, materials & supplies. Direct labor cost should have included insurance and taxes (e.g. - workmen's compensation, federal unemployment tax, state unemployment tax, social security tax, fringe benefits, vacation time, etc.). The percentage used or a calculation of how insurance and taxes on labor was derived must be shown in the estimate. Applicable indirect costs including subcontractor & prime contractor markups (field overhead, home office overhead, profit, bond) will be added to reflect construction cost. A reserve for design & construction contingencies and construction supervision and inspection overhead (SIOH) will be added to determine the current working estimate (CWE). The construction contingency reserve & the construction management percentage are defined in the DD1391. If there is no DD1391, the percentages will be as directed by the Corps of Engineers.

Market Analysis:

Additional market analysis may be warranted, which may be due to the instability in the global, national, and/or local construction economy. Additional analysis, discussions, cost tables shall be provided to include your market research into labor shortages, material costs, fuel, etc. This analysis shall be included as part of the backup submission. This analysis may include the following: vendor quotes is good till; forward pricing; labor premium & the trade impacted, shortage of specific subcontractors; unique work items; fuel costs; Specific information can be found in UFC 3-700-02A Construction Cost Estimates, paragraphs 3-5, 8-2, 8-4, 13-2

Subcontracted Work:

In every major construction job, the prime contractor will subcontract specialty items such as concrete, structural steel, finishes, roofing, plumbing, heating, electrical, etc. In the region within NY District, the prime contractors will be subcontracting the majority of the work to specialist. These specialty items are more effectively performed by a subcontractor. Therefore, the CWE should show a summary sheet of subcontracted work to include the total direct and indirect costs (field overhead, home office overhead, and profit). A percentage of prime markups should be added to the total subcontracted work. As a general rule, the same prime contractor's general condition, home office overhead, profit, & bond will apply to the subcontractor's work.

Indirect Costs:

Indirect costs are those costs that cannot be attributed solely to a single segment of work. General condition, home office overhead, profit, bond, and escalation (for future cost growth) shall be show for all phases of the cost estimate (should follow the order shown above for prime contractor). More detailed information on indirect costs can be found in UFC 3-700-02A Construction Cost Estimates, chapters 10, 11, 12. As a general rule, 10% for Profit (applicable to prime & subcontractors) should be used, unless justified otherwise. Sales tax should be evaluated with the vendor or suppliers. Though Federal projects are exempt from sales tax, small subcontractors or vendors may still charge a sales tax when they submit their proposal to the General Contractor.

General Condition:

The prime contractors General Condition should always be itemized in detail. During the conceptual stages of cost estimate development, a spreadsheet showing the computation of general condition is acceptable. However, whenever an MII estimate is performed, there is a place to input the itemized costs. Specific information can be found in UFC 3-700-02A Construction Cost Estimates, paragraphs 10-2,

D. SUBMITTAL REQUIREMENTS

Organization of Cost Estimate:

The cost estimate shall be organized as follows:

- A. A variance report shall be prepared in Excel & submitted (including electronic file), starting with the 1st submission and includes the DD1391 (in its detail format), to be followed by new columns for each phase of the estimate submission. The level of detail should be to the 3rd level WBS (UFC 3-700-02A Construction Cost Estimates, table C-2). Any large discrepancy between the last submission and current submission shall be explained on a separate sheet.
- B. A PDF of the CWE.
- C. An electronic MII/PACES file.
- D. All pertinent back-up information to support the estimate. Reference UFC 3-700-02A Construction Cost Estimates, paragraph 3-5, 3-6, 3-7, 4-4, 4-5, 8-2, 8-3, 8-4

E. REFERENCES

- ER 1110-1-1300 Cost Engineering Policy and General Requirements (Mar 93)
- ER 1110-3-1300 Military Programs Cost Engineering (Aug 1999)
- <http://www.usace.army.mil/publications/eng-regs/cemp.htm> for above ER's
- UFC 3-700-02A Construction Cost Estimates (Mar2005)
- UFC 3-710-01A Code 3 Design with Parametric Estimating (Mar2005)
- UFC 3-700-01A Programming Cost Estimates for Military Construction (Mar2005)
- TI 800-01 Design Criteria, Chapter 5 Building & Facilities Criteria (Gross Square Foot Computation)

CHAPTER 19

ANTITERRORISM/FORCE PROTECTION (AT/FP)

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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 4-020-01	Security Engineering: Project Development
UFC 4-020-02	Security Engineering: Concept Design
UFC 4-020-03	Security Engineering: Final Design
UFC 4-020-04	Security Engineering: Electronic Security Systems
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 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 by each design discipline, as stated in this document.

19.4.2 Design Analysis

Each discipline's section of the Concept Design analysis shall include a narrative on antiterrorism/force protection design. This 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) 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

Each discipline's section of the Interim Design Analysis shall include a separate sub-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

Each discipline's section of the Final Design Analysis shall include an analysis in a separate sub-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 shall be followed.

(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

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CHAPTER 20

SUSTAINABLE DESIGN

20.1 GENERAL.

20.1.1 Scope. This chapter states criteria, requirements and guidance for sustainable design. Specific submittal requirements in this chapter supplement the requirements of Volume 1. LEED scoring is our internal measure of success for sustainable design.

20.1.2 Objective. The objective of the Corps of Engineers (COE) is to incorporate sustainable design into all projects to the maximum extent feasible in coordination with functional, operational, cost and other project requirements.

20.1.3 Army Projects and Projects Located on Army Installations. Unless indicated otherwise, all Army projects and projects located on Army installations shall comply with the USACE Army LEED Implementation Guide. LEED certification by USGBC is required only when indicated in the predesign conference or Specific Instructions.

20.1.4 Air Force Projects. Unless indicated otherwise, all Air Force projects shall comply with the USACE Army Implementation Guide, modified for minimum LEED score requirements indicated in Air Force Policy Letter "Air Force Sustainable Design and Development (SDD) Policy", dated 31 July 2007. LEED certification by USGBC is required only when indicated in the predesign conference or Specific Instructions.

20.1.5 LEED Project Registration. Although USGBC certification is required on selected projects only, all projects are required to be registered with USGBC and use the LEED Letter Templates for project documentation. Unless indicated otherwise, register the project, pay registration fees to USGBC and administer the on-line project. Unless indicated otherwise, transfer Project Administrator designation for the registered on-line project to the Government when services are complete.

20.1.6 LEED Accredited Professional. Provide a LEED Accredited Professional who shall ensure compliance with the USACE Army LEED Implementation Guide.

20.2 APPLICABLE PUBLICATIONS. The following publications form a part of this Manual to the extent indicated by the references thereto.

HQ USAF/A7C Memorandum, Air Force Sustainable Design and Development (SDD) Policy, July 31, 2007,
http://www.afcee.brooks.af.mil/green/resources/A7C_Ltr_AFSustainableDesignandDevelopmentPolicy_1_Aug07.pdf

USACE Army LEED Implementation Guide, January 15, 2008 at

<http://en.sas.usace.army.mil> "Engineering Criteria".

20.3 PRECONCEPT SUBMITTAL REQUIREMENTS.

20.3.1 Submittal. Certain projects may be of such magnitude or significance that in order to select the best possible design the COE may require a study to be made prior to concept submittal. Where a preconcept submittal is specifically called for, the design team shall submit three separate schemes of the project (Scheme A, Scheme B, Scheme C) consisting of a site plan, floor plan and major elevations for each scheme.

20.3.2 LEED Project Checklist. Each scheme shall include a LEED Project Checklist identifying the LEED points earned and those points which have good potential to be developed by the scheme. LEED projects shall use LEED Project Checklist by USGBC.

20.4 CODE 3 DESIGN REQUIREMENTS.

Comply with USACE Army LEED Implementation Guide.

20.5 CONCEPT/EARLY PRELIMINARY (35 PERCENT) DESIGN SUBMITTAL REQUIREMENTS.

Comply with USACE Army LEED Implementation Guide. Provide draft Basis of Design, Commissioning Plan and Owner's Project Requirements documents with this submittal. USACE Templates for these documents are available at <http://en.sas.usace.army.mil>, "Engineering Criteria".

20.6 PRELIMINARY (60 PERCENT) SUBMITTAL REQUIREMENTS.

Comply with USACE Army LEED Implementation Guide. Implement concept submittal review comments.

20.7 FINAL (100 PERCENT) DESIGN SUBMITTAL REQUIREMENTS.

Comply with USACE Army LEED Implementation Guide. Implement Concept and Preliminary comments.

20.8 CORRECTED FINAL DESIGN SUBMITTAL REQUIREMENTS.

20.8.1 Corrected Final Submittal. The corrected final submittal is not to be considered a normal design level and will be provided in those cases in which the review comments require revision due to A-E error or omission.

20.8.2 Review Comments. Implement final review submittal comments.

20.9 REQUIREMENTS FOR PREPARATION OF DESIGN/BUILD RFP SOLICITATION PACKAGES.

Comply with USACE Army LEED Implementation Guide.

20.10 **TECHNICAL REQUIREMENTS.**

20.10.1 General. Comply with USACE Army LEED Implementation Guide.

20.10.2 Materials Credits Implementation Strategy Plans in Full Design Contracts. In full design contract documents Materials Credit Implementation Strategy Plans shall be as follows (if credit is applicable):

Regional Materials MR5: Plan developed by Contractor (include requirement in specifications). Materials Reuse MR3: Plan developed by Designer (include in final design submittal, specify products).

Rapidly Renewable Materials MR6: Plan developed by Designer (include in final design submittal, specify products).

Recycled Content MR4: Plan developed by Designer (include in final design submittal, specify products) OR developed by Contractor (include requirement in specifications). NOTE: EPA designated products (Comprehensive Procurement Guidelines) must always be researched and specified by Designer, regardless of this LEED credit.

Certified Wood MR7: Plan developed by Designer (include in final design submittal, specify products) OR developed by Contractor (include requirement in specifications).

All Implementation Strategy Plans developed by Designer shall be incorporated into contract specifications (as attachment(s) to UFGS 01 33 29 LEED DOCUMENTATION or similar method).

CHAPTER 21

QUALITY MANAGEMENT

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 - 21.3.13 Project Files and Document Management
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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 New York 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 1110-3-111 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

New York District (NAN)

Quality Management Plan, July 2004

21.3 DEFINITIONS

21.3.1 Quality Control Plan (QCP)

A management plan, which establishes the products and sub-products to be reviewed, roles and responsibilities in developing the product or sub-product, the document(s) to be reviewed, the review team, a schedule for reviews associated with development of the product or sub-products and the agreed upon requirements of the customer, and the appropriate laws, regulations, policies and technical criteria for the development of the product or sub-product. The Designer of Record is the lead in preparing the QCP 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 New York District customers. The TM/PE will be the lead preparer of the QAP in coordination with the PDT.

21.1.3. New York 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 New York District Technical Manager/Project Engineer (TM/PE)

The TM/PE 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 TM/PE 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 of the New York District's Quality Management Plan.

(c) The QCP will be prepared in accordance with A-E standard practice and the following instructions.

(1) Within 10 calendar days after award of the contract the A-E shall submit to the TM/PE for approval, the firm's QCP. The QCP 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 QCP 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 QCP 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 QCP 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.

(3) The QCP 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 TM/PE of the name of the individual and the name of an alternate person assigned to the position.

(4) The TM/PE will notify the A-E, in writing, of the acceptance of the QCP Plan. After acceptance, any changes proposed by the A-E are subject to the acceptance of the TM/PE 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 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 New York 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) TM/PE'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.

21.3.6 Installation Criteria

The Engineering Management Office of the Chief will maintain installation specific design criteria which shall be readily available to I-H and A-E PDT members. The TM/PE will update the installation criteria using installation specific lessons learned and evaluation of construction changes. The TM/PE will periodically provide the installation criteria to the executing Resident Engineer, and installation engineering office for comment.

21.3.7 Design Schedule

The TM/PE is responsible for developing the design schedule in coordination with the PDT. The TM/PE will enter and maintain I-H and A-E project schedules in the New York 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. TM/PE's establish projects in DrChecks and add PDT reviewers and evaluators. New York District site administrators are available to provide assistance with DrChecks.

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(b) The A-E is required to obtain the necessary rights to use DrChecks. For account registration and questions on use of DrChecks, contact David Chew at 1-917-790-8362. For individual project access to respond to comments, contact the TM/PE 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 TM/PE and PM with the customer.

(b) For I-H work, the TM/PE 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. 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 the New York District Quality Management Plan.

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.

21.3.12 Bidability, Constructability, Operability, and Environmental (BCOE) Review Certification

A BCOE review will be conducted by the executing Construction 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 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 Construction Division's Quality Assurance Section verifies that all comments have been annotated and resolved to the satisfaction of the BCOE reviewers, the C, QAS shall request that EN create the BCOE certification letter. The BCOE certification letter will be signed by Chief, Engineering Division and then routed to C, Construction Division. After signing, the TM/PE will forward the letter to Contracting Division (CT). Bids/Proposals will not be opened until the BCOE is in hand by CT.

21.3.13 Project Files and Document Management

The Project Manager is responsible for maintaining project files. The TM/PE is responsible for maintaining the technical files related to design submissions and reviews documents including drawings, design analyses, and supporting information. SpecsIntact will be used to develop and manage I-H project specifications. CT is responsible for maintaining all A-E contract files.

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 the TM/PE to EN Design Branch.

CHAPTER 21

QUALITY MANAGEMENT

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 - 21.3.3 New York District Project Manager (PM)
 - 21.3.4 New York District Project Architect Engineer (TM/PE)
- 21.4 PROCEDURES
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 - 21.3.14 As-Built Drawings

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 New York 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 1110-3-111 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

New York District (NAN)

Quality Management Plan, July 2004

21.3 DEFINITIONS

21.3.1 Quality Control Plan (QCP)

A management plan, which establishes the products and sub-products to be reviewed, roles and responsibilities in developing the product or sub-product, the document(s) to be reviewed, the review team, a schedule for reviews associated with development of the product or sub-products and the agreed upon requirements of the customer, and the appropriate laws, regulations, policies and technical criteria for the development of the product or sub-product. The Designer of Record is the lead in preparing the QCP 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 New York District customers. The TM/PE will be the lead preparer of the QAP in coordination with the PDT.

21.1.3. New York 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 New York District Technical Manager/Project Engineer (TM/PE)

The TM/PE 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 TM/PE 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 of the New York District's Quality Management Plan.

(c) The QCP will be prepared in accordance with A-E standard practice and the following instructions.

(1) Within 10 calendar days after award of the contract the A-E shall submit to the TM/PE for approval, the firm's QCP. The QCP 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 QCP 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 QCP 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 QCP 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.

(3) The QCP 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 TM/PE of the name of the individual and the name of an alternate person assigned to the position.

(4) The TM/PE will notify the A-E, in writing, of the acceptance of the QCP Plan. After acceptance, any changes proposed by the A-E are subject to the acceptance of the TM/PE 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 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 New York 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) TM/PE'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.

21.3.6 Installation Criteria

The Engineering Management Office of the Chief will maintain installation specific design criteria which shall be readily available to I-H and A-E PDT members. The TM/PE will update the installation criteria using installation specific lessons learned and evaluation of construction changes. The TM/PE will periodically provide the installation criteria to the executing Resident Engineer, and installation engineering office for comment.

21.3.7 Design Schedule

The TM/PE is responsible for developing the design schedule in coordination with the PDT. The TM/PE will enter and maintain I-H and A-E project schedules in the New York 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. TM/PE's establish projects in DrChecks and add PDT reviewers and evaluators. New York District site administrators are available to provide assistance with DrChecks.

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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 TM/PE and PM with the customer.

(b) For I-H work, the TM/PE 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. 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 the New York District Quality Management Plan.

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.

21.3.12 Bidability, Constructability, Operability, and Environmental (BCOE) Review Certification

A BCOE review will be conducted by the executing Construction 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 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 Construction Division's Quality Assurance Section verifies that all comments have been annotated and resolved to the satisfaction of the BCOE reviewers, the C, QAS shall request that EN create the BCOE certification letter. The BCOE certification letter will be signed by Chief, Engineering Division and then routed to C, Construction Division. After signing, the TM/PE will forward the letter to Contracting Division (CT). Bids/Proposals will not be opened until the BCOE is in hand by CT.

21.3.13 Project Files and Document Management

The Project Manager is responsible for maintaining project files. The TM/PE is responsible for maintaining the technical files related to design submissions and reviews documents including drawings, design analyses, and supporting information. SpecsIntact will be used to develop and manage I-H project specifications. CT is responsible for maintaining all A-E contract files.

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 the TM/PE to EN Design Branch.

CHAPTER 23

CHARRETTES

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CHAPTER 23

CHARRETTES

23.1 GENERAL

23.1.1 This chapter applies to planning and design charrettes conducted by in-house and A-E personnel in support of New York 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.

23.1.2 Planning charrettes are critical activities essential to the scope definition and programming at adequate funding levels of planned facilities.

23.1.3 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.

23.2 APPLICABLE PUBLICATIONS

23.2.1 Army

23.2.1.1 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.

23.2.1.2 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.

23.2.1.3 For Army efforts conducted as part of MILCON Transformation, see Chapter 24.

23.2.2 Air Force

23.2.2.1 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>.

23.3 DEFINITIONS

23.3.1 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, preliminary site and building plans, DD Form 1391 with TABS A-J (see attached) and parametric cost estimate. The products may also include a 1391 sign off sheet, a geotechnical and/or flow test data.

23.3.2 Design Charrettes

23.3.2.1 Design Charrette with a Finalized DD 1391:

The purpose of this type of a design charrette is to develop a document that clearly sets project design requirements within the already established DD 1391. The final product will normally be a narrative document, preliminary site drawings, preliminary architectural floor plans and elevations, and a parametric cost estimate. The product from a design charrette should have all the information required to develop an RFP or proceed to the next design phase such as the 65% design submission.

23.3.2.2 Design Charrette with a Draft DD 1391 Open to Modification:

The purpose of this type 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. The product from a design charrette should have all the information required to develop an RFP package or proceed to the next design phase such as the 65% design submission.

23.3.3 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. The Level of design should be at the point where no more information is required to develop an RFP package or proceed to the next design phase such as the 65% design submission.

23.4 PROCEDURES FOR A CHARRETTE CONDUCTED BY AN IN-HOUSE DESIGN TEAM

23.4.1 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.

23.4.2 Pre-Charrette Activities

Depending on funding and scheduling constraints pre-charrette activities can be done separately and prior to the charrette itself or they can be done at the charrette during the first day in-brief/interview session. This cuts down on the travel and labor costs.

Determine the disciplines required to attend the charrette, the number of days the charrette will take and whether or not other deliverables are required such as a geotechnical report, survey and/or a flow test.

23.4.2.1 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. (If 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. This should be re-emphasized at charrette kick-off;
- (b) Explain the concept of charrettes emphasizing the participation and support required from the customer and user for completion of a successful charrette. This should be re-emphasized at charrette kick-off;
- (c) Explain the purpose of the questionnaire and date for receipt of completed questionnaires;
- (d) Gain an initial understanding of customer and user needs. This should be re-visited at charrette kick-off;
- (e) Gather any available information (site information, installation design standards, preliminary facility criteria, etc.). This should be re-visited at charrette kick-off;
- (f) Determine customer point of contact for transfer of information and decisions prior to and following conduct of the charrette. This should be re-emphasized at charrette kick-off;
- (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. This should be re-emphasized at charrette kick-off;
- (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. This should be re-emphasized at charrette kick-off;

23.4.2.2 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 1-1. Depending on funding and scheduling, questionnaires could be replaced with appropriate and thorough interviews at the charrette itself. Interviews should be conducted by the PM with each technical discipline

participating by asking questions necessary to develop the required charrette products. The technical disciplines from the In-House team need to be able to interpret non-technical user requirements into the technical requirements of the charrette products.

23.4.2.3 Concept Designs

Prior to a Design Charrette the In-House team should develop 3 rough concept sketches for the project. These concept sketches are used for talking points. Most people are visual in nature and having concepts in front of them, the customer will be able to discuss what they like and do not like in greater detail.

23.4.2.4 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.

23.4.2.5 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.

23.4.2.6 Sample Projects Concept Designs 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. Collect the electronic and hard copies of the 3 concept designs developed for discussion. 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.

23.4.3 Conducting the Charrette

Exhibit 1-2 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 (typically done at the end of each day or at expected critical decisions), schedule final out-brief. If pre-charrette meeting was not conducted, all items from the pre-charrette meeting need to be addressed at this initial charrette meeting. After the initial meeting

the interviews and site visits shall be conducted. 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. Bring Utility maps to site visit to verify locations of utility connection points.

(c) Conduct user interviews. Record information gathered digitally or long hand. Display information acquired digitally or longhand. Collected information should be displayed during the rest of the charrette. If collected longhand, the information should be written on large easels then taped to the walls of the conference room. If collected digitally, the information should be projected at all times for the users, designers and other charrette participants to see. Allowing the user/interviewee to see their information in real time makes the information more accurate and creates "buy-in" from the user/interviewee. Recommend that samples of similar types of facilities be displayed for command/installation/customer reference - these will promote discussion. In addition to or instead of the similar facilities, places hard copies of the 3 concept designs 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 assessment, state LEED goal for the project and describe possible cost impact and reasonableness of goal. Develop preliminary cost information. Coordinate visits by decision maker periodically to review work and adjust. Prepare design information and out-briefing. Draft Charrette Document Development. The charrette document should be in a complete draft version by the out-brief of the charrette.

(e) Develop preliminary parametric cost estimate or draft 1391. The cost estimate needs to be developed concurrently with the narrative and design information. In order to make decisions on scope during the charrette the user, designer and PM need to know approximately where they are in regards to the cost of the project.

(f) Out-Brief. Purpose of briefing is to gain concurrence on initial design concepts. Prepare formal briefing, usually in done with a Power Point presentation consisting of all the sketches used as starting points, sketches developed during the charrette, major discussion points for each discipline and cost information, and present to MACOM, customer, user representatives, and decision maker. Along with the digital Power Point presentation, each attendee to the Out-Brief should be given a hard copy of the draft charrette report and a hard copy of the slide presentation. Special attention should be paid to the draft estimate during the out-brief. Request comments. Request/receive concurrence, or record any changes required for concurrence. Leave copy of out brief with MACOM, customer, and user representatives. Discuss whether or not Dr. Checks will be used to formalize comment/response process.

23.4.4 Post-Charrette Activities

(a) Return to home station. Revise concept designs, narrative and cost estimate if necessary based on the results of out-brief and/or Dr. Checks comments. Resolve comments via conference call. Revise and finalize charrette report. Submit final charrette report.

(b) 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.

23.5 PROCEDURES FOR A CHARRETTE CONDUCTED BY AN A/E FIRM

23.5.1 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.

23.5.2 Pre-Charrette Activities

Depending on funding and scheduling constraints pre-charrette activities can be done separately and prior to the charrette itself or they can be done at the charrette during the first day in-brief/interview session. This cuts down on the travel and labor costs.

23.5.2.1 Selection the A/E firm/contract award

Select A/E firm based on experience on similar type of projects. Ensure that the project manager from the A/E has experience running successful charrettes. Meet with customer/user to develop A/E scope of work. Determine such things as disciplines required, number of days that the charrette will be, and whether or not deliverables such as geotechnical report, surveys and flow test as required. See example 1-6 for sample A/E scope of work. If it is felt that a pre-charrette visit is necessary, then try to have it occur at the scoping meeting with the A/E firm.

23.5.2.2 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) Explain the objectives for the charrette to the user. This should be re-emphasized at charrette kick-off;

(b) Explain the concept of charrettes to the user/customer emphasizing the participation and support required from the customer and user for

completion of a successful charrette. This should be re-emphasized at charrette kick-off;

(c) Explain the purpose of the questionnaire and date for receipt of completed questionnaires;

(d) Gain an initial understanding of customer and user needs. This should be re-visited at charrette kick-off;

(e) Gather any available information (site information, installation design standards, preliminary facility criteria, etc.). This should be re-visited at charrette kick-off;

(f) Determine customer point of contact for transfer of information and decisions prior to and following conduct of the charrette. This should be re-emphasized at charrette kick-off;

(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. This should be re-emphasized at charrette kick-off;

(i) Verify location for the charrette;

(j) Verify the product to be produced to complete the charrette. This should be re-emphasized at charrette kick-off;

23.5.2.3 Questionnaire Preparation, Submittal and Return

The questionnaire will be developed with the A/E firm's 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 1-1. Depending on funding and scheduling, questionnaires could be replaced with appropriate and thorough interviews at the charrette itself. Interviews should be conducted by the PM with each technical discipline participating by asking questions necessary to develop the required charrette products. The technical disciplines from the In-House team need to be able to interpret non-technical user requirements into the technical requirements of the charrette products.

23.5.2.4 Concept Designs

Prior to a Design Charrette the A/E firm should develop 3 rough concept sketches for the project. These concept sketches are used for talking points. Most people are visual in nature and having concepts in front of them, the customer will be able to discuss what they like and do not like in greater detail.

23.5.2.5 Charrette Agenda

With the assistance of the designated installation point of contact and the A/E firm, 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.

23.5.2.6 Pre-Charrette Teleconference

A few days prior to the charrette kick-off, conduct a teleconference with the A/E to go over the scope of work and what is expected of them during the charrette. Make sure they are bringing the necessary equipment to perform a successful charrette such as: the electronic and hard copies of the 3 concept designs developed for discussion. 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.

23.5.3 Conducting the Charrette

Exhibit 1-2 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 (typically done at the end of each day or at expected critical decisions), schedule final out-brief. If pre-charrette meeting was not conducted, all items from the pre-charrette meeting need to be addressed at this initial charrette meeting. After the initial meeting the interviews and site visits shall be conducted. 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. Bring Utility maps to site visit to verify locations of utility connection points.

(c) Conduct user interviews. Record information gathered digitally or long hand. Display information acquired digitally or longhand. Collected information should be displayed during the rest of the charrette. If collected longhand, the information should be written on large easels then taped to the walls of the conference room. If collected digitally, the information should be projected at all times for the users, designers and other charrette participants to see. Allowing the user/interviewee to see their information in real time makes the information more accurate and creates "buy-in" from the user/interviewee. Recommend that samples of similar types of facilities be displayed for command/installation/customer reference - these will promote discussion. In addition to or instead of the similar facilities, places hard copies of the 3 concept designs 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 assessment, state LEED goal for the project and describe possible cost impact and reasonableness of goal. Develop preliminary cost information. Coordinate visits by decision maker periodically to review work and adjust. At the end of each day of the charrette, the A/E PM will brief conduct a "mini out-brief" for the USACE PM. This mini out-brief may also serve as the coordinated visits from the users/customers. Prepare design information and out-briefing. Draft Charrette Document Development. The charrette document should be in a complete draft version by the out-brief of the charrette.

(e) Develop preliminary parametric cost estimate or draft 1391. The cost estimate needs to be developed concurrently with the narrative and design information. In order to make decisions on scope during the charrette the user, designer and PM need to know approximately where they are in regards to the cost of the project.

(f) Out-Brief. Purpose of briefing is to gain concurrence on initial design concepts. Prepare formal briefing, usually in done with a Power Point presentation consisting of all the sketches used as starting points, sketches developed during the charrette, major discussion points for each discipline and cost information, and present to MACOM, customer, user representatives, and decision maker. Along with the digital Power Point presentation, each attendee to the Out-Brief should be given a hard copy of the draft charrette report and a hard copy of the slide presentation. Special attention should be paid to the draft estimate during the out-brief. Request comments. Request/receive concurrence, or record any changes required for concurrence. Leave copy of out brief with MACOM, customer, and user representatives. Discuss whether or not Dr. Checks will be used to formalize comment/response process.

23.5.4 Post-Charrette Activities

(a) Return to home station. Revise concept designs, narrative and cost estimate if necessary based on the results of out-brief and/or Dr. Checks comments. Resolve comments via conference call. Revise and finalize charrette report. Submit final charrette report.

(b) 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.

1-1 Sample Charrette Questionnaire

Sample Questionnaire. Items in *italic* 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.)

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.

- 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.

j. Identify any new equipment 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 utility 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.

1-2 Charrette Checklist

Determine whether preliminary meeting can be or should 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.

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 New York. 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.

1-3 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

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

1-4 Sample Charrette Report

Adjust as the following outline as necessary for the intended facility type

COVER PAGE. Incorporate graphics, MACOM, customer and user insignia, New York District logo (and A-E logo when appropriate), project title, project number, date of report.

Section 1 - General

- 1.1 Project Introduction
- 1.2 Project Description
- 1.3 Applicable Criteria
- 1.4 Design Scope
- 1.5 Site Visit Reports
- 1.6 Government-Funded Equipment
- 1.7 Construction Phasing
- 1.8 Waste and Borrow Areas and Haul Routes
- 1.9 Air and Water Pollution Control
- 1.10 Special Design Issues
- 1.11 Inadequate Funds
- 1.12 Waivers
- 1.13 Environmental Permits
- 1.14 Security Provisions
- 1.15 Economic Analysis
- 1.16 Functional Criteria Changes
- 1.17 Rehabilitation
- 1.18 Explosive Temporary Storage
- 1.19 Operation and Maintenance
- 1.20 Removal/Demolition
- 1.21 Other Special Provision Items
- 1.22 Historical Preservation

Section 2 - Architecture

- 2.1 General
- 2.2 Building Description
- 2.3 Building Design
- 2.4 Code Analysis
- 2.5 Floor
- 2.6 Exterior Walls
- 2.7 Interior Walls
- 2.8 Doors
- 2.9 Windows
- 2.10 Roof
- 2.11 Ceilings
- 2.12 Finishes
- 2.13 Regulations

Section 3 - Civil

- 3.1 General
- 3.2 Site Clearing
- 3.3 Site Earthwork
- 3.4 Potable Water System

- 3.5 Fire Water System
- 3.6 Sanitary Sewer System
- 3.7 Site Fuel Distribution System
- 3.8 Site Layout
- 3.9 Access Roads and Parking
- 3.10 Pavement
- 3.11 Drainage
- 3.12 Landscaping
- 3.13 Security Fence and Gates
- 3.10 Site Lighting
- 3.11 Air Emissions Permitting
- Section 4 - Structural
 - 4.1 General
 - 4.2 Applicable Publications
 - 4.3 Design Criteria
 - 4.4 Foundations
 - 4.5 Building Frame
 - 4.6 Design Loads
- Section 5 - Geotechnical
 - 5.1 Geotechnical Report
- Section 6 - Mechanical
 - 6.1 Heating, Ventilating, and Air-Conditioning (HVAC)
 - 6.1.1 Design Conditions
 - 6.1.2 U-Values:
 - 6.1.3 Infiltration:
 - 6.2 HVAC Systems
- Section 7 - Electrical
 - 7.1 General
 - 7.2 Applicable Publications
 - 7.3 Primary Electrical Service
 - 7.4 Secondary Service
 - 7.5 Grounding
 - 7.6 Lightning Protection
 - 7.7 Raceway Systems
 - 7.8 Area Classification
 - 7.9 Interior Lighting
 - 7.10 Exterior Lighting
 - 7.11 Emergency and Exit Lighting
 - 7.12 Communications Service
 - 7.13 Fire Alarm and Detection System
 - 7.14 Closed Circuit Television System
 - 7.15 Emergency Power

APPENDICES

- Appendix A - Figures/Drawings
- Appendix B - Site Visit Reports and Meeting Notes
- Appendix C - User Requirements
- Appendix D - Preliminary Cost Estimate

Appendix E – LEED Scoring Sheets
Appendix F – Completed DD1391

1-5 DD 1391 TABS A-J

1. The complete DD Form 1391 includes TAB A through TAB J, with supporting documentation, coordinated with responsible agency, and ready for installation signatures. Each TAB is described as follows:

a. **TAB A**, DD Form 1391. Define the objective of the facility and establish the need. Document the methods by which the need is currently being met. Define and validate all special use, technical and functional requirements. Identify all items of work to include special items. Clearly and concisely describe all principal features of work that are included in the project cost. Prepare a parametric cost estimate for the entire project. Provide the total project cost estimate in a format compatible to the DD Form 1391 Processor. Ensure that the unit costs are in accordance with Department of Defense (DOD) guidance. Identify costs to be incurred during the warranty period, such as training for new heat, ventilation and air conditioning (HVAC) systems. Ensure the information system and the Antiterrorism/Force Protection (AT/FP) costs are accurate. Parametric information system cost estimates will be prepared with the Information System Planning, Programming, and Cost Estimation (ISCE) Software available in the DD Form 1391 Processor or other software approved by DOIM. The project needs to support the sustainable design goal established in the use of the Sustainable Project Rating Tool (SPiRiT). **GOLD** is the required minimum level. Accurate life-cycle costing is essential to support the sustainable design goal of SPiRiT. Provide the additional required paragraphs based on project location and function.

b. **TAB B**, Planning and Design. The AE will coordinate with the USACE Project Engineer for the required data to complete this TAB. Provide design and construction milestones to include start dates and completion dates, acquisition strategy, use of standard designs, and total planning and design costs associated with the project.

c. **TAB C**, General Justification Data. Provide the major topics to include mission statement, site description, and traffic analysis. Address the overall reason for the project. Provide narrative analysis of facility deficiencies citing how they limit the desired performance of mission accomplishment. Describe unusual site conditions. Identify the sources of Army standards, criteria and guidance used to develop the project scope. Discuss provisions for storage, handling or use of classified information. Discuss anticipated traffic for the facility and the expected impact on existing circulation patterns. Provide the installation engineer name and telephone number.

d. **TAB D**, Economic Analysis. The economic analysis contains a project objective describing the requirement, a listing and description of each considered option, and a discussion of the feasibility of each alternative. When a feasible option to the proposed project exists, the project is required to be supported by an Economic Analysis. Evaluate life cycle cost of long-term operation and maintenance costs to support SPiRiT. Economic Analysis will be prepared with the Economic Package (ECONPACK) Software available in the DD Form 1391 Processor.

e. **TAB E**, Furnishing & Equipment. Identify by fund type and procurement date, items of furnishings and equipment necessary to facilitate functional occupancy of the completed facility.

f. **TAB F**, Information Systems Support. Include all communications costs both inside and outside the building by fund type. The items need to be concurrently programmed in the appropriate procurement and supply channels. Parametric information system cost estimates will be prepared with the Information System Planning, Programming, and Cost Estimation (ISCE) Software available in the DD Form 1391 Processor or software approved by DOIM.

g. **TAB G**, Antiterrorism/Force Protection (AT/FP) Data. The project must be evaluated in accordance with DOD AT/FP Standards and Installation Threat Assessment (completed by Installation Force Protection Office) for AT/FP measures. Installation threat assessment shall govern. The needs for physical security are separate from AT/FP and are not to be included in the AT/FP costs. Provide the name and telephone number for the Force Protection Officer, Provost Marshal, and the Director of Public Works.

h. **TAB H**, Present Accommodations and Disposition. Account for the facilities currently being utilized to meet the project mission. Account for the disposition of any existing facilities affected by the construction of the proposed project. Any facilities that are not designated for demolition must have the proposed reassignment and use indicated.

i. **TAB I**, Real Property Maintenance Data. Provide a projection of the continuing funding requirement for the operation, maintenance and functional use of the facility that includes the total cost of not only the new facility, but the projected costs to operate and maintain the new facility, as well as net changes in real property assets.

j. **TAB J**, Regulatory Data. This data includes commercial activities; environmental consequences; protection of historical and archeological sites; flood hazards; encroachment on wetlands; summary of energy/utility requirements; and provisions for the handicapped. Include a copy of the environmental documentation here, to be provided by the Fort Drum Environmental Office.

1-6 Sample A/E Charrette Scope of Work

**Revised Scope of Work
Planning Charrette for
Indoor Training Facilities (PN #s 69441, 65808 & 58550). Fort Drum,
NY**

13 September 2007

1.0 Project Descriptions

The primary purpose of this planning charrette is to produce accurate DD1391 forms for the three indoor firing range projects (PN #s 69441, 65808 & 58550). It is essential that the cost estimate prepared by the AE be in sufficient detail to back up the cost data included in the DD1391.

The AE shall conduct a planning charrette and prepare three DD1391s, one for each of the following facilities:

	<u>Qty</u>	<u>Unit</u>	<u>Cost (000)</u>
PN #58550 - Indoor Training Facility South BCT	27,100	SF	\$5,500,000
PN #69441 - Indoor Training Facility Sustainment BD	27,100	SF	\$5,400,000
PN #65808 - Indoor Training Facility for Central BC	27,100	SF	\$5,300,000

PN #58550 - Indoor Training Facility South BCT - This project consists of a single story Interior Training Facility at Fort Drum, NY. The project includes an indoor firing range with twenty lanes, an observations area enclosed in glass, range storage rooms, a weapons cleaning and degreasing room, an alarmed weapons storage and ammunitions storage vault, two classrooms, one of which will function as an Engagement Skills Training (EST) room, administrative offices for four (4) personnel, men's and women's toilet rooms with showers, boiler, electrical and telecom rooms. In addition, a mezzanine will be provided over the firing range to accommodate the Range air-handling units. The new Indoor Training Facility will be located on the southeast side of South Memorial Drive between Second Street West and Fourth Street East. The project also includes grading, support utilities, entry drive, parking lot, service road and landscaping. The support utilities include electric and communications service, domestic and fire protection water supply, storm and sanitary sewers and gas service.

PN #69441 - Indoor Training Facility Sustainment BD - This project consists of a single story Interior Training Facility at Fort Drum, NY. The project includes an indoor firing range with twenty lanes, an observations area enclosed in glass, range storage rooms, a weapons cleaning and degreasing room, an alarmed weapons storage and ammunitions storage vault, two classrooms, one of which will function as an Engagement Skills Training (EST) room, administrative offices for four (4) personnel, men's and women's toilet rooms with showers, boiler, electrical and telecom rooms. In addition, a mezzanine will be provided over the firing range to accommodate the Range air-handling units. The new Indoor Training Facility will be located on the southeast side of South Memorial Drive between Second Street West and Fourth Street East. The project also includes grading, support utilities, entry drive, parking lot, service road and landscaping. The support utilities include electric and communications service, domestic and fire protection water supply, storm and sanitary sewers and gas service.

PN #65808 - Indoor Training Facility for Central BC - This project consists of a single story Interior Training Facility at Fort Drum, NY. The project includes an indoor firing range with twenty lanes, an observations area enclosed in glass, range storage rooms, a weapons cleaning and degreasing room, an alarmed weapons storage and ammunitions storage vault, two classrooms, one of which will function as an Engagement Skills Training (EST) room, administrative offices for four (4) personnel, men's and women's toilet rooms with showers, boiler, electrical and telecom rooms. In addition, a mezzanine will be provided over the firing range to accommodate the Range air-handling units. The new Indoor Training Facility will be located on the southeast side of South Memorial Drive between Second Street West and Fourth Street East. The project also includes grading, support utilities, entry drive, parking lot, service road and landscaping. The support utilities include electric and communications service, domestic and fire protection water supply, storm and sanitary sewers and gas service.

2.0 Scope of A/E Services

The AE shall conduct a planning charrette, on-site at Fort Drum, NY. As a result of the charrette, the AE shall deliver three completed DD1391 forms, approved by all responsible parties.

The AE shall be represented by a highly capable team consisting of experienced personnel in the following disciplines:

Project Manager,
Senior Mechanical Engineer,
Senior Architect (CADD Capable),
Senior Civil Engineer (CADD Capable)

A Senior Electrical Engineer and a Cost Estimator will support the charrette but not attend. The use of the previous charrette information is allowed and encouraged. The Senior Electrical Engineer should update previous information. The Cost Estimator should update previous cost prior to charrette and then incorporate any changes found during the charrette.

The Charrette will be four (4) days long. All three projects will be done during the four (4) days. There should be one building design and three site designs.

The 1391 will be inputted in to the PAX processor by Fort Drum DPW.

The AE shall perform all Architectural and Engineering services necessary for the subject project. This includes, but is not limited to, studies, investigation of supporting utilities and/or facilities, such as, water supply, sewer, natural gas, HVAC, electric service, exterior and/or security lighting, parking, storm drainage, communications, fire protection, access roads, fencing, signage, landscaping, paving, walks, curbs, Antiterrorism/Force Protection measures, information systems and general site improvements. The product of this planning charrette will be three completed DD1391s and three charrette reports that support the project requirements contained in the DD1391s. Contents of the charrette reports are described in paragraph 2.5 below.

It is essential that the AE conduct the on-site charrette in the most efficient manner possible.

Therefore, prior to commencing the charrette, at a minimum the AE shall:

- Review any existing plans provided by the Government
- Update and Review previous charrette and PACES estimate done for PN #58550
- Review Department of Army standard designs
- Be familiar with the appropriate codes and regulations
- Bring copies of required reference materials
- Propose a plan and agenda outlining how the AE plans to complete the task

Any Substantial changes to the facility requirements after the start of the charrette will result in a scope change such that the AE may minimize rework (e.g. revisions may be documented by annotated drawings rather than revised drawings).

The NYD shall be responsible for providing the AE with the following, one week following the NTP:

- AE Master Plan MS CADD drawings, on CD, showing all known site/site utility data;
- All local cost adjustment factors to be used in the project cost estimating process;
- Site geotechnical reports

Structural engineering services are not required for this charrette; the NYD shall provide the AE with geotechnical assumptions and building foundation types to be used.

In conducting the charrette, the AE shall:

- a) Investigate the site(s) to verify terrain, wetlands, and infrastructure.
- b) Meet with User representatives to validate and document their requirements. The AE shall document any deviations requested from the standard designs, and any special requests that go beyond the code requirements.
- c) Establish the Project Requirements and Parameters. Establish facility parameters such as facility footprint, number of floors, roof shape and construction, exterior finish materials and other parameters that will impact construction costs.
- d) Evaluate special site/facility conditions.
- e) Review existing geo-technical data to determine possible impact on cost.
- f) Establish Utilities Requirements. Evaluate utility requirements including heating and cooling sources, estimate electrical loads, water and sewage, etc. to establish utility parameters to include tie in points and capacities. Estimate quantities of each utility separately.
- g) Establish Parking, Site-work, and Landscaping parameters. Evaluate site plan sufficiently to establish site-work and landscaping parameters, including quality level of landscape materials and plantings, need for irrigation systems, storm drainage, etc. that will impact construction costs (Landscaping may be in narrative form; however, the site plan shall show building, paving, and utilities). Ensure sufficient real estate is set aside for this project.
- h) Identify and quantify all facility supporting requirements including Antiterrorism/Force Protection measures, paving, and all facilities and requirements that are not or may not be included in the facility unit costs
- i) Identify and quantify the user parking needs; i.e., POV, truck, government vehicles.
- j) Define parameters and quality levels for interior and exterior finishes/materials
- k) Determine parameters for the mechanical, electrical and plumbing systems.
- l) Determine the need for fire protection measures.
- m) Document any anticipated special requirements, such as fire pumps, mass notification systems etc.
- n) Develop a cost estimate based on facility/site requirements. Due to the nature of the charrette, preliminary cost data is required throughout the process as it may affect the decisions made. The estimate may be refined after the project requirements are better known.
- o) Provide a recommendation for additional studies and/or testing. Identify any additional investigations, studies, tests or other special requirements that will be necessary for the designer of record to accomplish before completion of final plans and specifications; e.g., soft digs, flow tests, etc.
- p) The AE shall identify potential costs resulting from a Sustainable Design and Development (SDD) Project Rating Tool (LEED). LEED Silver is the target Checklist and documentation only, no application required.
- q) Develop a **complete** DD1391 including TAB's A-J. The AE is required to coordinate with various Fort Drum agencies (Environmental, Master Planning, Engineering, DOIM, etc.)

- to assist in accurate preparation.
- r) Prepare a charrette report to provide instructions to the designers and to support the information contained in the DD1391.

Project Management, Meetings, and Presentations:

The AE shall brief the USACE Project Engineer each day during the charrette. The AE shall describe the work accomplished, and the plan to complete the work within the required timeframe. In addition, the AE shall make available to the government draft/working copies of the charrette products as they become available during the Charrette.

The AE shall hold an Outbrief meeting at the conclusion of the on-site charrette. The AE shall present the project requirements and results of the charrette. In addition, at this time the AE shall identify taskers required in order to complete the final deliverables for the project. The outbrief report should be a complete draft with only corrections and finishing touches to be added for the final report.

The AE will provide overall project management for their services on this project. This includes, but is not limited to, management of sub-consultants, management of CADD files, and overall quality control. The AE will attend meetings with the Corps of Engineers, Fort Drum and other Federal, State and Local Government personnel as required. The AE will conduct/attend field investigations, fact gathering meetings and comment review meetings.

The AE must provide a fully capable team. **Within 7 calendar days of NTP, the AE shall submit the resumes of all proposed team members.** The Government reserves the right to reject proposed team members.

In addition, during the charrette, the Government reserves the right to dismiss non-performing team members. The AE shall provide a suitable replacement within 24 hours.

CONTRACTOR MANPOWER REPORTING - Application (CMR-A) Requirement

The Office of the Assistant Secretary of the Army (Manpower and Reserve Affairs) operates and maintains a secure Army data collection site where the contractor will report ALL contractor manpower (including subcontractor manpower) required for performance of this contract. The web address for the data collection site is: <https://cmra.army.mil>. This web site address includes links to a helpdesk and a user's manual. The contractor is required to completely fill in all the required information. The required information includes:

- (1) Contracting Office, Contracting Officer, Contracting Officer's Technical representative;
 - (2) Contract number, including task and delivery order number;
 - (3) Beginning and ending dates covered by the reporting period (Reporting period will be the period of performance not to exceed 12 months ending September 30 of each year)
 - (4) Contractor name, address, phone number, e-mail address, identity of contractor employee entering data;
 - (5) Estimated direct labor hours (including sub-contractors);
 - (6) Estimated direct labor dollars paid this reporting period (including subcontractors);
 - (7) Total payments (including sub-contractors);
 - (8) Predominant Federal Service Code (FSC) reflecting services provided by contractor (and separate predominant FSC for each sub-contractor if different);
 - (9) Estimated data collection cost;
 - (10) Organizational title associated with the Unit Identification Code (UIC)
- For New York District contracts, the contractor shall use:

UIC:
W912DS

Organizational title:
U.S. Army Engineer District, New York
ATTN: CENAN-CT
26 Federal Plaza
New York, NY 10278

- (11) Locations where contractor and subcontractor perform the work (specified by zip code in the United States and nearest city, country, when in a overseas location, using standardized nomenclature provided on website);
- (12) Presence of deployment or contingency contract language; and
- (13) Number of contractor and sub-contractor employees deployed in theater this reporting period (by country).

Reporting period will be the period of performance not to exceed 12 months ending September 30 of each government fiscal year and must be reported by 31 October of each calendar year.

2.5 Deliverables

The AE should anticipate that due to the dynamic nature of the charrette process, several iterations of each of the deliverables may be required during the charrette period. The AE team should present various options and recommendations to the customer throughout the process. The AE should keep a record of the various designs discussed during the charrette, and shall deliver a copy of all notes, and interim products to the Project Engineer. Throughout the charrette, hand sketches, and “back of the envelope” calculations may be required. The final report must clearly identify all decisions made, and the supporting information used.

- **Completed DD1391**

The AE shall deliver a fully coordinated and completed DD1391 form for the subject project.

The AE shall enter the approved DD1391 in to the PAX processor.

1. The complete DD Form 1391 includes TAB A through TAB J, with supporting documentation, coordinated with responsible agency, and ready for installation signatures. Each TAB is described as follows:
 - a. **TAB A**, DD Form 1391. Define the objective of the facility and establish the need. Document the methods by which the need is currently being met. Define and validate all special use, technical and functional requirements. Identify all items of work to include special items. Clearly and concisely describe all principal features of work that are included in the project cost. Prepare a parametric cost estimate for the entire project. Provide the total project cost estimate in a format compatible to the DD Form 1391 Processor. Ensure that the unit costs are in accordance with Department of Defense (DOD) guidance. Identify costs to be incurred during the warranty period, such as training for new heat, ventilation and air conditioning (HVAC) systems. Ensure the information system and the Antiterrorism/Force Protection (AT/FP) costs are accurate. Parametric information system cost estimates will be prepared with the Information System Planning, Programming, and Cost Estimation (ISCE) Software available in the DD Form 1391 Processor or other software approved by DOIM. The project needs to support the sustainable design goal established in the use of the Sustainable Project Rating Tool (SPiRiT). **GOLD** is the required minimum level. Accurate life-cycle costing is essential to support the sustainable design goal of SPiRiT. Provide the additional required paragraphs based on project location and function.
 - b. **TAB B**, Planning and Design. The AE will coordinate with the USACE Project Engineer for the required data to complete this TAB. Provide design and construction milestones to include start dates and completion dates, acquisition strategy, use of standard designs, and total planning and design costs associated with the project.
 - c. **TAB C**, General Justification Data. Provide the major topics to include mission statement, site description, and traffic analysis. Address the overall reason for the project. Provide narrative analysis of facility deficiencies citing how they limit the desired performance of mission accomplishment. Describe unusual site conditions. Identify the sources of Army standards, criteria and guidance used to develop the project scope. Discuss provisions for storage, handling or use of classified information. Discuss anticipated traffic for the facility and the expected impact on existing circulation patterns. Provide the installation engineer name and telephone number.

d. **TAB D**, Economic Analysis. The economic analysis contains a project objective describing the requirement, a listing and description of each considered option, and a discussion of the feasibility of each alternative. When a feasible option to the proposed project exists, the project is required to be supported by an Economic Analysis. Evaluate life cycle cost of long-term operation and maintenance costs to support SPiRiT. Economic Analysis will be prepared with the Economic Package (ECONPACK) Software available in the DD Form 1391 Processor.

e. **TAB E**, Furnishing & Equipment. Identify by fund type and procurement date, items of furnishings and equipment necessary to facilitate functional occupancy of the completed facility.

f. **TAB F**, Information Systems Support. Include all communications costs both inside and outside the building by fund type. The items need to be concurrently programmed in the appropriate procurement and supply channels. Parametric information system cost estimates will be prepared with the Information System Planning, Programming, and Cost Estimation (ISCE) Software available in the DD Form 1391 Processor or software approved by DOIM.

g. **TAB G**, Antiterrorism/Force Protection (AT/FP) Data. The project must be evaluated in accordance with DOD AT/FP Standards and Installation Threat Assessment (completed by Installation Force Protection Office) for AT/FP measures. Installation threat assessment shall govern. The needs for physical security are separate from AT/FP and are not to be included in the AT/FP costs. Provide the name and telephone number for the Force Protection Officer, Provost Marshal, and the Director of Public Works.

h. **TAB H**, Present Accommodations and Disposition. Account for the facilities currently being utilized to meet the project mission. Account for the disposition of any existing facilities affected by the construction of the proposed project. Any facilities that are not designated for demolition must have the proposed reassignment and use indicated.

i. **TAB I**, Real Property Maintenance Data. Provide a projection of the continuing funding requirement for the operation, maintenance and functional use of the facility that includes the total cost of not only the new facility, but the projected costs to operate and maintain the new facility, as well as net changes in real property assets.

j. **TAB J**, Regulatory Data. This data includes commercial activities; environmental consequences; protection of historical and archeological sites; flood hazards; encroachment on wetlands; summary of energy/utility requirements; and provisions for the handicapped. Include a copy of the environmental documentation here, to be provided by the Fort Drum Environmental Office.

- **Charrette Report**

The AE shall fully document all decisions and courses of action discussed during the charrette, including the responsible parties in attendance, and any external coordination that was required. The AE shall deliver a completed charrette report containing at a minimum the following information:

- Design analysis containing narrative descriptions, notes for the future designer of record, and basis for design. See attached sample report outline.
- Pre-design level description narrative for mechanical, electrical, structural, fire-protection, life safety, architectural finishes, plumbing, and information systems. Determine approximate heating, cooling, and electrical loads.
- Identification of unusual requirements (for example, special foundations, security and force protection design) that will influence the cost.
- A summary of environmental issues that would impact the cost of the project and require waivers and permits
- A description of off-site utilities requirements, including central energy plants, if applicable.
- A description of interior design requirements, and the procurement of furniture and furnishings.
- A description of government furnished and installed equipment that will be procured by the installation or using agency, if applicable.
- Pre-design level functional relationship diagram showing functional space arrangements
- Sketches/Drawings - All Sketches/Drawings should be high quality, clear, concise and uncluttered by extraneous detail for ease of reading. Sketch drawings should be presented on 215 mm x 280 mm (8 ½" x 11") letter size sheets or, if necessary, with 280 mm x 430 mm (11" x 17") fold-out sheets. A graphic bar scale and North Arrow should be provided on each separate sketch. The drawings shall be provided in CAD and the

electronic files shall be submitted along with the hard copies. Files shall be in Microstation V8 , .DGN format.

- Site Plan - Sketches/Drawings should be prepared based on accurate information obtained during on-site visits and surveys or based on previous information available if sufficiently accurate. The building locations, the size and capacities of existing utilities and their connection points, and the estimated size and capacities of new utilities needed for the project, including electric, water, gas, sewer, voice and data communication and other utilities, should be shown. As much of the project area as necessary should be included to convey meaningful information to someone who has not visited the location. The following shall be included:
 - A well-defined site adaptation of the facility that notionally addresses the Installation Design Guide requirements.
 - Project location in relation to major landmarks or features on the installation.
 - Proximity of related facilities that could influence the project operation.
 - Major project features such as buildings, roads, parking areas, etc.
 - Inserts with an overall view of the installation should be used to show widely separated but related facilities.
 - Sketches/Drawings for pavement projects only can be effectively shown by a combined site/location plan and cross-sections. Utilities Site Plans, if applicable.
- Floor plan or plans in sketch/drawing form, either single line or double lines as appropriate, for buildings and structures should be provided showing functional spaces and areas, utilization, and major pieces of building equipment. Only significant layouts and dimensions should be shown. The proposed use of partitioned areas on the floor plan or plans should be shown using standard and well known room designations. A numbering system should be used that is keyed to descriptions to label functional areas if space is limited on the sketch drawings.
- Exterior elevations and cross-sections should be provided to facilitate visualizing the project, unless otherwise directed by the Project Engineer. The architectural style, significant materials and dimensions, if available, should be clearly shown in the exterior elevations.
- A record of all review comments and meeting minutes generated during the charrette.
- **Cost Estimate**

The AE shall prepare a parametric cost estimate in accordance with UFC 3-700-01A. The estimate shall be in sufficient detail to support the data provided in the DD1391. Quantities of each aspect of construction, including separate utility lines shall be clearly identified. The AE may use Excel, PACES, PC-Cost, or another method for estimating during the charrette, however, the final Cost Estimate must clearly support the DD1391 and shall be in the same format as the DD1391 (PC-Cost).

The cost estimate shall include both primary and supporting facility costs. Primary Facility costs include everything within 5 ft. of the building line. Supporting facility construction costs shall include everything outside 5 ft. of the building line. The cost estimate will identify complete project costs including those not shown on the contract drawings (i.e., work performed by other contractors, telecommunications and other set aside costs, NYD contingency costs, bid market saturation effects, etc. as provided by NY District).

3.0 General Clauses

3.1. The Architect-Engineer agrees that if the surveys, studies or work prepared under the proposed contract comes under question, he will justify such work to the degree necessary to assure their correctness. Upon completion of this task, the AE will be rated using the ACASS rating system. Sample ratings forms are attached.

3.2. It is understood that the Architect-Engineer assumes full responsibility for quality control of his work under the contract and will thoroughly review his Charrette Design package after completion to ensure that the professional quality of the final work shall be such that review by the Government will be at a minimum. The AE is required to provide the Corps with a high quality product. The AE is required to provide a copy of its quality control procedures with the submission of the fee proposal. The AE is required to perform an independent quality control check of his design before each scheduled submittal. The AE along with his scheduled design submission will submit a letter certifying that the quality control check has been performed and will also provide a copy of all comments generated by the quality control check. Failure to do so may be cause to reject the submittal.

3.3. All supporting data shall be submitted with each design submission.

3.4. In addition to DOD and Army criteria, the Architect-Engineer will employ safety and health standards promulgated under the Occupational Safety and Health Act (OSHA) of 1970 as published in the Federal Register, October 18, 1972, Volume 37, Number 202, Part II (Title 29, Chapter 17, Part 1910) and subsequently issued OSHA standards or standards consistent therewith in the design of this facility. In those cases where an identified inconsistency appears to be necessary, the Architect-Engineer will notify the New York District of the inconsistency for review and decision.

3.5. Review periods will be completed by government personnel per the schedule in paragraph 8.0. If a review period is not indicated, the government has up to 30 calendar days to review each submittal.

3.6. The A/E will provide within 10 calendar days of receipt of NTP a management work breakdown structure (CPM). This will be used to manage A/E payment estimates and project progress.

4.0 Project Criteria

4.1 The applicable portions of the Engineering Manual Army Regulations and other applicable publications shall govern the design and preparation of plans, specifications, cost estimates and design analysis. Particular attention is invited to the following engineering manuals, which establish minimum requirements for plans, specifications, cost estimates and design analysis. This includes but is not limited to the following publications:

UFC 3-260-01, AIRFIELD AND HELIPORT PLANNING AND DESIGN

AFH 32-1084 - Facility Requirements

ETL 02-15 - Fire Protection

UFC 4-721-11.1 - Design: Unaccompanied Enlisted Personnel Housing (UEPH)

Complexes

UFC 4-214-02 - Design: Army Tactical Equipment Maintenance Facilities (TEMF)

NANP-1110-1-1, US Army Corps of Engineers, New York District (NAN), Manual of Standard Procedures for Planning and Design, dated March 1990.

COE Engineering Regulations, Manuals, Technical Letters and Pamphlets (current editions); including, but not limited to the following:

AR415-15 Army Military Construction Program Cost Development & Execution

TI 800-01 Technical Instructions Design Criteria

UFC 1-300-07A, Technical Requirements for Design-Build
UFC 1-200-01 Design: General Building Requirements
UFC 3-700-01A Programming Cost Estimates for Military Construction
ER 1110-3-1300, Military Programs Cost Engineering.
EI 01D010, Construction Cost Estimates
EM 385-1-1, U.S. Army COE Safety and Health Requirements Manual.
UFC 3-120-02AN, Design Guide: Interiors
ER 1110-345-700, "Design Analysis".
ER 1110-345-710, "Drawings, Military Construction".
ER 1110-345-720, "Specifications, Military Construction"
ER 1180-1-9, "Contracts, Design-Build Contracting"
EM 1110-1-1002 Survey Markers & Monumentation
TM 5-8181-1- Procedures for Foundation Design of Buildings and Other Structures
UFC 3-600-01, Fire Protection Engineering for Facilities
UFC 4-010-01, Design: DoD Minimum Antiterrorism Standards for Buildings
UFC 4-010-02, Design (FOUO): DoD Minimum Standoff Distances for Buildings
UFC 4-021-01, Design and O&M: Mass Notification Systems
UFC 3-701-05, DoD Facilities Pricing Guide, Version 7

Current version of Tri-Service A/E/C CADD Standards, Spatial Data Standards, and A/E Deliverable Standards. See web page: <http://tsc.wes.army.mil> for latest version.
Installation Information Infrastructure Architecture (I3A) Implementation Guide, Version 3 dated April 2001. See web page: <http://akea-cio.army.mil/i3a/i3a.asp>

Fort Drum Draft Design Standards

Fort Drum Installation Design Guide

- 4.2. Other Applicable (non-Government) Publications and References (latest editions):
- a. National Standard Plumbing Code
 - b. National Fire Protection Association (NFPA)
 - c. National Institute of Occupational Safety and Health (NIOSH) Standards (latest editions)
 - d. Occupational Safety and Health Administration (OSHA) Standards (latest editions)
 - e. ASTM D 2488- Description and Identification of Soils
 - f. ASTM D 2487- Classification of Soils for Engineering Purposes
 - g. ASTM D 2113- Diamond Core Drilling for Site Investigation
 - h. ASTM D 1586- Penetration Test and Split Barrel Sampling for Soils
 - i. International Building Code

5.0 Coordination

Meetings and conferences initiated by the A/E or U.S. Agencies shall be held only with the approval of and/or in the presence of the project engineer. A Memorandum for the Record (MFR) of the matters discussed during the meeting and conferences regarding the project will be prepared and typewritten by the A/E and forwarded to the project engineer within 5 calendar days.

6.0 Schedule and Submittals

The technical products should be essentially complete at the conclusion of the charrette. The

government may provide further comments up to 7 days following the outbrief. The final product must incorporate all review comments.

<u>Submission</u>	<u>Elements</u>
Charrette Outbrief (Final Day of Charrette)	Review copy of DD1391 including Cost Estimate Overview Briefing of the Project and Charrette Results Outline Charrette Report Drawings including floor plans and site plans (utility tie-ins)
Final (28 Days After Outbrief)	Detailed Cost Estimate DD 1391 DATA (Word and or Excel) Tabs A-J Charrette Report (including Geotech report) Drawings including floor plan, site plan (utility tie-ins), cross section and elevations

7.0 Reproduction and Other Items

All submissions shall be submitted in electronic form as well as hard copy as described below. Narratives shall be submitted in Microsoft Word (.doc) format. Drawings shall be submitted in Microstation (.dgn) format and shall be ESRI compatible as well. The cost estimates shall be submitted in PC-Cost format, as well as Excel format. An Adobe Acrobat (.pdf) file of the entire submittal shall be provided.

The Architect/Engineer shall provide for reproduction and delivery of all design submissions of material under this contract as follows:

Approximately 15 copies of the Outbrief Package shall be distributed at the outbrief meeting on the final day of the charrette. A CD containing the electronic files of the submission shall be delivered to the Project Engineer.

Three (3) copies of the final Charrette Design Package shall be delivered to the following address:

US Army Corps of Engineers
ATTN: Matthew Emigholz (CENAN-EN-M)
26 Federal Plaza
Room 2037
New York, NY 10278-0090

Twelve (12) copies of the final Charrette Design Package shall be delivered to the following address:

US Army Corps of Engineers
ATTN: Eric Smith (CENAN-EN-M)
Building T-4884 Jones St
Ft Drum, NY 13602

8.0 Schedule

Planning charrette shall begin within 45 days of NTP.

All work including final deliverables shall be complete within 120 calendar days of NTP

9.0 Request for Payment

The A/E shall include a progress report along with the Payment Estimate – Contract Performance, ENG Form 93 as justification for the amount of payment requested. The progress report shall include in narrative form a Summary of Activities, Estimated Percentage Complete, Project Schedule Evaluation, Action Items, and Problems and Recommended Solutions.

The Final Payment request shall be accompanied by the completed Release of Claims form (attached).

Subsurface Explorations – Geotechnical

The contractor/A-E shall furnish the required personnel, material and equipment necessary to accomplish the work including, but not limited to a qualified licensed Geologist, Engineering Geologist or Geotechnical Engineer experienced in subsurface exploration and a surveyor licensed in the state of New York to establish test pit locations and elevations. The contractor/A-E shall comply with all applicable Federal, State and local laws, regulations, and ordinances relating to the performance of this work. The contractor/A-E shall procure all required permits, certifications and licenses required by Federal, State and local law for execution of this work. Within ten (30) days after receipt of NTP, the A/E will submit to the Project Engineer a test pit program for review & approval. Call Ben Baker for any questions (917) 790 8379.

Test Pits:

Test pit locations and elevations shall be determined using a surveyor licensed in the state of New York.

Excavate a total of 12 test pits (one at each corner of the proposed building locations), 4 test pits at each site location. Verify the depth to bedrock and determine the ripability of the bedrock.

The actual location of test pits will be established in the field prior to start of work and shall be surveyed prior to start of work. Test pits location plan shall be submitted to COE for approval one week prior to work. Survey control shall be in accordance with EM 1110-1-1004 and per fourth order survey control for construction layout/grade control.

Soil samples will be described according to the Unified Soil Classification with minor constituents quantified according to the Berminster method using the terms trace (0-10%), little (10-20%) and some (20-40%). The rock type will be identified and the degree of weathering and fracturing noted. Rock quality designation (RQD) and percent recovery will be noted on the log.

Laboratory Testing:

All testing shall be conducted at a soil laboratory that has been validated by the Corps of Engineers. Each sample selected for testing shall be visually examined and classified. Physical property tests shall be performed on selected representative samples taken from at least ½ of the test pits to aid in classification and determination of stratigraphic continuity, and to serve as indices to soil behavior. Physical testing shall include sieve and hydrometer analysis, moisture content, specific gravity, dry unit weight (or density), and grain size analysis. Other testing such as compaction, consolidation and unconfined compressive strength may be conducted at the discretion of the Geotechnical Consultant.

Ground Water

Ground water level shall be determined in each test pit approximately 24 hours after test pits are completed. Three groundwater observation wells (piezometer) shall be installed at three of the 12 test pit locations (one at each site).

PRELIMINARY SUBSURFACE INVESTIGATION REPORT:

The accumulated field and laboratory data will be analyzed relative to the influence of the subsurface conditions upon the proposed construction. At the conclusion of the analysis, a comprehensive report shall be submitted, presenting the field and laboratory data obtained, together with conclusions and recommendations for the design and construction of foundations for the proposed building, and associated earthworks. The subsurface investigation report shall be preliminary in nature and include but not necessarily be limited to the following elements:

2. An evaluation of the feasibility of using shallow foundations
3. A range of probable bearing pressures
4. Narrative of soil identification and classification

5. Laboratory test results
6. Brief discussion on engineered fill recommendations
7. Cut and/or excavation consideration
8. Frost susceptibility
9. Ripability
10. Plot plan, drawn to scale, with north arrow, showing test borings or pits. Borings shall be numbered and located dimensionally (include surface elevations)
11. Any other geotechnical information that the geotechnical engineer believes, in his professional opinion, to be important to the design of foundation and pavement systems for this project.
12. A minimum of six (6) completed geotechnical reports shall be furnished to the Contracting Officer.

TEST PIT LOGS:

Logs of each test pit shall be drawn to scale and include the following heading information,

- a. Test Pit number Project name and contract identification
- b. Location (x and y) coordinates
- c. Surface Elevation
- d. Name of driller and/ foreman in charge of field operation

The standard penetration test portion of the log should clearly record the following information,

1. Soil or rock description and classification (as noted above)
2. Strata breaks (top and base of soil or rock units)
3. Sample number
4. Blow counts (blows per six inches)
5. Samples selected for soil or rock testing.
6. Elevation of groundwater table

SPECIAL REQUIREMENTS:

- a) Coordination & assistance with Ft. Drum PW-PM in obtaining Excavation Permit is required.
Talk to Robert Avar (315) 772 2862
- b) Coordination with Ft. Drum PW-PM in locating known utilities and properly marking prior to drilling.
- c) There will be no cutting of trees and brush cutting will be kept to a minimum.
- d) The Contractor will contact the Ft. Drum PW-PM and the New York District (Matthew Emigholz) a minimum of five days prior to mobilization for notification & coordination of all geotechnical work.

CHAPTER 24
MILCON TRANSFORMATION (MT)

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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) The USACE maintains a website to disseminate all the necessary information related to Military Construction Transformation (MT) process and standard design development. It can be accessed at:

<https://eportal.usace.army.mil/sites/COS/Pages/Default.aspx>

- On this site you will find:
- Points of Contact to all the COS and USACE Headquarters
- All the necessary information pertaining to each standard facility type developed to date:
- Army Standards
- Army Standard Designs
- Adapt-Build Model information
- 1391 Templates
- All pertinent COS policy and procedural documents
- Important website links to other pertinent COS and MT information

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 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

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 and Administration (S&A) and Post-Award Engineering and Design

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, the individual COS listed below will be contacted for participation in design and construction. POC's for specific facility types are listed at the COS website:

<https://eportal.usace.army.mil/sites/COS/Pages/Default.aspx>

(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 COS's identified above. The USACE has developed the RFP Wizard to provide a way to meet all mandatory guideline for developing the "Request for Proposal" documents for all MILCON projects utilizing the model RFP. The Wizard can be accessed at :

https://ff.cecer.army.mil/rfp_wizard/index.jsp

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.

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
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
ENG	Engineer Form designation
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
TM/PE	Technical Manager/Project Engineer
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

