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ELECTRICAL POWER, LIGHTING, GROUNDING, COMMUNICATIONS AND ALARM SYSTEMS

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CHAPTER A-5

ELECTRICAL POWER, LIGHTING, GROUNDING, COMMUNICATIONS AND ALARM SYSTEMS

5.1 GENERAL

This chapter gives general guidelines for the preparation of drawings, specifications and design analysis as related to power, lighting, grounding, communications and alarm systems.

5.2 APPLICABLE CRITERIA

The most current editions of the criteria applicable at the time of contract issuance or otherwise defined in the contract shall be used.

5.2.1 Unified Facilities Criteria (UFC)

Army, Navy, and Air Force projects shall comply with UFC documents unless otherwise indicated. A complete list of UFC documents can be found at <http://www.wbdg.org/>. A list of commonly referenced UFC documents is provided below.

UFC 1-200-02	High Performance and Sustainable Building Requirements
UFC 3-501-01	Electrical Engineering
UFC 3-520-01	Interior Electrical Systems
UFC 3-530-01	Design: Interior and Exterior Lighting and Controls
UFC 3-540-01	Engine-Driven Generator Systems for Backup Power Applications
UFC 3-550-01	Exterior Electrical Power Distribution
UFC 3-570-02A	Cathodic Protection
UFC 3-575-01	Lightning and Static Electricity Protection Systems
UFC 3-570-06	Operation and Maintenance: Cathodic Protection Systems
UFC 3-580-01	Telecommunications Building Cabling Systems Planning and Design
UFC 3-600-01	Fire Protection Engineering for Facilities
UFC 3-710-01A	Code 3 Design with Parametric Estimating
UFC 4-010-01	DoD Minimum Antiterrorism Standards for Buildings
UFC 4-010-05	Sensitive Compartmented Information Facilities Planning, Design, and Construction

UFC 4-021-01 Design and O&M: Mass Notification Systems

UFC 4-021-02 Electronic Security Systems

5.2.2 Army Criteria

All Army projects shall also comply with applicable Army Criteria. A list of commonly referenced Army Criteria is provided below.

AR 190-11 Physical Security of Arms, Ammunition, and Explosives (where applicable)

Technical Criteria for Installation Information Infrastructure Architecture (I3A)

Secret Internet Protocol Router Network (SIPRNET) Technical Implementation Criteria (FOUO; contact USACE Project Manager for access.)

5.2.2.1 Army Medical Facilities Design Criteria

All Army Medical Facilities shall comply with UFC 4-510-01 (Design: Medical Military Facilities), as well as any additional criteria provided by the Tri-Service Medical Agency (TMA).

5.2.3 Air Force Criteria

Air Force projects shall comply with UFC documents. In addition, unique Air Force projects may also require Air Force specific criteria. These criteria can be found at <http://www.wbdg.org/>.

5.2.4 National Security Agency (NSA) Criteria

Projects that include the design of facilities and the installation of equipment and systems that receive, transmit, route, switch, manipulate, graph, store, archive, calculate, generate, print, scan, or in any other manner process or transfer National Security Information (NSI), shall comply with the following criteria.

CNSSAM TEMPEST/1-13 Red/Black Installation Guidance (FOUO; contact USACE Project Manager for access.)

5.2.5 Industry Criteria

In addition to Military Criteria, all projects shall comply with the Applicable Industry Criteria. The most current editions of the criteria (as of the date of the contract issue) shall be used. This list is not intended to include all criteria that may apply.

ANSI C2 National Electrical Safety Code

ASHRAE 90.1 Energy Standard for Buildings Except Low- Rise Residential Buildings

TIA 568-C Commercial Building Telecommunications Cabling Standards

TIA 569-C	Telecommunications Pathways and Spaces
TIA 607-B	Generic Telecommunications Bonding and Grounding for Customer Premises
EPAct	Energy Policy Act of 2005 (Public Law 109-58)
IESNA RP-1	Recommended Practice for Office Lighting
IESNA RP-3	American National Standard Practice on Lighting for Educational Facilities
IESNA RP-8	Recommended Practice for Roadway Lighting
IESNA HBK	Lighting Handbook Reference and Application
NACE SP0169	Control of External Corrosion on Underground or Submerged Metallic Piping Systems
NFPA 70	National Electrical Code
NFPA 72	National Fire Alarm Code
NFPA 101	Life Safety Code
NFPA 780	Standard for the Installation of Lightning Protection Systems
UL 96A	Installation Requirements for Lightning Protection Systems
Uniform Federal Accessibility Guidelines (UFAS)	
USGBC LEED-NC	Green Building Rating System for New Construction & Major Renovations

5.2.6 MILCON Business Process Criteria

MILCON Business Process (MBP) projects shall comply with the MBP Criteria. A listing of the MBP Criteria can be found in Section 01 10 00, Paragraph 4.0, Applicable Criteria of the Sample of Model Standard RFP, which is located at <http://mrsi.usace.army.mil/rfp/Shared%20Documents/CTYPEmodelSAMPLE.pdf>.

5.3 PRECONCEPT SUBMITTAL REQUIREMENTS

There are no electrical requirements for this submittal.

5.4 CODE 3 DESIGN REQUIREMENTS

Submittal content and format shall be as described in UFC 3-710-01A.

5.5 CONCEPT (35%) DESIGN SUBMITTAL REQUIREMENTS

5.5.1 Concept Design Narrative

5.5.1.1 General. Briefly describe the electrical scope of work on the project.

5.5.1.2 Interior Work. Indicate the electrical characteristics (phase, voltage, and number of wires) of the electrical system. Indicate any special systems or unique requirements of the project (generator, UPS, renewable energy, SIPRNET, SCIF, Arms Room, hazardous locations, special power outlets, etc.)

5.5.1.3 Exterior Work. Identify if the existing electrical and communication utilities are adjacent to the site and if they contain sufficient capacities for the project.

5.5.1.4 Design Charrette Electrical Minutes. Include all electrical minutes from the Design Charrette, where applicable. This should include any functional or technical requirements identified at the meeting, as well as any special requirements or criteria identified by the Facility Users. It should include information obtained from the Privatized Utilities (primary electrical power, exterior lighting, CATV, etc.) or Installation agencies (DOIM, Fire Department, Security office, etc.).

5.5.2 Concept Design Analysis

5.5.2.1 Electrical Load Estimate. Provide an estimate of the total connected load (kVA), total demand load (kVA) and transformer size.

5.5.2.2 Lightning Protection. Provide a Lightning Protection Risk Assessment in accordance with NFPA 780, and provide a recommendation regarding the need for lightning protection.

5.5.2.3 Exterior Lighting Calculations. Point-by-point lighting calculations are not required for this submittal. Rule of thumb calculations (i.e. 1:4 pole height-to- pole spacing ratio) may be used.

5.5.3 Concept Design Drawings

5.5.3.1 Electrical Site Plan. Provide a dedicated electrical site plan showing the existing and proposed electrical & communications lines, as well as the proposed transformer location(s). Clearly distinguish between the existing and proposed work. Identify the demarcation point(s) between the Contractor's scope of work and any work provided by the Installation or Privatized Utilities. Provide a layout for any exterior lighting included in the project.

5.5.3.2 Communication Interior Plan. Provide dedicated communication plans with legend showing the locations of telephone, data, and CATV outlets.

5.5.4 Concept Specifications

Include a listing of Specifications to be used in the project. Unless otherwise indicated, utilize only Unified Facilities Guide Specifications (UFGS).

5.6 PRELIMINARY (60%) SUBMITTAL REQUIREMENTS

5.6.1 Review Comments.

Evaluate the Concept Submittal review comments and incorporate all approved comments into the design.

5.6.2 Preliminary (60%) Design Narrative

The Preliminary (60%) Design Narrative shall include all of the requirements of the Concept Design Narrative. The narrative shall include any revised or updated information, as well as any additional information obtained at the 35% Review Conference.

5.6.3 Preliminary (60%) Design Analysis

5.6.3.1 General. The Preliminary (60%) Design Analysis shall include all of the requirements of the previous submittals and shall include any revised or updated information.

5.6.3.2 Lighting Calculations. Lighting calculations shall be performed to provide average maintained illumination levels in accordance with the Applicable Criteria. Calculations for all interior rooms and exterior areas shall be included. Calculations shall be coordinated with the Architect and Interior Designer to assure surface reflectances and proposed furniture layouts are modeled in the calculations. Computer generated point-by-point computations shall be used to perform the calculations. In addition to the average maintained illumination levels, the maximum maintained illumination level, minimum maintained illumination level, and the average-to-minimum ratios for each room and area shall be included.

5.6.4 Preliminary (60%) Design Drawings

5.6.4.1 General. All CADD drawings shall be prepared in accordance with Chapter A-10, Drawings.

5.6.4.2 Legend. Provide a legend on a dedicated drawing showing all of the symbols used throughout the electrical drawings.

5.6.4.3 Electrical Site Plans. The electrical site plans shall meet all of the requirements of the concept (35%) submittal, except shall be updated to reflect any revised or updated information. For large projects or where required for clarity, provide dedicated plans for power, communications, and lighting

5.6.4.4 Interior Lighting Plans. Provide dedicated lighting plans showing the locations and types of light fixtures.

5.6.4.5 Lighting Fixture Schedule. Provide a light fixture schedule describing the salient features of each light fixture shown on the drawings.

5.6.4.6 Interior Power Plans. Provide dedicated power plans showing the locations of all mechanical equipment, receptacles, power panels, and photovoltaic (PV) arrays.

5.6.4.7 Interior Fire Alarm and Mass Notification Plans. Provide dedicated fire alarm and mass notification plans showing the locations of all alarm initiation and detection devices, as well as the location of the control panel and annunciator (where applicable).

5.6.4.8 Interior Communication Plans. The interior communication plans shall meet all of the requirements of the concept (35%) submittal, except it shall be updated to reflect any revised or updated information.

5.6.4.9 Interior Special Systems Plans. Provide dedicated special systems plans showing the locations of all special systems devices (e.g., public address, intrusion detection and access control systems).

5.6.5 Preliminary (60%) Specifications

No specifications are required.

5.7 PRELIMINARY (OVER THE SHOULDER) SUBMITTAL REQUIREMENTS

5.7.1 General.

The purpose of this submittal is to check the design progress and the incorporation of the concept review comments. The design process does not stop at this submittal.

5.7.2 Preliminary (Over-the-Shoulder) Design Narrative.

There are no requirements for this submittal.

5.7.3 Preliminary (Over-the-Shoulder) Design Analysis.

There are no requirements for this submittal.

5.7.4 Preliminary (Over-the-Shoulder) Design Drawings.

The design drawings requirements shall match those listed in the Preliminary (60%) Submittal requirements.

5.8 FINAL (100%) DESIGN SUBMITTAL REQUIREMENTS

5.8.1 Review Comments.

Evaluate the review comments from the previous design submittal reviews and incorporate all approved comments into the design.

5.8.2 Final (100%) Design Analysis.

5.8.2.1 General. The design analysis shall be accumulative, incorporating all requirements from previous submittals, revised or updated as appropriate. If a Preliminary (60%) Submittal is not required for a particular project, the submittal requirements for a Preliminary (60%) Submittal shall be included with this submittal. Failure to submit a complete Final Design Analysis is sufficient grounds to require a re-submittal of the Final 100% Design package with no extension to the project deadline. Calculations shall be computed and checked by separate individuals with the checking

accomplished by a Registered Electrical Engineer. Calculations and data for the following shall be included in the analysis:

5.8.2.2 Lighting Calculations. Include all of the required information from the Preliminary (60%) Design submittal, except it shall be updated to reflect any revised or updated information including changes to room surface reflectances and the furniture layout. In addition, provide catalog cuts of all lighting fixtures upon which the design is based. Ensure that no proprietary light fixtures are specified. (Upon request, be able to provide three manufacturers' names and catalog numbers for each light fixture).

5.8.2.3 Emergency Lighting Calculations. Lighting calculations shall be performed to demonstrate compliance with NFPA 101 emergency lighting requirements for means of egress. Calculations for all spaces within the means of egress shall be included. Computer generated point-by-point computations shall be used to perform the calculations.

5.8.2.4 Daylighting Calculations. Daylighting calculations shall be performed in all spaces with daylight harvesting. Calculations shall demonstrate the basis for selected set-points and daylighting zones, as applicable. Computer generated point-by-point computations shall be used to perform the calculations. Building orientation and location (latitude and longitude) shall be accurately represented in the computer model, as shall the 3-dimensional shape of the spaces and the locations of windows and skylights. Where available by the manufacturer for the geographic location and the time of interest, tubular daylighting devices may be represented by ies-formatted photometry and the daylighting contributions can be determined using a standard lighting program. As a minimum, daylighting calculations shall be calculated at 9:00 AM and 3:00 PM on the equinox. Calculations for additional times and dates shall be provided where required by energy codes or other criteria.

5.8.2.5 Interior Lighting Power Allowance Calculations. Calculations shall be performed in accordance with ASHRAE 90.1 and other energy codes as referenced in UFC 1-200-02. Compliance with either the Building Area Method or Space-by-Space Method is permitted. Calculations shall follow the steps indicated in ASHRAE 90.1, and shall clearly show that the total interior lighting power is in compliance with ASHRAE 90.1 and other applicable criteria.

5.8.2.6 Exterior Lighting Power Allowance Calculations. Calculations shall be performed in accordance with ASHRAE 90.1 and other energy codes as referenced in UFC 1-200-02. Calculations shall follow the steps indicated in ASHRAE 90.1, and shall clearly show that the total interior lighting power is in compliance with ASHRAE 90.1 and other applicable criteria.

5.8.2.7 Short Circuit Calculations. Calculations shall be performed to determine the rating of all protective equipment. Assume an infinite bus on the primary unless more accurate data is available. Short circuit calculations shall account for the peak asymmetrical fault current by de-rating any equipment in which the calculated X/R ratio exceeds the equipment's tested X/R ratio.

5.8.2.8 Voltage Drop Calculations. Calculations shall be performed for all services and feeders, dry-type transformers, and worst-case branch circuits. Voltage drop calculations shall meet the requirements of ASHRAE 90.1, Chapter 8.

5.8.2.9 Demand Load Calculations. Calculations for each panelboard and switchboard shall be provided. Calculations shall show the demand factors used for each load category (lighting, receptacles, motors, spare, etc.) and shall be in accordance with the NEC.

5.8.2.10 Arc Flash Hazard Analysis. Calculations shall be provided for all electrical equipment. Calculations shall determine the Arc Flash Boundaries and the required PPE levels for all equipment in accordance with NFPA 70E or IEEE Standard 1584. Where insufficient information is available at the time of design, a performance specification section shall be provided requiring the construction Contractor to perform the arc flash hazard analysis based on site conditions and selected equipment. The specification shall require the Contractor to submit the analysis for Government approval as a shop drawing submittal. The construction documents shall direct the Contractor to label the electrical equipment as required by NEC 70E.

5.8.2.11 Photovoltaic (PV) Calculations. Calculations shall be provided to determine the number of photovoltaic modules per string and the number of strings per inverter. Calculations shall take into account the site's lowest recorded low temperature, highest average high temperature, and the corresponding cell temperatures of the photovoltaic modules. Calculations shall demonstrate that the inverter will provide Maximum Power Point Tracking for the full voltage and current ranges expected from the PV array.

5.8.2.12 Cathodic Protection Calculations. Cathodic protection (CP) is a functional requirement for virtually all projects involving new aboveground water tanks, direct buried or submerged structures, or the repair or replacement of similar existing structures. The need for a CP system shall be considered for all projects. A CP system shall be provided where required; see Chapter 3 of UFC 3-570-06. Where provided, the CP system shall comply with UFC 3-570-02A. Provide calculations for the surface area of the protected surface, the current density requirements, the number, size, and type of anodes to be used, the size of all conductors, and the size of the rectifier and branch circuit calculations for the circuit serving the rectifier. Where insufficient information is available at the time of design, a performance specification section shall be provided requiring the construction Contractor to design the cathodic protection system based on site conditions and selected underground materials. The specification shall require the Contractor to submit the design for Government approval as a shop drawing submittal.

5.8.2.13 LEED Credit and Sustainable Design Calculations. LEED credit and sustainable design calculations are separate from the LEED credit and sustainable design documentation required by Chapter A14: SUSTAINABLE DESIGN. Calculations shall be provided to demonstrate electrical systems comply with the requirements of LEED credits claimed on the LEED project checklist. In instances where calculations are provided as part of the Chapter A14 submittal, the electrical calculations may be omitted from the electrical design analysis but the electrical design analysis must clearly cross-reference the location of the omitted calculations elsewhere in the Final Design Submittal Package.

5.8.2.14 Miscellaneous Calculations. See UFC 3-501-01 for additional requirements.

5.8.2.15 Product Data Sheets. Product data sheets shall be provided for all electrical equipment, including luminaires, lighting controls, normal and emergency power

distribution equipment, photovoltaic (PV) and other renewable energy equipment, communication and special systems distribution equipment, lightning and surge protection equipment, and grounding equipment.

5.8.3 Final (100%) Drawings

The final (100%) drawings shall be prepared in accordance with Chapter A-10, Drawings. The final (100%) submittal shall include the drawings required for the Preliminary (60%) Submittal, even if a Preliminary (60%) Submittal is not required for the project. The drawings shall be complete and, together with the specifications, shall constitute the Final Construction Documents. In addition to the drawings indicated for the Preliminary (60%) Submittal, the Final (100%) Drawings shall include the following:

5.8.3.1 Electrical Site Details. Provide details for all electrical site equipment, including aerial poles, transformers, ductlines, site luminaires and site luminaire standards.

5.8.3.2 Electrical Site Schedules. Provide schedules for site luminaires, site lighting control strategies, and other site electrical equipment as appropriate.

5.8.3.3 Electrical Site Single-Line Diagrams. Provide single-line diagrams for power and communication systems and other site electrical systems as appropriate.

5.8.3.4 Electrical Plans. Provide plans showing locations of all electrical equipment and devices. Dedicated plans shall be developed for lighting protection system and the photovoltaic (PV) systems. PV equipment shall include but not be limited to photovoltaic modules, inverters, disconnect switches, combiner boxes, meters, and monitoring equipment.

5.8.3.5 Electrical Interior Details. Provide details for all electrical interior equipment, including luminaires, power distribution equipment, building communication equipment, fire alarm and mass notification equipment, special systems equipment, grounding equipment, lightning protection equipment, and other equipment for which a detail will clarify or convey the equipment requirements. A luminaire detail shall be provided for each luminaire type, depicting the physical appearance of the luminaire and listing all salient features.

5.8.3.6 Electrical Interior Single-Line Diagrams. Provide single-line diagrams for power systems, communication systems, fire alarm and mass notification systems, access control systems, intrusion detection systems, public address systems and other electrical systems as appropriate.

5.8.3.7 Electrical Interior Schedules. Provide schedules for wire and conduit, panelboards, transformers, luminaires, lighting control strategies, and other electrical equipment as appropriate.

5.8.3.8 Electrical Interior Lighting Control Documentation. Each unique lighting control scenario shall be represented by a unique lighting control strategy. Lighting control strategies shall be clearly conveyed in a tabulated narrative format. Strategies shall be labeled and cross-referenced to the applicable rooms on the lighting plans, and shall be supplemented with wiring, functional, or schematic diagrams as appropriate for clarity. For projects with programmable control panels, provide lighting control panel relay

schedules and automation channel schedules. Show all lighting control system components on the plans.

5.8.3.9 Fire Alarm and Mass Notification Input/Output Matrix. Provide an input/output matrix indicating the required sequence of operation of the fire alarm and mass notification system.

5.8.3.10 Enlarged Electrical Plans. Provide enlarged electrical plans where advisable to provide clarity and legibility.

5.8.4 Final (100%) Specifications

The final (100%) specifications shall be prepared in accordance with Chapter A-10, Specifications, using the Unified Federal Guide Specifications (UFGS). Referenced codes and standards shall be checked to assure the referenced date matches the most current date. All electrical equipment shall be specified. For equipment for which there is no UFGS specification available, provide a specification in UFGS format.

5.8.5 Final (100%) Certifications

For projects with Arms Rooms, provide a completed Arms Room Checklist as described in Chapter A-3, Architecture.

5.9 CORRECTED FINAL DESIGN SUBMITTAL REQUIREMENTS

In the Corrected Final Design Submittal, the designer of record finalizes the construction documents. This includes the incorporation of approved comments from the previous design submittal reviews. The Corrected Final Design Submittal requirements shall be the same as the Final Design Submittal requirements.

5.10 REQUIREMENTS FOR PREPARATION OF DESIGN/BUILD RFP'S.

5.10.1 General

Unless otherwise indicated, Army RFP's shall be prepared using the MILCON Business Process (MBP) template and the online RFP "wizard". Contact the SAS Project Manager for access to the RFP "wizard". Unless otherwise indicated, Air Force and all other RFP's shall be based upon "partial" design development as defined by UFC 1-300-07A.

5.10.2 MILCON Business Process (MBP) RFP's

5.10.2.1 General. Develop a complete RFP using the current MILCON Business Process (MBP) Template documents and the online "wizard". In developing the RFP, follow the MILCON Business Process (MBP) RFP Implementation Guidelines (located at <http://mrsi.usace.army.mil/rfp/Shared%20Documents/Forms/MBP.aspx>).

5.10.2.2 Facility-Specific Functional and Technical Requirements. For Army projects with Center of Standardization (COS) facility types, utilize the standard Paragraph 3 for each building type. For Army projects with non-standard facilities, develop each Paragraph 3 to include functional and technical electrical &

communications requirements for each building based on input from the Users, as well as any criteria provided by the Project Manager.

5.10.2.3 Project-Specific Requirements. Coordinate with the facility Users, privatized utilities (primary electrical power, exterior lighting, CATV, etc.), and Installation agencies (DOIM, Fire Department, Security office, etc.) to develop Paragraph 6 and RFP appendices.

5.10.2.4 Deviations. Coordinate with the Installation and provide technical support for Installation requests for deviations from the MILCON Business Process RFP requirements as needed.

5.10.2.5 Draft RFP Submittal Requirements

5.10.2.5.1 For the COS facility types, ensure that the standard Paragraph 3 for each building type is included in the RFP. For non-standard facilities, include the functional and technical electrical & communications requirements developed for each building in Paragraph 3.

5.10.2.5.2 Denote any privatized utilities (primary electrical power, exterior lighting, CATV, etc.) on the Installation and clarify the responsibilities of both the Contractor and the privatized utilities.

5.10.2.5.3 Coordinate with the Installation Directorate of Information Management (DOIM) or other Communications Agency to determine any manhole and cabling tie-in points required. Denote this information either on a dedicated communications site plan or in Paragraph 6. Denote all other Installation-specific communications requirements in Paragraph 6.

5.10.2.5.4 Denote any other Installation specific information provided by the Installation Fire Department, Security Office, etc. in Paragraph 6.

5.10.2.5.5 Include any appendices provided by the privatized utilities or government agencies.

5.10.2.6 Final RFP Submittal Requirements

5.10.2.6.1 Evaluate the review comments from the previous design submittal reviews and incorporate all approved comments into the RFP.

5.10.2.6.2 Verify consistency between the drawings, appendices, and the RFP text.

5.10.2.6.3 Update the RFP to reflect any changes to the MILCON Business Process RFP Template documents as needed during RFP preparation.

5.10.3 "Partial" Design Development RFP

5.10.3.1 General. Prepare the RFP in accordance with UFC 1-300-07A. Develop the functional and technical electrical & communications requirements for each building based on input from the Users, as well as any criteria provided by the Project Manager. Coordinate with the facility Users, privatized utilities (primary electrical power, CATV,

etc.), and Installation agencies (DOIM, Fire Department, Security office, etc.) to develop any project specific electrical requirements.

5.10.3.2 Draft RFP Submittal Requirements

5.10.3.2.1 Include the functional and technical electrical & communications requirements developed for each building in the RFP.

5.10.3.2.2 Denote any privatized utilities (primary electrical power, CATV, etc.) on the Installation and clarify the responsibilities of both the Contractor and the privatized utilities.

5.10.3.2.2 Coordinate with the Installation Directorate of Information Management (DOIM) or other Communications Agency to determine any manhole and cabling tie-in points required. Denote this information either on a dedicated communications site plan or in the narrative portion of the RFP. Denote all other Installation-specific communications requirements in the RFP.

5.10.2.5.3 Include any other Installation specific information provided by the Installation Fire Department, Security Office, etc. in the RFP.

5.10.2.5.4 Include any appendices or specifications provided by the privatized utilities or government agencies in the RFP.

5.10.3.3 Final RFP Submittal Requirements.

5.10.3.3.1 Evaluate the review comments from the previous design submittal reviews and incorporate all approved comments into the RFP.

5.10.3.3.2 Verify consistency between the drawings, appendices, specifications, and the RFP text.

5.10.3.3.3 Update the RFP to reflect any changes due to new project criteria or new information obtained during coordination.