

ARMY RESERVE

Design Process And Submittal Requirements

PART B DETAILED DESIGN (PHASE II) - DESIGN/BID/BUILD



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SAMPLE TYPED SUMMARY ESTIMATE

U.S. ARMY RESERVE

Design Process and Submittal Requirements

PART B – DETAILED DESIGN (PHASE II)

Chapter 1.0 – ALL DISCIPLINES

1.1 GENERAL

This portion of the Army Reserve Design Process and Submittal Requirements manual describes development of project detailed designs – the working drawings, specifications and other documents that make up the completed project design documents.

Note: This portion of the Manual is called Part B. It is specific to Design/Bid/Build projects. There are two other parts, described below for general information only.

- DPSR manual **Part A - Project Inception and Project Definition** provides background information. It describes the Inception and Project Definition steps of Army Reserve projects. It begins with the Budget Process and ends with Project Definition (Phase I) wherein the project is sufficiently defined to allow detailed design. Part A may be of general interest to the D/B/Build designer, but it does not extend the requirements of D/B/B as described in Part B and is not a part of this Part B.
- DPSR manual **Part B - Detailed Design (Phase II)** describes the standard Detailed Design (Phase II) process, requirements, and responsibilities for projects using the Design/Bid/Build (D/B/B) method. It spells out the requirements for major milestone design submittals - Charrette, Interim, Final, etc. - which defines the design process, resulting in a Solicitation provided to construction contractors for project bidding.
- DPSR manual **Part C – Design/Build - Design Submittal Requirements After Award** is specific to Design Build projects, and is for use by the successful D/B Contractor. It has no requirements concerning D/B/B and is not a part of this Part B.

'A-E' in this document refers to the A-E Contractor DOR, or the Louisville District In-House design team.

1.2 REFERENCE DOCUMENTS

Reference documents and criteria, including but not limited to the USAR Design Guide and reference documents therein, and guidance related to items in this document can be found on the Louisville District website, (herein referred to as the Army Reserve website). The Army Reserve website can be found here:

<https://www.lrd.usace.army.mil/Mission/Military-Construction-Reserve/Design-Guides/>

A-E Contract-related Documents:

A-E's Contract Appendix A (SOW), date as per the fully executed/signed Contract.

Requirements in this AR DPSR shall take precedence if there is a conflict with the Louisville District Military Design Guide (LDMDG).

1.3 ENERGY CONSERVATION

Provide energy conservation analyses on all buildings as required to ensure compliance with UFC 1-200-02. Provide a summary of the information provided to state the percentage reduction in energy usage over ASHRAE 90.1, the improvements over the minimum building, describing systems and equipment compared, reasons for choices selected and calculation summary. This summary, also called the Energy Compliance Analysis (ECA), is a cooperative narrative and is not the responsibility of one discipline, overall responsibility of this narrative is that of the entire A-E team. Include the ECA in the Design Analysis at each design phase submittal. Refer to ECA requirements at each design phase submittal, as noted in the chapters below.

1.4 LIFE CYCLE COST ANALYSIS (LCCA)

Refer to the A-E SOW for project specific LCCA requirements. Provide life cycle cost analyses (LCCA) on all buildings as required in UFC 1-200-02, to ensure compliance with the Energy Policy Act of 2005 and in accordance with Engineering and Construction Bulletin (ECB) 2020-8 (or current replacement ECB or updated UFC). The period of the LCCA will be based on the expected life of the building or 40 years from the beginning of beneficial use, whichever is shorter. The analysis will be in constant dollars, with the real discount rate determined from the rate published in the annual supplement to the Life Cycle Costing Manual for the Federal Energy Management Program (NIST 85-3273) and determined annually by DOE, subject to a floor of three percent and a ceiling of ten percent. LCCA must meet the requirements described in 10 CFR part 436 subpart A - Methodology and Procedures for Life Cycle Cost Analyses.

1.5 CYBERSECURITY

Identify the System Owner (SO) and Authorizing Official (AO). Identify systems affected. Provide cybersecurity analysis on all Facility Related Control Systems (FRCS) as required to ensure compliance with UFC 4-010-06; analyze the Confidentiality, Integrity, and Availability (CIA) impacts of that direction. Provide the Control Correlation Index (CCI) list for each system, and design systems in compliance with them.

1.6 LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED)

Refer to the A-E SOW for LEED Project Requirements. Currently LEED certification is required. Provide the LEED documentation indicated in this document, and in the SOW. Level of LEED certification is to be as indicated in the project SOW.

1.7 BUILDING INFORMATION MODELING (BIM) / CIVIL INFORMATION MODELING (CIM)

Refer to the A-E's Appendix A (SOW) and the Louisville District Military Design Guide (LDMDG) CADD/BIM chapter which at the time of this document is titled "Chapter 15 - Advanced Modeling and Digital Document Submittals" (located at <https://www.lrd.usace.army.mil/Mission/Military-Construction-Reserve/Design-Guides/>) for CADD/BIM/CIM requirements.

1.8 VALUE ENGINEERING

Value Engineering (VE) is a requirement for Army Reserve projects per ER 11-1-321 Value Engineering (VE). The VE requirement is being met on a program wide basis through a variety of VE initiatives on facility design standards and projects. The PE/A is to coordinate with the Louisville District Value Engineering Officer to determine exact requirements. These project specific requirements will be included in the A-E SOW. When included in the A-E SOW, VE should be held during the Charrette stage of the project.

1.9 GENERAL SUBMITTAL REQUIREMENTS

Charrette Design Submittal, Revised Charrette Documents, Interim Design Submittal, Final Design Submittal, Corrected Final Design Submittal, and Certified Final Design Submittals shall be provided in the formats indicated below, unless otherwise indicated in the A-E's Contract Appendix A (SOW).

1.9.1 Hard Copies

- 1.9.1.1 All hard copy document sets shall include printed plans, specifications, and Design Analyses (DA) as indicated below, unless otherwise indicated in the A-E SOW, and in the quantity indicated in the A-E (SOW).

1.9.2 Digital Copies

- 1.9.2.1 CD/DVDs shall contain all design submittal files, in electronic format. Drawing Set in full-size PDF format. DA in PDF format. Specifications (when applicable) in PDF format. CID (FF&E and SID) documents/binders (when applicable) shall be another PDF file. In addition to the CD/DVDs, also distribute the digital content of the CDs to all listed on the distribution list, via government file transfer website (confirm site with the USACE PE/A).
 - a. Drawing Set – Each drawing sheet shall be bookmarked.
 - b. Design Analysis (DA) - The beginning of each section, and each appendix (attachment) of the DA, shall be bookmarked.
 - 1) DA Appendices - Minimum of 10 pages between bookmarks, maximum of 100 pages between bookmarks.
 - 2) For DA appendices for calculations with a significant number of pages, like HVAC and energy modeling, provide bookmarks to separate calculations for easy navigation of the file.

- c. Specifications - The start of each section shall be bookmarked.
 - 1) The Certified Final CD shall contain a folder with native specification section files.
- d. CAD/BIM/CIM native drawing files as required by other sections of this document and criteria.

1.9.2.2 Cost Estimate

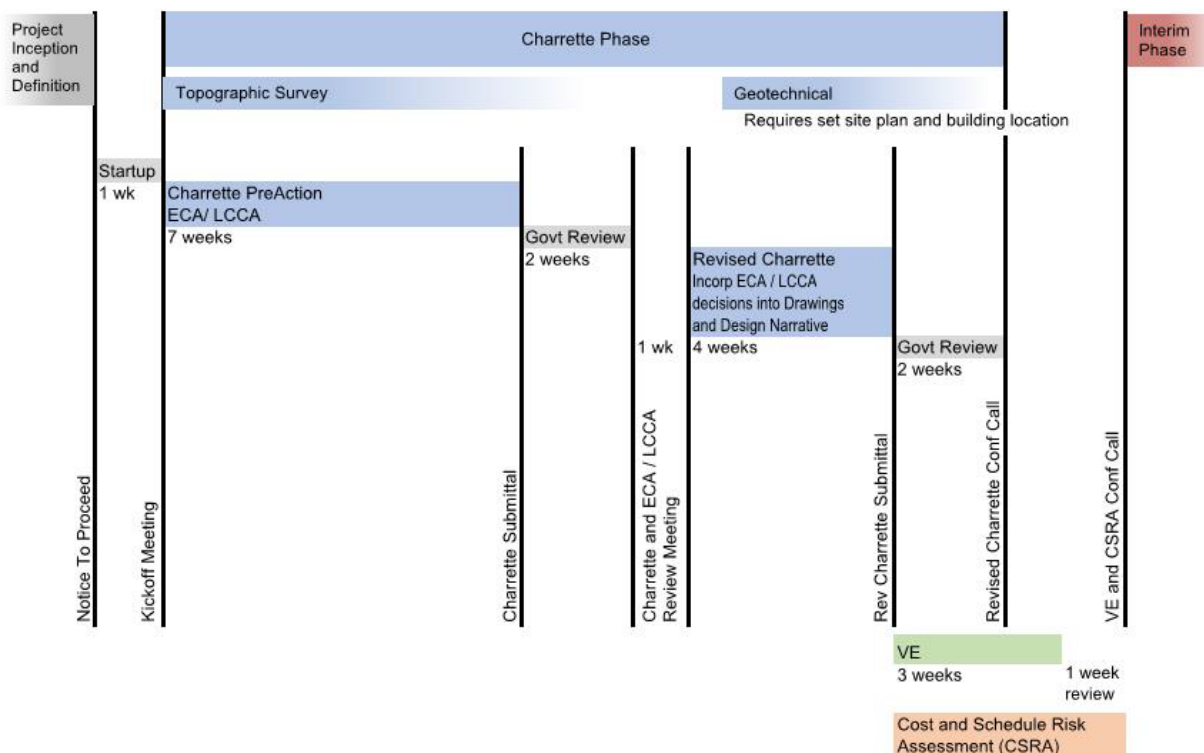
- a. Provide a PDF of the Cost Estimate to the USARC G-3/5/7 Project Officer, the USACE PM, and the USACE PE/A in accordance with the LDMDG. Provide the native cost estimate files to the USACE PE/A in accordance with the LDMDG.

1.10 PHASE II–CHARRETTE DESIGN PROCESS, MEETING, AND SUBMITTALS

1.10.1 General

- 1.10.1.1 The purpose of design phase II is to prepare a complete detailed design. Phase II is divided into three major phases; a Charrette, Interim and Final Design. The goal is to produce a set of construction contract documents ready for bid. This phase begins approximately fifteen months before the fiscal year of construction, when Headquarters U.S. Army Corps of Engineers in Washington (HQUSACE) issues a directive to complete final design phase II. This is ninety days prior to the start of detailed design at the on-site charrette design meeting.
- 1.10.1.2 The charrette process is part of the methodology for providing an integrated design approach which is critical to developing high performance projects. Sustainability and energy/water conservation strategies may have been considered in the project definition meeting, ASIV, and pre-design project phases (prior to Charrette). These early meetings and submittals serve as the building block for the design phase and are critical to gathering input and establishing “buy-in” or approval for sustainability measures from stakeholders. If a project definition meeting that included analysis of sustainability and energy features was not held, then those features need to be included in the design charrette.

1.10.1.3 The Conceptual Charrette Phase Timeline graphic below is provided as a depiction of how the different stages within the Charrette Phase correlate to each other. This graphic is conceptual in nature and shall be considered as a tool, and reviewed relative to each project. Each project delivery team shall consider project specific influences including but not limited to project specific tasks, available programming and site data, required deliverables, and durations.



Conceptual Charrette Phase Timeline

This concept timeline is a concept only and is to be reviewed and verified on each project

1.10.2 Design Charrette - Pre-Charrette Actions

1.10.2.1 The Louisville District Project Manager will ensure the design team receives a copy of the Phase I package and revised project documentation (revised DD Forms 1391/1390) approximately 45 days before the Charrette design meeting.

1.10.2.2 Kick-Off Meeting. Prior to the start of the Charrette phase, there will be a Kick-Off Meeting (may be held as teleconference or videoconference, as determined by the PE/A). This meeting is to discuss the DD Form 1391, budget discussions, existing site information, project program discussion, and end User concerns. This meeting shall also be utilized to discuss and define the systems and strategies to be analyzed as part of the ECA/LCCA efforts. The RD (and Installation, if applicable) shall be part of this discussion. The A-E shall document the agreed upon systems and strategies in meeting minutes distributed via email to those in attendance.

- a. The minutes are to be distributed by the PE/A to the USACE Mechanical Subject Matter Expert (SME) for their review of the selected HVAC related systems planned to be analyzed during the Revised Charrette stage. The SME shall respond with comments in two business days.
- 1.10.2.3 The A-E shall take the information gathered at the ASIV, project definition meetings (Phase I Planning Charrette), and Kick-Off Meeting with other relevant data to prepare the Charrette Submittal. The intent is for the design team to develop initial alternatives and perform analysis prior to the Charrette Design Meeting so the PDT can make decisions efficiently. The A-E should assess site impacts related to evaluated building layouts and include potential alternatives to address other sustainable site considerations.
- 1.10.2.4 Two weeks prior to the Charrette Design Meeting (or duration as stipulated in the AE contract), Designer shall send the Charrette Submittal documents in PDF format to the Charrette Design Meeting participants. Electronic submissions shall be via government file transfer website or email (size permitting); discuss with the Louisville District Project Engineer/Architect. During this time period, the Louisville District Project Engineer/Architect will engage the USACE Mechanical SME for review of the ECA and/or LCCA findings (as described below); comments may be received via ProjNet from this reviewer. Comments from others are usually brought to the meeting and discussed during the meeting. Design team shall prepare and send out the following documents ahead of the Charrette Design Meeting:
- a. Design Narrative. Describe the proposed architectural, interior design, civil, mechanical, structural, electrical, telecommunication, and sustainability designs. Also include the following at a minimum:
 - 1) Compile applicable project requirements; including the project DD Form 1391, and applicable criteria list.
 - 2) For 'Maintenance Repair Army Reserve' (MRAR) projects, include the hazardous material reports, structural reports, etc.
 - 3) Request from the Installation/Readiness Division a defined Design Basis Threat and Level of Protection (per UFC 4-010-01 'DoD Minimum Antiterrorism Standards for Buildings), or if the minimum AT standards are adequate.
 - 4) A description of site characteristics, and any special site considerations, site utilities, permits, and foundations, to the extent known.
 - 5) Provide historical and present-day site aerial images, for possible reference.
 - 6) A description of the major systems, including roof material, exterior skin, windows, doors, mechanical units, electrical, structure, finishes, fire protection, mass notification, ICT systems, and any special systems.
 - 7) Identify elements outside of the norm such as deep foundations, high Seismic Design Category (D or higher), progressive collapse requirements, environmental remediation, etc. which will impact the cost.
 - 8) Functional Space Details Worksheet. Indicate the facilities' 'approved' (by project program requirements) square footages, the 'placed' (as designed) square footages, and the resulting area 'differences' in

square feet. Format to follow the Functional Space Details Worksheet indicated program functional categories and space (room) listings.

This document is often referred to as an Area Tabulation.

- 9) Provide the conceptual ECA (as described above, including LCCA where required, and as defined in the Scope of Work and/or LDMDG). Further develop the systems and strategies below, which were discussed and defined at the project Kickoff Meeting; verify with the USACE PE/A. Provide the following as a minimum:
 - (a) Provide a conceptual energy model for one of the floor plan layouts. The design team shall become familiar with energy and site impacts associated with changes to massing, orientation, and layout. Assess impacts related to daylighting including consideration for space layout, structure, fenestration location and types, energy consumption, and costs. Develop calculations for daylighting energy impacts.
 - (b) Envelope Construction: Explore wall and roof construction alternatives, construction type and insulation values. Develop Life Cycle Cost Analyses for each alternative. Include a summary of results showing changes in energy performance, utility costs, and life cycle cost related to changes in insulation value and construction type. Develop preliminary energy model reflecting the ASHRAE baseline as the baseline for life cycle cost analysis.
 - (c) Energy and Water Conservation Measures: Evaluate suitable alternative water heating, water conserving, lighting strategies, and other energy conservation measures.
 - (d) Renewable Energy: Further evaluate renewable energy features deemed feasible at the project definition meeting. Prepare matrices comparing installation costs, maintenance costs, utility cost savings, energy generation, and life cycle costs among alternatives. Baseline for life cycle cost is no renewable energy (no costs).
 - (e) Lighting and daylight strategies.
 - (f) HVAC Systems: HVAC analysis shall be executed as part of the later Revised Charrette, and be based on the ECA and LCCA results and decisions related to the other facility design features (i.e. envelope, massing, orientation, daylighting, energy and water conservation measures, renewable energy systems, set plan, and any other non-HVAC system/strategy required by criteria). These other systems have a direct impact on the HVAC analysis, and need to be defined prior to the HVAC analysis. As part of this stage, provide a preliminary list of HVAC systems intended to be evaluated via LCCA in the future (as previously discussed during the Kick-Off Meeting), to verify stakeholder input.
 - (g) Cybersecurity: Provide documentation that needed requests for information have been submitted and that the Charrette meeting includes ample time for cybersecurity discussion with necessary representation from the installation. Provide narrative identifying Facility-Related Control Systems that apply to the project and, in the absence of owner input, the assumed CIA impact ratings of each.

- b. Drawings.
 - 1) Three alternate site layouts and floor layout block plans.
 - (a) Floor plans shall be color coded by Reserve Unit occupying the building. Provide annotation of the units occupying the building for each battle assembly (drill) weekend. Floor plans are to show the caging layout and number of cages in Unit Storage.
- c. Cost Estimate. As described under the “Cost Engineering” chapter; \$/square foot cost comparison of the three alternatives. Each discipline shall supply the cost estimator with enough information to make an accurate cost estimate.

1.10.2.5 Via email, provide a draft Charrette Meeting agenda to the USACE PE/A and PM, for USARC G-3/5/7 approval. Agenda should include breakout sessions by discipline. Provide approximately one month prior to the meeting, coordinate with the PE/A.

1.10.3 Charrette Design Meeting

Detailed design begins at the Charrette Design Meeting. It takes place on or near the site and uses a charrette process to arrive at a mutually acceptable design solution. This process is characterized by an informal and free exchange of information and ideas between users and designers that establish project design direction. Charrette Design Meeting participants are encouraged to bring their ideas to the meeting, with no formal comment collection and response required or desired beforehand (except Mech SME review of ECA/LCCA information). A typical design team in attendance at the meetings shall consist of the designer’s project manager, lead architect, civil engineer, interior designer, electrical/IT, mechanical engineer, CADD/BIM technical support, and cost estimator. This may be adjusted based on the A-E SOW, agreement with the PE/A, and evaluation of the requirements by the design team leader.

The various project design direction and alternative approaches are evaluated and prioritized and incorporated into the project based on the PDT group consensus as monitored by the USACE Project Manager. The meeting can last two or more days.

It is the responsibility of the USACE PM to arrange for the Users, the Readiness Division (RD), the military installation representatives (such as DPW, Fire Department, NEC, Security, Cybersecurity), commercial utility representatives, G6, ISEC and other communications staff to attend the meeting and discuss the utilities, electrical, communications, mechanical, and fire protection breakout sessions. As many of these individuals do not need to be present for the entire meeting, it is good practice to provide specific times in the agenda to discuss those items.

- 1.10.3.1 Process. The goal of the Charrette Design Meeting is for all decisions made at this meeting to be final. The USACE PM and Project Officer should emphasize this to all team members. Attendees must be decision-makers. This is the last opportunity to change functional requirements. The PDT finalizes all major site features and floor plans at this meeting. It may require participants to maintain continuous dialogue with off-site experts and commanders during the meeting to obtain information, guidance, and approvals.

- 1.10.3.2 Color Scheme. Select one of the four Reserve interior color schemes. The design team shall bring for discussion color images of the four schemes. The color schemes are to be used as a visual reference for concept only, to initiate discussion and for the RD/Installation to select a scheme on which to base future material selections. Refer to the color schemes located at the following website, labeled 'Army Reserve Standard Color Palettes' under 'Army Reserve Customers', under the 'Furniture' tab:
<https://www.lrd.usace.army.mil/Mission/Military-Construction-Reserve/Design-Guides/>
- 1.10.3.3 Facilities. Administrative support is crucial to this type of process. Normally, the Government provides space at or near the site to accommodate a large meeting and separate, smaller sessions. If so scoped and directed in the SOW, the A-E may arrange for and provide the facility. The facility must have workspace with chairs, tables, and sufficient electrical outlets to accommodate the use of computers. Among other methods and tools, the designers may use CAD/BIM based software to provide the revised design documents during the meeting, and some attendees will probably bring laptops as well. The design team will provide their own computers, software, projectors, presentation materials and equipment needed on site to produce revised digital design files (drawing PDFs, etc.), and outline draft meeting minutes.
- 1.10.3.4 Presentation. In the opening session, the PDT elaborates, as needed, to explain key functional relationships, desired features, and other important considerations.
- a. This meeting shall include a very brief review of the project design criteria. This includes baseline requirements, goals for energy and water use reduction, renewable energy, and LEED.
 - b. The design team will present the Charrette Documents, at a minimum the items listed under the 'Pre-Charrette Actions' above, and the following:
 - 1) Alternative site and building layouts, massing, and orientations.
 - (a) Evaluate locations for site equipment, including possible future renewable energy systems.
 - (b) Identify alternative strategies for compliance with EISA 438, ASHRAE, Low Impact Development and other site requirements including local permits and regulations.
 - 2) Initial ECA and LCCA calculations and findings.
 - c. Discuss cybersecurity documentation status.
 - d. The design team reviews possible LEED rating system "points" that require a commitment from the owners, (e.g. training, use of the 'Green Power' credit, etc.) and that the PDT determines whether these credits will or will not be available to meet the LEED rating goals.
 - e. The design team reviews the cost estimate.
- 1.10.3.5 Design Iteration. Ideally, the design review meeting trip by the A-E will be scheduled to allow the designers to walk the site and existing building (if the project includes one), to validate information before the meeting. After the initial Charrette Review Meeting session, the designers are to visit with local utility providers and regulatory agencies, and start revising site and space layout schemes based on those discussions. Breakout sessions of other disciplines should occur. Other members of the PDT remain available for consultation. When the designer is ready, the other participants reconvene to

hear and discuss the design proposals, eliminate alternatives, and provide additional guidance. The group adjourns again, while the designer refines the design to incorporate the latest comments. This is an iterative process, which continues until the design is acceptable, and the design team incorporates the comments into an agreed upon design approach for the site and building.

1.10.3.6 Breakout Meetings. The Designers of Record are also required to hold the following individual meetings with the Users on their respective areas of responsibility.

- a. The Architect and Interior Designer are required to hold a furniture meeting with the Users on site after the Charrette. This meeting is usually held the day after the general Charrette Design Meeting. They shall discuss each room and the furniture requirements involved. The discussions from this meeting shall be reflected in the future FF&E and SID submittals. Meeting minutes will be provided to the entire project delivery team.
- b. For projects on an Installation, the ICT Designer is required to hold a separate meeting with the Users and personnel from the Army Reserve telecommunications office (usually the Installation's NEC). For projects on an Installation, a separate meeting with USARC G6 is not typically needed. The ICT Designer shall discuss the telecommunications requirements of the project. The discussions from this meeting shall be reflected in the Interim Design Submittal. Meeting minutes will be provided to the entire project delivery team.

1.10.3.7 The end result of the Charrette phase is an agreement on the following:

- a. Site Plan. Plan will show building footprints, AT/FP setbacks/clear zones, Privately Owned Vehicle (POV) parking, Military Equipment Parking (MEP), access roads, and general site layout and circulation. Indicate the general location of new buildings, paved areas, structures, fences. Locate the building from a known point of reference. Show areas for stormwater management/low impact development best management practices.
 - 1) A preliminary site grading flow concept plan should be developed, depicting anticipated flow directions of stormwater runoff.
 - 2) A preliminary site utility plan(s), including telecommunications and power, should be developed, depicting anticipated utility connection points and potential routings to provide service for the project.
- b. Floor Plan/Space Layout. Floor plans, provided for each building. Agreement on massing, orientation, daylighting strategies, plan adjustments, room configurations, room adjacencies, and adjusted room areas.
- c. Provide a list of the agreed upon non-HVAC systems/strategies, based on the ECA and LCCA results of those systems, and meeting discussions.
 - 1) List all accepted systems, sustainability and water conservation measures, and renewable energy technologies agreed upon during the meeting. List the accepted wall and roof construction type, and minimum insulation values.
- d. Summarize the anticipated HVAC systems (based on initial system selection during the Kickoff Meeting and subsequent USACE SME approval) to be analyzed during the upcoming Revised Charrette phase and submittal.

- e. Selected Army Reserve color scheme.
- f. Wrap-up, including:
 - 1) Design summary.
 - 2) Schedule, including scheduling the Revised Charrette Conference Call.
 - 3) Action items, also referred to as Taskers.
- g. Deliverables: The design agent (A-E or USACE in-house) provides participants with electronic outline draft meeting minutes, a list of participants, electronic copies of the draft design files (PDF format), sufficient to define the results of the meeting.

1.10.3.8 The Design Project Manager is responsible for preparing and distributing meeting minutes for all meetings and conference calls during design. Unless otherwise noted in the A-E SOW, the meeting minutes will be distributed to the entire project delivery team and meeting attendees within 10 business days of a meeting and within 5 business days of a conference call, and shall include clearly designated and assigned Taskers (Action Items).

1.10.4 Revised Charrette Design Submittal Requirements

- 1.10.4.1 Revised Charrette Document: The revised charrette document will be submitted to the PDT after the Charrette Design Meeting, in the time called for in the schedule/SOW. It consists of meeting minutes, updated narrative, image files, and a parametric cost estimate. Note that this is not an opportunity to revise functional space. All those decisions are final at the adjournment of the Charrette Review Meeting. The designer in some instances may make minor changes after the meeting, such as enlarging the telecommunications closets to accommodate bulkier-than-anticipated equipment. Provide the following:
- a. Design Narrative: This narrative will supplement meeting minutes that provide a thorough record of discussions, iterations, and decisions from the Charrette Design Meeting. Provide an update/elaboration of the information previously provided as part of the Charrette package. Also include the following:
 - 1) Provide updated ECA and LCCA documentation related to the non-HVAC systems analyzed during the Pre-Charrette Actions (described in section above). List of selected non-HVAC systems/features, and technologies which will be implemented into the project.
 - 2) Provide ECA and LCCA documentation related to the analysis of the HVAC systems defined during the Kickoff Meeting, as part of a whole-building analysis. Identify discrete optional features of the HVAC systems that should be considered (Examples: energy recovery devices, demand-controlled ventilation, and occupancy sensors for HVAC controls). Provide comparison of energy consumption and energy cost for major systems. Prepare matrices that compare installation costs, maintenance costs, utility costs, energy consumption, and life cycle costs among alternatives. Include water consumption in Life Cycle Cost Analyses for HVAC systems. Baseline for Life Cycle Cost Analysis is ASHRAE compliant facilities for energy conservation alternatives.

- 3) The ECA is to be a separate chapter with narrative, and with the calculations and energy optimization report as distinct appendices. Bookmark for each item/system reviewed and calculated.
 - 4) List the approved wall and roof construction type and insulation.
 - 5) List special equipment with unusually large electrical or cooling loads.
 - 6) Document and confirm any Government provide equipment lists; i.e. vehicle lists, weapons lists, unique requirements for Unit Storage, etc.
 - 7) Provide information on any known utility conflicts or capacity upgrades that are required for the project.
 - 8) Provide an updated project design schedule; review and confirm with the PE/A prior to issuing.
 - 9) Information Needed to Complete Design. Each discipline is to provide a listing of additional information or material required to complete the design and the source needed for that information, including dates the information is to be provided before the design schedule is adversely impacted, or state that additional information is not necessary.
 - 10) In the hard copy submittal, the drawings required below may be properly scaled to fit in the back of the Design Narrative as foldouts, or provided separately.
- b. Drawings.
- 1) Site Plan. Provide the updated site plan based on agreements during the Charrette Review Meeting, including at a minimum:
 - (a) Indicate the general location of new buildings, paved areas, structures, fences and site appurtenances.
 - (b) Privately Owned Vehicle (POV) parking, Military Equipment Parking (MEP), access roads, and general site layout and circulation.
 - (c) Accessible parking as required.
 - (d) Dumpster location(s) and screen walls as required.
 - (e) Show the work area limits.
 - (f) Show the building orientation, footprint, and facility expansion areas.
 - (g) AT/FP setbacks/clear zones.
 - (h) Locations for renewable energy equipment, or planned future location.
 - (i) Show areas for stormwater management/low-impact development (LID) strategies and best management practices (BMP) infiltration areas. Revise conceptual site plan to incorporate approved strategies.
 - (j) Show any known site constraints such as wetlands, Waters of the State, environmentally sensitive areas, etc.
 - (k) Provide updated preliminary grading flow plan and site utility plans.
 - 2) Architectural Floor Plans. Update the floor plans based on decisions made during the Charrette review meeting. Show the correct room names, wall locations, storage cages, doors, and the common administration area workstations and benching systems.

- c. Cost Estimate. The A-E will revise the Charrette Submittal cost estimate to reflect decisions made at the Charrette Design Meeting and Revised Charrette conference call/meeting. Submit the formal estimate at the end of charrette design phase (within four days after the Revised Charrette Meeting).

1.10.5 Review

The A-E shall send the Revised Charrette Design Submittal to the Charrette Design Meeting participants to document agreements made at the Charrette Design Meeting, and to the USACE Mechanical SME for HVAC analysis review. Depending on the decisions remaining, there may be a follow-up in-person meeting; however, a Revised Charrette Conference Call (virtual meeting) will normally suffice. If an in-person meeting is needed, the A-E shall discuss this with the PE/A, relative to the SOW. The purpose of the meeting/conference call is to verify the submitted site and floor plans, and other submitted documents, are as agreed upon during the Charrette Design Meeting. Any new changes to the Revised Charrette documents must be approved by the Project Officer and will be incorporated in the Interim Design Submittal.

The design team reviews updates to the sustainability and LEED strategies, energy/water conservation measures, and renewable energy technologies at this review. The design team presents the ECA and LCCA findings related to the proposed HVAC systems. The selected HVAC system is determined at this meeting, to form the basis of the Interim design.

1.10.6 Value Engineering

Refer to the A-E SOW for the planned scope and timeline of a possible Value Engineering stage, relative to the Charrette phase. Value Engineering must occur and be complete prior to the Interim start-up, to avoid design rework costs and project schedule implications.

1.11 PHASE II–INTERIM DESIGN SUBMITTAL

1.11.1 General

Interim Design Submittal will be per the schedule. It is for technical review of the design. It is not a functional review. It includes the following:

- 1.11.1.1 Drawings. Depicting major components of the civil, architectural, interior design, structural, mechanical, electrical, fire protection, and ICT design as well as complete building elevations. Interim Design Submittal drawings also include ramps, curbs, and any LEED site features, such as vehicle parking signs, designated smoking areas, and bicycle storage/rack locations, etc.
 - a. Fire Protection/Life Safety Plan. Provide fire protection/life safety drawings that indicate fire suppression information, exit signs, pull stations, exit devices, exit distance, emergency lights, detectors, alarm locations and fire panel locations. Provide the same review code text from the Fire Protection and Life Safety Form on the Fire Protection/Life Safety and Accessibility Drawing(s).

- 1.11.1.2 Design Analysis. Provide narrative that is an expansion and elaboration, with updates, by each discipline from that provided at Revised Charrette design. Contains a narrative by each discipline. Each discipline narrative will list major deviations from the standards in the USAR Design Guide. Provide the Interim Design Analysis as a new document, not as addenda to the Charrette document. Include the following items:
- a. Minutes of prior meetings.
 - b. The current project DD Form 1391
 - c. Functional Space Details Worksheet.
 - d. Engineering Considerations and Instructions for Field Personnel (ECIFP). All disciplines are to contribute and provide a narration of unusual project conditions that need special attention by construction personnel. Refer to the Army Reserve website for the form. The Interim version is labeled and considered as the 'Draft ECIFP', with the edited complete version submitted at Final.
 - e. Provide a list of required permits for the project. Include requirements and process for obtaining each permit, associated costs, and status of permit acquisition.
 - f. Include a draft of the Louisville District (LRL) ATFP Standards Review Checklist (with a header label of "DoD Minimum Antiterrorism Construction Standards") for the project to demonstrate compliance. The form is available on Army Reserve website; link labeled 'LRL ATFP Standards Review Checklist'.
 - g. Completed draft version of the "Fire Protection / Life Safety / Accessibility Code Review" form. The form is available on the Army Reserve Website; link labeled 'Fire Protection/Life Safety Code Submittal'.
 - h. Provide a draft version of the Energy and Sustainability Record Card, available on the Army Reserve website; verify most current version of the form with the PE/A.
 - i. LEED spreadsheet with anticipated credits noted.
 - j. Provide updated ECA narrative and calculations based on current project design.
 - k. If element(s) of the building envelope, mechanical systems, energy use reduction strategies, water use reduction strategies, etc. are changed after the Charette phase, the associated LCCA and subsequent decisions made need to be recalculated and documented accordingly if they affect more than 30% of the total energy consumption or project cost. Provide updated ECA narrative and calculations based on current project design. Include as appendices project-specific documentation such as existing hazardous materials (asbestos/lead/etc.) reports, and other hazmat reports.
 - l. A consolidated list of project specification sections, in Table of Contents format.
 - 1) Specifications are to be (in order of precedence) Army Reserve specific adaptations of the UFGS specs, Louisville District adaptations of the UFGS, or standard United Facilities Guide Specifications (UFGS). The Louisville District and Army Reserve (AR) UFGS adaptations are available on the Army Reserve website.

- m. Information Needed to Complete Design. Each discipline is to provide a listing of additional information or material required to complete the design and the source needed for that information, including dates the information is to be provided before the design schedule is adversely impacted, or state that additional information is not necessary.
 - n. Provide cybersecurity analysis in accordance with UFC 4-010-06.
- 1.11.1.3 CID (FF&E and SID) Binders. Refer to the Chapter "Interior Design" for specific requirements.
 - 1.11.1.4 Cost Estimate. Refer to the Chapter "Cost Engineering" for specific requirements.
 - 1.11.1.5 Independent Technical Review (ITR). Provide the following completed and signed forms to the PE/A, verify current forms with the PE/A prior to submission:
 - a. Form "A-E Statement of Technical Review – Completion of Independent Technical Review".
 - b. Form "A-E Contractor Certification of Independent Technical Review".

The design effort continues during the review process.

1.11.2 Submittal Requirements

- 1.11.2.1 As listed above, plus see the discipline chapters for additional specific submittal requirements.

1.11.3 Checking

All drawings and calculations are checked as required by the project's Approved Quality Control Plan.

1.11.4 Review

- 1.11.4.1 All review comments will be submitted in DrChecks, completed no less than one week prior to the review meeting. The design team shall respond to the DrChecks comments before the review meeting, and bring 6 hard-copies of the DrChecks comments for key players to the meeting. Email a PDF of the comments and draft responses to the USACE PE/A and PM. The USACE PE/A or PM will send the meeting invitation, the agreed upon meeting agenda, DrChecks and any other information to the invited meeting attendees. At the meeting, the design team is to use a projector/large format television for reviewing the comments with the entire team to reduce the number of printed copies. It is anticipated that those DrChecks comments that have not been evaluated and those whose evaluation is not "Concur" (Non-Concur, Check and Resolve, and For Information Only) will be discussed at the review meeting. Comments with a "Concur" response that is acceptable to Government may not receive further discussion at the meeting.
- 1.11.4.2 There will be an Interim Design Review Meeting to discuss review comments and other issues. An 'over-the-shoulder' type of review conducted at the design agent's office is an option, if so indicated in the A-E SOW, or in the Louisville District in-house design team Quality Assurance Surveillance Plan (QASP).

1.12 PHASE II–FINAL DESIGN SUBMITTAL

1.12.1 General

The Final Design Submittal consists of a 100% complete design required to build the project. It includes all completed drawings, fully edited specifications and Design Analysis. The Final Design Submittal is to be completed in accordance with the agreed schedule and delivery date.

It is highly preferable that the Final cost estimate be 90% of the project's programmed Construction Cost Limit (CCL) amount (see Chapter: "*Cost Engineering*" of this Manual), or USARC G-3/5/7 must approve a higher amount.

1.12.2 Comments

Incorporate all approved Interim Design Submittal comments into the design.

1.12.3 Submittal Requirements

(See also the discipline chapters for specific submittal requirements.)

1.12.3.1 Design Analysis.

- a. Provide a narrative that is an expansion and elaboration, with updates, by each discipline from that provided at Interim design. Include required and missing information that was not included in prior submittal phases. Address all previous review comments and incorporate into submittal. The Final DA shall be a complete document with all content, not issued as an amendment to previously submitted Design Analysis. Also provide the following items.
- b. Provide design calculations and supporting documentation to support the major technical design considerations. Calculations shall be computed and checked by separate individuals, one of which must be a licensed professional in the associated discipline. Supporting documentation shall be clear, and formulas and references shall be identified. Assumptions and conclusions shall be explained and cross-referencing shall be clear. Provide as called for in the various discipline chapters.
- c. Checking
 - 1) All drawings and calculations are checked as required by the project's Approved Quality Control Plan.
- d. Meeting Minutes from all previous meetings.
- e. Copy of the Interim DrChecks; current at the time of the submittal.
- f. Cut sheets provided at the design stages are intended only to show the basis of design, and do not create or show a sole-source requirement.
- g. Include as appendices, in addition to the DD Form 1391 and Functional Space Details Worksheet, all project-specific documentation such as geotechnical, existing conditions hazardous materials (asbestos, lead, etc.) reports, and other hazmat reports.
- h. Provide a refined energy model which incorporates all strategies selected during the Charrette phase, and refined through Interim and Final phases. Include an estimated project energy use index (EUI) kbtu/sf/yr resulting from combined strategies. Include a typical range of similar buildings in the same climate zone for comparison.

- i. Provide sustainability/LEED credit checklist (Yes/No form), all applicable LEED template forms, and LEED template supporting documentation, or other applicable documentation as indicated in the A-E's Contract Appendix A (SOW).
 - 1) The LEED content is preferred to be a separate volume of the DA due to sheet count.
 - j. Provide a completed Energy and Sustainability Record Card.
 - k. Completed and signed Louisville District "DoD Minimum Antiterrorism Construction Standards Checklist".
 - l. Completed and signed Louisville District "Fire Protection / Life Safety / Accessibility Code Review" form.
 - m. Completed and signed 'Arms Vault Security Checklist' (available on the Army Reserve website).
 - 1) This form is completed by the A-E, to confirm the design documents meet the requirements. The A-E is to provide additional signature lines with the AEs responsible for design listed and named, with discipline indicated.
 - 2) The A-E version of the form will not be directly used to certify the vault.
 - 3) The USACE Construction District will have a blank version of the form coordinated with the construction Contractor, and completed by USACE and the construction Contractor during the construction phase as part of the vault certification process.
 - n. Provide an asbestos certification letter, if required by the A-E SOW.
 - o. Provide cybersecurity analysis in accordance with UFC 4-010-06.
- 1.12.3.2 Drawings. The drawings shall be developed and detailed as required in the SOW. This effort includes providing native CAD/BIM/CIM files, with quality control measures implemented, as required. Complete all the drawings required at the Final design review stage, with incorporated approved Interim comments.
- a. The fire protection engineer shall place their registered professional engineer stamp on all Fire Protection/Life Safety Plans prior to submittal to the Government.
 - 1) Fire Protection/Life Safety Plan: Provide fire protection/life safety drawings that indicate fire suppression information, exit signs, pull stations, exit devices, exit distance, emergency lights, detectors, alarm locations, and fire panel locations. Provide the same review code text from the fire protection and life safety form on the fire protection/life safety and accessibility drawings.
- 1.12.3.3 Specifications. The specifications are to be edited using SpecsIntact software. The specification document will have an overall index located in the front and each individual specification will have its own separate index. If a particular item is not contained in the UFGS or its adaptations, a new specification must be developed. All new specifications must follow the UFGS format.
- a. The digital versions of the Final specifications shall be provided in two bookmarked PDF versions; one showing all additions and deletions (with graphical differentiation between original UFGS text and the additions and deletions), and the other being a version with all edits incorporated (no

deletions shown and no graphical differentiation between original text and additions). These two versions will enable reviewers to understand the scope of editing. The printed version of the specifications will only be the version with all edits incorporated.

- b. Usage of product manufacturer's names is permitted only when a Justification and Approval (J&A) is completed by the DOR and USACE.
- c. Provide independent page numbering for each specification section. The page number shall incorporate the specification section number (e.g. 08 11 13.00 06-1).
- d. Submitted hard copies must be printed from the electronic file.
- e. Price Breakout Schedule. Provide the proposed Price Breakout Schedule for USACE's review. Properly reflect all Bid Options, including OMAR related items.
- f. Submittal Register. Provide a separate file of the completed submittal register (ENG Form 4288), including submittal requirements for each technical specification section. Refer to the A-E SOW. Provide to the PE/A and the Construction District representative.

1.12.3.4 CID (FF&E and SID) Binders. Refer to the Chapter "Interior Design" for specific requirements.

1.12.3.5 Cost Estimate. Refer to the Chapter "Cost Engineering" for specific requirements.

1.12.3.6 DD Form 1354. Provide draft DD Form 1354 (Transfer of Real Property). A blank PDF form can be found here:

<https://www.esd.whs.mil/Directives/forms/>

Refer to UFC 1-300-08 "Criteria for Transfer and Acceptance of DoD Real Property" for information on the DD Form 1354 and form completion guidance.

The 1354 form itemizes the types, quantities and costs of various equipment and systems that make up the project, for the purpose of transferring the new construction project from the USACE Construction Division to the Readiness Division/Installation's inventory of real property. Contact the Readiness Division or Installation's real property POC and obtain the specific category codes used to report key utilities for O&M funds, and to align the DD Form 1354 document with the identical category codes.

- a. A draft DD Form 1354 is prepared by the A-E, and submitted with the Final design. The draft is updated per the Final design comments and resubmitted with the Certified Final design. This document is used by USACE construction personnel to complete the final DD 1354 upon completion of construction.

1.12.3.7 Independent Technical Review (ITR). Provide the following completed and signed forms to the PE/A, verify current forms with the PE/A prior to submission:

- a. Form "A-E Statement of Technical Review – Completion of Independent Technical Review".
- b. Form "A-E Contractor Certification of Independent Technical Review".

- 1.12.3.8 Final Design Checklist. Provide a completed and signed checklist to the PE/A. Verify current form with the PE/A prior to submission.

1.12.4 Review

- 1.12.4.1 All review comments will be submitted in DrChecks, completed no less than one week prior to the review meeting. The design team shall respond to the DrChecks comments before the review meeting, and bring 6 copies of the DrChecks comments for key players to the meeting. Email a PDF of the comments and draft responses to the invited meeting attendees. At the meeting, the design team is to use a projector/large format television for reviewing the comments with the entire team to reduce the number of printed copies.
- 1.12.4.2 The PE/A should direct the PDT to review the Final Submittal against their Interim DrChecks comments, and close those comments that have been addressed. Any comments still open or outstanding should be discussed at the Final Design Review Meeting.
- 1.12.4.3 A Final Design Review Meeting is held at the project location per the date in the agreed project schedule, to discuss the review comments and other issues. A-E staff to attend the meeting in-person as defined in the A-E SOW, or in the Louisville District in-house design team Quality Assurance Surveillance Plan (QASP).
- 1.12.4.4 At the Final Design Review Meeting, discuss review comments and other issues. It is anticipated that those DrChecks comments which have not been evaluated, and those whose evaluation is not "Concur", will be discussed at the review meeting. Comments with a "Concur" response that is acceptable to Government may not receive further discussion at the meeting. Interim DrChecks comments that have not been closed or are still outstanding should also be reviewed for closure at the meeting.

1.13 PHASE II–CORRECTED FINAL DESIGN SUBMITTAL AND REVIEW

1.13.1 Cost Estimate

Verify that the PACES or MII cost estimate is updated to reflect any scope changes and review comments from the Final Submittal. Evaluate the estimate in comparison with the project's CCL. Correlate the Final estimate format with any Bid Options that are to be included in the bid documents. Incorporate all cost estimating comments in the Corrected Final Estimate. The A/E shall also provide a completed Bid Schedule or Proposal Schedule with costs associated with each line item. The estimate shall be provided in electronic format - PDF and native files for review.

1.13.2 Comments incorporation

Corrected Final Design Submittal shall incorporate all approved Final Submittal review comments into the design and other issues arising at the Final Design Review Meeting and as agreed.

- 1.13.2.1 Provide an electronic PDF complete set of the Drawings, Specifications, and Design Analysis incorporating Final review comments. The Specification is to be issued (digital and hard copy) with all edits incorporated, with no graphical differentiation between original text and additions. The documents shall

include red-lined mark-ups with a red cloud circling the change related to the applicable comment, and marking each comment affected edit with the Commenter's name and the DrChecks comment number. Electronic files to be submitted via CD/DVD to those listed in the A-E SOW distribution list. Verify with the PE/A if the files may be submitted via other electronic methods (i.e. DoD SAFE).

- 1.13.2.2 Unless otherwise indicated in the A-E SOW, hard copies of the Corrected Final Design Submittal are not required.
- 1.13.2.3 Any further corrections made to the Corrected Final shall be sent to the PE/A and reviewer directly via email or fax, or with a PDF file attached to the DrChecks comment, so the outstanding comment can be closed.
- 1.13.2.4 The Interim and Final design reviewers will perform a backcheck of all review comments, based on the Corrected Final Submittal. Once the comments are satisfactorily resolved and the comments are all closed, the project may move on to the next stage.

1.14 CERTIFIED FINAL DESIGN SUBMITTAL

The Certified Final Design Submittal is ready for distribution when ALL review comments have been addressed, incorporated into the design, and the Final design has been approved, and ready for construction. The A-E PM and the USACE PE/A should agree that the design is ready for this submittal.

Upon agreement, the A-E shall provide one hard copy full size drawing set, specification(s), and Design Analyses updated to include Final Design Review Meeting Minutes and closed Final DrChecks comments. Verify quantities with the A-E SOW.

The Certified Final Design Analysis is to include narrative and attachments that are an expansion and elaboration, with updates, by each discipline from that provided at Final design, all Interim and Final DrChecks comments, and all meeting minutes including from the Final Design Review Meeting.

The Certified Final Design Submittal shall include a plotted full size stamped and signed set of drawings.

Each sheet of the Certified Final drawing set shall include signed professional stamp from the respective Designer of Record (all engineers, LA, Architect, RCDD, etc.).

The PE/A shall also provide the Solicitation Number, which shall be located on the drawing title block and on the header of each specification page. This number is generated when the project is advertised by the Contracting group at USACE.

The drawings shall also include the original Project Number (located on the DD Form 1391 document), the Drawing Code, and the P2 Number (which is a Corps of Engineer six-digit number for project funding). The PE/A or the PM can provide the P2 Number, and the PE/A can provide the Drawing Code.

The electronic drawings shall have the names of the designer and checker typed in the title block.

At completion of this phase the A/E shall provide, as called for in the Appendix A SOW, CD(s) containing:

Contract document files formatted for advertisement – drawings, and specifications (both native and PDF format). The drawing set shall be formatted into one large PDF document, with each sheet bookmarked with sheet number and sheet name. Also provide the Design Analysis in PDF format, for Government reference (not part of the solicitation). Refer to Chapter 1 “GENERAL SUBMITTAL REQUIREMENTS” above.

1.15 BIDDABILITY, CONSTRUCTABILITY, OPERABILITY, ENVIRONMENTAL, AND SUSTAINABILITY REVIEW (BCOES)

1.15.1.1 The Final Design comments from the Corps of Engineers form the basis of the BCOES review. The PE/A will be forwarding project documents to the BCOES review team, for their use. Refer to BCOES ER 415-1-11. Verify if there are additional requirements for BCOES reviews beyond those listed below, please refer to the BCOES ER 415-1-11 (or most current).

The Corrected Final Design Submittal shall reflect all comment responses. They are the working documents used by the Government for BCOES review. The A/E's Project Manager is responsible to ensure that ALL comments have been addressed. The Corps of Engineers Construction District must have all comments satisfied before they will provide their concurrence so the Louisville District Construction Division will sign the BCOES Certification.

Once the PE/A receives this document with the signature, then the Louisville District Review Team is responsible for the remaining portion of the certification.

1.15.1.2 For the PE/A to obtain BCOES Certification, all comments must be closed in DrChecks. BCOES Certification must be complete to issue a project for construction advertisement, unless an Early Release document has been completely signed. The BCOES Certification must be signed before prices from Construction Contractors may be opened as part of a sealed bid opening or a source selection evaluation board can begin. BCOES Certification must be the highest priority for design completion and be completed as soon as possible, to not delay a project award.

1.15.1.3 The PE/A shall download the current BCOES Forms, located on the Louisville District's Qualtrax System website.

The first form that should already be partially signed (by the Certified Final Design phase), is the BCOES and VE Certification form. Once Value Engineering is addressed (before the Interim Design phase), the first portion of this form shall be signed by the Corps of Engineers PM and the VE Officer. The remainder of this form will be the last signatures signed for BCOES by the LRL Construction Division Chief and the LRL Engineering Division Chief.

- 1.15.1.4 The PE/A shall provide the following BCOES forms to the A/E PM, for completion. BCOES will be rejected and will need to resubmitted if the current forms are not used.
- a. As called for in the Appendix A (SOW) and indicated under the Final Design Submittal above, the A/E is responsible to provide two Independent Technical Review (ITR) Forms. These forms shall be completed and signed.
 - 1) The Contractor Statement of Technical Review requires signatures by the ITR team. It documents that an ITR was conducted for the project.
 - 2) The Certification of Independent Technical Review requires signatures by a principal of the firm and Design team leader, ITR team leader and other management level reviewers. It certifies that the ITR comments have been considered, concerns identified, and their resolution in the Certified Final documents.
 - b. The Final Design & Certified Final Design Checklist requires completion and a signature by the A/E PM. It certifies that all design requirements in the SOW have been addressed.
 - c. The A/E PM will also provide the Submittal Register .txt file at this time.
 - d. As part of the Corrected Final and Certified Final Design Submittals, the A/E provides responses to all DrChecks comments, with further responses as needed to satisfy backcheck follow-up by USACE.
 - 1) Upon satisfactory comment resolution as described above, USACE should then close all comments.
 - e. A/E provides full size stamped and signed set of drawings. (See description and sequence in paragraph "Certified Final Design Submittal", above).
- 1.15.1.5 The Designer will promptly correct any items discovered during the course of BCOES review, and demonstrate satisfactory correction to the PE/A and BCOES team. This is necessary before BCOES can be completed. The corrections may be sent to the PE/A and reviewer directly via email or fax, or with a PDF file attached to the DrChecks comment.
- 1.15.1.6 The remaining BCOES forms are the responsibility of the PE/A. These forms shall be completed as follows.
- a. The Statement of Technical Review Completion of Quality Assurance Review form shall be provided to and signed by each appropriate design discipline reviewer in Engineering Division.
 - b. In order to obtain the LRL Construction Division Chief's signature for BCOES Certification, the Corps of Engineers PM shall send an email to the Geographic District Construction Division Resident Engineer requesting his/her concurrence that all comments have been addressed, there are no outstanding issues, and the BCOES process can begin.

The following documents should be included in this email:

- 1) Signed Statement of Technical Review Completion of Quality Assurance Review form PDF.
- 2) The Contractor Statement of Technical Review form.
- 3) The Certification of Independent Technical Review form.

- 4) The Final Design & Certified Final Design Checklist.
 - 5) Engineering Considerations and Instructions to Field Personnel (ECIFP) PDF. (The AE should have this located in the Design Analysis).
 - 6) Submittal Register .txt file.
 - 7) DrChecks PDF of the Project front page (showing all comments are closed by having all 0's in the pending and open columns) proving all comments have been closed.
- c. Once a return email is received by the Resident Engineer, the PE/A shall include it with the BCOES request to Louisville District Construction Division.
 - d. The PE/A shall send an email to CELRL-CD-CM-QA CELRLCDCM.ga@usace.army.mil mailbox requesting the BCOES Certification form be signed. This email shall also include the Corps of Engineers PM, Louisville District CD-CM-QA Section Chief, and CD-R Project Engineer. The following documents should be included in this email:
 - 1) BCOES and VE Certification form.
 - 2) Engineering Considerations and Instructions to Field Personnel (ECIFP) PDF.
 - 3) Submittal Register .txt file.
 - 4) DrChecks PDF of the Project front page (showing all comments are closed by having all 0's in the pending and open columns) proving all comments have been closed.
 - 5) Email from Construction District Resident Engineer.
 - e. Once the PE/A receives the BCOES and VE Certification form with the LRL Construction Division Chief's signature, it is time to assemble all forms and original drawings to ensure they are thoroughly completed and signed. The PE/A shall ensure the front cover of the A/E provided Certified Final drawings includes stamps and signatures by all Designers of Record, proving the project design is complete and ready for construction.
 - f. The PE/A shall request the signature of the EDM-R Section Chief, who will thoroughly review all forms and Certified Final drawings. Once the EDM-R Section Chief signs the Routing and Signature form, he/she will request the signature of the ED-M Branch Chief.
 - g. Once the ED-M Branch Chief thoroughly reviews all forms and original drawings, he/she will sign the Routing and Signature form, and request the signature of the LRL Engineering Division Chief on the BCOES and VE Certification form.
 - h. Once the Engineering Division Chief signs the BCOES and VE Certification form, in most cases this completes BCOES Certification. There may be other situations where other Division Chiefs need to sign this document, but this is not common.
 - i. Once the BCOES and VE Certification form is completely signed, it needs to be routed by the PE/A to the Louisville District PM, CELRL-CD-CM-QA CELRLCDCM.ga@usace.army.mil mailbox, the Contracting Specialist, Cost Estimating Section Chief, and the Cost Estimator providing the Independent Government Estimate for the Construction advertisement.

1.16 READY TO ADVERTISE (RTA)

Normally, the project is ready-to-advertise (RTA) when all the BCOES Certification comments have been responded to by the designers in writing, incorporated into the design and certified by the construction district. This should occur on the date shown in the approved project schedule.

The Louisville District utilizes the Certified Final Design Submittal as part of the RTA process, and does not require an additional submittal from the Designer.

If a project has a shortened schedule, the Louisville District PM and PE/A can agree to an Early Release of Product, and sign an internal document. If this is the case, BCOES Certification does not have to be complete before the project is Ready to Advertise. The project may be advertised and issued for construction early, with the clear understanding that BCOES Certification must occur before bids or proposals are opened by the Contracting Division.

1.17 ADVERTISE

The Louisville District Contracting Division advertises projects electronically on a government website (<https://beta.sam.gov/>) at the time of the creation of this document). The initial notice shall be posted 15 days before issue of the plans and specifications.

1.18 ISSUE

The Louisville District Contracting Division issues the Solicitation (project documents) electronically on (<https://beta.sam.gov/>). The minimum number of days a project is available before the bid or proposal due date is 30 days.

1.19 AMENDMENTS

The A/E is responsible for preparing Amendments as necessary for every project. When amendments are prepared by the designer, the individual pages shall be marked as amended, and the location of the change marked. Prior to initiating an amendment, the PE/A shall verify the correct amendment number with the Contracting Specialist.

Refer to the A-E SOW for drawing and specification revision notation requirements.

Per the FAR, the last amendment must be issued no later than 10 days before the bids or proposals are due. If an amendment is issued within the 10-day window, the bid or proposal due date will need to be extended.

1.20 BID OPENING & AWARD

Thirty days (note: minimum 30 days per FAR) after the project is advertised or as otherwise scheduled, the Louisville District, or responsible Corps District, receives sealed bids or proposals. The bids or proposals (depending on the procurement method) are examined and the contract is awarded approximately two to four weeks after the bid opening.

1.21 AS AWARDED DOCUMENTS

After contract award, the Corps shall ensure all amendments are incorporated into the electronic files, and a complete set of files shall be provided to the A/E and the end User for use during construction. All amendments will be marked on the "As Awarded" documents as stated in the "Amendments" paragraph above.

As Awarded CD: The Corps shall develop an As Awarded documents package, which will include all project files. There will be separate file folders for the Native drawing files, PDF drawing files, Native Specifications, PDF Specification, and where BIM is required by the contract, the BIM model. The PDF Specification file shall be one large file of the entire document, bookmarked appropriately. PDF Design Analysis shall be provided in a separate file folder, and is for USACE and A/E use. USACE will distribute the As Awarded CD to the A/E, Contractor, and others. Each package containing the appropriate documents.

1.22 LEED SUBMITTAL TO GBCI

After contract award, the designer shall complete all LEED Online forms and documentation for the Design Credits, incorporating all awarded bid options affecting LEED credits into the documentation. The A-E shall submit the Design Credits to GBCI for review within 30 days of award (or as otherwise agreed upon by the PE/A), and complete all subsequent resubmittals and reviews in a timely manner.

1.23 RENDERINGS

If renderings are required per the Scope of Work, then designer shall submit one or more samples of renderings (which can be from another project), showing the quality and style of the proposed final rendering.

Once the USARC G-3/5/7 Project Officer approves the submitted style, designer shall develop three sample draft view angle sketches (black and white from the BIM model is acceptable) for the project. Submit the three sketches electronically in PDF format to the USACE PE/A, who will distribute to the PM and Project Officer. These will be used by the USARC G-3/5/7 Project Officer to determine the best view/angle for the particular project. Designers shall wait until a selection and approval is given by the PE/A before further developing the selected sketch into the final rendering. Reproduce the rendering according to the Scope of Work.

Renderings shall have the facility/complex as the main focal point. The project name from the DD Form 1391 is usually centered as a title, with the project location. It is acceptable for the design firm to include its name and logo on the rendering.

Chapter 2.0 – CIVIL

2.1 GENERAL

2.1.1 Scope

This chapter provides guidance for the preparation and development for each of the different required submittal stages, as they relate to civil engineering. Including how civil interfaces with survey, geotechnical, and environmental disciplines. Electrical and telecommunications utilities are found in their respective chapters.

2.1.2 Design Submittal Requirements and Criteria

Refer to Chapter 1 "All Disciplines" above for the general requirements and requirements at each design stage. Additional requirements specific to this discipline are listed in this chapter.

2.1.3 BIM/CIM Submittal Requirements

Refer to Chapter 1 for CAD/BIM/CIM requirements.

2.1.4 Site Survey

A site visit and topographical survey by a licensed professional land surveyor may have been accomplished as a part of Project Definition (Phase I) work. Refer to "PART A – PROJECT INCEPTION AND DEFINITION", Chapter "Project Definition (Phase I)", and its subparagraphs: "Louisville District Actions" and "Submittal Requirements" for more details on the site survey.

If a suitable site survey from Phase I is unavailable, then the survey should be made a part of the Scope of Work (SOW) for Detailed Design (Phase II), and accomplished as early as feasible so as not to impede the other Detailed Design (Phase II) work.

2.1.5 Geotechnical Investigation

Once the proposed building(s), stormwater management areas, and parking locations are finalized after the Charrette Design Meeting, perform a complete geotechnical investigation.

A "Proposed Geotechnical Exploration Data" form is attached to the back of the "Geotechnical Requirements for Full Plans and Specs Solicitation Package" narrative. Refer to the website reference below. The form is to be completed by the A-E and should be returned as an attachment to the fee schedule before negotiation of the original A-E contract. A-E's should make sure the USACE PE/A assigned to the project is aware of this and gives them the opportunity to look at it. This completed document provides USACE with an opportunity to review and comment on the appropriateness of the planned geotechnical investigation.

Additional information may be found on the Louisville District Army Reserve Website:

File titled "Geotechnical Requirements for full P&S (Plans and Specs) Solicitation Package..."

2.1.6 Environmental Considerations

If the site for the project is within the jurisdiction of a military Installation, the post Directorate of Public Works (DPW) is responsible to certify that the project site is free of environmental hazards and that the proposed project will not have a negative impact on the environment. Usually any required studies are funded by the responsible Readiness Division (RD). If the project is located off-post in a public area the civil engineer will be required to work with the local authorities to provide information to be used to complete any required environmental permits, including the stormwater construction permit (NPDES) and local permits. Refer to the AE SOW which will provide direction to identify the responsible party, requirements, and the required timeline to execute the NEPA process.

2.2 PHASE II–CHARRETTE DESIGN

2.2.1 Utility Investigation and Coordination

- 2.2.1.1 It may be necessary for design team members to meet with local utility companies at their offices. Design team members should coordinate such meetings prior to the Charrette Design Meeting.
- 2.2.1.2 The civil engineer must contact and meet with the appropriate local or state office which has stormwater permitting authority for the site. This initial contact should gather information on site erosion control and stormwater design requirements, as well as the permitting process, to prevent subsequent delays prior to construction.

2.2.2 Site Utility Narrative

- 2.2.2.1 Provide information concerning sources and availability of gas, water, and fire utilities, and what is intended for the project.
- 2.2.2.2 Include a discussion of special plumbing and fire protection needs and requirements. Discuss upgrade issues when systems require larger capacities.
- 2.2.2.3 Discuss who owns the various utility systems, and what is involved in obtaining services.
- 2.2.2.4 Provide draft survey and geotechnical report, if available.
- 2.2.2.5 Discuss how the site will comply with EISA Section 438 and UFC 3-210-10 Low Impact Development.

2.3 PHASE II–INTERIM DESIGN

2.3.1 Design Analysis

- 2.3.1.1 Site Design. Provide a complete explanation of the site design.
 - a. Describe any required site demolition.
 - b. Provide a section on the utility design including metering, backflow prevention, easements, connection fees, design coordination/approval process, and any other utility provider requirements.
 - c. Describe the setbacks and separations of parking and buildings required by UFC 4-010-01 DoD Minimum Antiterrorism Standards.

- d. Describe new site grading, including anticipated maximum cut and fill on the site, as well as disposition of excess materials or source of borrow material.
- e. Describe management of site stormwater runoff; including both volume and quality of runoff. Describe compliance methods related to meeting the requirements of UFC 3-210-10 Low Impact Development.
- f. Provide truck turning diagrams and vehicle circulation information based on project-specific design vehicles coordinated with Users.

2.3.1.2 Geotechnical Report. Provide a complete geotechnical report with the Interim design.

2.3.2 Drawings

2.3.2.1 Site Location Map. Include a drawing showing site and area location maps indicating the location of the site in relation to the state, city/county, and local areas.

2.3.2.2 Survey Control Drawing. Show the baseline reference points on a site plan, together with detailed information for each reference point (location from known features, horizontal coordinates, elevation, and reference datum).

2.3.2.3 Aerial Photograph. Obtain recent aerial photography, which reflects current site conditions, typically available by using Google Earth or other aerial websites, and include a drawing showing the proposed site overlaid on an aerial photograph. The date and copyright of the aerial photography should be noted on the drawing. Mark this sheet "For Information Only".

2.3.2.4 Site Photographs. Include drawing(s) showing photographs of the existing site conditions to be encountered by the Contractor. Approximately eight photographs are to be provided, along with a key plan showing location and orientation of the photographs. Provide additional photos if more site-specific conditions need to be shown. Provide the date that the photographs were obtained and mark this sheet "For Information Only".

2.3.2.5 Demolition Plan. Complete the demolition plan.

2.3.2.6 Code Compliance Site Plan. Include drawing as required by UFC 3-600-01 Fire Protection Engineering for Facilities.

2.3.2.7 Site Plans. Complete the site plan, as a development of the Charrette site plan requirements (see Chapter 1 above).

- a. Dimension all significant features of the site plan including ATRP setbacks, easements, and Right of Way limits/setbacks.
- b. Identify the work limits for the project with coordinates including the area used by the Contractor for material staging.
- c. Identify reserved area(s) for future expansion on the site and minimize future site impacts with current design, if possible.

2.3.2.8 Grading and Drainage Plan. Provide proposed contours and drainage structure locations superimposed on the proposed new site plan with the existing contours in the background. Grading plan may be incomplete at Interim review.

- a. Label structure types and show piping between structures.

- b. Indicate the new building(s), pavement, drainage inlets, structures, swales and/or detention areas along with the existing and proposed new piping.
 - c. Indicate existing contours with a light line proposed new contours with a darker line. Locate spot elevations and slope labels to describe the design intent.
 - d. Indicate finished floor elevations (FFE) of any buildings.
 - e. Show locations of soil borings with symbols and numbers, as defined in the geotechnical investigation.
- 2.3.2.9 Storm and Sanitary Site Plan. Provide storm and sanitary sewer layouts superimposed on the proposed site plan. Label sewer structures. Pipe sizes and elevations may be estimated. Sanitary utilities may be shown with the overall utility plan instead, if the information can be displayed clearly.
- 2.3.2.10 Utility Plans. Initiate the creation of the overall utility plan for other disciplines and coordinate this with other disciplines. Create utility plans for the sanitary sewer, storm sewer, natural gas, domestic water, and fire protection water systems. Create enlarged plans as required to clearly depict all requirements.
- a. To help facilitate coordination and understanding of all utility relationships; on the civil utility plans reference and show electrical, telecommunications, and any mechanical site utility plans from other disciplines and refer to those plan sheet locations for additional information.
 - b. Facilities not on a military Installation require coordination with the local utility and may involve separate submittals and permits.
 - c. Facilities in military installations that have some or all utilities privatized may involve separate submittals and compliance with the standards of those utilities.
 - d. This sheet shall show the building and pavement locations with the connection of new utilities from the building to the existing utilities. Indicate the pipe sizes and/or capacities for electricity, gas, water and sewer. Indicate the adequacy of the water system for providing water for fire protection, including flow test data if available. Also indicate the above ground utility structures such as power poles and fire hydrants. Show estimated size for new project demand.
- 2.3.2.11 Road and Parking Area Profiles. Grading profiles should be completed for the Interim Submittal. Provide profiles of proposed roadway and parking lot facilities. Label vertical alignment, proposed profile grade, existing ground and utility crossings. AE is to notify the LRL PE/A if grading profiles cannot be included in the Interim design, with specific reason.
- 2.3.2.12 Typical Sections. Provide typical roadway and parking lot sections.
- 2.3.2.13 Boring Locations and Logs. Provide a drawing showing the location of the borings taken in the geotechnical investigation. Also provide boring logs that show graphically the types of soils encountered in the geotechnical investigation. Typically, six letter sized boring logs per drawing sheet display legibly when printed at half-size; verify legibility when printed. Coordinate these sheets with the geotechnical engineer.

2.3.2.14 Right of Way Plans. If the project is located adjacent to private property, provide a separate “Right of Way” plan as required. Provide reference drawings showing all land required for construction of the project.

2.3.3 Specifications

Provide a listing of specifications in the Design Analysis. This is to be the Table of Contents intended for the Final specifications.

2.4 PHASE II–FINAL DESIGN

2.4.1 Design Analysis

- 2.4.1.1 Site Design. Update and continue development of the Design Analysis submitted for the Interim design, providing additional details as needed to describe the complete site design, including decisions made on the project. Provide information regarding site demolition and landscaping. Provide a section on the utility design.
- 2.4.1.2 Civil Calculations. Provide calculations for stormwater management as required by utility agencies, ASHRAE, EISA Section 438 Low Impact Development, and LEED. Provide PCASE calculations for pavement designs. Provide utility calculations for sanitary sewer piping, grease traps, and oil/water separators if used.
- 2.4.1.3 Permits. Provide documentation of communication/coordination/approvals with each Local Issuing Authority (LIA), including but not limited to utility companies and regulatory agencies, including permits required for construction.
- a. The project specific contract with the AE may contain requirements which vary from the requirements indicated here. If so, the most restrictive requirements apply.
 - b. Provide documentation to identify all permits required for construction, for each LIA. It is recognized that each project location, and related LIA, will introduce specific and unique permit requirements on each project.
 - c. The AE is to research, prepare, and submit all permitting applications to the greatest extent possible.
 - 1) Certain permits require the signature of the "owner" of the facility and will require coordination with the local installation or Readiness Division.
 - 2) Each LIA is different, and some will not allow for a permit to be obtained before a construction contractor is identified. If there is a requirement of Contractor input, review, signature, etc., the AE is to notify LRL that the permit is not executable under the design phase.
 - (a) Some permitting requirements such as NPDES, utility connections and drive access permits may need to be executed as part of the construction contract.
 - (b) Provide list of all fees to be paid by the Contractor and any other action items required by others after award.
 - 3) If the A-E finds a permit is allowed to be submitted as part of the design phase (as defined by the LIA), the A-E shall submit the permit.

- (a) If the permit(s) fees are in contradiction to the assumed permit fee values included in the AE contract proposal, or was not anticipated at the time of the AE contract, a contract Modification discussion is to occur with the LRL PE/A.
- (b) If the permit(s) fees include a required annual maintenance fee, and is in contradiction to the assumed permit fee values included in the AE contract proposal, a contract Modification discussion is to occur with the LRL PE/A.
- 4) Environmental permits - Obtain the necessary permits such as NPDES, 401 and/or 404 and develop the Storm Water Pollution Prevention Plan (SWPPP) associated with NPDES.
 - (a) The A-E will coordinate the NPDES permit associated with construction activities, including obtaining forms and supporting data, and complete the permit to the extent possible.
 - (b) Often the NPDES will require construction contractor input after construction award; AE to confirm.

2.4.2 Drawings

Complete previously submitted Interim drawings, and additional drawings for a complete design package.

- 2.4.2.1 Sanitary Sewer Profiles. Provide profile sections of the sanitary sewer system showing the manhole locations, pipe sizes and grades and other utility crossings.
- 2.4.2.2 Storm Sewer Profiles. Provide pipe profiles of the storm system when necessary showing manhole locations, pipe sizes and grades and other utility crossings.
- 2.4.2.3 Road and Parking Area Profiles. Grading design and profiles not previously included at Interim.
- 2.4.2.4 Erosion Control Plan. Provide an erosion control plan with details that show the critical areas that are being protected while the project is under construction. Coordinate the details of this sheet with state and local authorities as required.
- 2.4.2.5 Permit Matrix. See 'Permits' in the Design Analysis section above. The A-E is to include a Permit Matrix in the drawing set showing each permit, including but not limited to agency, application type, contact information, submitted date (if applicable), approved date (if applicable), agency permit/project number, agency review fee, fee remarks (description), contractor instructions to pay fees (to clarify if the A-E already paid, or if the construction contractor is to pay), requirements for "owner" signature, and notes (i.e. miscellaneous instructions to the contractor).
 - a. Indicate in the construction documents the requirement for the construction contractor to complete their information after award, and to submit the permit(s).
- 2.4.2.6 Details. Provide complete details of stormwater BMPs, pavement joints, concrete, fences, manholes, catch basins, other site structures and any other details necessary to show all aspects of the design.

2.4.2.7 Exterior Facility Signage. Provide location of facility signage with complete design and installation details. This signage may be shown on the Site Plan or Landscape drawings. A note referencing the signage schedule and any other facility signage information found in the architectural drawings will be included.

2.4.3 Specifications

Provide a complete set of fully edited specifications.

Chapter 3.0 – LANDSCAPE ARCHITECTURE

3.1 GENERAL

3.1.1 Scope

This chapter provides guidance for preparation and development for each of the different required submittal stages, as they relate to landscape architecture.

3.1.2 Submittal Requirements

Refer to Chapter 1 "All Disciplines" above for the general requirements and requirements at each design stage. Additional requirements specific to this discipline are listed in this chapter. Refer to Chapter 4.1.5 "Military Installation Aesthetic Improvement Guidance" for additional design considerations.

3.1.3 BIM/CIM Submittal Requirements

Refer to Chapter 1 for CAD/BIM/CIM requirements.

3.2 PHASE II–CHARRETTE DESIGN

Provide narrative focused on ensuring the cost estimate includes project-specific requirements.

3.3 PHASE II–INTERIM DESIGN

3.3.1 Design Analysis

The Charrette phase Design Narrative forms the basis of the Interim and Final Design Analysis. Depending on submittal requirements, include the following in narrative form:

- 3.3.1.1 Overview. State the purpose, function, and capacities in sufficient detail to characterize the functional features and the desired image or visual appearance of the project site.
- 3.3.1.2 Security and Protection Requirements. Describe how the landscape elements meet safety and protection requirements.
- 3.3.1.3 Enhancement of Proposed Architecture. Describe how the landscape architecture relates to the architecture of the building(s) and the surrounding environment.
- 3.3.1.4 Exterior Pedestrian Spaces. Define how pedestrian spaces are incorporated on the site.
- 3.3.1.5 Screening. Describe the methods utilized to screen undesirable views and objects and site privacy, if required.
- 3.3.1.6 Maintenance Reduction and Sustainable Design. Quantify features of the design that minimize maintenance related activities. Describe strategies incorporated to promote sustainable design.

- 3.3.1.7 Existing Design Vernacular. Provide a statement that addresses how the design continues the existing context of the surrounding site. Indicate if master plan design criteria (or Installation Design Guide) must be followed and list (or attach applicable criteria) the features and materials which must be included.
- 3.3.1.8 Site Circulation. Describe how pedestrian and vehicular circulation is coordinated to provide safe, non-conflicting functionality.
- 3.3.1.9 Tree Mitigation. If required, define methods for providing mitigation for tree removal.
- 3.3.1.10 Anti-Terrorism Force Protect (ATFP). Provide description of how the landscape design meets ATFP requirements.

3.3.2 Drawings

Provide drawings in sufficient detail and annotated for the local User to visualize precisely how the landscape architect has interpreted the Users' site functional, operational and aesthetic requirements. Provide as a minimum the following drawings:

- 3.3.2.1 Landscape Notes and Schedules. Provide a planting schedule, landscape site materials and site furniture legend with descriptions and landscape and site notes that include general notes, planting notes, irrigation notes, and project specific notes.
- 3.3.2.2 Landscape Plans. Provide a landscape plan that indicates and locates site features, plantings, groundcovers, and building maintenance strips (coordinated with civil and architecture).
- 3.3.2.3 Landscape Details. Provide planting details and site feature details.

Show in the same scale and matchline areas as other site work drawings.

3.3.3 Specifications

Provide a listing of specifications in the Design Analysis. This is to be the Table of Contents intended for the Final specifications.

3.4 PHASE II–FINAL DESIGN

3.4.1 Design Analysis

Update the Final Design Analysis from the Interim design to include descriptions of all design revisions and/or developments. Provide Final DA as a new document, not as addenda to the Interim document.

3.4.2 Drawings

Complete previously submitted Interim drawings, and additional drawings for a complete design package.

- 3.4.2.1 Final plans are complete, with all necessary details, layout drawings, section views, plan views, and schedules.
- 3.4.2.2 Provide details of sufficient scale to allow construction and installation of the work without additional design work by the construction contractor.

3.4.3 Specifications

Provide a complete set of fully edited specifications.

Chapter 4.0 – ARCHITECTURAL

4.1 GENERAL

4.1.1 Scope

This chapter provides guidance for the preparation and development for each of the different required submittal stages, as they relate to architecture.

4.1.2 Submittal Requirements

Refer to Chapter 1 "All Disciplines" above for the general requirements and requirements at each design stage. Additional requirements specific to this discipline are listed in this chapter.

4.1.3 BIM Submittal Requirements

Refer to Chapter 1 for CAD/BIM requirements.

4.1.4 Architectural Quality

The architectural objective is to provide attractive structures using sound technical design knowledge that can be constructed using recognized, good industry practices in a cost-effective manner. The design and construction must incorporate those characteristics which will provide structures that present continuing utility, durability and desirability, and which will be economical to maintain for the life of the structure. The design must also provide a safe and healthy environment for occupants.

4.1.5 Military Installation Aesthetic Improvement Guidance

The aesthetic quality of an area is not determined solely by the architecture of its buildings, the complexity of its development and landscape features nor by the predominate size, shapes, colors, and textures of adjacent forms. The aesthetic quality is determined by how all these elements function together and complement existing natural and man-made features. Typically, not much criteria or guidance has been available concerning preservation or improvement of the aesthetic character of existing or new facilities and sites. This policy will provide an effective vehicle of communication between participating personnel to achieve harmony of design, and to assure a consensus of opinion in the approach to aesthetic quality.

- 4.1.5.1 Policy. The design agent is responsible for ensuring that proper attention is paid to achieving an aesthetic design solution which includes harmony of design and the visual linkage of architecture to the surrounding community. The design must respect the architectural character of existing facilities that are to remain and be architecturally appropriate for the environment. Where the architecture of existing permanent facilities reflects a predominant character of style, design the new facilities to be in harmony with that character or style. Emphasis will also be placed on landscaping and structures other than buildings. Where applicable, review the Installation Design Guide before beginning any design effort and determine installation requirements. The installation DPW/Master Planner and USARC G-3/5/7 must approve the building's exterior appearance and material/color selections.

- 4.1.5.2 Application. The exterior appearance requirement applies to facilities having a significant visual impact within an Installation and/or occupancy which requires special design attention. The A-E will be notified when this requirement exists. Address the following items in each design:
- a. Ensure all disciplines consider the effect of their decisions upon the project aesthetics.
 - b. Provide a descriptive narrative of the design approach used for each project.
 - c. During the project definition phase, or as part of the Charrette Design Meeting, make a site visit to become familiar with existing conditions and take color photographs of the surrounding area.
 - d. Give special attention to color and materials selection or relationship with existing surroundings.
 - e. Landscaping, exterior lighting, and signage will be given the same aesthetic consideration as the structures.
 - f. The exterior treatment of renovated buildings must be in harmony with the existing buildings. Important elements on the existing building that are compatible with the surrounding aesthetic quality of an area should be retained to the maximum extent possible.
 - g. Review site adapted building(s) (standard designs, i.e. TEMFs and Barracks) with the same aesthetic criteria required for new design.
 - h. Provide visual screening for exterior equipment, i.e., chillers, cooling towers, transformers, etc., to the maximum extent possible. However, note the possible implications of screening with relation to the Minimum Antiterrorism standards.
 - i. Provide underground electrical service lines, unless otherwise directed by the Installation and Readiness Division.

4.1.6 Technical Requirements

Materials and construction methods must comply with the instructional notes inserted within the applicable specifications and criteria.

4.2 PHASE II–CHARRETTE DESIGN

Refer to Chapter 1 "All Disciplines" above, paragraph: Phase II – Charrette Design, Process, Meeting, And Submittals.

4.3 PHASE II–INTERIM DESIGN

4.3.1 Design Analysis

Update the Charrette phase Design Narrative to include description of all design revisions and/or developments. Provide Interim DA as a new document, not as addenda to the Charrette document.

- 4.3.1.1 State the purpose, function, and capacities in sufficient detail to delineate and characterize functional features and the desired image or visual appearance of this project.
- 4.3.1.2 Describe the architecture of the existing facilities near the site and how the project relates to these facilities.

- 4.3.1.3 Provide a brief statement of the interior and exterior finish materials to be used in the project. Include an interior design statement that indicates the coordination of the structural finishes and features with the selected furnishings' function, styling, detailing and finishes.
- 4.3.1.4 If the project has a kitchen, include kitchen equipment cut sheets (model number specific manufacturers' product literature).
- 4.3.1.5 Provide results of vapor transmission analysis per UFC 3-101-01; reflecting the vapor retarder/barrier planned course of action for the project specific assemblies.
- 4.3.1.6 Provide plumbing fixture quantity calculation that lists quantity and type of fixtures.

4.3.2 Drawings

Provide drawings in sufficient detail and annotated for the local User to visualize precisely how the architect has interpreted the using activity's functional and operational requirements. Provide as a minimum the following drawings:

- 4.3.2.1 Show North Arrow on all plan drawings for solar orientation.
- 4.3.2.2 Composite Floor Plan. If the main floor plans must be shown in segments in order to comply with the requirements of the proper scale, provide a smaller scale floor plan showing exterior wall, interior partitions, circulation elements, and cross referencing for enlarged floor plans and sections. Show overall dimensions on the floor plan and gross building areas tabulation on the drawing.
- 4.3.2.3 Floor Plans. Provide floor plans at 1/8"=1'-0" or 1/4" = 1'-0" (1:100 or 1:50) scale. Show gross floor area tabulations if no composite sheet is included.
 - a. Building Entrances. Show all stoops, steps, or similar access features pertaining to the building entrance, which will normally be built by the building construction contractor as differentiated from sidewalks, driveways, etc., which are normally constructed by a sitework contractor. Stoops are typically detailed on Structural drawings. Show sufficient sidewalk and pavement graphics on floor plans, to show relationships of those items to building entrances, service doors, and points of egress.
 - b. Floor Drains and Slopes. Show floor drains and shower heads on the architectural drawings as well as on the plumbing drawings and closely coordinate with other disciplines. All floors in areas requiring drains are to slope toward the drains. Coordinate floor drain locations with structural elements.
- 4.3.2.4 Building Elevations. Provide building elevations showing grading, openings, exterior materials, gutters and downspouts, major roof mounted equipment visible in elevation drawings, equipment enclosures connecting to the building, and profiles of the building (scale shall be the same as the floor plans).
- 4.3.2.5 Roof Plan. Provide a roof plan showing the roof configuration and methods by which rain is directed to the building perimeter.

- 4.3.2.6 Wall Sections. Provide typical wall and stair/elevator sections (1/2" = 1'-0", or 1:20 minimum scale) that indicate major elements. Wall sections shall be unbroken where practical and indicate materials and floor-to-floor heights. At a minimum, two exterior wall sections, one section at stairs, and one section at the elevator shaft will be provided.
- 4.3.2.7 Roof and Wall Insulation. Indicate roof and wall insulation types and R-value minimums. At cavity walls or other conditions in which the insulation thickness is critical to maintain an air space or to accommodate other adjacent construction elements, the maximum insulation thickness and minimum R-values are to be indicated.
- 4.3.2.8 Schedules. Provide a door schedule and room finish schedules indicating the materials and finishes used in the design. Also, a special item schedule and/or notes shall be provided indicating any special items that will be required for the design.
- 4.3.2.9 Reflected Ceiling Plan. Provide a ceiling plan that indicates ceiling material and open ceiling areas. Indicate room numbers, light locations, registers, and all ceiling mounted items such as exit signs.
- 4.3.2.10 Provide drawings for: enlarged plans (stairs, lobby, kitchen, and miscellaneous plans), wall types, bathroom plans and details, vault plan and details (coordinated with structural), and radon plan and details (if required based on site location). Provide significant project details (roof & elevator) and primary exterior door and window details to establish detailing approach (all exterior roof and fenestration details are to be provided at Final).

4.3.3 Specifications

Provide a listing of specification sections in the Design Analysis. This is to be the Table of Contents intended for the Final specifications.

4.4 PHASE II—FINAL DESIGN

4.4.1 Design Analysis

Update the Final Design Analysis from the Interim Design Analysis to include descriptions of all design revisions and/or developments. Provide Final DA as a new document, not as addenda to the Interim document.

4.4.2 Drawings

Complete the Final drawings to present a complete description of all the construction elements required and fully coordinate with other disciplines. Complete previously submitted Interim drawings, and additional drawings for a complete design package.

- 4.4.2.1 Signage Plan. Provide an interior and exterior signage plan, schedules and details indicating the color, location and types of signs used on the project. Include the location and mounting information for the interior and exterior Army Reserve Minuteman plaques. Include the location and mounting information for the LEED plaque, if applicable.

4.4.2.2 Air Barrier Drawings. Refer to UFC 3-101-01 Architecture. In addition to the air barrier components being shown in all applicable details, provide separate Air Barrier drawings. At a minimum the air barrier drawings shall include a plan of the building indicating the desired perimeter boundary of the air barrier system(s), and building sections reflecting the same boundaries. The details are to clearly demonstrate the critical interfaces and locations of how the air barrier components are to be lapped and constructed.

4.4.3 Specifications

Provide a complete set of fully edited specifications.

Chapter 5.0 –INTERIOR DESIGN

5.1 GENERAL

5.1.1 Scope

This chapter provides guidance for the preparation and development for each of the different required submittal stages, as they relate to interior design.

5.1.2 Submittal Requirements

Refer to Chapter 1 “All Disciplines” above for the general requirements and requirements at each design stage. Additional requirements specific to this discipline are listed in this chapter.

5.1.3 BIM Submittal Requirements

Refer to Chapter 1 for CAD/BIM requirements.

5.1.4 Comprehensive Interior Design (CID)

Below is a description of the overall package - the CID and its subparts the FF&E and the SID - that form the Interiors Submittals.

5.1.4.1 Comprehensive Interior Design (CID). A CID package shall be included as a requirement in the A-E contract for all Army Reserve projects. The CID package includes the Furniture, Fixtures and Equipment (FF&E) design and the Structural Interior Design (SID). The two types of services cover different aspects of the interior environment. The FF&E includes selecting and developing interior building furnishings for an integrated visual design theme, which reflects the interior atmosphere desired by the customer. The Structural Interior Design (SID) includes exterior finishes, interior finishes, and special item selections; and is included as a separate binder submittal. Currently, there are four pre-established Army Reserve interior color schemes: Blue, Green, Rust, and Red. The color schemes are to be used only as a visual reference concept to initiate discussion. The CID package must be developed concurrently with the design of the facility and submitted for review.

- The FF&E submittal includes:
 - a. FF&E Table of Contents
 - b. Statement of Design Objective
 - c. Furniture Room Layouts
 - d. Room Contents List
 - e. Item Installation List
 - f. Specification List by Tag
 - g. Manufacturer POC List
 - h. Furniture Illustration Sheets
 - i. Furniture Procurement Sheets
 - j. Presentation Color Boards (with physical samples included)
 - k. Site Plan
 - l. Architectural Floor Plans

- m. Electrical Plans
- n. ICT Plans
- o. Composite Furniture Floor Plans
- p. Enlarged Furniture Floor Plans
- q. Furniture Key Code Plan
- r. Enlarged Furniture Typical Details

- The SID submittal includes:
 - a. SID Table of Contents
 - b. Statement of Design Objective
 - c. Finish Schedule and Special Items Schedule
 - d. Presentation Color Boards with physical samples of all applied finishes including material, color, texture and patterns necessary to complete the exterior and interior finishes and special items.

5.1.4.2 Furniture, Fixtures and Equipment (FF&E). Furniture, Fixtures and Equipment (FF&E) includes selecting and developing interior building furnishings for an integrated visual design theme which reflects the interior atmosphere desired by the U.S. Army Reserve. This information shall be submitted in 4" (maximum) D-ring binder(s), 8-1/2" x 11" format with only one foldout per page. The maximum foldout width shall be approximately 25". Each binder shall be labeled on the outside spine and front cover with the following information: Project title and number, date, project location, design firm and type of submittal (Interim, Final, etc.). Material and finish samples shall indicate true pattern, color and texture, labeled with manufacturer, name, model number, and finish schedule tag reference. Each sample board is to be inserted into a clear, heavy-duty page protector that is sturdy enough to keep the pages from tearing out. The FF&E must be developed concurrently with the design of the facility. With each new submittal, the Interior Designer of Record shall create new FF&E binder(s) to satisfy review comments until the Government approves the completed CID package. At the time of the furniture procurement (approximately six months prior to the Furniture BOD), the Interior Designer of Record is required to update the FF&E to correct any deficiencies, errors, or furniture product updates after the technical furniture review by Louisville District prior to the actual procurement of the furniture.

5.1.4.3 Structural Interior Design (SID). The Structural Interior Design (SID) includes the selection and sampling of all applied finishes including material, color, texture and patterns necessary to complete the building's interior architectural features. Items include, but are not limited to: wall and floor finish materials, window and door finishes, glazing and trim materials, ceiling materials and finishes, millwork materials and finishes, paint and stain finishes, as well as specialty items. Since exterior colors, materials and finishes influence interior selections, include exterior materials as a separate section of the SID Items include, but are not limited to, roofing materials and finishes, gutter and downspout, soffit and fascia panels, brick and mortar, window and door frames, as well as specialty items. This information shall be submitted in 3" D-ring binder(s), 8-1/2" x 11" format with only one foldout per page. The maximum foldout width shall be approximately 25". Each binder shall be labeled on the outside spine and front cover with the following information:

Project title and number, date, project location, design firm and type of submittal (Interim, Final, etc.). Material and finish samples shall indicate true pattern, color and texture, labeled with manufacturer, name, model number, and finish schedule tag reference. Each sample board is to be inserted into a clear, heavy-duty page protector that is sturdy enough to keep the pages from tearing out. The SID must be developed concurrently with the design of the facility. With each new submittal, the Interior Designer of Record shall create new SID binder(s) to satisfy review comments until the Government approves the completed SID package.

5.2 PHASE II–CHARRETTE DESIGN

Refer to Chapter 1 "All Disciplines" above, paragraph: Phase II –Charrette Design, Process, Meeting, And Submittals.

The Charrette Submittal shall include:

- A narrative description of the interior design features and furnishings intent.

5.3 PHASE II–INTERIM DESIGN

The Interim Submittal shall include the Design Analysis, construction drawings and CID package consisting of the FF&E and SID material and finish samples.

5.3.1 Design Analysis

- 5.3.1.1 Statement of Design Objective. Provide a narrative explaining the interior design concept of the facility. Where applicable, include desired psychological impact of the interior environment on its inhabitants and proposed method of accomplishing same by using space planning, shapes, forms, color, patterns, textures, fabrics and furnishings. Include which of the four Army Reserve color schemes was the starting point for the project. Explanations of unusual conditions shall be included, such as the coordination of special laminates and fabrics between various product lines and manufacturers to provide a consistent overall environment. Explanations of deviations or unusual conditions required by the Army Reserve Unit of the furnishings layout and/or items used from the information included in the USAR Design Guide, shall also be included.

5.3.2 Drawings

- 5.3.2.1 Furniture Floor Plans. Provide as part of the construction drawings, furniture floor plans showing the furnishings required for the various functions that are to be housed in the facility, indicating the adequacy of the size and shape of each space and the spatial relationship between the furnishings and doors, windows, light switches, thermostats, electrical/communication connections/outlets, bulletin boards, projection screens and other building features. Basic furniture plans shall be provided as a minimum with any additional furnishings items known at this stage of design included. Any areas that may pose "furniture fit" or other problems should be highlighted or annotated by notes on the furniture drawings to ensure that they are addressed at the Interim Design Review Meeting. Drawings shall include Composite Furniture Floor Plans, Systems Furniture Plans, and Systems Furniture Panel Plans (if systems furniture is included in the project). Other

plans shall be provided as the project requires i.e., Systems Furniture Component Plans for complex panel systems projects. Furniture Floor Plans shall include the room names and numbers. If the furnishings and room names and numbers overlap each other on the drawings, the room names and numbers should be relocated to provide legible information. Furnishings are to be “Government Furnished, Government Installed” (GFGI). Include a statement on the furniture drawings indicating that the furniture drawings are “For Information Only”, are to be used to coordinate furnishings locations with other disciplines, and that the furnishings are not part of the construction contract.

5.3.2.2 Additional Plans, Enlarged Plans, Elevations and Details. Provide as necessary any plans, enlarged plans, elevations and details indicating location and identification of accent walls, graphics, wall hangings, wall patterns/finishes, floor patterns/finishes, wall and corner protection and special items known at this stage of design.

5.3.2.3 Exterior and Interior Color, and Special Item Schedules. Provide an Exterior Color Schedule, an Interior Color Schedule, and a Special Item Schedule (or notes) for those items known at this stage of design. The Exterior Color Schedule may be indicated in the Architectural drawing sheets or in the Interior drawing sheets, as long as the correct references are made to the location of the schedules. The Interior Color Schedule and Special Item Schedule shall be in the Interior Design sheets (I-Sheets). The Exterior Color Schedule, Interior Color Schedule, and Special Item Schedule may be a single combined schedule in the Interior Design sheets (I-Sheets). These finishes include, but are not limited to, exterior and interior wall finish materials, window and door frames, doors, glazing, roofing materials, trim materials, floor and ceiling finishes, signage colors and styles, case goods, toilet partitions, lockers and other visible materials affecting visual design aesthetics. Include a general non-proprietary disclaimer to indicate that naming the commercial product does not restrict the construction contractor to the particular product identified. (Example: “Manufacturers referenced are intended to establish color and finish only, and are not intended to limit selections from other manufacturers. When alternate selections are submitted, submittal shall include materials listed for comparison.”) Each finish/item selected must be available from at least three manufacturers. (Exceptions to this must be discussed with Louisville District on a case by case basis with detailed explanations provided.)

5.3.3 CID - FF&E and SID

5.3.3.1 Finish Samples and Furnishing Illustrations. Finish Samples shall be mounted on color boards as part of the FF&E and SID binder(s), and a Finish/Special Item Key shall be included indicating the following information: manufacturer, finish model number and/or color number, where the finish is used, fabric content, finish schedule tag reference and any other pertinent information.

- a. Illustrations of the major furnishing products or product lines may be presented at the Interim Design Review Meeting using manufacturers’ product catalogs and pamphlets, or included in the FF&E binder.

- b. The finish samples for the FF&E and SID may be presented in loose format at the Interim Design Review Meeting, or as mounted on color boards as part of the FF&E and SID binder(s). If presented loose, each sample shall be labeled with the following information: manufacturer, finish model number and/or color number, where the finish is used, fabric content, finish schedule tag reference and any other pertinent information.

5.3.3.2 Typical Furniture Layouts. Provide the “basic” typical room furniture layouts and typical workstations used in the project. It is not expected that every typical, every atypical and every workstation will be known at this stage of the design. The typicals included are to be representative only. Include the furniture “tags” in these typicals and the general project information. Drawings must be legible with a minimum drawing scale of 1/4" = 1' - 0". The typicals will include basic information on where they are used, such as “Full Time Private Offices”, “Unit Exclusive Shared Offices”, etc. They may also include the room numbers where the typicals are to be used. These tagged typicals may also be shown on the construction drawings as described in the Final Design Submittal paragraph.

5.3.3.3 Room Contents List. This report shall provide the furnishings specified for each room by furniture tag, description, manufacturer, model number and quantity. List all desk units and panel systems workstations by a group furniture tag. Desk units consist of the desk, credenza, bridge, overhead, etc. and are tagged as one unit. The report is to be sorted by building, floor, room and tag in alpha/numeric order.

5.3.4 Specifications

Provide a listing of specifications in the Design Analysis. This is to be the Table of Contents intended for the Final specifications.

5.4 PHASE II–FINAL DESIGN

5.4.1 Design Analysis

The submittal shall have the Interim Submittal Design Analysis updated to include all design revisions and/or developments.

5.4.2 Drawings

Update and complete all information provided in previous submittals and approved review comments. Complete previously submitted Interim drawings, and additional drawings for a complete design package.

5.4.2.1 Furniture Floor Plans. Provide as part of the construction drawings Composite Furniture Floor Plans, Systems Furniture Plans, Systems Furniture Panel Plans and Enlarged Furniture Floor Plans. Other plans shall be provided as the project requires i.e., Systems Furniture Component Plans for complex panel systems projects. Plans shall reflect added or changed items since the previous submittal. Furniture Floor Plans will consist of the following:

- a. Composite Furniture Floor Plans. For large facilities include room names and numbers but do not include furniture tags. Include a building footprint key plan in the lower right-hand corner of the sheet indicating how the

floor plan has been divided between the larger scaled sheets (matchlined areas). For smaller facilities where the architectural floor plan does not require multiple plan drawings, the Composite Furniture Floor Plan shall include room names and numbers, and furniture tags but does not require a building footprint key since the facility is not split between two or more sheets. All furniture plans are to be labeled "FOR REFERENCE ONLY" or "NOT IN CONTRACT (NIC)".

- b. Enlarged Furniture Floor Plans and Enlarged Furniture Typical Details are to include all furniture, desk unit and panel systems workstation/panel tags, furniture legend representing the furniture tag with description, and building key plan in the lower right hand corner of the sheet indicating how the floor plan has been divided between the larger scaled sheets.
 - 1) Systems Furniture Panel Plan(s) are to include dimensions for placement within a room for accurate installation of the panel systems furniture and all walls, doors and window locations.
 - 2) 1/8" scale is acceptable for enlarged furniture floor plans, provided tagging and room numbers and names are legible. If not legible, utilize 1/4" scale enlarged furniture floor plans. Drawing scale must be large enough scale so that the furniture "footprints" are clearly discernible, and data is legible.
 - 3) Furniture tags - Every furniture item, desk unit and panel systems furniture workstation is to be tagged individually with alpha/numeric tags. The desk unit, consisting of the main desk components; i.e. desk, credenza, bridge, overheads, keyboard, etc. will be tagged as one unit D1, D2, D3, etc. All panel systems furniture workstations will be tagged as WS1, WS2, WS3, etc. with the panel systems pods only tagged as a P1, P2, P3, etc.
 - 4) Include enlarged views of each desk-based unit typical and each panel systems furniture workstation typical indicating all components.
 - 5) The enlarged Furniture Panel Systems only plan should be tagged listing all panels with sizes, powered and non-powered, power end feed locations, and duplex/data locations.
 - 6) All furniture plans are to be labeled "FOR REFERENCE ONLY" or "NOT IN CONTRACT (NIC)".
- c. Structural related built in equipment (such as marker boards, projection screen and map rails) or cabinets (items to be provided with the construction contract) shall be shown and identified on the furniture plans as well as on the architectural plans, and on any enlarged plans of those areas where such items are placed in the facility. These items shall be shown and identified by name and/or SID finish or Special Item code.

5.4.2.2 Additional Plans, Enlarged Plans, Elevations and Details. Provide as necessary any plans, enlarged plans, elevations and details indicating location and identification of accent walls, graphics, wall patterns/finishes, floor patterns/finishes, wall and corner protection and special feature items.

5.4.2.3 Electrical/ICT Plans. Provide as necessary electrical/data floor box and wall power feed locations with dimensions to coordinate with the furniture layouts for all areas receiving furniture.

5.4.3 Specifications

Provide a complete set of fully edited specifications.

5.4.4 FF&E and SID Binders

Separate FF&E and SID binders are included at Final Design Submittal to illustrate the designer's intended interior and exterior color schemes, material finishes, colors for the furnishings, and detailed furnishing layouts. The FF&E contains the furnishings procurement and installation information needed to purchase and install the furnishings that are procured under a separate contract and are provided with the construction documents for information only. Furnishings presentation color boards are also included in the FF&E binder. The presentation color boards and Finish/Special Item Key for the structural finishes are included in the SID binder. Maximum binder thickness shall be four inches. Binders shall indicate project information on the cover and on the spine for easy identification (see General Interior Design paragraph). The FF&E and SID binders shall include the following as a minimum.

5.4.4.1 FF&E Binder with Presentation Color Boards. Provide the following in the FF&E binder:

- a. Table of Contents. Provide a Table of Contents for the FF&E binder.
- b. Statement of Design Objective. Provide the narrative included in the Design Analysis explaining the interior design concept of the facility. Edit/expand the previous submittal narrative as needed to convey the design intent as it relates to FF&E and the structural finishes.
- c. Room Contents List. This document shall provide the furnishings specified for each room by furniture tag, description, manufacturer, model number and quantity. List all desk units and panel systems furniture pods by a group furniture tag. Do not list individual components and panel systems furniture parts required to build the units. The report is to be sorted by building, floor, room and tag in alpha/numeric order.
- d. Item Installation List. This document provides the location by room for each item included in the furniture package. List all desk units and panel systems furniture pods by a group furniture tag. Do not list individual components and panel systems furniture parts required to build the units. The report is to be sorted by furniture tag, description, manufacturer, model number, room number and quantity listed in alpha/numeric order by the furniture tag.
- e. Specification List by Tag. This document is to define the furniture requirements for the project. It shall list all pertinent information for each furniture item specified in the furniture package including the tag, description, manufacturer, model number, size, finishes and total quantity per installation phase, floor, and building. The report is to be sorted by manufacturer, phase, floor, building and furniture tag listed in alpha/numeric order by the manufacturer first and furniture tag second.
- f. Manufacturer POC List. This document is to list the furniture manufacturers specified for the project with address, telephone, fax, and e-mail address: Contact's name, address, telephone, fax, and e-mail address.
- g. Furniture Illustration Sheets. Provide furniture illustration sheets for all products specified in the furniture package. Illustrations are to be represented by black and white or color photographs. Information on the

furniture illustration sheets shall include furniture tag, description, model number, finishes, size and manufacturer. A product photo or brochure of the desk units and panel systems workstations may be included or .jpg or .bmp file format photos may be used. It is not necessary to include individual photos of the parts and pieces that make up the desk units and panel systems furniture workstations.

- h. Furniture Procurement Sheets. Provide an individual furniture procurement sheet for each manufacturer specified in the furniture package. Information on these sheets shall include manufacturer's name, address, telephone, fax and e-mail address; Contractor's name, address, telephone, and email address; Contact's name address, telephone, fax and e-mail address. List GSA Contract number and contract expiration date if applicable. List Open Market if product is not on a GSA Contract.
- i. Presentation Color Boards. Provide presentation color boards in an 8 ½" x 11" binder format. The presentation color boards shall depict all materials and finishes for each proposed furniture item. Label the material and finish sample with specific color names with references to the specified furniture tag. The material and color samples provided must be large enough to indicate true patterns, colors and textures. Each sample board is to be inserted into a heavy-duty clear page protector that is sturdy enough to keep the pages from tearing out. **COLORED COPIES OF FINISHES ARE NOT ACCEPTABLE.**
- j. Drawing Set Plans. Provide 11" x 17" plots (to scale) with the FF&E binder of the following:
 - 1) Site Plan – A site plan and vicinity map shall be provided showing the location of the building or buildings in which the subject furniture is to be installed and site conditions/restrictions as provided in the construction contract.
 - 2) Architectural Floor Plans – Architectural floor plans shall be provided showing relationships and dimensions of all areas receiving furniture. Include the locations of any special items i.e., trophy cases, projection screens, marker boards, building directories and map rails as provided in the construction contract.
 - 3) Electrical/Data/Communications Plans – Plans shall be provided showing electrical receptacles, power feeds, switches, thermostats, fire alarm annunciators, telephone, and computer locations for areas receiving furniture. Place all dimensions for floor boxes on the electrical/data/communications plans as provided in the construction contract. This would include all floor junction boxes for panel power feeds and any floor boxes located in classrooms, conference rooms, training center rooms, etc.
 - 4) Composite Furniture Floor Plans – Include composite furniture floor plans as described in paragraph "Drawings" above.
 - 5) Enlarged Furniture Floor Plans – Include enlarged furniture floor plans as described in paragraph "Drawings" above.
 - 6) Enlarged Furniture Typical Details – Include enlarged furniture typical plans described in paragraph "Drawings" above.
 - 7) Furniture Key Code Plan – Provide a key code plan per manufacturer's key code requirements listing all furniture to be keyed alike and random.

5.4.4.2 SID Binder with Presentation Color Boards. Provide the following in the SID binder:

- a. Table of Contents. Provide a Table of Contents for the SID binder
- b. Statement of Design Objectives. Provide the narrative included in the Design Analysis explaining the interior design concept of the facility. Edit/expand the previous narrative submittal as needed to convey the design intent as it relates to the structural finishes.
- c. SID Presentation Color Boards. Provide in the SID binder presentation color boards. Code and coordinate samples with the exterior finish, interior finish and special items schedules in the project contract documents. Provide a Finish/Special Item Key or legend that includes what each sample is used for, the manufacturer, style name and/or number, pattern name and/or number, color name and/or number, finish schedule tag reference, and any remarks or notes needed to describe what the boards are illustrating. Samples shall be large enough to show full patterns, colors, and textures. Securely mount samples to the presentation boards to withstand long periods of use. PHOTOGRAPHS OR COLOR XEROX COPIES OF FINISHES, MATERIALS AND COLORS ARE NOT ACCEPTABLE. Finish materials shall be mounted on presentation boards in an 8 1/2" x 11" binder format and inserted into a clear, heavy-duty page protector that is sturdy enough to keep the pages from tearing out of the binder.

5.4.5 Certified Final Submittal

5.4.5.1 Provide Certified Final DA, Drawings, and Specifications, based on the requirements above. In addition, the Interior Designer of Record shall create and submit final FF&E and SID binder(s) to satisfy all review comments from previous submittals. These binders shall be submitted concurrently with the Certified Final Submittal. Delay in submitting the FF&E and SID Certified Final would be on a case by case basis, only if approved by the PE/A.

Chapter 6.0 – STRUCTURAL

6.1 GENERAL

6.1.1 Scope

This chapter provides guidance for the preparation and development for each of the different required submittal stages, as they relate to structural engineering.

6.1.2 Submittal Requirements

Refer to Chapter 1 "All Disciplines" above for the general requirements and requirements at each design stage. Additional requirements specific to this discipline are listed in this chapter.

6.1.3 BIM Submittal Requirements

Refer to Chapter 1 for CAD/BIM requirements.

6.2 PHASE II–CHARRETTE DESIGN

6.2.1 Design Analysis

- 6.2.1.1 General. Provide a general description of the scope of the project and all the major structures. Give overall building dimensions and a description of the principal features such as wall and roof construction. If the building is irregularly shaped, explain where seismic joints will be placed to create regular shapes or provide a statement that dynamic analysis of the building will be performed.
 - a. Note: Seismic joints are preferred in areas of high seismic activity for all structures of an irregular shape. For buildings in area of low seismic activity, building joints are recommended only as needed for expansion and contraction purposes.
- 6.2.1.2 Criteria. Include a listing of the required technical manuals, UFCs, building codes, standards, and specifications in the Design Analysis.
- 6.2.1.3 Loading. Describe all loading to be used in the structural calculations. Include dead loads, live loads, wind, snow, seismic, ATFP, risk category, Seismic Design Category, and any other special loading conditions.
- 6.2.1.4 Framing System
 - a. Provide a brief structural narrative on the gravity load resisting framing system chosen and the reasons why.
 - b. Provide a brief narrative on the lateral load resisting system and how these loads will be transmitted to the foundations.

- 6.2.1.5 Foundation. Give a brief description of the anticipated foundation type/system based on the geotechnical report. Reference the geotechnical report to state the allowable soil bearing capacity, modulus of subgrade reaction, minimum footing sizes, and minimum frost depth requirements. If a geotechnical report is not available at this stage, the designer may also refer to similar construction in the area if it is known.
- 6.2.1.6 Special. List any special/unique design features.
- 6.2.1.7 Information Needed to Complete the Design. List any unknowns that the designer needs to complete the design. For instance, the designer may request from the User a list of the military vehicles and their weights for the purpose of designing slabs.
- 6.2.1.8 Calculations. No structural calculations are required in this phase.

6.2.2 Drawings

No structural drawing requirements at this phase. However, the structural engineer must have strong input in the creation of the column grid/layout and roof plan, which is carried out by the architectural discipline. The reason for this input is so the structural engineer ensures that the column grid lines and/or bearing wall locations are such that an adequate framing plan can be achieved.

6.3 PHASE II-INTERIM DESIGN

The structural portion of the Interim Design Submittal must outline for approval the proposed methods and materials of design and construction. Include the following:

6.3.1 Design Analysis

The Interim Design Analysis is a refinement of the prior Design Analysis and contains all the information called for in those sections of this chapter. Include required and missing information that was not included in prior submittal phases. Incorporate any changes required by comments on the Charrette Design Submittal.

- 6.3.1.1 Calculations. The following specific items shall be included:
 - a. Load Assumptions. State all loading used in the design. Include dead loads, live loads, wind, snow, seismic, ATFP, risk category, Seismic Design Category, and any other special loading conditions.
 - b. Serviceability Considerations. State member deflection limits, story drift limits, vibration criteria, and Environmental Severity Classification, etc.
 - c. Calculate both main wind force resisting system pressures as well as component and cladding wind pressures. Tabulate/summarize results accordingly.
 - d. Calculate the basic seismic loading for the frame or lateral load resisting system and contrast them with the comparable wind loads. Note the controlling design loads. Detailed calculations for seismic loads on parts and portions are not required at this submittal level.
 - e. Material Properties. State the strength values, properties, and designations (ASTM, etc.) for the structural materials.
 - f. Calculations for primary structural members (roof, floor, columns, walls, braces, foundations, etc.) shall be completed at this submittal.

6.3.2 Drawings

Furnish sufficient plans for foundations, and framing plans for roof and floors, as applicable, to indicate layout of principal members. Provide a Structural Notes sheet(s) which shall list all structural criteria, loading, and structural material properties/notes in accordance with design criteria/codes. Typical sections shall be furnished through roof, floor, and foundation indicating materials and type of construction proposed. Furnish a plan identifying the location of all seismic joints.

6.3.3 Specifications

Provide a listing of specifications in the Design Analysis. This is to be the Table of Contents intended for the Final specifications.

6.4 PHASE II–FINAL DESIGN

6.4.1 Design Analysis

The Final Design Analysis is a refinement of the prior Design Analysis and contains all the information called for in those sections of this chapter. Furnish complete checked calculations for all structural members and connections. Incorporate any changes required by comments on Interim Design Submittal.

6.4.2 Drawings

Complete previously submitted Interim drawings, and additional drawings for a complete design package. Furnish complete Final plans and details of all structural elements. Before this submittal, coordinate structural drawings with all other design disciplines. Always include the items listed below on the Final drawings if applicable:

- 6.4.2.1 Structural Notes sheet(s) which shall list all structural criteria, loading, etc. in accordance with “Construction Documents” requirements of design criteria/codes. List the material requirements for masonry, concrete, steel, etc.
- 6.4.2.2 Wind uplift and snow load diagrams.
- 6.4.2.3 Roof framing plan and details including details of any opening in the roof.
- 6.4.2.4 Intermediate floor framing plans and stair details on multiple story structures.
- 6.4.2.5 Loads, spans and support reactions of features which are part of a delegated design which is to be construction contractor designed (e.g., connector plates on wood trusses that are construction contractor designed based on member stress information shown by the Engineer on the structural drawings).
- 6.4.2.6 Column schedule, beam schedules, and connection schedules.
- 6.4.2.7 Foundation plan including any notes relative to special foundation treatment required and cross-references to proper specification sections.
- 6.4.2.8 Foundation section and details.
- 6.4.2.9 Layout of expansion, construction, and contraction joints in floor slabs; horizontal and vertical joints in foundation walls; joints in footing; and layout of control joints in masonry walls.
- 6.4.2.10 Typical and special sections as required.
- 6.4.2.11 Details of expansion, construction, and contraction joints in concrete.

6.4.2.12 Layout and detail of exterior entrance pads and steps.

6.4.2.13 Lintel plan(s) and schedules.

6.4.2.14 Masonry wall elevations as required.

6.4.2.15 Braced frame elevations as required.

6.4.2.16 Lateral Force Resisting System details.

6.4.2.17 Details of any special items.

6.4.2.18 General and special notes as required.

6.4.3 Specifications

Provide a complete set of fully edited specifications.

Chapter 7.0 – FIRE PROTECTION

7.1 GENERAL

7.1.1 Scope

This chapter provides guidance for the preparation and development for each of the different required submittal stages, as they relate to fire protection engineering.

7.1.2 Submittal Requirements

Refer to Chapter 1 "All Disciplines" above for the general requirements and requirements at each design stage. Additional requirements specific to this discipline are listed in this chapter.

7.1.3 BIM Submittal Requirements

Refer to Chapter 1 for CAD/BIM requirements.

7.2 PHASE II–CHARRETTE DESIGN

7.2.1 Design Narrative

7.2.1.1 Fire Protection

- a. Discuss fire suppression design requirements, including any specifics regarding unit storage.
- b. Discuss with the Fire Department (municipality or Installation) and review the design standard if available for any special requirement, such as the fire department connection type required.
- c. Gather and confirm details on the types of commodities that will be used in storage areas on the project.
- d. Obtain fire flow data relevant to the site at the earliest practicable time. (Note that UFC 3-600-01 requires the designer to perform or witness a flow test on hydrants near the site, not just receive fire flow data from others.)
- e. Per UFC, and any other applicable criteria, the QFPE shall review all aspects of fire protection and life safety design requirements of the project.

7.2.1.2 Fire Alarm

- a. Discuss smoke/fire detection and annunciation design requirements, including specific types of required devices.
- b. Discuss Fire Department special requirements such as remote reporting connection type required and any compatibility issues.
- c. If a remote reporting radio system is required, determine the make, model, operating frequency, and signal coding of existing equipment, and include sufficient information in the narrative to insure compatibility of the completed system. If proprietary equipment is required, provide a description of the proper procedures to authorize the specification of this equipment.

7.2.1.3 Mass Notification

- a. Discuss mass notification design requirements, including specific types of required devices. Verify that the mass notification system is to be combined with the fire alarm system.
- b. Discuss Fire Department special requirements such as connection to base wide mass notification systems, including type required and any compatibility issues.
- c. If a remote reporting radio system is required, determine the make, model, operating frequency, and signal coding of existing equipment, and include sufficient information in the narrative to insure compatibility of the completed system. If proprietary equipment is required, provide a description of the proper procedures to authorize the specification of this equipment, and notify the USACE PE/A.

7.3 PHASE II—INTERIM DESIGN

7.3.1 Design Analysis

The Charrette phase Design Narrative forms the basis of the Interim and Final Design Analysis. Depending on submittal requirements, include the following in narrative form.

7.3.1.1 Fire Protection System.

- a. List of Applicable Criteria - NFPA, UFC 3-600-01, handbooks, manuals, codes, standards, and other applicable governing criteria.
- b. Listing of the hazard classifications for each space and discussion of protection requirements for specific hazards, including unit storage design assumptions.
- c. For storage areas, discuss commodity type, maximum storage height, ceiling height, and storage arrangement.
- d. Discussion of fire protection features for each building to reflect the types of systems considered with a description of the systems selected.
- e. Provide a detailed description of the fire suppression system and its controls such as activation of the system, interlocks with the HVAC system, and connection to detection and alarm systems. Describe the fire detection and alarm system features that are used to actuate the suppression systems.
- f. If water sprinkler systems are required, provide preliminary hydraulic calculations for the most hydraulically demanding area to ensure the flow and pressure requirements are met with current water supply. Provide results of flow test data with preliminary hydraulic calculations. Make recommendations about the plumbing requirements, the sprinkler system requirements, and backflow.
- g. Identify the requirements for fire pumps and storage tanks based on preliminary calculations. Determine electric power reliability per UFC 3-600-01 to determine if an electric motor driven or diesel engine driven fire pump will be used.
- h. Provide calculations for other fire protection systems or features, such as standpipes, deluge systems, or in-rack sprinkler systems. Include the source for calculation methodology.
- i. List any special requirements requested by the local Fire Department.
- j. Describe major items that deviate from the USAR Design Guide.

7.3.1.2 Fire Alarm

- a. List of Applicable Criteria - NFPA, UFC, handbooks, manuals, codes, standards, and other applicable governing criteria.
- b. Discussion of smoke/fire detection and annunciation features for each building to reflect the types of systems considered with a description of the systems selected and their interconnections.
- c. Provide a detailed description of the fire alarm system and its controls such as activation of the system, interlocks with the HVAC system, and connection to other systems.
- d. Describe the basis of design for the equipment chosen.
- e. List any special requirements requested by the Installation or local Fire Department.

7.3.1.3 Mass Notification

- a. List of Applicable Criteria - NFPA, UFC, handbooks, manuals, codes, standards, and other applicable governing criteria.
- b. Discussion of mass notification features for each building to reflect the types of systems considered with a description of the systems selected and their interconnections.
- c. Provide a detailed description of the mass notification system and its controls such as activation of the system, interlocks with the HVAC system, and connection to other systems.
- d. Describe the basis of design for the equipment chosen.
- e. List any special requirements requested by the Installation or local Fire Department.

7.3.2 Drawings

Provide plan views showing the features listed.

7.3.2.1 Fire Protection System. Prepare a plan for each floor of each building. Provide the following types of information:

- a. Indicate all building areas, their sprinkler hazard classification, and extent of fire protection.
- b. Provide the location of any major fire protection equipment or features such as; fire service line location, sprinkler risers, backflow preventers, standpipes, inspector test and drain, fire department connections, pump, etc.
- c. Include Fire Protection equipment schedules.
- d. Provide the location and hazard classification of any special fire suppression systems such as; Unit Storage protection in-rack sprinkler systems, deluge systems, and hose racks.
- e. Include sprinkler density (gpm/sf), area of operation, demand area, area of coverage/head (sf/head), sprinkler spacing, sprinkler design k-factor, k-factor height limitation, and flow test results.

- 7.3.2.2 Fire Alarm System. Prepare a plan for each floor of the building. Provide the following types of information:
- a. Indicate all building areas, their classification, and extent of fire/smoke detection and annunciation.
 - b. Provide the location of fire/smoke detection equipment such as control panels, annunciator panels, sprinkler system supervisory locations, smoke detectors, elevator systems, kitchen hood suppression systems, etc.
 - c. Provide fire alarm and mass notification system riser diagram and sequence of operation matrix. Include in the riser diagram control panels, annunciator panels, sprinkler system supervisory locations, smoke detectors, elevator systems, kitchen hood suppression systems, etc.
- 7.3.2.3 Mass Notification System. Prepare a plan for each floor of each building. Provide the following types of information:
- a. Indicate all building areas and extent of mass notification annunciation, including Military Equipment Parking area(s) if applicable.
 - b. Provide the location of mass notification equipment and such as control panels, Local Operator Consoles (LOC), annunciator panels, and connections to HVAC systems.
 - c. Provide mass notification system riser diagram and sequence of operation matrix. Include in the riser diagram control panels, LOC, annunciator panels, and connections to HVAC systems.

7.3.3 Specifications

Provide a listing of fire protection specifications in the Design Analysis. This is to be the Table of Contents intended for the Final specifications. Where a departure or addition to a UFGS guide specification is required, include in the listing a brief description of the equipment or procedure constituting the change.

7.4 PHASE II–FINAL DESIGN

7.4.1 Design Analysis

The Final Design Analysis is a refinement of the prior Design Analysis and contains all the information called for in those sections of this chapter. Include required and missing information that was not included in prior submittal phases. Address all previous review comments and incorporate into submittal as required.

7.4.1.1 Fire Protection System.

- a. For fire sprinkler system information, include hazard classification, zoning (if appropriate), and sizes of all riser pipes including wet and dry pipes, sprinkler valves, mains, and principle branches based on available water pressures by either computer-generated hydraulic analysis, or manual calculations.
- b. Provide the results of the analysis for a fire pump. Determine electric power reliability per UFC 3-600-01 to determine if an electric motor driven or diesel engine driven fire pump will be used. When a fire pump is required, provide vendor information on the pump.

- c. Provide computations for other applicable systems such as standpipe, deluge, or in-rack sprinkler systems.
- d. Thoroughly detail any smoke evacuation, clean agent, or special hazard extinguisher systems when such systems are required.
- e. Provide a certification letter from the project Fire Protection Engineer in accordance with UFC 3-600-01.

7.4.1.2 Fire Alarm

- a. Discussion of smoke/fire detection and annunciation zoning and interconnections.
- b. Provide an analysis of the fire alarm system overall loading and battery capacity requirements reflecting the basis of design.

7.4.1.3 Mass Notification

- a. Discussion of mass notification system zoning and interconnections.
- b. Provide an analysis of the mass notification system overall loading and battery capacity requirements reflecting the basis of design.

7.4.2 Drawings

7.4.2.1 General. Final drawings are complete when all necessary details, layout drawings, section views, plan views, and schedules are finished and include the incorporation of all review comments and resolutions. Complete previously submitted Interim drawings, and additional drawings for a complete design package.

7.4.2.2 Fire Protection Drawings. Label fire protection drawings as "PRELIMINARY," and provide a water flow test and results, sprinkler design densities, demand areas, specific areas protected, hazard classification of all areas, sprinkler head coverage, zoning requirements, pump sizing and locations, building entrances, exact control system locations (must include all locations if shown), and device locations. The fire protection engineer shall place their registered professional engineering stamp on all drawings prior to the Certified Final Submittal to the Government.

7.4.2.3 Fire Alarm System.

- a. Provide the location of all fire/smoke detection equipment, devices, and notification appliances.
- b. Include all equipment, devices, and notification appliances in the riser diagram.

7.4.2.4 Mass Notification System.

- a. Provide the location of all mass notification equipment, devices, and notification appliances.
- b. Include all equipment, devices, and notification appliances in the riser diagram.

7.4.3 Specifications

Provide a complete set of fully edited specifications.

Chapter 8.0 – MECHANICAL – HVAC AND PLUMBING

8.1 GENERAL

8.1.1 Scope

This chapter provides guidance for the preparation and development for each of the different required submittal stages, as they relate to mechanical and plumbing engineering.

8.1.2 Submittal Requirements

Refer to Chapter 1 "All Disciplines" above for the general requirements and requirements at each design stage. Additional requirements specific to this discipline are listed in this chapter.

8.1.3 BIM Submittal Requirements

Refer to Chapter 1 for CAD/BIM requirements.

8.2 PHASE II–CHARRETTE DESIGN

8.2.1 Design Narrative

8.2.1.1 Heating, Ventilating and Air-Conditioning (HVAC).

- a. Discuss with the Users and Project Engineer/ Architect the HVAC alternatives and requirements. Include the alternatives in the narrative noting User preferences on systems. These items should be documented in the kickoff meeting notes as described in Chapter 1 and form the basis of the charrette approach.
- b. Discuss Installation/Readiness Division requirements to communicate with a base-wide EMCS. Determine if there is a preference in DDC protocol, LONWORKS or BACNET on the Installation/Readiness Division.

8.2.1.2 Site Utilities. Refer to Chapter "Civil".

8.2.1.3 Plumbing.

- a. Include a discussion of special plumbing needs and requirements.

8.2.2 Special Considerations

These items are found in the Appendix 1 of the DD Form 1391.

8.3 PHASE II–INTERIM DESIGN

8.3.1 Design Analysis

The Charrette phase Design Narrative forms the basis of the Interim and Final Design Analysis. Depending on submittal requirements, include the following in narrative form:

8.3.1.1 Heating, Ventilating and Air-Conditioning (HVAC).

- a. List of Criteria. Codes and manuals used to create the design - design technical instructions or manuals, pamphlets, technical references, and other design guidance or criteria used in the design and their updates.
- b. Design conditions used in calculations – inside and outside temperatures/humidity, psychometric analyses, personnel load, equipment heat release (if any), energy sources, exhaust or ventilation requirements, U-factors, and other special conditions.
- c. Include discussion and calculations for Special Considerations, when required, in the Design Analysis.
- d. Detailed system heating and cooling load calculations. Use professionally recognized, nationally used computerized load calculating programs. The Design Analysis shall contain layout sketches that show how the building systems are zoned for the computer input. Include input and output reports only for the designed systems for the calculation. Input and output shall be organized such that each space, zone, system, item of equipment, building component, etc. is correlated with identifiers on design plans and easily identifiable. Examples: Conference Room #244 is identified as ConfRm #244 on input/output documents; AHU-2-4 on equipment schedule is identified as AHU-2-4 on input/output documents; Zone 3-4 on the input/output files is associated with VAV-3-4 on the schedules.
- e. Energy Compliance Analyses (ECA): As part of the ECA documentation (refer to Chapter 1), include a narrative describing systems and equipment compared, reasons for choices selected for analysis, and calculations. Include energy model input and outputs, calculation of associated water use (if applicable), LCCA input/output, installation costs, and calculations of maintenance costs. Identify source of cost data. Provide PDF bookmarks for each separate input and output report with easy to understand labels to allow quick navigation of the reports.
- f. Provide narrative descriptions of the systems considered, justification for selection, intended equipment, description of air distribution, zoning, HVAC controls description, and description for any connections to existing systems.
- g. Describe the various equipment items including operating temperatures and capacities.
- h. Include a brief description of miscellaneous systems such as vehicle exhaust, general exhaust, and makeup air strategies.
- i. Provide capacity calculations for all major items of mechanical equipment such as air handling units and coils, variable air volume boxes and reheat, condensing units, water chillers, boilers, humidifiers, cooling towers, fans, and tanks. Show manufacturer's make and model number of equipment used for layout purposes, and show weights of major items of equipment. Provide determination of ventilation and exhaust quantities including a room-by-room inventory that includes the design number of occupants, room area, ventilation required per person and per floor area, ventilation effectiveness, and adjustments for intermittent or variable occupancy, multiple spaces, etc. Show determination of water quantities and temperature rise or drop for hot water, chilled water, and condenser

- water. Provide vendor information for equipment selected and mark specific items on the vendor's literature indicating the intended features.
- j. Provide calculations showing estimated pipe and duct sizes, flow quantities, pressure drops, initial/final pressures, etc.
 - k. When specifically required, provide Energy Monitoring and Control System (EMCS) or Utility Monitoring and Control Systems (UMCS) requirements narrative identifying existing EMCS/UMCS conditions, and requirements for providing new or future interface EMCS/UMCS on this project.
 - l. Provide HVAC controls data. Include sequences of control narratives sufficient to describe generally how systems will operate. Detailed sequences are not required for Interim Design. Example: Controls such as economizer, setpoint reset, occupancy modes, unoccupied bypass, etc. shall be listed, but detailed written sequence is not necessary for Interim Design.
 - m. Describe major items that deviate from the USAR Design Guide.

8.3.1.2 Plumbing.

- a. List of Criteria. Codes, UFCs, handbooks, standards and manuals applicable to be project.
- b. Plumbing unit calculations as necessary to determine number of fixture units, cold and hot water capacity requirements, sanitary and vent capacity requirements, and equipment or capacities of miscellaneous and special systems. Indicate male and female building populations. Describe backflow preventer requirements.
- c. ECA: As part of the ECA documentation (refer to Chapter 1), include a narrative describing systems and equipment compared, reasons for choices selected for analysis, and calculations. Include energy model input and outputs, calculation of associated water use (if applicable), LCCA input/output, installation costs, and calculations of maintenance costs. Identify source of cost data.
- d. Description of domestic water heating and storage equipment, including capacity, type (gas, electric, boiler, water), materials, and insulation. Provide narrative describing the systems considered, justification for selection, and control description. Provide capacity calculations for water heaters, storage, and expansion tanks and show manufacturer's make and model number used for layout purposes. Provide natural gas/propane and compressed air calculations for service line and branch pipe sizing. Include sizing calculations for any other equipment such as; booster pumps, sump pumps, air compressor. Include POL system sizing calculations when applicable.
- e. Piping types, materials, locations (concealed or exposed), and insulation requirements. Show estimated pipe sizes and include calculations showing flow quantities, pressure drops, etc.
- f. Include a brief description of miscellaneous systems such as compressed air (capacity, pressure, piping, location of air outlets, etc.), roof drainage, natural gas (pressure, quantity, and equipment served), and other special systems.
- g. Include a brief description of radon system requirements and planned mitigation systems, if required.
- h. Describe major items that deviate from the USAR Design Guide.

- i. Provide a list of items for which additional criteria, clarification, or guidance is required.
- j. List of information required to complete the design.

8.3.2 Drawings

Provide plan views showing the features listed.

8.3.2.1 Heating, Ventilating, and Air Conditioning (HVAC).

- a. Include HVAC equipment layouts. Include locations of major pieces of mechanical equipment. Show unique equipment identifiers for each item of equipment.
- b. Include the air distribution duct layouts for supply, return, ventilation and exhaust ducts (single line duct layouts are permissible in this submittal), hoods, and other items of major equipment required for the facility. Include duct sizes on main duct runs.
- c. Include chilled water, heating hot water, or other HVAC piping layout and sizes. HVAC piping plans shall be separate from ductwork plans.
- d. Provide mechanical equipment schedules filled out with what is known; schedules are not required to be completed.

8.3.2.2 Plumbing.

- a. Include plumbing fixture layout, floor and area drains, and plumbing equipment layouts (hot water generator, storage tanks, air compressors, etc.).
- b. Include water, drainage and vent, gas, fuel, compressed air, and other system layouts and pipe sizes.
- c. Include plumbing fixture schedule listing individual fixtures and pipe size connections (cold water, hot water, waste, and vent).
- d. Provide plumbing equipment schedules filled out with what is known; schedules are not required to be complete for this phase.

8.3.2.3 Enlarged Mechanical Room Plan completed to a level that identifies all HVAC, plumbing, and fire protection equipment; piping and duct layouts; and access for maintenance. Indicate space for maintenance of equipment on plans.

8.3.2.4 Outside Utilities. Refer to Civil chapter.

8.3.3 Specifications

Provide a listing of mechanical, plumbing, and fire protection specifications in the Design Analysis. This is to be the Table of Contents intended for the Final specifications. Where a departure or addition to a UFGS guide specification is required, include in the listing a brief description of the equipment or procedure constituting the change.

8.4 PHASE II–FINAL DESIGN

8.4.1 Design Analysis

The Final Design Analysis is a refinement of the prior Design Analysis and contains all the information called for in those sections of this chapter. Include required and missing information that was not included in prior submittal phases. Address all previous review comments and incorporate into submittal as required.

8.4.1.1 HVAC Equipment.

- a. Provide equipment sizing calculations with summaries of all major items of mechanical equipment such as: air handling units and coils, condensing units, water chillers, boilers, pumps, humidifiers, cooling towers, fans, water heaters and tanks. For all computer-generated calculations (cooling loads, heating loads, pipe sizing, duct sizing, etc.), the Design Analysis shall contain layout sketches that show how the building or system was segmented for computer input. Show manufacturers' make and model number of equipment used for design purposes, and show weights of major items of equipment. Provide vendor information for equipment selected and mark the specific items on the vendor's literature.
- b. Cut sheets, product selections forming the basis of design: Clearly mark the selected product type or model intended to apply to the project. If the cut sheets or brochures are standard printouts from manufacturer showing several variations, either mark/mark out to indicate just the selected product or accompany the cut sheet with a cover sheet or narrative showing the applicable product.

8.4.1.2 Piping.

- a. Include all pipe-sizing computations.
- b. Show design flow, pipe size, friction factors, slopes, lengths, and elevations (where applicable), quantity conducted, and velocity in the various mains and branches.
- c. Include flow diagrams, or on the drawings.
- d. Include pump capacity and head calculations and valve coefficient, C_v calculations. Include expansion loop sizes for heat distribution and low temperature heating water systems.
- e. Provide a plumbing piping analysis showing the main and branch loads in terms of fixture units as well as flow quantities.

8.4.1.3 Ducting.

- a. Show all duct sizing calculations. Show friction loss and clearly indicate the air velocities encountered in the main ducts.
- b. Provide flow rates and static pressure on fans and air handling units based upon complete takeoff of static losses. Include filter losses.
- c. Provide air balance calculations addressing the relationship between supply, return, outside air, and exhaust air quantities and indicating pressurization. Show supply, return, relief, exhaust, ventilation, and transfer air flows through the system. Include flow arrows and label equipment and rooms.
- d. Special requirements for space pressurization shall be reflected and referenced in the air balance calculations.
- e. Include flow diagrams.

8.4.2 Drawings

- 8.4.2.1 General. Final drawings are complete when all necessary details, layout drawings, section views, plan views, and schedules are finished and include the incorporation of all review comments and resolutions. Complete previously submitted Interim drawings, and additional drawings for a complete design package.
- 8.4.2.2 Sections and Elevations. Show sufficient sections and elevations to indicate clearly the exact location of the particular item in relation to other building or equipment items. Sections shall indicate critical interference between mechanical items and building features. Provide at a minimum one section at each mechanical room, showing walls, structure, ductwork, equipment, and piping. Provide additional sections at critical duct/piping crossovers.
- 8.4.2.3 Risers and Isometric View(s). Show isometric riser diagrams for domestic water, drainage and vent, gas, compressed air and other piping systems. Show all piping sizes, valves, water hammer arrestors, etc. When using BIM, provide an isometric view of the mechanical equipment rooms. Label all equipment in the isometric; sizes and other notes not required for isometric. Indicate that isometric is "For Information Only".
- 8.4.2.4 Details. Provide sufficient elevations and details to allow construction and installation of the work.
- 8.4.2.5 Accessories. Where equipment connection details are shown, indicate all required valves, gages, and fittings required and minimum sizes. Coordinate with specification requirements and make sure valves, fittings, etc., that are specified are included in the detail furnished with each piece of equipment.
- 8.4.2.6 Mechanical Room Plans. Include an enlarged plan of the mechanical room(s) indicating all equipment with the manufacturer's recommended maintenance clearances between each item. Indicate adequate spacing for HVAC controls, electrical panels and other similar items. Indicate space required for placement of all such items as coils, filters, heat exchanger tubing, motors and belts on the plan. Show routing of hydronic piping, location of sprinkler riser, and location of plumbing items such as water heaters and air-compressors.
- 8.4.2.7 Plans.
 - a. Final plans must show all pipe and duct sizes. Draw ductwork to scale on plans and indicate pressure class. Indicate those duct systems to be leak tested and specify the test pressure for each.
 - b. Show all balancing dampers.
 - c. Show condensate drain lines, required depth of water traps, and slope.
 - d. Show location of sensors such as differential pressure, thermostats, humidistats, CO2 sensors, etc.
 - e. Show locations for HVAC emergency shutdown switch(es) and boiler emergency shutdown switch(es).
 - f. Show locations of control panels, variable frequency drives, etc.
 - g. Where critical, indicate on the drawings the air suction and discharge directions of such items as fans, air cooled condensers and cooling towers.

- h. Provide sequences of operation for plumbing equipment such as water heaters, recirculating systems, solar hot water heating systems, pressure booster systems, etc. Coordinate with HVAC controls.
 - i. Provide details of catwalks, ladders, platforms, access panels, and doors necessary for operation and maintenance of equipment, valves, and accessories. Show all locations of turning vanes, and all volume, fire and smoke dampers.
- 8.4.2.8 Performance Characteristics. Place performance characteristics for all items of mechanical equipment in the equipment schedules. Do not make selections that would restrict to any one manufacturer the typical equipment characteristics selected. The equipment specified must be able to be submitted on by at least 3 manufacturers as a minimum for ordinary equipment.
- 8.4.2.9 Schedules. Verify that all schedules reflect the necessary equipment information so that the contractor can select all of the equipment without referring to a specific model/manufacturer's product. The loads indicated on the schedules are the minimum demand requirements from the design calculations for the building features, instead of the sizing items from the vendor catalog information.
- 8.4.2.10 HVAC Controls. Include complete HVAC control plans. Provide DDC controls drawings as required by the design, control logic ladder diagrams are optional. Include control drawings for each system type. When required, provide details of EMCS and final EMCS input/output summaries. Sequence of control shall be placed on the drawings. Provide sequence of control for all HVAC equipment items. (Note, typical sequence of control is found on the USACE standard control drawing templates.)

8.4.3 Specifications

Provide a complete set of fully edited specifications.

Chapter 9.0 –ELECTRICAL

9.1 GENERAL

9.1.1 Scope

This chapter provides guidance for the preparation and development for each of the different required submittal stages, as they relate to electrical engineering.

9.1.2 Submittal Requirements

Refer to Chapter 1 "All Disciplines" above for the general requirements and requirements at each design stage. Additional requirements specific to this discipline are listed in this chapter.

9.1.3 BIM Submittal Requirements

Refer to Chapter 1 for CAD/BIM requirements.

9.2 PHASE II–CHARRETTE DESIGN

9.2.1 Design Narrative

Design Narrative shall include the following items:

- 9.2.1.1 Site Utilities. Describe the available electric power and general description of the existing system (voltage, wire size, wire and pole conditions, etc.). If the primary source is inadequate, state measures proposed to correct the deficiency in the design.
- 9.2.1.2 Electric Service.
 - a. On a Military Installation. Document the Department of Public Works (DPW), Base Civil Engineer (BCE), or other appropriate authority's requirements for electric service and metering. Document coordination made with the authority.
 - b. Not on a Military Installation. Document the local electric service provider's requirements for electric service and metering. Document coordination made with the service provider.
- 9.2.1.3 Secondary Power. List voltages used for power distribution. State basis for selection of secondary distribution voltage. Include an estimated building load based on the criteria in the USAR Design Guide.
- 9.2.1.4 Metering. Describe metering requirements.
- 9.2.1.5 Lighting. Provide a basis of design description of the proposed interior and exterior lighting systems for the project.
- 9.2.1.6 Permits. Provide contact information for any permits that may be required.
- 9.2.1.7 Installation Design Guides. Document Installation Design Guide or municipality standards compliance where applicable for exterior lighting.

- 9.2.1.8 Special Power Conditions. List requirements for UPS, generators, power filtering, or any other special requirements.
- 9.2.1.9 Hazardous Locations. List hazardous locations.
- 9.2.1.10 Lightning Protection. Provide a Lightning Risk Protection Assessment in accordance with NFPA 780.
- 9.2.1.11 Corrosion Protection. List requirements for Cathodic Protection if it is required as a substitute or addition to other means of corrosion protection. If other means are provided and are adequate, state as such.
- 9.2.1.12 Energy Conservation Design Narrative. Describe energy conservation measures considered for the project.

9.2.2 Drawings

Provide electrical site plan for existing conditions, demolition, and new utilities. Review the floor plan and ensure that adequate space exists for electrical equipment including panels, motor control centers, fire alarms, and other equipment.

9.3 PHASE II—INTERIM DESIGN

9.3.1 Design Analysis

The Charrette phase Design Narrative forms the basis of the Interim and Final Design Analysis. Depending on submittal requirements, include the following:

- 9.3.1.1 List of Criteria. Codes, design technical instructions or manuals, pamphlets, technical references, and other design guidance or criteria used in the design.
- 9.3.1.2 Field Trip Report. Furnish a report on any site visits held for the project. The report will contain minutes of any meetings held with facility and/or utility personnel along with names, phone numbers and a summary of agreed to actions. Unforeseen site/building conditions will also be documented in the report.
- 9.3.1.3 Energy Compliance Analysis narrative. As part of the ECA section (refer to Chapter 1), describe energy conservation measures and techniques proposed in the electrical design which will conserve energy. Provide analysis of ASHRAE 90.1 considerations and FEMP/Energy Star mandated energy efficiency considerations. The electrical engineer shall participate in the energy budget preparation and shall provide necessary information to the architect and mechanical engineer for inclusion in the ECA.
- 9.3.1.4 Electrical System Characteristics. Indicate electrical system characteristics (including voltage, phase, number of wires). Provide a statement describing standards of design such as voltage selection and voltage drop. State short circuit current available at project site if it can be obtained from the utility. If not available, state as such.
- 9.3.1.5 Load Calculations. Provide preliminary load calculations based on building area and expected loads.
- 9.3.1.6 High Voltage Work. Describe physical characteristics of aerial or underground circuits and the basis for the selection of aerial or underground distribution.
- 9.3.1.7 Electric Service. Describe service entrance equipment selected.

- 9.3.1.8 Power Distribution Equipment. Describe characteristics of panelboards, protective devices, switchgear, motor control center, transformers, and other major equipment to be provided.
- 9.3.1.9 Grounding. Describe grounding system. If a counterpoise, grid, or other system is to be used, state the standards to be used in the design.
- 9.3.1.10 Metering. Describe specific electrical metering equipment to be provided.
- 9.3.1.11 Hazard Classes. Define any hazardous area by class, division and group and indicate type of equipment proposed for use in the area.
- 9.3.1.12 Lighting. Provide a description of the proposed interior and exterior lighting system(s). Include a concept lighting fixture schedule showing room name, room number, room type, lighting intensity, type of fixture, mounting method (wall or ceiling), mounting height, fixture efficacy, minimum lumen output at end of life, sequence of operation/control information, and any special conditions.
- 9.3.1.13 Emergency Lighting. Provide description of emergency lighting system, including emergency mode output information for each emergency fixture.
- 9.3.1.14 Wiring. State type of wiring system, including type of conduit (rigid conduit or intermediate conduit, electrical metallic tubing, nonmetallic sheathed cable, etc.), conductors and cables, etc., and where they will be used.
- 9.3.1.15 Special Provisions. Provide paragraph describing proposed addition and alterations of special items of design, such as, specialized equipment, special receptacles, and seismic requirements, etc. Include description and location of special power outlets and circuits (volts, phase, and amps). Reference pertinent NEMA or other recognized standards to identify the type receptacles selected. Include documentation of the source of the criteria.
- 9.3.1.16 Lightning Protection. Describe lightning protection system; if none, state as such.
- 9.3.1.17 Security Systems. Describe the arrangement and functionality of IDS and PACS systems.
- 9.3.1.18 Manufacturer Data Sheets. Provide preliminary cut sheets for all system equipment with enough detail to determine expected lifespan, system component and power configurations, input and output characteristics, efficacy, etc., as applicable to establish the fixtures meet minimum UFGS requirements.

9.3.2 Drawings

- 9.3.2.1 Site Plan. Provide a site plan indicating existing and proposed electrical utility lines and equipment required to serve the project including electrical power lines, roads and driveways, parking areas, and other items necessary for functional and operating adequacy. Indicate the extent of any demolition to be done. If extensive, provide separate drawings with independent legend for new work.
- 9.3.2.2 Exterior Lighting. Indicate location, height, and type of proposed exterior lighting.

- 9.3.2.3 Interior Power. Provide floor plan drawings showing convenience, special and general purpose power receptacles and power distribution equipment. Since these portions of the electrical design cannot be completed until the mechanical and furniture layouts are completed only preliminary drawings should be submitted.
- 9.3.2.4 Interior Lighting. Provide floor plan drawings showing lighting fixtures and controls.
- 9.3.2.5 Emergency Lighting. Show the location of emergency lighting fixtures including exit signs and exterior path illumination. This information is also required to be shown on the Life Safety code drawings (Refer to Chapter 1 above).

9.3.3 Specifications

Provide a listing of specifications in the Design Analysis. This is to be the Table of Contents intended for the Final specifications. Where a departure or addition to a UFGS guide specification is required, include in the listing a brief description of the equipment or procedure constituting the change.

9.4 PHASE II—FINAL DESIGN

9.4.1 Design Analysis

Provide a complete Design Analysis, updated to reflect changes from prior submittals.

- 9.4.1.1 Calculations. Provide design calculations and supporting documentation to support design considerations. Calculations shall be computed and checked by separate individuals, one of which must be a registered electrical engineer. Indicate the names or initials of these individuals on the page or insert carrying the calculations. Supporting documentation shall be clear, and formulas and references shall be identified. Assumptions and conclusions shall be explained, and cross-referencing shall be clear. When a computer program is used, state the name of the program and version used. Include calculations and data for the following in the Design Analysis:
 - a. Lighting. Provide tabulated calculations for normal and emergency egress light levels for each room, functional area, MEP, POV parking, walkways, roadways, and security areas. Provide emergency egress lighting calculations indicating minimum and average illuminance values and uniformity ratios that demonstrate compliance with the IBC, ASHRAE 90.1, and NFPA 101.
 - b. Load Analysis. Provide calculations of all connected loads, demand factors, and estimated demand loads for each panel and switchboard. Separate loads by categories such as lighting, receptacles, HVAC, special equipment, etc. Provide calculations where connections are made to existing transformers or load centers including method determining the availability of sufficient capacity for the additional loads. This can be provided in the DA or on the Drawings.
 - c. Fault Current. Provide calculations in the DA and indicate results on the one-line diagram as well.
 - d. Voltage drop. Provide calculations that demonstrate compliance with ASHRAE 90.1.

- e. Over-Current Protection Coordination. Using basis of design components, provide data to verify proper overcurrent protection and selective overcurrent protection coordination is provided for the distribution system(s). Include transformer damage and conductor damage curves. Coordination calculations shall incorporate results of arc-flash calculations, to minimize arc-flash hazard while maintaining system coordination as much as possible.
- f. Arc Flash Hazard Analysis. Using basis of design components, provide arc flash hazard analysis in accordance with NFPA 70E. Provide calculations indicating the arc-flash energy level at each bus in the electrical system and the Personal Protective Equipment (PPE) level required. Provide arc flash hazard warning labels on all distribution equipment.
- g. Corrosion Protection. Describe cathodic protection specification requirements.
- h. CATV. Describe system requirements and infrastructure provided.

9.4.2 Drawings

Complete previously submitted Interim drawings, and additional drawings for a complete design package.

9.4.2.1 Details. Include all details for Final package on drawings. For congested areas that might interfere with various building systems, cable trays, piping, ducts, etc., thoroughly detail by expanded scale drawings.

9.4.2.2 Provide an enlarged floor plan for each electrical room, and show clearances.

9.4.3 Specifications

Provide a complete set of fully edited specifications. Include references to industry standards and criteria, and descriptions for items not adequately covered by the specifications.

Chapter 10.0 INFORMATION AND COMMUNICATIONS TECHNOLOGY (ICT)

10.1 GENERAL

10.1.1 Scope

This chapter provides guidance for the preparation and development for each of the different required submittal stages, as they relate to telecommunications design.

10.1.2 Submittal Requirements

Refer to Chapter 1 "All Disciplines" above for the general requirements and requirements at each design stage. Additional requirements specific to this discipline are listed in this chapter.

10.1.3 BIM Submittal Requirements

Refer to Chapter 1 for CAD/BIM requirements.

10.2 PHASE II-CHARRETTE DESIGN

10.2.1 Design Narrative

Design Narrative shall include the following items:

10.2.1.1 Site Telecommunications Services.

- a. On a Military Installation. Describe the point of connection for telecommunication services. Describe the available telecommunications Outside Plant (OSP) distribution system. If the existing OSP system is inadequate to support the project, state measures proposed to correct the deficiency.
- b. Not on a Military Installation. Describe existing Service Provider Point of Connection (SPPOC) and requirements for connecting to it.
- c. Describe requirements for OSP pathways and cabling to other buildings (i.e. training building to VMS).

10.2.1.2 Security Requirements. List security requirements, including requirements for Intrusion Detection (IDS) and Physical Access Control Systems (PACS).

10.2.1.3 Cable TV (CATV). List if CATV service is required and what provisions are required for it.

10.2.1.4 Permits. Provide contact information for any permits that may be required.

10.2.1.5 Installation Design Guides. Document Installation Design Guide or municipality standards compliance where applicable for telecommunications.

10.2.2 Drawings

10.2.2.1 Site Plan. Provide telecommunications site plan showing existing conditions, demolition, and new OSP pathways. Refer to the sheet list in the Final Design section below for planned sheet organization.

- 10.2.2.2 Telecommunications Spaces (EF, TER, TR). Coordinate with the architectural floor plans to ensure proper locations, size, and access. No telecommunication-specific building plans are required for this phase.

10.3 PHASE II-INTERIM DESIGN

10.3.1 Design Analysis

The Charrette phase Design Narrative forms the basis of the Interim and Final Design Analysis. Depending on submittal requirements, include the following:

- 10.3.1.1 List of Criteria. List the codes, criteria, standards, and manuals used to create the design - design technical instructions or manuals, pamphlets, technical references, and other design guidance or criteria used in the design and their updates.
- 10.3.1.2 Field Trip Report. Furnish a report on any site visits required for the project. The report will contain minutes of any meetings held with facility and/or utility personnel along with names, phone numbers and a summary of agreed to actions. Unforeseen site/building conditions will also be documented in the report.
- 10.3.1.3 OSP. Describe extent of OSP infrastructure including ductbank characteristics, number or cables required, etc. Provide a statement describing standards of design such as ductbank sizing, manhole construction, exterior building penetration condition (e.g. below grade, through foundation, up through slab; or exterior surface mounted conduit (more typical on renovations)), etc.
- 10.3.1.4 Premises Distribution. Describe characteristics of pathways, cabling, and telecommunications outlets.
- 10.3.1.5 Telecommunication Rooms. Describe telecommunication room sizing, location, equipment, electrical requirements and environmental control to be provided.
- 10.3.1.6 Grounding and Bonding. Describe telecommunications bonding system. Provide a statement describing standards of design.
- 10.3.1.7 Other Systems (e.g. IDS, Access Control, CATV). Provide paragraph describing special items of design. Include documentation of the source of the criteria.

10.3.2 Drawings

- 10.3.2.1 Provide the drawing items for this phase (below), organized per the drawing list and organization in the Final Design section below.
- 10.3.2.2 Site Plan. Provide a site plan indicating existing and proposed telecommunications lines and equipment required to serve the project including overhead and underground lines, roads and driveways, parking areas, exterior building penetrations, and other items necessary for functional and operating adequacy. Indicate the extent of any demolition to be done. If extensive, provide separate drawings with independent legend for new work.

10.3.2.3 Building Drawings.

- a. Symbols Legend.
- b. Telecommunication Spaces. Provide floor plans showing EF, TR, and TER locations, sizes, and access.
- c. Pathways and Cable Support. Show location and type of proposed cable support including cable trays, ladder racks, conduits and sleeves, and areas with non-continuous cable support.
- d. Grounding and Bonding. Provide telecommunications grounding and bonding requirements for communications rooms (EF, TER, and TR).
- e. Racks and Cabinets. Provide enlarged aerial (overhead) plans showing rack and cabinet locations and quantities.
- f. Backbone Cabling. Provide a riser diagram showing backbone cable interconnections and cable counts.
- g. Telecommunications Outlets. Provide floor plans showing locations and types of telecommunication outlets.

10.3.3 Specifications

10.3.3.1 Provide a listing of specifications which are planned to be incorporated in the Final specifications, in the Design Analysis. This is to be the Table of Contents intended for the Final specifications.

10.4 PHASE II-FINAL DESIGN

10.4.1 Design Analysis

Provide a complete Design Analysis, updated to reflect changes from prior submittals. The Final DA shall be complete, not just amendments to previously submitted design analyses.

10.4.1.1 Calculations. Provide design calculations and supporting documentation to support design considerations. Calculations shall be computed and checked by separate individuals, one of which must be an RCDD. Indicate the names or initials of these individuals on the page or insert carrying the calculations. Supporting documentation shall be clear, and formulas and references shall be identified. Assumptions and conclusions shall be explained, and cross-referencing shall be clear. When a computer program is used, state the name of the program and version used. Include calculations and data for the following in the DA:

- a. Cable Fill. Provide calculations demonstrating compliance with ARNEC requirements for cable tray initial fill capacity.

10.4.2 Drawings

Complete previously submitted Interim drawings, and additional drawings for a complete design package.

10.4.2.1 At a minimum, provide the following Telecommunications-Site (TS series) drawings:

- a. Site Plan.
 - 1) OSP pathways.
 - 2) Concrete encasement areas and details.

- 3) Maintenance holes and Hand holes.
 - 4) SPPOC location and type (i.e. pedestal, pole, hand hole).
 - b. Enlarged Duct bank details.
 - 1) Direct buried.
 - 2) Concrete encased.
 - c. Enlarged Maintenance hole and Hand hole details.
 - 1) Maintenance hole and Hand hole accessories.
 - 2) Butterfly diagrams.
 - d. Enlarged Exterior Building Penetration detail.
- 10.4.2.2 At a minimum, provide the following Telecommunications building (T series) drawings:
- a. General:
 - 1) General Notes.
 - 2) Symbols Legend (must use symbols from ARNEC and add other symbols as needed for the project).
 - b. Composite floor plan for each floor with serving area(s) indicated.
 - c. Building area floor plans. For each building area, include separate floor plans for:
 - 1) Cable tray.
 - 2) Telecommunications outlets.
 - 3) Backbone cable distribution conduit.
 - d. Enlarged Telecommunications spaces.
 - 1) Aerial (overhead) plan.
 - 2) Wall elevations of each wall, including backboard elevations.
 - 3) Rack and cabinet elevations (both front and rear of each rack).
 - (a) Provide detailed elevations of telecommunications racks and cabinets indicating arrangement, wire management, power, equipment provided by the project, and space allocated for GFGI equipment. Show termination of OSP cables, connection of OSP cables into the premises, and termination and connection of backbone cables.
 - e. Telecommunications Bonding.
 - 1) Enlarged details for PBB, SBB, and RBB.
 - 2) Bonding riser diagram, to include the following bonding conductors: TBC, TBB, BBC, SBC and the components bonded to these conductors.
 - f. Enlarged Faceplate(s).
 - 1) Faceplate type.
 - 2) Outlet type/color/termination type.
 - 3) Blank inserts.
 - g. Enlarged floor-box and poke-through box plans and details.
 - h. Backbone riser diagram.
 - 1) Cabling from the TER to EF.
 - 2) Cabling from the TER to each TR.
 - 3) Indicate cabling type, strand/pair count, termination type (fiber only).

10.4.2.3 Details. Include all details for Final package on drawings to include one-line diagrams for telecommunications backbone system and telecommunications grounding and bonding system, telecommunications floor, wall and ceiling outlet details, cable management details, labeling requirements of all telecom components, cable tray support, and audio/visual systems. For congested areas that might interfere with various building systems, thoroughly detail by expanded scale drawings. Provide an enlarged detail for all telecommunication spaces and show clearances.

10.4.3 Specifications

Provide a complete set of fully edited specifications. Be sure to utilize the telecommunications specifications (ending with '48' suffix) on the Army Reserve website. Include references to industry standards and criteria, and descriptions for items not adequately covered by base specification.

Chapter 11.0 – COST ENGINEERING

11.1 GENERAL

11.1.1 Scope

This chapter provides guidance for the preparation and development for each of the different required submittal stages, as they relate to Cost Engineering.

11.1.2 Submittal Requirements

Refer to Chapter 1 "All Disciplines" above for the general requirements and requirements at each design stage. Additional requirements specific to this discipline are listed in this chapter.

11.1.3 Cost Estimating Tools

Either the Parametric Cost Estimating System (PACES) or Micro-Computer Aided Cost Estimating System (MCACES), Second Generation (MII) shall be used for estimate preparation, as defined in the Louisville District Military Design Guide (LDMDG).

11.1.4 Cost Estimate Organization

The estimate shall be organized in the Military Work Breakdown Structure (WBS) format. The Military WBS is obtained using the Project Template Military of MII. Once the Price Breakout Schedule is developed by the Project Delivery Team (PDT), the determined CLIN cost elements within the estimate shall be organized to match the Price Breakout Schedule.

11.1.5 Cost Estimate Premise

The estimate shall be current, complete, accurate, and in accordance with the LDMDG, reflecting the information contained in the design documents of the submittal. The level of detail contained in the estimate shall be consistent with the level of detail contained in the other elements of the submittal. Square foot (SF) pricing and lump sum (LS) allowances may be used to price elements without sufficient design to warrant more detailed pricing methods.

11.1.6 Escalation and Pricing Adjustments

- 11.1.6.1 Escalation and Pricing Adjustments will be determined using sound cost engineering principles and in accordance with the LDMDG. The resulting values and the processes used to develop those values will be documented in the Cost Estimate Basis of Estimate.

11.1.7 Contingencies

- 11.1.7.1 Design Contingencies. Design contingency may be applied at early design stages, depending on the amount of anticipated deviation from Army Reserve standard criteria and in accordance with the LDMDG.
- 11.1.7.2 Construction Contingencies. Construction contingencies shall be applied in accordance with the LDMDG.

11.1.7.3 Other Contingencies. Contingencies other than those identified above shall not be used in project cost estimates.

11.1.8 Cost Estimate – Basis of Estimate

11.1.8.1 A basis of estimate will be submitted in accordance with Basis of Estimate requirements as presented in the LDMDG.

11.1.9 Reports

11.1.9.1 General. A Summary Estimate shall be included with each submittal. See Sample Typed Summary Spreadsheet in the Appendix. All reporting requirements should be in accordance with the LDMDG submittal requirements.

11.1.9.2 PACES. The reports identified below shall be generated for inclusion with each submittal. Additionally, a Building Parameters Report reflecting the data generated during automated estimate creation (PACES Import BLIS/IFC Project) shall be generated for each building in the project and submitted with each project submittal that used automated estimate creation processes.

- a. ENG Form 3086 Summary Report
- b. Subsystem Detail Report
- c. Building Parameters Report for each building in the estimate
- d. Markups Screen Capture
- e. Escalation Computation (if used) Screen Capture
- f. Profit Calculation (if used) Screen Capture

11.1.9.3 MII. The Army Reserve Standard Report Selections shall be generated for inclusion with each submittal. The Army Reserve Standard Report Selections file will be provided by the Government.

11.1.10 Quantity Takeoff

Quantity take-offs shall be prepared for all cost items contained within the estimate not generated during automated estimate creation (PACES Import BLIS/IFC Project; and subsequent export to MII, if used). This includes quantity determinations for SF pricing; quantities associated with LS elements and quantities for PACES Parameters, Assemblies, or Models used in the estimate. A copy of the quantity takeoffs prepared shall be submitted with the estimate in accordance with the LDMDG.

11.2 PHASE II-CHARRETTE DESIGN

The cost estimate shall be prepared in the software and format required by the preparer's Scope of Work (SOW). It will be largely parametric due to the state of design development, with detail to the extent the level of design permits. Options to the Base Bid may be required to assure that the project can be awarded within funds available. The estimate will be in accordance with the LDMDG Concept Submittal requirements. Refer to Chapter 1 "All Disciplines" above.

11.2.1 Cost Estimate Premise

The estimate may use the previous estimate, if available, as its basis. Prepare the Charrette cost estimate to reflect the current design submittal.

11.2.2 Contingencies

Design contingencies, as determined and justified by the estimator, may be used in accordance with the LDMDG. Refer to the LDMDG for further notations on contingency. Documentation and explanation of percentages are to be documented in the cost estimate basis of estimate in accordance with the LDMDG.

11.2.3 Cost Estimate – Basis of Estimate

A basis of estimate will be submitted in accordance with basis of estimate requirements as presented in the LDMDG.

11.3 PHASE II–INTERIM DESIGN

A cost estimate may be required if significant changes occurred since the prior submittal. The Project Manager will determine the need for a cost estimate at this submittal. If a cost estimate is required, the cost engineering requirements shall be as indicated below.

11.3.1 Cost Estimate Premise

The estimate may use the previous design phase estimate as its basis. Revise the project estimate as needed to reflect the current design submittal.

11.3.2 Contingencies

Design contingencies based on estimator judgement may be used for projects where more than 50% of the project's design falls outside Army Reserve standard criteria and insufficient design development has occurred to provide a basis for pricing. Documentation and explanation of percentages are to be documented in the cost estimate basis of estimate in accordance with the LDMDG.

11.3.3 Cost Estimate - Basis of Estimate

Revisions to the estimate shall be documented in the cost estimate basis of estimate, in accordance with the LDMDG.

11.3.4 MII Estimate Development

- 11.3.4.1 If an Interim submission estimate is required by the A-E SOW, then the estimate will be performed in MII and in accordance with the LDMDG.

11.3.5 Cost Reduction Spreadsheet

- 11.3.5.1 If the Interim cost estimate exceeds 90% of the Construction Cost Limit (CCL), the A-E shall prepare a cost reduction spreadsheet for discussion at the Interim review meeting. Note that the CCL value does not include Contingency and Supervision and Administration (S&A), also known as Supervision Inspection and Overhead (SIOH). The A-E shall provide suggestions to the design that will reduce cost and minimize changes to overall function of the project. Each alternative shall be provided with a ballpark estimate of the reduction. The A-E shall provide a reasonable number of suggestions that bring the project back under budget and also provide the Project Officer some latitude of choice with how the project will be reduced. Approved project reductions shall either be incorporated into the

project or defined as Bid Options in the documents and on the Price Breakout Schedule.

11.4 PHASE II–FINAL DESIGN

11.4.1 Cost Estimate Premise

The estimate may use the previous design submittal cost estimate as its basis.

11.4.2 Contingencies

Only construction contingency applies at this design stage. Discontinue use of design contingency, if used during prior submittals.

11.4.3 Cost Estimate – Basis of Estimate

Remaining assumptions will be clearly identified, in accordance with the LDMDG. Efforts to verify assumptions shall be documented.

11.4.4 Current Pricing

The current, site-specific General Wage Decision shall be used for the labor source library. Current, site-specific quotes shall be obtained for materials and subcontracted work having significant impact on project costs.

11.4.5 Cost Reduction Spreadsheet

Similar to the Interim phase, if the Final cost estimate exceeds 90% of the construction cost limit, the A-E shall prepare an updated cost reduction spreadsheet for discussion at the Interim Design Review Meeting. Refer to Interim paragraph above. Approved project reductions shall either be incorporated into the project or defined as Bid Options in the documents and on the Price Breakout Schedule. PDT is to discuss possible design schedule impacts.

Chapter 12.0 – ENVIRONMENTAL

12.1 GENERAL

12.1.1 REQUIREMENTS

Environmental requirements are project and location specific, and could include site asbestos survey and remediation planning, building asbestos survey and demolition, lead paint and environmental lead identification and remediation planning, radon assessment, reporting and abatement design, and a variety of other site and building environmental concerns. The A-E will refer to the DD Form 1391, data from prior surveys and studies and other information made available from the Government. Whether these conditions exist, and the extent if any to which they are part of the A-E's project work Scope will be as set forth in the A-E's Appendix A (SOW).

12.1.2 Submittal Requirements

Refer to Chapter 1 "All Disciplines" above for the general requirements and requirements at each design stage. Additional requirements specific to this discipline are listed in this chapter.

12.2 PHASE II–CHARRETTE DESIGN, INTERIM DESIGN, AND FINAL DESIGN

12.2.1 Submittal Requirements

Refer to Chapter 1 "All Disciplines" above, paragraphs concerning the requirements at each submittal state.

12.2.2 Environmental Reports

Include the following reports, and any other environmental reports related to the project, in the project Design Analysis at each phase, as applicable to each project:

National Environmental Policy Act (NEPA) reports.

At the start of the process, determine and document the parties who will be contacted. Including, but not limited to, the applicable native tribes.

Threatened and Endangered (T&E) Species Report or State Historic Preservation Office (SHPO) Report.

Record of Environmental Consideration (REC) report.

Categorical Exclusion (CATX) or Environmental Assessment (EA) report.

Munitions and explosives of Concern (MEC) Probability Assessment.

If the project is taking place on an existing military installation, the A-E will ensure that there has been a "Munitions and Explosives of Concern (MEC) Probability Assessment" survey performed on site in accordance with EM 385-1-97, III.B.01. The A-E is to request this document within 15 working days from their notice to proceed. If the A-E does not receive a MEC Probability Assessment within 15 working days of their request, the USACE COR will be notified immediately. The MEC Probability Assessment is criti-

cal to perform the design. The Installation/Readiness Division is responsible for performing the MEC Probability Assessment. The assessment is used to determine the probability of encountering MEC and therefore, the level of MEC support the project requires.

Location: Anytown, ST
 Description: USARC/OMS/UHS
 Mid-Point of Construction: December 2021

Date Prepared: 19-Mar-07
 MCAR PA: \$14,700,000
 Cost Growth: 1.060

Design Phase:
 Certified Final RFP

Item	Quantity	Unit	Unit Cost	Totals **
BASE BID MCAR CONSTRUCTION CONTRACT - CFCI				
PRIMARY FACILITIES:				
Training Facility	60,382.00	SF	\$118.49	\$7,154,600
OMS Building	3,432.00	SF	\$193.21	\$663,100
UHS Building	2,501.00	SF	\$58.34	\$145,900
AT/FP		LS		\$144,000
SUBTOTAL PRIMARY FACILITIES				\$8,107,600
SUPPORTING FACILITIES:				
Electric Service		LS		\$322,600
Water, Sewer & Gas		LS		\$160,400
Paving, Walks, Curbs & Gutters		LS		\$1,040,000
Storm Drainage		LS		\$37,200
Site Improvements & Demolition		LS		\$676,400
Turning Lane		LS		\$100,300
Wash Bay		LS		\$43,500
AT/FP		LS		\$127,300
SUBTOTAL SUPPORTING FACILITIES				\$2,507,700
SUBTOTAL BASE BID MCAR CONSTR CONTRACT COST - CFCI				\$10,615,300
Budget Contingency	5.00%			\$530,800
Subtotal				\$11,146,100
Supervision and Administration	5.70%			\$635,300
Design-Build Fee (Incl S&A)	4.03%			\$449,400
TOTAL BASE BID CONSTR CONTRACT COST- CFCI (MCAR CWE)				\$12,230,800
OTHER MCAR PROJECT COSTS				
Real Estate by Government				\$1,300,000
Information Systems by Government				\$400,000
Utility Payments by Government				\$725,000
TOTAL OTHER PROJECT COSTS (MCAR CWE)				\$2,425,000
TOTAL PROJECT BASE BID COST (MCAR CWE)				\$14,655,800

Example - TYPED
SUMMARY ESTIMATE

(** All amounts rounded to nearest \$100)

Location: Anytown, ST
 Description: USARC/OMS/U HS
 Mid-Point of Construction: December 2021

Date Prepared: 19-Mar-07
 MCAR PA: \$14,700,000
 Cost Growth: 1.060

Design Phase:
 Certified Final RFP

Item	Quantity	Unit	Unit Cost	Totals **
TOTAL PROJECT BASE BID COST (MCAR CWE)				\$14,655,800
OPTIONS MCAR CONSTRUCTION CONTRACT - CFCI				
Option 1- Loading Ramp		LS		\$55,600
Option 2- Landscaping		LS		\$64,100
Subtotal Options				\$119,700
Budget Contingency		5.00%		\$6,000
Options Subtotal				\$245,400
Supervision and Administration		5.70%		\$14,000
Design-Build Fee		4.00%		\$9,800
TOTAL OPTIONS CONSTR CONTRACT COST - CFCI (MCAR CWE)				\$269,200
TOTAL PROJECT COST - Base Bid Plus Options (MCAR CWE)				\$14,925,000

Example - TYPED
 SUMMARY ESTIMATE

(** All amounts rounded to nearest \$100)

Location: Anytown, ST
 Description: USARC/OMS/U HS
 Mid-Point of Construction: December 2007

Date Prepared: 19-Mar-07
 MCAR PA: \$14,700,000
 Cost Growth: 1.060

Design Phase:
 Certified Final RFP

Item	Quantity	Unit	Unit Cost	Totals **
BASE BID INSTALLED EQUIPMENT COSTS - CFCI (OMAR):				
All Buildings		LS		\$696,800
Budget Contingency		5.00%		\$34,800
Subtotal				\$731,600
Supervision and Administration		6.50%		\$47,600
TOTAL BASE BID INSTALLED EQUIP COST - CFCI (OMAR CWE)				\$779,200

OPTIONS INSTALLED EQUIPMENT COSTS - CFCI (OMAR):				
Loading Ramp Accessories		LS		\$6,900
Budget Contingency		5.00%		\$300
Subtotal				\$7,200
Supervision and Administration		6.50%		\$500
TOTAL OPTIONS INSTALLED EQUIP COST - CFCI (OMAR CWE)				\$7,700

FURNITURE & FITNESS EQUIPMENT COSTS (GFGI):				
Pre-Wired Workstation Furn - All Bldgs (incl esc)		LS		\$162,400
Free-Standing Furn - All Bldgs (incl esc)		LS		\$341,200
Fitness Equipment - All Buildings (incl esc)		LS		\$93,300
Subtotal				\$596,900
Budget Contingency		5.00%		\$29,800
Transportation & Install		15.00%		\$89,500
Subtotal				\$716,200
Supervision and Administration		6.50%		\$46,600
TOTAL PRE-WIRED FURNITURE COST - GFGI (OMAR CWE)				\$762,800

TOTAL OMAR-FUNDED COST (OMAR CWE)				\$1,549,700
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(** All amounts rounded to nearest \$100)

Example - TYPED
SUMMARY ESTIMATE