

SECTION 01 10 10

DESIGN REQUIREMENTS

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SECTION 01 10 10

DESIGN REQUIREMENTS

1. DESCRIPTION OF FACILITY

1.1 The Contractor shall design and construct the FTEV 16-1066 CONSTRUCT TRAINING FACILITY, 2 CWSS at Hurlburt Field to result in a complete and usable facility based on Design Requirements and Technical Specifications contained within this solicitation.

1.2 This project will construct a new facility to provide area for training supplies and equipment, three offices, systems training classroom, conference room, and restrooms with approximately 2,270 square feet. The Contractor shall design and construct the facility in accordance with the design requirements and technical criteria established in this document.

1.3 Sustainable Design

Leadership in Energy and Environmental Design (LEED) certification is not required for this project. However, the Contractor shall utilize Sustainable Design based principles in the design and construction of this project to achieve increased energy conservation and reduced operational costs through the use of energy efficient materials, components and systems. Materials containing recycled content shall be utilized wherever possible, as well.

2. DESIGN REQUIREMENTS

2.1 The information provided in this Request for Proposal (RFP) is intended to guide design and construction by establishing existing conditions and desired character, appearance, and function of the FTEV 16-1066 CONSTRUCT TRAINING FACILITY, 2 CWSS. Refer to drawings found in Appendices for visual information related to this project. Drawings include a conceptual site plan and a conceptual floor plan as a basis of design. Modifications to the concept plans are expected in order to fully develop the project requirements. Requests for changes to the concept drawings shall be submitted to the Contracting Officer in sufficient time for review and comment prior to the 50% submittal.

2.2 The Contractor shall prepare complete construction documents for all work designed as required by the RFP. The construction documents to be prepared include, but are not limited to: construction drawings, specifications, submittals, and design analysis as required in SECTION 01 10 12 DESIGN AFTER AWARD. The project shall be designed and constructed in accordance with the criteria contained in the RFP using industry standard materials and efficient practices. The building design and the materials selected shall be high quality, durable and easily maintained. The Contractor shall be responsible for the professional quality, code compliance, technical accuracy and coordination of all designs, drawings, specifications and other documents or publications upon which the design and construction are based. The design and construction of this facility shall conform to the drawings, specifications and design requirements issued in this solicitation. In case of a conflict in design requirements, the most stringent requirements govern.

2.2.1 Hurlburt Field Master Specifications (HFMS) are referenced in various sections below. The referenced specifications shall be as authored by Hurlburt Field Civil Engineering (BCE) which will be provided by the Contractor as submittals at the stages shown in Section 01 10 12 "Design After Award". The referenced specifications are anticipated requirements - specifications shall be deleted and/or additional HFMS specifications shall be added by the Contractor as necessary to complete the design. Should an existing HFMS section require editing or a new section added to the HFMS, contractor shall coordinate with BCE for final approval before implementing. Utilize Unified Facilities Guide Specifications (UFGS) format specifications as basis for all specifications not covered by the HFMS.

2.2.2 Operations and maintenance (O&M) portions of HFMS shall be as designated in the various sections. O&M requirements and submittals in the HFMS shall not be edited out. Submittals, operating procedures, schematics, as-built drawings, manuals, software, and computer hardware required in the HFMS for system operation incorporated in the design phase are critical to operation of the new facility on completion.

2.3 The intent of this RFP is to describe the requirements for appearance, function, and equipment, materials, and types of construction in sufficient detail to enable design and engineering to be completed by the Contractor.

2.4 All design and construction document drawings and specifications shall be prepared to comply with the RFP. The RFP describes the design work that shall not be changed, and shall be included in the construction documents. All remaining design work shall be performed by the Contractor based on the design criteria as required by the RFP. No deviations from the criteria will be allowed unless prior approval is obtained from the Contracting Officer. All questions or problems encountered by the Contractor in the following criteria shall be promptly submitted with recommendations to the Contracting Officer's Representative (COR) for approval.

2.4.1 Section 01 10 10 - DESIGN REQUIREMENTS defines the design and performance requirements. Applicable building codes and standards shall be used as the minimum criteria to develop the construction documents for areas of work not specifically defined.

2.4.2 Section 01 10 12 - DESIGN AFTER AWARD defines the format and submittal requirements in which the design and the construction documents shall be prepared by the Contractor.

2.5 Construction documents shall be sufficient to afford a clear understanding of the construction work required. The work shall be organized in a manner that will assure thorough coordination between the various details on the drawings, and between the drawings and the specifications. The Contractor shall cross-check all work until all conflicts have been reconciled.

2.6 Conflicts in RFP Criteria. Where the various elements of the RFP are in conflict, the following priority shall be used to establish precedence, unless specifically noted otherwise herein or within the criteria's referenced in this RFP. In the event of conflict or inconsistency between any of the below described portions of the confirmed contract, precedence shall be given in the following order:

a. Any portions of the proposal or final design that exceed the requirements of the solicitation

- (1) Any portion of the proposal that exceeds the final design.
- (2) Any portion of the final design that exceeds the proposal.
- (3) Where portions within either the proposal or the final design conflict, the portion that most exceeds the requirements of the solicitation has precedence.

b. The requirements of the solicitation, in descending order of precedence:

- (1) Building and Life Safety Codes and UFC's related to life safety.
- (2) Section 01 10 10 DESIGN REQUIREMENTS.
- (3) Drawings.
- (4) Other referenced criteria.

c. Government Review or Approval

- (1) Government review or approval of any portion of the proposal or final design shall not relieve the Contractor from responsibility for errors or omissions with respect thereto.

2.7 The architectural character of the building, interior design, siting, and landscaping shall be consistent with the existing facility construction.

2.8 The Contractor's Designers of Record shall develop construction document technical specifications for all areas of work. The design of architectural, interior, structural, mechanical, fire protection, electrical, civil, and other engineering features of the work shall be accomplished, reviewed, and approved by architects and engineers registered to practice in their respective professional fields in a State or possession of the United States, in Puerto Rico, or in the District of Columbia.

### 3. GENERAL REQUIREMENTS AND DEFINITIONS

#### 3.1 Proposed Construction Description

3.1.1 Modifications to the existing stormwater conveyance and treatment system and the associated new permitting under FAC 62-330 for the entire Combat Weather complex are to be included in this project. Silt fences sediment barriers will be incorporated into the design to prevent sediment migration off-site. Water service to the building for both fire and domestic services is provided by connection to an existing water main near the northwest corner of the building. A new sanitary sewer lateral will be installed connecting to the existing gravity sanitary sewer north of the building location.

3.1.2 Structural system consists of a pre-engineered metal building (PEMB) system on shallow continuous strip footings with spread column footings.

3.1.3 The exterior envelope will consist of split-face CMU veneer on exterior sheathing on metal studs with batt insulation. The roof system includes standing-seam metal panels on PEMB purlins with batt insulation. Interior spaces include Server Room, Systems Training Classroom, Conference Room, Offices, and ancillary support areas, delineated with non-bearing metal stud/gypsum board walls. The new facility will be approximately 2,270 square

feet in size and will match the style of adjacent building 91024 including exterior materials and colors.

3.1.4 Electrical system consists of connecting to existing pad mount transformer to feed a new service panel. All electrical infrastructure shall be new and consist of power, lighting, lightning protection, and fire alarm.

3.1.5 Communications system consists of installing new outside plant fiber and copper cable to the new communications equipment in the Server Room. New outlets and Category 6 cabling will be installed throughout the interior from the user networks. The cabling will terminate to patch panels in the rack and be tested to the government requirements.

3.1.6 The HVAC system will consist of multiple split system heat pumps to condition the various spaces. Outside ventilation air and restroom exhaust shall be provided as required by ASHRAE 62.1 and International Mechanical Code.

3.1.7 A Wet-Pipe Automatic Fire Suppression system shall be installed to protect the facility without the requirement for a dedicated fire pump.

3.1.8 Plumbing system will include backflow prevention, a water meter, water closet, lavatory, water cooler, floor drains, hose bibbs and other items as required to provide a fully functioning system.

### 3.2 General Construction Requirements

3.2.1 Government Furnished Contractor Installed Equipment (GFCI) is not required.

3.2.2 Contractor Furnished Contractor Installed Equipment (CFCI) is as shown on the criteria plans.

3.2.3 Contractor Staging Area and Haul Routes. The construction routes and potential Contractor staging areas are depicted on the Base Location and Vicinity Map.

3.2.4 Project Site Access. Access to the site is depicted on the Base Location and Vicinity Map.

3.2.5 Borrow and Spoil Areas. No borrow or spoil areas will be available on Government property. The Contractor shall be responsible for identification, procurement, and delivery of borrow materials from off-site locations. The Contractor shall be responsible for removal, transport, and legal disposal of all spoil materials generated by the project.

3.2.6 Furniture, Fixtures and Equipment (FFE). Movable furnishings including desks, workstations, chairs, tables, AV support furnishings and equipment, files, storage cabinets, shredders, and conference tables shall be Government Furnished, Government Installed (GFGI). The contractor's design requires coordination with all GFGI FFE for all power, data and structural support requirements. Computer racks and rack mounted equipment shall be Contractor Furnished, Contractor Installed (GFCI).

### 3.3 Definitions of Terms

The following frequently used terms are defined hereinafter to establish a common understanding when the term is used in this solicitation.

3.3.1 Net Area (occupiable area): The gross square feet less building infrastructure and support members such as exterior walls, electrical and communications spaces, mechanical spaces, fixed corridors, restrooms, stairwells, janitor closets, vestibules, etc. Covered walks, enclosed walkways, terraces, balconies and patios shall not be counted as net area. Net area is the physical space, which is available for use by the occupant to support the occupant's mission.

3.3.2 Gross Area: All floor area measured from the outer surface of the exterior wall to the outer surface of the exterior wall. Covered (but not enclosed) loading docks, walks, terraces, porte-cocheres, balconies and patios shall be counted as one-half of the total square feet. Uncovered walks, terraces, balconies and patios shall not be counted.

#### 4. PERMIT REQUIREMENTS

4.1 Permits. The Contractor shall determine permit requirements as part of the design process and shall submit permit draft applications as part of the submittal process. The Contractor shall list all permits that are to be obtained by the Contractor. The permits shall be listed by title, permit number, permitting agency, effective date and expiration date. The Contractor shall be responsible for submitting all applications and paying for all associated fees for environmental permits for the project. All permits shall be delivered through the Contracting Officer to the BCE who will forward them to the appropriate government organizations. All environmental permit applications and construction completion certificates shall be prepared by an engineer registered in the State of Florida. All environmental permit applications and accompanying drawings and calculations shall be furnished using English units. The approved permit application must be provided to the Contracting Officer prior to starting construction on any of these activities.

4.2 Permit Completion. At the Contractor's expense, the Contractor shall complete all necessary work (as-built surveys, bacteriological tests, application forms, etc.) for all certifications of completions for permitted activities. Certifications of completions shall be performed by a Florida License Professional Engineer as required for each permit certification. The Contractor shall submit the construction completion certificates on all permits from local, state and federal agencies within 30 days of completion of the permitted activity. The construction completion certificates shall be provided to the Contracting Officer.

#### 5. ANTI-TERRORISM FORCE PROTECTION REQUIREMENTS

##### 5.1 Codes and References.

UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings (9 February 2012, Including Change 1, Dated 1 October 2013)

UFC 4-010-02 DoD Minimum Standoff Distances for Buildings, (9 February 2012)

5.2 The new building shall be classified as "Inhabited" for a "low" level of protection. Per Table B-1 of UFC 4-010-01, the applicable explosive weight shall be "II". All site and facility elements of this contract shall comply

with UFC 4-010-01 criteria. The structural design shall incorporate applicable requirements of UFC 4-010-01.

5.3 Site Layout. All site work shall be in accordance with the criteria presented in UFC 4-010-01 as defined by the approved risk and threat assessment. The Contractor shall incorporate the following criteria into the site layout for the new building:

- Eliminate potential hiding places near the facility.
- Provide an unobstructed view around the facility.
- Eliminate lines of approach perpendicular to the building.
- Minimize vehicle access points.
- Illuminate building exteriors or sites where exposed assets are located.
- Where pavement is adjacent to the building, include visible "NO PARKING" paint markings and signage.

5.4 Supporting Structural Elements. Design supporting structural elements and their connections based on their ultimate capacities. The flexural and shear design of the supporting structural elements and their connections shall be based on the requirements as set forth in UFC 4-010-01.

5.5 Exterior Openings. Exterior hollow metal door and frame assemblies, glazing, and aluminum window frame assemblies shall be engineered and installed to meet applicable blast resistance requirements of UFC 4-010-01.

5.6 Mass Notification System for the new building. See Electronic Systems.

## 6. SITEWORK

### 6.1 Codes and References

The engineering design requirements and criteria for the sitework section herein shall be in accordance with the requirements specified within this section and the criteria documents listed. All criteria documents shall be the current edition, where there is a conflict in criteria, the most stringent shall apply.

- NFPA 24, Installation of Private Fire Service Mains and Their Appurtenances
- UFC 1-200-01 Design, General Building Requirements
- UFC 3-201-01 Civil Engineering
- UFC 3-220-01 Geotechnical Engineering
- UFC 3-230-01 Water Storage, Distribution, and Transmission
- UFC 3-240-01 Wastewater Collection
- UFC 3-250-04 Standard Practice for Concrete Pavements
- UFC 3-600-01 Design, Fire Protection Engineering For Facilities
- UFC 4-010-01 DOD Minimum Antiterrorism Standards for Buildings
- Section 438 of the Energy Independence and Security Act (EISA) of 2007
- National Pollutant Discharge Elimination System (NPDES) for Construction Activities

### 6.2 Demolition

The Contractor shall provide layout surveying as necessary to locate the new work items prior to initiating demolition work. Erosion and sediment control BMP's shall be in place and approved by the Contracting Officer's Representative prior to initiating demolition work. As-Built drawings

provided in the RFP presents approximate topographic conditions and locations of existing structures and utilities. The Contractor may utilize the utilities during construction operations as approved by the Contracting Officer's Representative and may incorporate the utilities as part of the final project. Existing utilities that interfere with this project shall be relocated or removed. Utilities connected to buildings to be demolished as part of this project shall be disconnected a minimum of five (5) feet from the building's existing footing/foundation perimeter or at the nearest joint, valve or flange beyond the five feet minimum distance. Utilities shall be terminated in a manner conforming to the nationally recognized code covering the specific utility. Meters and related equipment shall be removed and delivered to the respective utility authority offices for disposal or reuse. All other demolition debris shall be removed from the limits of Hurlburt Field and disposed of in a manner as required by law and Air Force regulations. The Contractor shall be responsible for all disposal permits and regulations requirements. The Contractor shall clear and grub the entire area within the limits of construction.

No phase of demolition shall impede access for emergency response vehicles or personnel to adjacent facilities. The Fire Prevention authority shall be notified prior to any road closure.

The following items shall be demolished by the Contractor as part of the Base Bid of this contract: entire concrete pad and adjacent sidewalk in the area of the building footprint shall be removed; a portion of gravel surface of the existing Equipment Yard in the area of the building footprint shall be removed and may be reused for finish grade; a portion of existing Equipment Yard fence shall be removed, the associated gate may be reused. The following items shall be relocated by the Contractor as part of the Base Bid of this contract: electrical manhole, conduit, and associated items within the building footprint.

### 6.3 Site Design and Construction

The conceptual site plan presents the general layout for the site and facilities. The Contractor shall design the drainage, sidewalks, landscaping, site grading, miscellaneous building access pavement areas, and utilities including fire hydrants, and area lighting. Any proposed changes from the concept site layout shall be submitted for review and approval in accordance with the requirements set forth in Section 01 10 12 DESIGN AFTER AWARD.

### 6.4 Storm Drainage

This project in an undeveloped area would meet the exemption from permitting criteria under Florida Administrative Code (FAC) Rule 62-330. However, it is proposed within an existing storm drainage management system that was designed for the Combat Weather complex under project FTEV023001. FTEV023001 records indicate the original design intent was to meet the then-applicable requirements of FAC 62-25 by utilizing swales for stormwater treatment, which would qualify for an exemption from permitting. Records are not available verifying that the storm system is functioning as designed to meet the treatment requirements. Current inspection has verified that the drainage system does not conform to as-built drawings. Therefore, professional engineering evaluation with geotechnical investigation and survey of the entire original drainage system is required. Modifications to the stormwater conveyance and treatment system and the associated new permitting under FAC 62-330 are to be included in this project. The Air Force is exempt from



permit application fees, but all other documents associated with the FAC 62-330 application for permit will be required. Professional seal and signature on documents are required per FAC 62-330.

The drainage design documents shall include erosion and sediment control features as necessary to minimize site erosion and to prevent silt-laden stormwater from leaving the site. The Contractor shall follow all current Best Management Practices (BMP) during construction, and shall implement the use of silt fences, hay bales, and sediment traps as necessary.

Allowable pipe types shall include concrete pipe, HDPE, and PVC. Pipe joints shall be water tight with gaskets.

The new facility will not utilize gutters or downspouts and will simply drain at the roof fascia to the ground.

#### 6.5 Government Furnished Information

The government has provided As-Built site drawings. Plans presented herein are not final site plans but are criteria drawings for bidding purposes. The contractor shall verify actual locations, sizes and types of all existing utilities and shall coordinate with the government regarding any future utility installations that affect the work under this contract.

#### 6.6 Geotechnical Investigation and Design.

If necessary, the Contractor shall employ a licensed geotechnical engineer to prepare a geotechnical investigation report necessary for building foundation design.

#### 6.7 Soil Treatment.

Just prior to placing concrete slab on grade and just prior to backfilling around concrete or masonry foundations for structures, soil treatment shall be applied. All pesticide applications shall be made by state licensed and certified pest control personnel and in conformance with Hurlburt Field Base Standards in strict accordance with manufacturer's label. The Contractor shall formulate, treat, store and dispose of the pesticides in accordance with manufacturer's instructions, and both State and Federal regulations.

#### 6.8 Landscaping.

Disturbed areas within the existing Equipment Yard shall be repaired with gravel to match the existing gravel surface of the Equipment Yard. Disturbed earth outside of the Equipment Yard shall be stabilized with sod. Sod shall be Argentine Bahia (*Paspalum Notatum*) or Common Bermuda grass (*Cynodon dactylon*) or Base approved equal.

#### 6.9 Earthwork

Material shall be classified in accordance with the Unified Soil Classification System and compaction efforts shall be specified by ASTM standards. Borrow material will be obtained off site. Disposal of materials will be off site. All costs in connection with borrow material and disposal of materials shall be at the Contractor's expense. All liability of any nature resulting from borrow operations including transportation of, and

those resulting from disposal of material shall be the responsibility of the Contractor.

There shall be no open cuts on major streets. All utilities crossing shall be bored and jacked. Only minor streets and drives may be open cut, with prior approval of the COR. The Contractor shall notify the Government 7 days in advance of any such open cut.

#### 6.10 Utilities

6.10.1 General. The Contractor shall design and construct new utility services to provide fire protection, domestic water, and sanitary sewage removal for the new facility. Coordination of all site work on the project, including utility work, is the responsibility of the Contractor. The contractor shall coordinate with the utility providers when relocating any utility lines which will conflict with the proposed building.

6.10.2 Existing Utilities. Government As-Built related to the location of utilities may not represent actual installed conditions. The Contractor shall verify actual locations of all placed utilities and shall coordinate with the Government regarding any future planned utility installations that affect the work. Coordination of all site work on the project, including utility work, is the responsibility of the Contractor. It is the Contractor's responsibility to confirm the specific locations of the existing utilities and to design and construct new utility services for the new building and, if required, for building 91024. The contractor shall provide necessary measures to protect existing utilities.

6.10.3 Device Location. Backflow prevention valves, post indicator valves, transformers, electric switches, telephone/cable boxes, manholes, irrigation pump and controller, etc., shall be located in locations not immediately apparent to the facility users or personnel passing by the site.

6.10.4 Marking of Utility Lines. Utility lines shall be marked with plastic marking tape. The tape shall be manufactured with integral wires, foil backing or other means to enable detection by a metal detector when the tape is buried up to 3.28 ft deep. The tape shall be of a type specifically manufactured for marking and locating underground utilities. The metallic core of the tape shall be encased in a protective jacket or provided with other means to protect it from corrosion. Warning tapes shall be provided and installed directly above all buried pipes or wires, at a depth of 18-inches below finished grade. Tape color shall be as specified below and shall bear a continuous printed inscription describing the specific utility.

#### Tape Color:

Red:	Electric
Orange:	Telephone, Telegraph, Television, Police, and Fire Communications
Blue:	Water Systems
Green:	Sewer Systems
Yellow:	Gas, Dangerous Materials

6.10.5 Metering. Install new water meter on the domestic water feed.

6.10.6 Water and Wastewater.

6.10.6.1 Codes and References.

UFC 3-240-01 Wastewater Collection  
UFC 3-230-01 Water Storage, Distribution, and Transmission

6.10.6.2 Wastewater. Install new sanitary sewage lateral routed to existing sewage drainage system.

6.10.6.3 Existing Wastewater. It is not anticipated that any alterations will be made to the sanitary sewer utilities on base.

6.10.6.4 Wastewater Piping. Installation of new external sanitary sewer laterals are required.

6.10.6.5 Sanitary Sewer Manholes. No new sanitary sewer manholes are required.

6.10.6.6 Connections to Manholes. No connections to sanitary sewer manholes are anticipated, but new sewer lateral shall be connected to existing sewer main.

6.10.7 Water Supply. The building will require new domestic water service and fire suppression service.

6.10.7.1 Existing Water. No changes will be made to the existing domestic water system to Bldg 91024. A new fire protection line and domestic water line will connect into the existing water distribution system.

6.10.7.2 Water Supply Mains, Service Lines, and Appurtenances. New domestic service and fire suppression service line is required for this project.

6.10.7.3 Piping. A new fire suppression line is proposed for this project. The proposed fire protection line shall connect to the existing water main with a tapping sleeve and valve assembly. The pipe shall be C900 and shall maintain 36" cover.

6.10.7.4 Hydrant Flow Tests. A fire hydrant flow test shall be performed by the contractor to ensure the flow in the existing water main is acceptable for the building. Contractor to perform separate fire hydrant flow test data for design of sprinkler system.

6.10.7.5 Meters. Install meter on new domestic line proposed for this project.

6.10.7.6 Valves. Install new valve at the point of connection of the new domestic water service. Exterior valves shall be installed in valve box.

6.9.7.7 Post Indicator Valves. The proposed fire protection line shall be equipped with an owner control post indicator gate valve. The post indicator valve shall be located at least 40 feet from the edge of the building.

6.10.7.8 Backflow Preventer. The backflow preventer for the proposed fire suppression line and domestic water line shall be located in the interior of the building within the mechanical room.

6.10.8.1 Fire Hydrants. No new fire hydrants are proposed for this project.

6.10.8.2 Fire Protection System. The proposed improvements include the addition of a fire protection line as mentioned in section 6.9.7. The fire department connection shall be stubbed out from the north side of the building outside of the fence.

6.10.9 Water Permit. It is not anticipated a FDEP water permit will be required.

6.11 Gas Distribution System. Additional gas distribution lines are not required for this project.

6.12 Specifications. As a minimum, the Contractor shall edit and submit the following HFMS as defined in Section 01 10 12, Design After Award:

- 31 10 00 Site Clearing
- 31 23 16 Excavation
- 31 23 16A Excavation and Sub-grade Preparation for Sidewalks, Curbs and Gutters
- 31 23 23 Fill
- 31 31 16 Termite Control
- 32 31 13 Chain Link Fences and Gates
- 32 31 19 Pre-Finished Metal Panel Fencing
- 32 92 23 Sodding
- 32 93 44 Treatment of Existing Trees
- 33 11 16 Site Water Utility Distribution Piping
- 33 31 00 Sanitary Utility Sewage Piping
- 33 41 00 Storm Utility Drainage Piping

## 7. NARRATIVES ON AREAS AND FUNCTIONAL REQUIREMENTS

7.1 The paragraphs in this section are included to aid the Contractor in understanding the requirements of all the functional areas within the training facility. To aid in the design, the net square footage totals shown on the conceptual floor plan, and general functional requirements given below shall be fully coordinated. All materials and equipment are Contractor Furnished and Contractor Installed (CFCI) unless otherwise indicated. General types of furnishings and equipment for each room are shown in the concept drawings to assist in establishing anticipated individual room areas.

### 7.2 Functional Area/Room Summary And Requirements

#### SERVER ROOM

Description:	Information technology.
Quantity & Area:	1 @ 12 ft x 21 ft (200 Minimum Net Sq Ft).
Functional Requirements:	Management of IT equipment utilized for training students on deployed and fixed meteorological instruments.
Ceiling:	9' minimum.
Special Requirements:	Access flooring; accordion partition with Conference Room; power, data, and structural support for IT systems; split system air conditioning; exterior door with direct access to Equipment Yard; communications equipment cabinets, coordination with GFGI furniture and equipment including power, data, and structural support for large screen monitor/TVs.

SYSTEMS TRAINING CLASSROOM

Description: Space for GFGI student desks approximately 2' deep x 8' long that can seat 16 people, and GFGI instructor desks approximately 2' deep x 4' long that can seat 2 people.

Quantity & Area: 1 @ 20 ft x 36 ft (725 Minimum Net Sq Ft)

Functional Requirements: Training.

Ceiling: 9' minimum.

Special Requirements: Exterior door with direct access to Equipment Yard; support for laptops and telephone; coordination with GFGI furniture and equipment including a power, data, and structural support for Smart Boards, large screen monitor/TVs, magnetic dry erase boards; a port/ access hatch to run cable out of the classroom into the yard; cabinet storage and/or closet space with adjustable shelving for storage of A/V equipment and course curriculum articles.

CONFERENCE ROOM

Description: Space for GFGI table for seating 12 people.

Quantity & Area: 1 @ 12 ft x 21 ft (255 Minimum Net SF)

Functional Requirements: Conference.

Ceiling: 9' minimum.

Special Requirements: Coordination with GFGI furniture and equipment including a power, data, and structural support for large screen monitor/TVs, magnetic dry erase boards; support for data, speaker (teleconference) telephone, audio system; accordion partition with Server Room.

OFFICE

Description: Space for GFGI desk.

Quantity & Area: 2 @ 10 ft x 10 ft (200 Total Net SF)

Functional Requirements: Private office.

Ceiling: 9' minimum.

Special Requirements: Coordination with GFGI furniture and equipment; support for data and telephone.

OFFICE

Description: Space for GFGI desk and small table.

Quantity & Area: 1 @ 10 ft x 15 ft (150 Net SF)

Functional Requirements: Private office.

Ceiling: 9' minimum.

Special Requirements: Coordination with GFGI furniture and equipment; support for data and telephone.

RESTROOM

Description: ABA standard unisex toilet room

Quantity & Area: 1 @ 6 ft x 8 ft (48 Net SF)

Functional Requirements: Public restroom.

Ceiling: 9' minimum.

MECHANICAL ROOM

Description: Space for two air handlers, electrical panels, fire alarm/mass notification panel, fire riser, and associated clear space for access.

Quantity & Area: To Be Determined.  
Functional Requirements: Utility.  
Ceiling: Exposed to structure.  
Special Requirements: Direct access from exterior.

CORRIDOR

Description: Space for circulation, bulk color printer, shredder.  
Quantity & Area: To Be Determined.  
Functional Requirements: Support.  
Ceiling: To Be Determined.  
Special Requirements: Main entrance half-glass door with covered access oriented to building 91024.

8. ARCHITECTURAL DESIGN

8.1 Architectural Theme. Construction shall match all existing materials, finishes, and colors of building 91024, including all banding/accent elements and other characteristics of the existing structure. The main structural system shall be a pre-engineered metal building with rigid frames supported on shallow foundations.

8.2 Codes and References.

IBC International Building Code, 2015 Edition  
NFPA 101 National Fire Protection Association, Life Safety Code, 2015 Edition  
UFC 1-200-01 DoD Building Code (General Building Requirements)  
UFC 3-101-01 Architecture, with Change 3  
UFC 3-110-03 Roofing, with Change 1  
UFC 3-120-10 Interior Design, with Change 1  
UFC 3-600-01 Fire Protection Engineering for Facilities  
ABA Architectural Barriers Act Standards

8.3 Life Safety Code Analysis. The Contractor shall prepare and submit a code analysis with the design documents documenting compliance with life safety codes and references.

8.4 Materials and Details

8.4.1 Exterior

8.4.1.1 Walls. Exterior walls shall be painted split- and smooth face concrete masonry veneer to match the existing facility. Backup wall construction shall be minimum 18 gage 8" galvanized metal stud framing with glass-mat gypsum sheathing and self-adhering sheet membrane air barrier at the exterior face. All wall cavities shall be completely filled with batt insulation. Interior face of studs shall be finished with 5/8" moisture/mold resistant type X gypsum board. Exterior wall construction and finishes shall extend to the underside of roof deck and shall be sealed against air and moisture intrusion.

8.4.1.2 Roof. Utilize a prefinished standing seam metal roof of color and dimensions to match building 91024 meeting HFMS roofing specification. Roof slope shall match building 91024. The standing seam roof shall be placed over pre-engineered metal building purlins with thermal spacers and R-30 vinyl-faced batt insulation equal to Simple Saver System. The standing seam roof

shall incorporate a standing seam fascia and soffit system to match existing color and dimensions. It shall not incorporate the integral gutter that is a characteristic of the existing facility.

8.4.1.3 Exterior Doors. Provide galvanized steel exterior doors and frames. Doors, frames and hardware shall meet and AT/FP requirements of UFC 4-010-01, 9 Feb 2012, for low level of protection with explosive weight II, tested in accordance with ASTM F 2247. Single doors shall be a minimum 3' x 7' and double doors 6' x 7' unless required otherwise to be larger.

Provide an insulated, lockable steel door in hollow metal frame at Mechanical.

Exterior doors shall include minimum 5 ft x 5 ft concrete stoop and covered with metal canopy.

8.4.1.4 Exterior Windows and Glazing. Provide 48 inch by 48 inch prefinished, fixed aluminum windows, similar to windows in building 91024, in the east wall of the large office and in the south wall of the conference room.

8.4.1.5 Canopy. Provide metal canopy at each exterior door.

#### 8.4.2 Interior

8.4.2.1 Partitions. Interior partitions shall be constructed of 3-5/8" galvanized metal stud framing with 5/8" gypsum board finish with acoustical batt between studs. All walls shall be sealed to deck above and shall be a minimum STC 45 rated partition.

All walls to receive mounted items whether Government or Contractor provided or installed must have galvanized steel or treated wood blocking as structural backup. Grab bars must sustain a pulling force of 350 lbs. exerted in any direction. The Contractor is responsible for installing all blocking and coordination of the size, extent and location of blocking required for each item and shall coordinate blocking for Government furnished and installed equipment (GF/GI) with the Contracting Officer to confirm actual equipment weights and dimensions of the specific wall mounted equipment.

8.4.2.2 Flooring. Concrete slab-on-grade finish elevation shall match the floor elevation of existing building 91024 except Server Room slab shall accommodate a 12 inch deep raised access flooring system.

8.4.2.3 Ceilings and Exposed Structure Finish. Ceilings shall be 24"x24" suspended acoustical ceiling tile; type and finish to match the HFBS The mechanical room ceiling shall be painted exposed structural system.

8.4.2.4 Doors. Typical interior doors shall be factory finished, solid core, flush wood veneer doors in painted hollow metal frames. Wood type, species, cut, and finish shall match the HFMS.

8.4.2.5 Finish Hardware. Interior and exterior door hardware shall be provided to match the HFMS. All doors shall be keyed to the existing building keying system.

8.4.2.6 Accessories. Refer to structural paragraphs for building expansion and settlement control measures.

8.4.2.7 Cabinetry. Materials and construction of cabinets and countertops shall be in accordance with Architectural Woodwork Institute (AWI) quality

standards "AWI Custom Grade" with plastic laminate finish except as noted below. Melamine is not allowed.

Wall and base cabinets shall be of the same construction and appearance with solid ends and frame fronts, or with frames all around. Frames shall be not less than 3/4 inch by 1-1/2 inches hardwood. All ends, bottoms, backs, and partitions shall be hardwood plywood. All drawers will include solid wood rails and plywood bottoms. Cabinet doors and drawer fronts shall be either hardwood plywood or medium density fiberboard cores with like materials both faces. Construction of cabinets shall be by mortise and tenon, dovetail, or dowel and glue joints. Countertops will be plastic laminate unless otherwise indicated.

Hardware: Provide cabinet hardware including minimum two self-closing hinges for each door and two side-mounted metal drawer slides for each drawer and pulls for all doors and drawers as follows. All cabinet hardware exposed to view shall be ANSI/BHMA 156.9, Grade 1, and comply with the following requirements:

- a. Concealed Euro-Style, back mounted hinges with opening to 165 degrees and a self-closing feature at less than 90 degrees.
- b. Drawer slides shall have a static rating capacity of 100 lbs. (444N), full extension.
- c. Provide adjustable shelving standards with shelf support hardware for all cabinets.

Countertops shall be 100 percent solid acrylic surface material where indicated on the drawings. Solid surfacing material shall consist of 100percent pure acrylic polymer, mineral fillers, and pigments. The material shall be homogenous, not coated or laminated. Superficial damage to a depth of 0.010 inch shall be repairable by sanding or polishing. Install with factory recommended fasteners/adhesives/sealant.

8.4.2.8 Equipment. Contractor shall provide magnetic marker boards in Systems Training Classroom, Conference Room, and Server Room. All other equipment and furnishings including racks and rack mounted equipment will be furnished and installed by the Government (GFGI). Contractor is to coordinate power, data, and structural support requirements with GFGI equipment provided.

8.5 Specifications. As a minimum, the Contractor shall edit and submit the following HFMS as defined in Section 01 10 12, Design After Award:

07 21 13	Board Insulation
07 21 16	Blanket Insulation
07 61 00	Preformed Roofing, Wall Siding, and Accessories
07 62 00	Sheet Metal Flashing and Trim
07 90 00	Joint Protection
08 13 14	Standard Steel Doors and Frames
08 14 16	Flush Wood Doors
08 51 13	Aluminum Windows
08 71 00	Door Hardware
09 21 16	Gypsum Board Assemblies
09 22 16	Non-Structural Metal Framing

## 9. INTERIOR DESIGN



9.1 Structural Interior Design (SID). The SID includes the selection and sampling of all applied finishes to complete the building exterior and interior architectural features.

9.1.1 Design Requirements. Exterior and interior finishes, materials, and colors shall match existing building 91024. The Contractor shall provide color boards to illustrate proposed replacements for discontinued manufacturer products. The SID submittals shall run concurrent with the architectural submittal. The finishes accepted at the Final design phase shall be the finishes installed during the construction phase of the project.

9.1.2 SID Room Finish Narrative. Each interior space shall be finished in accordance with this narrative. This narrative provides initial guidance only. As the design becomes more defined after award of the contract, the Contractor shall provide a comprehensive room finish schedule, signage schedule, updated color boards and associated guide specifications to define all aspects of the SID.

9.1.2.1 Server Room. Floor shall be constructed of 12" elevated Computer Access flooring with high pressure laminate finish. 4" Rubber base to match existing facility standard base. Paint to be 3-coat (primer, intermediate, top coats) latex paint for gypsum board substrates and of a color to match the existing building color schemes. Ceilings are to be Hurlburt standard 24"x24" suspended acoustical ceiling tile system, white in color.

9.1.2.2 Systems Training Classroom, Conference Room, and Offices. Floor shall be carpet tile finish to match existing building color schemes. 4" Rubber base to match existing facility standard base. Paint to be 3-coat (primer, intermediate, top coats) latex paint for gypsum board substrates and of a color to match the existing building color schemes. Ceilings are to be Hurlburt standard 24"x24" suspended acoustical ceiling tile system, white in color.

9.1.2.3 Corridor. Floor shall be porcelain tile finish to match existing building color schemes, include 4" tile base. Paint to be 3-coat (primer, intermediate, top coats) latex paint for gypsum board substrates and of a color to match the existing building color schemes. Ceilings are to be Hurlburt standard 24"x24" suspended acoustical ceiling tile system, white in color.

9.1.2.4 Restroom. Floor shall be porcelain tile with 48" height wainscot to match existing building color schemes. Paint to be 3-coat (primer, intermediate, top coats) latex paint for gypsum board substrates and of a color to match the existing building color schemes. Ceilings are to be Hurlburt standard 24"x24" suspended acoustical ceiling tile system, white in color.

Toilet accessories shall be ABA compliant and furnished as indicated below. All accessories shall be stainless steel commercial grade quality products: double roll toilet tissue dispenser, door mounted coat hooks (standard and ABA height), ABA wall mounted grab bars, sanitary napkin disposal unit, a mirror minimum 24 inches wide by 36 inches in height, handicapped accessible paper towel dispenser/disposal unit.

9.1.2.5 Mechanical. Floor shall be clear sealed concrete. Provide rubber base to match existing facility standard base. Walls shall be painted gypsum

board, white in color. There will be no ceiling; contractor to paint exposed structure overhead to match wall color.

9.1.2.6 Signage. The Contractor shall submit a signage plan that shows the placement of all interior signage used in the project including room identification plaques, emergency egress plaques, and directional information signs. Coordinate with the user and BCE to confirm final room number and graphics.

9.1.2.6.1 Systems Training Classroom, Server Room, Conference Room, Offices, and Restroom. Provide room identification signs to match existing facility standard dimensions, color, profile, and other characteristics. Coordinate with the users and BCE to confirm final room numbers, text, and graphics.

9.1.2.6.2 Systems Training Classroom, Server Room, and Mechanical. Provide a permanent exterior rated room sign. Exterior signage is to match existing type, color, and dimensions.

9.1.2.7 Corner Guards. Provide corner guards at the exterior corners of walls in high use areas. Corner guards shall be solid plastic with solid, integral color and extend from top of base to ceiling. Assembly shall have a snap on retainer. Surface mounted corner guards shall be placed on all outside corners in corridors. Corner guards shall have top and bottom caps to provide a finished appearance.

9.2 Specifications. As a minimum, the Contractor shall edit and submit the following UFGS as defined in Section 01 10 12, Design After Award:

06 41 00	Architectural Wood Casework
09 30 00	Tiling
09 51 13	Acoustical Panel Ceiling
09 65 00	Resilient Flooring
09 68 00	Carpeting
09 69 00	Access Flooring
09 90 00	Painting and Coating
10 14 00	Signage
10 26 00	Wall Protection
10 28 00	Toilet and Bath Accessories
10 44 00	Fire Protection Specialties

## 10. STRUCTURAL DESIGN

### 10.1 Codes and References.

IBC 2015	International Building Code, 2015 edition
ASCE 7-10	Minimum Design Loads for Buildings and Other Structures, 2010
UFC 3-301-01	Structural Engineering, Change 2
UFC 4-010-01	DoD Minimum Antiterrorism Standards, Change 1
UFC 4-010-02	DoD Minimum Standoff Distances for Buildings

### 10.2 General Design Requirements

10.2.1 The Structural Engineer shall be responsible for the design of the complete structural building system. A complete structural system for the building shall include foundations, walls, roof framing, roof diaphragms,

lateral load stability, framing and connection of any architectural features, and the support of mechanical and electrical equipment. In addition, the Structural Engineer is responsible for the design of all lesser related structures such as utility vaults, pits, retaining walls, etc., although they may be shown on other disciplines' drawings. Structural design of the building shall be compatible with the architectural design. Structural design shall be in accordance with the criteria, requirements, and guidance provided in the International Building Code, 2015, and the following requirements. In event of a conflict, the most stringent shall govern design.

10.2.2 The main structural system is a pre-engineered metal building with rigid frames and with portal frames providing the lateral. The walls will be veneer backed by metal studs that span from the slab to a wind beam at the eave of the building that is provided with the metal building system. The roof structure is to be constructed of metal Z-purlins spanning between the rigid frames and supporting a standing seam metal roof system.

10.2.2.1 Columns and bracing at perimeter walls shall be inside stud framing cavity to avoid projections into the interior of the building.

10.2.2.2 Interior columns are not permitted based on the architectural layout presented in this RFP.

10.2.3 Variations from level or from slopes specified for roof decks, floors, ceilings, beam soffits, lintels, sills, horizontal grooves, or other conspicuous lines shall be as follows: for overall length of line or surface of 10 feet or less, +/- 1/8 inch; up to 20 feet, +/- 1/4 inch; up to 40 feet, +/- 3/8 inch.

10.2.4 Where raised or depressed floors are provided, structural slab elevations shall be adjusted so that all finished floor levels are the same.

10.2.5 A minimum safety factor of 1.5 shall be provided against uplift, sliding, overturning, or flotation.

10.2.6 Wood shall not be used for any structural members. Plywood shall not be used for wall sheathing or structural roof sheathing, or floor decking. Tilt-up panels shall not be used.

### 10.3 Design Loads

10.3.1 Design dead, live, and wind loads, and load combinations shall be in accordance with the IBC 2015, unless specified otherwise herein.

10.3.2 Live loads, not given, shall be in accordance with Appendix B of UFC 3-310-01. The following floor areas shall be designed using the stated loads, as a minimum:

	Uniform	Concentrated
Slab-on-Grade (Unless Noted Otherwise)	150 psf	
Mechanical and Electrical Rooms	400 psf	
Access Floor Systems (Component load)	100 psf	2,000 lbs
Stairs and Exits	100 psf	300 lbs

10.3.3 Wind loads shall be based on a 145 miles/hr Basic Wind Speed, Building Occupancy Category II, and Exposure Category C as described in UFC 3-301-01. Wind loads shall be computed and applied in accordance with the IBC 2015 and

ASCE 7-10. All parts of all structures shall be designed for the specified wind velocity and shall be tied together to provide an integrated resistance to high wind effects.

10.3.4 Seismic loads shall be in accordance with UFC 3-310-01, Building Occupancy Category II. The short period spectral acceleration value ( $S_s$ ) shall be taken as 0.08g and the one second period spectral acceleration value ( $S_1$ ) shall be taken as 0.05g, for a 2 percent probability of exceedance in 50 years. Seismic Site Classification D shall be used unless modified by the contractor's geotechnical report. Seismic loads shall be computed and applied in accordance with the IBC 2015 and ASCE 7-10.

#### 10.4 Concrete

##### 10.4.1 Codes and References

- a. ACI 315 Manual of Standard Practice for Detailing Reinforced Concrete Structures, latest ed.
- b. ACI 318-11 Building Code Requirements for Reinforced Concrete
- c. ACI 360 R-06 Design of Slabs on Grade

10.4.2 Specified minimum compressive strength  $f'_c$  shall be 3500 psi at 28 days for all concrete, unless noted otherwise. All main structural concrete, including but not limited to beams, columns, and walls, shall have a minimum compressive strength  $f'_c$  of 4000 psi at 28 days.

10.4.3 All edge or spandrel beams shall have continuous reinforcing top and bottom. Use as a minimum, two #5 bars. Beams shall have continuous ties. Straight bars are recommended in lieu of bent bars for beams and slabs. In no case shall bent bars be used in slabs less than 6 inches thick.

10.4.4 The reinforcing of concrete walls, continuous footings, and tie and bond beams shall be continuous and, therefore typical details showing the arrangement of reinforcing at corners and intersections of these members shall be shown on the drawings.

10.4.5 Building slabs-on-grade shall be placed on a minimum 15 mil vapor barrier and minimum 6-inch capillary water barrier. Concrete floor slabs remaining exposed shall be treated with a hardener/sealer.

10.4.6 In no case shall a slab-on-grade be less than 6 inches thick. Thickened slabs shall be required for walls and partitions which have a vertical load of 300 pounds/foot to 950 pounds/foot. A separate isolated wall footing shall be used for walls having a vertical load in excess of 950 pounds/foot. A minimum of 0.15 percent welded wire mesh shall be provided in each direction in slabs placed 1-1/2 inch from the top of slab. Deformed welded wire fabric in flat sheets, or deformed reinforcing bars shall be used.

Maximum Uniform Design Live Load	Slab Thickness	Wire Mesh Reinforcement
400 psf	6 inches	6x6 - W5.5 x W5.5

10.4.7 Slabs shall be placed in a checkerboard or lane fashion. The area bounded by crack control joints shall not exceed 250 square feet and distance between crack control joints shall not exceed 16 feet. Crack control joints may be construction joints, contraction joints, expansion joints, or isolation

joints. Reentrant corners in slabs shall be reinforced with two #4 bars, 4 feet long, placed diagonally to the corner. Discontinuous joints shall be reinforced with two #4 bars, 4 feet long, placed opposite the end of the discontinuous joint. Where visible, construction joints in slabs, exterior walls and cap blocks shall match joints.

10.4.8 The flatness of the floors shall be carefully controlled and the tolerances shall be measured by the straightedge system as specified in paragraph 4.5.7 of ACI 117/117R, using a 10 foot straightedge, within 72 hours after floor slab installation and before shores and/or forms are removed. The listed tolerances shall be met at any and every location at which the straightedge can be placed.

Bullfloated	1/2 inch
Straightedged	5/16 inch
Float Finish	3/16 inch
Trowel Finish	3/16 inch

Tolerances may also be measured by the F-number system in accordance with Paragraph 4.5.6 and 4.5.6.1 of ACI 117/117R.

10.4.9 All detailing and materials used for concrete reinforcement shall be in accordance with ACI 315 and ACI 318, latest editions.

10.4.10 The contractor shall provide a hot weather concreting plan that shall be approved by the contractor's structural engineer of record.

## 10.5 Steel

### 10.5.1 Codes and References

MBMA MBSM	Metal Building Manufacturer's Association Metal Building Systems Manual
AISC 325	14th Edition Manual of Steel Construction
AISC 360-10	Specification for Structural Steel Buildings
AISC 341-10	Seismic Provisions for Structural Steel Buildings
SJI	Standard Specifications Load Tables and Weight, latest edition.
AISC D.G. 11	Steel Design Guide 11: Floor Vibrations due to Human Activities

10.5.2 Shop connections for structural steel shall be welded. Field connections shall generally be made with high strength bolts (ASTM A325) in bearing type connections. All connections other than standard AISC shear connections shall be designed by the structural engineer of record and detailed on the final plans. Connection angles shall be a minimum 5/16 inch thick and bolts shall be a minimum of 3/4 inch in diameter.

10.5.3 The fabricating plant furnishing the structural steel shall be certified under the AISC Certification Program for Conventional Steel Structures.

10.5.4 Structural Cold-Formed Steel: Cold-formed steel framing shall be designed in accordance with the IBC 2015. All cold-formed steel framing shall be formed from steel that conforms to the requirements of ASTM A-653, Grade 33 or higher, having a minimum yield of 33 ksi. Minimum uncoated steel thickness (design thickness times 0.95) shall be 0.0329 inches (20 gage). All cold-formed steel framing, connectors, etc. shall receive a G60 galvanized

coating, as a minimum. Deflection of exterior wall studs supporting concrete or masonry shall be limited to L/600.

10.5.5 Steel Joists: Steel joist construction will be in accordance with the IBC 2015 and the SJI, latest edition. Joists will be anchored to steel supports by bolting or field welding. Maximum insert plates will be provided in concrete work as required. Where equipment is hung from joists, details, of joist reinforcement at hanger locations shall be provided on drawings.

10.5.6 Braced frames, if used, shall be designed and detailed according to AISC 325 and AISC 341.

10.5.7 Structural steel frames, if used, shall be designed and detailed according to AISC 325 and AISC 341.

10.5.8 An erection plan shall be provided by the contractor. The erection plan shall be reviewed, stamped and sealed by a structural engineer licensed by the State of Florida. The erection plan shall also be approved by the engineer of record.

10.5.9 Masonry steel lintel angles and relieving angles: Shall be designed, detailed and indicated on the structural contract drawings. All masonry lintel angles shall be 1/4" thick minimum and shall be hot-dip galvanized.

10.5.10 Exterior steel embedded in concrete for such purposes as exterior railing, handrails, fence, base plates, anchor bolts, etc. shall be hot-dipped galvanized unless otherwise directed.

10.5.11 All column base plates and anchor bolts shall be completely encased in concrete. All below grade steel shall be completely encased in concrete or coated with coal-tar epoxy.

10.5.12 Where dissimilar metals are in contact, or where aluminum is in contact with concrete, mortar, masonry, wet or pressure-treated wood, or absorptive materials subject to wetting, the surfaces shall be protected with a coat of bituminous paint or asphalt varnish.

## 10.6 Masonry

### 10.6.1 Codes and References

ACI 530-11 Building Code Requirements for Masonry Structures

### 10.6.2 Concrete Masonry Units and Concrete Masonry Veneer Units

10.6.2.1 Masonry walls shall be laid in running bond and reinforced as required to resist all vertical and horizontal loads. All structural masonry walls (load bearing walls, shear walls, or exterior walls) shall be designed as reinforced masonry, neglecting the tensile strength of masonry, in accordance with ACI 530-11.

10.6.2.2 Minimum thickness of structural masonry walls shall be 8 inches. Minimum reinforcement shall be as follows: Minimum bar size shall be #4. One vertical reinforcing bar shall be provided continuously from support to support at each wall corner, at each side of each opening, at each side of control joints, at ends of walls, and elsewhere in the wall panels at a

maximum spacing of 48 inches. This minimum reinforcement shall be the same size as the minimum vertical reinforcement provided for flexural stresses.

10.6.2.3 Horizontal reinforcement in continuous masonry bond beams shall be provided continuously at floor and roof levels and at the tops of walls. Horizontal reinforcement shall also be provided above and below all wall openings. These bars shall extend a minimum of 40 bar diameters, but not less than 24 inches, past the edges of the opening. For masonry laid in running bond, the minimum horizontal reinforcement should be two #5 bars per bond beam. The minimum area of horizontal reinforcement placed in horizontal joints or in bond beams, which are spaced not more than 48 inches on center, shall be 0.0007 times the vertical cross sectional area of the wall. Lintel units shall not be used in lieu of bond beam units.

10.6.2.4 Nonstructural masonry walls may be designed as unreinforced masonry in accordance with ACI 530. However, the minimum reinforcement around openings given above for structural walls shall be incorporated.

10.6.2.5 Concrete masonry walls shall have vertical control joints as follows.

- a. Exterior and Interior Walls: 24 feet maximum
- b. At changes in wall height or thickness
- c. Near wall intersections
- d. At points of stress concentration
- e. At control joints in foundation walls and
- f. Where a slab joint passes beneath a wall.

In no case shall any masonry control joint be placed so as to interrupt the continuity of lintel bar extensions as described above.

10.6.2.6 If the masonry compressive strength ( $f'_m$ ) used in the design is 1500 psi or more, a qualified masonry inspector approved by the COR shall perform inspection of the masonry work. Minimum qualifications for the masonry inspector shall be 5 years of reinforced masonry inspection experience or acceptance by a State, municipality, or other governmental body having a program of examining and certifying inspectors for reinforced masonry construction. The masonry inspector shall be present during preparation of masonry prisms, sampling and placing of masonry units, placement of reinforcement (including placement of dowels in footings and foundation walls), inspection of grout space, immediately prior to closing of cleanouts, and during grouting operations. The masonry inspector shall assure Contractor compliance with the drawings and specifications. The masonry inspector shall keep a complete record of all inspections and shall submit daily written reports to the Quality Control representative reporting the quality of masonry construction.

## 10.7 Light-gage Metal Stud Infill Walls and Soffit Framing

### 10.7.1 Codes and References

AISI S100-07/SI-10	North American Specification for the Design of Cold-formed Steel Structural Members, with Supplement 1, dated 2010
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10.7.2 Structural steel studs may be used for interior and exterior non-load bearing walls and for soffits and fascia framing construction.

10.7.3 Cold formed metal framing shall be galvanized steel per ASTM A525, G60 Coating meeting the requirements of ASTM A446 Grade A, with a minimum yield strength of 33,000 psi.

10.7.4 Engineer of Record Responsibility: The building structural EOR has design responsibility for cold-formed steel systems and this responsibility will not be transferred to the Construction Contractor.

10.7.5 The contract drawings shall show all components of the steel stud walls, soffits or fascia systems. The connections shall be completely detailed on the drawings.

10.7.6 Design and detail the connections between steel stud framing and the main structural system to prevent the studs from carrying floor or roof axial or shear loads if the walls are non-load bearing.

10.7.7 Contract drawings shall specify the required stud depth, spacing, thickness, section modulus and moment of inertia

10.7.8 Light-gage steel framing along exterior walls and soffit shall be a minimum of 18 gage (43 mils) thickness material and spaced at a maximum spacing of 16-inch o.c. Light-gage steel track along exterior walls and soffit shall be fabricated from a minimum of 18 gage (43 mils) thick material. Use #10 minimum self-tapping screws for the connections of 18 gage (43 mils) studs. Do not weld 18 gage (43 mils) thick materials. 16 gage (54 mils) and thicker studs can be attached with weld or #10 minimum self-tapping screws.

10.8 Specifications. As a minimum, the Contractor shall edit and submit the following UFGS as defined in Section 01 10 12, Design After Award:

03 10 00	Concrete Forming and Accessories
03 20 00	Concrete Reinforcement
03 30 00	Cast-In-Place Concrete
03 35 00	Concrete Finishing
03 39 00	Concrete Curing
04 05 03	Masonry Mortaring and Grouting
04 20 00	Masonry
05 40 00	Cold-Formed Metal Framing

## 11. HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

### 11.1 GENERAL DESIGN REQUIREMENTS

a. The HVAC systems shall be designed to the latest industry standards, codes, Government regulations, and the Energy Policy Act of 2005 (EPACT 2005). These codes and regulations shall include, but not be limited to, the following:

- International Building Code 2015
- International Mechanical Code 2015
- ASHRAE 2011 Thermal Guidelines for Data Centers
- ASHRAE 90.1-2010
- ASHRAE 55-2004
- UFC 3-410-01

b. Design documents shall be submitted and approved prior to commencing work on the HVAC system. The Contractor shall be responsible for the



professional quality and technical accuracy of all HVAC design documents and shall insure construction meets all requirements of the approved design. Drawings, specifications, and other design documents upon which construction is based shall be coordinated with other disciplines to insure compatibility of all building systems.

- c. All equipment efficiencies shall meet or exceed the minimum equipment requirements set forth in ASHRAE 90.1 or as required to achieve energy efficiency compliance as prescribed by EPACT 2005. It shall be the responsibility of the Engineer of Record to perform the final design calculations as required for design efforts and final energy efficiency verifications of EPACT 2005. The layout of the mechanical rooms shall consider proper maintenance clearances around all equipment including coil pull space, separation of conditioned and unconditioned areas, and observance of the "dedicated electrical space" around electrical equipment as required by the National Electrical Code, as well as the minimum clearance requirements set forth in the International Mechanical Code, and the manufacturer's minimum recommended clearances.
- d. All exterior piping, tanks, or other appurtenances that could be damaged by freezing shall be protected with heat tracing.
- e. Provide DX/heat pump systems to heat and cool bldg. with a minimum three zones. One for training room, one for the server room and one for the rest of the building. DX VAV systems are not allowed.
- f. All refrigerant piping shall be routed underground or thru walls in a chase.
- g. Access panels and doors shall be provided for maintenance of all equipment and appurtenances above hard ceilings or otherwise concealed. Access panels shall be of sufficient size and located so that concealed items can be easily serviced, maintained and completely removed and replaced. Any valves, dampers or other mechanical devices that maintenance personnel may need to access shall be marked on the ceiling grid with an approved marking system and a laminated index of markings shall be placed in the mechanical room.

#### 11.2 HVAC EQUIPMENT SIZING

It shall be the design/build design professionals' responsibility to verify occupancy and heat loads from all government-furnished equipment prior to commencing work. The design/build contractor shall submit, for review and approval, building HVAC load calculations and shall demonstrate compliance with EPACT 2005.

#### 11.2 DESIGN PARAMETERS

Standard Design Conditions:

Outside:

Summer	95 Degrees FDB	78 Degrees FWB
Winter	25 Degrees FDB	-

Inside-General:

Summer	75 Degrees FDB	50% RH
Winter	70 Degrees FDB	-

DESIGN/BUILD FTEV 16-1066 CONSTRUCT TRAINING FACILITY, 2 CWSS  
HURLBURT FIELD, FLORIDA

Inside-Communication:

Summer 70 Degrees FDB 50% RH  
Winter 70 Degrees FDB -

Filtration Rates:

MERV 8 pre-filter and MERV 13 final filter per ASHRAE 52-76  
Maximum 500 feet per minute face velocity

Exhaust Rates:

Building Pressurization 10-15% minimum

Miscellaneous Loads:

Equipment Heat Load for Systems Training Room - include cooling load for 10 laptops, smartboard, large screen monitor, and network switch

Equipment Heat Load for Server Room - include cooling load for 6 PMO laptops, 4 workstations, large screen monitor, rack servers and base switch

Equipment Heat Load for Conference Room - include cooling load for smartboard

Equipment Heat Load for large Office - include cooling load for 2 workstations with dual monitors, printer, large screen monitor

Equipment Heat Load for small Offices - include cooling load for workstation with dual monitors

Personnel:

Systems Training Room - 20 occupants  
Server Room - 5 occupants  
Conference Room - 12 occupants  
large Office - 2 occupants  
small Offices - 1 occupant each office

Energy Conservation:

The design of the facility systems shall make use of the latest technology to provide equipment with the highest efficiency possible to achieve compliance with EPACT 2005 without compromising maintainability. The design shall comply with ASHRAE Standard 90.1-2010 "Energy Standard for Buildings Except Low Rise Residential Buildings"

Permitting: None.

Miscellaneous Information:

Refrigerant Ozone Depletion Factor: 0.050 or Lower. All refrigerants shall be either R-134A or R-410A. These refrigerants enable the project to meet criteria for LEED 2009 Energy and Atmosphere Credit 4.

Seismic Design:

See Structural Section.

Outside Air Criteria:

Design facilities to ASHRAE Standard 62.1-2010.

Energy Values:

Natural gas	1,000 BTUH per cubic foot
Electricity	3,413 BTU per Kilowatt Hour

11.4 TECHNICAL NOTES

- a. The HVAC systems shall be zoned to provide maximum year-around comfort and to provide adequate flexibility for utilizing areas of the facility during non-work hours. Air handling, heating, ventilation, and exhaust systems shall comply with NFPA 90A, except as modified by UFC 3-600-01, Par. 2-11.1.
- b. The Design/Build Contractor shall provide documentation describing the calculations and methodology and total ventilation.
- c. New refrigeration equipment shall use refrigerants as required to comply with AFI 32-7086 "Hazardous Materials Management" and as indicated previously. No Class I or Class II ODS will be allowed on any refrigeration equipment.
- d. The air distribution systems shall be designed to meet the minimum ASHRAE design guidelines for 2003 (ASHRAE HVAC Application Table 34) room criteria (RC) sound levels when operating at maximum space design requirements (Maximum air flow). Fire dampers, smoke dampers, exhaust fans, terminal units, turning vanes, balancing dampers, control dampers, diffusers, registers, grilles, louvers, flexible connections, etc. shall be selected to provide a complete, easy to balance air distribution system free of objectionable noise. The supply, return and exhaust air systems shall be fully ducted using galvanized steel of thicknesses suitable for the pressure classification. All exhaust, return, outside air and low pressure supply ductwork shall be insulated, single walled round or rectangular ductwork. The mechanical room shall not be used as a return air plenum.
- e. All outside air intakes shall comply with ATFP requirements.
- f. The new air handlers shall have minimum 2" insulated walls. Provide ARI 430 certified fan and ARI 410 certified coils. The fan bearings shall be designed with minimum 200,000 hour life at design operating conditions. The air handlers shall be double-walled with solid inner and outer liners filled with 1.5 lb per cu.ft. insulation and shall be provided with positive draining stainless steel drain pan. The air handler shall be provided with a housekeeping pad of sufficient height for proper trapping and draining of the condensate drain pan. The air handler shall be provided with MERV 8 pre-filters and MERV 13 final filters.
- g. Server room shall be designed for a sensible heat load of approximately 5 tons cooling load. The successful D/B team shall verify exact loading prior to design. Server room shall be provided with its own air conditioning unit sized for the equipment and provided with condensate pump (if required to pump condensate to drain location).
- h. The design shall include testing, balancing, and adjusting of all HVAC systems by a certified AABC or NEBB test and balance firm. Reports of all tests shall be submitted for approval to the COR on standard AABC or NEBB forms.

- i. Operation and Maintenance Manuals for all components of the HVAC systems shall be submitted by the design/build contractor prior to the Training Date. Manuals shall be submitted for approval 60 days prior to the scheduled completion date for the project. The design shall include requirements for training of operating personnel in the operation and maintenance of the complete HVAC system as specified in the included specifications. Framed instructions, control drawings, and system diagrams shall be in place prior to the start of training.

11.5 DIRECT DIGITAL CONTROLS: Direct digital controls are not required on this facility.

The facility mechanical systems shall be designed and controlled with the consideration that maintenance personnel shall not be readily available to address operational problems in a timely manner. To this end, the controls shall provide for automatic restart of all equipment after interruptions except in the case of safety code requirements for a manual restart. The supplier of the control system shall provide a copy of the operating and the technical manuals for the control system to the operating personnel. System is to be designed to maintain control of humidity below 60% under all conditions.

The new HVAC systems shall be interfaced to the existing emergency shutoff switch that will immediately shut down the entire HVAC air distribution system for that facility.

11.6 Specifications. As a minimum, the Contractor shall edit and submit the following UFGS as defined in Section 01 10 12, Design After Award:

23 05 00	Common Work Results for HVAC
23 05 29	Hangars and Supports for HVAC Piping and Equipment
23 05 53	Identification for HVAC Piping and Equipment
23 05 93	Testing, Adjusting, and Balancing for HVAC
23 07 00	HVAC Insulation
23 08 00	Commissioning of HVAC
23 31 00	HVAC Ducts and Casings
23 33 00	Air Duct Accessories
23 34 00	HVAC Fans
23 37 00	Air Outlets and Inlets
23 81 26	Split-System Heat Pumps

## 12. PLUMBING

### 12.1 GENERAL DESIGN REQUIREMENTS

The Plumbing systems shall be designed to the latest industry standards, codes, Government regulations, and the Energy Policy Act of 2005 (EPACT 2005). These codes and regulations shall include, but not be limited to, the following:

- International Building Code 2015
- International Plumbing Code 2015
- ASHRAE 90.1-2010
- UFC 3-420-01

Inspection and testing of the plumbing system shall be performed as prescribed in the International Plumbing Code. The plumbing system shall conform to the applicable rules of the International Plumbing Code governing backventing of plumbing fixtures, sizing of waste, vents, drains, and water systems. All piping shall be labeled, color coded, titled, and indicate direction of flow. All shutoff/isolation valves and water hammer arrestors shall be accessible. If installed above hard ceilings, access doors shall be provided. Any valves or other mechanical devices that maintenance personnel may need to access shall be marked on the ceiling grid with an approved marking system and a laminated index of markings shall be placed in the mechanical room.

- a. Backflow Preventers: All facilities requiring potable water shall be provided with a reduced pressure backflow preventer. New backflow preventers shall be installed at the domestic water service entrance inside the mechanical room. The assembly shall have two positive seating check modules with bronze valve seats. The assembly shall meet the requirements of ASSE Std. 1015 and AWWA Std. C510 and be approved by the foundation for Cross-Connection Control and Hydraulic Research (FCCHR-01) at the University of Southern California. All test cocks shall be equipped with 1/4 inch flare adapters to facilitate attachment of test equipment. A poppet replacement kit shall be provided with each backflow preventer.
- b. Flush and disinfect all potable water systems in entire building in accordance to the International Plumbing Code.

#### 12.2 PLUMBING MATERIALS AND EQUIPMENT:

- a. Routing and Design: All piping shall be concealed, properly supported with allowances for expansion and contraction. Interior water distribution piping shall not be buried under concrete floors except where no other routing options exist. All piping shall be drainable and exposed piping subject to freezing shall be insulated and heat traced. Individual shutoff or stop valves shall be provided on water supply lines to all plumbing fixtures and humidifier connections.
- b. Materials for Waste and Vent Lines: Soil, waste, and drain piping and fittings passing through and located below the slab and out to the exterior line, and soil, waste, drain and vent piping above the slab shall be cast iron pipe and fittings or PVC. Each fixture and piece of equipment requiring connections to the drainage system shall be equipped with a trap, and all fixtures shall be vented. Surface or wall cleanouts shall be provided for each drainage main. If pipe is larger than 2 inches nominal, encase plastic piping passing through fire rated walls with schedule 40 steel or cast iron pipe sleeve extending not less than 2 feet beyond either side of such walls. Cleanouts shall be provided at each change in direction of sanitary sewer lines, at the intervals specified in the International Plumbing Code, and at the building service entrance. All cleanouts shall be permanently accessible and located in low traffic areas (such as storage rooms, locker rooms, etc.). Ground cleanouts shall be installed in a 1 foot by 1 foot, 4 inch thick concrete pad, flush with grade. PVC shall not be used in plenums.
- c. Material for Domestic Water Lines: Water piping shall be type K copper pipe. Joints under the slabs are not permitted. Amount of supply piping located under concrete slabs shall be held to a minimum. Interior water piping, above slab, in walls, shall be copper conforming to ASTM B 42, B

88, B 88M & B 641. Fittings for soft copper tubing shall conform to ANSI B16.26-75 and for hard drawn ANSI B16.22-73. Material or equipment containing lead shall not be used in any potable water system. See Table I for a complete list of domestic water piping materials.

- d. Water Supply Insulation: Provide mineral fiber insulation on all domestic water (hot, cold and re-circulating) supply and recirculation piping. Provide vapor barrier on all cold water piping.

12.3 PLUMBING FIXTURES:

- a. Hose Bibbs: Provide angle type copper alloy hose bibbs with lockshield and removable tee-handle. Inlet shall have internal threads. Outlet shall have vacuum breaker with 3/4 inch external hose threads. Hose bibbs shall be provided in mechanical rooms.
- b. Floor Drains: Floor drains shall be flush strainer type with automatic trap primers or deep-seal P-traps. Floor drains shall be located within the new mechanical room for disposal of condensate from new HVAC equipment.

12.4 PIPING MATERIALS

Table I - Piping Materials

PLUMBING - DOMESTIC WATER PIPE

APPLICATION	MATERIALS
1 Pipe, Interior, Above Ground, Conditioned Spaces	Copper
2 Pipe Interior, Above Ground, Unconditioned Spaces	Copper
3 Pipe Under Buildings	Copper
4. Pipe, Underground Outside Buildings	Copper
5. Pipe, Above Ground, Outside Buildings	Copper

PLUMBING - SANITARY DRAINAGE AND VENT PIPE

APPLICATION	MATERIALS
1 Pipe, Gravity Draining, Above Ground within Buildings and Pipe in Raceways or Tunnel Spaces	Cast Iron or PVC
2 Pipe, Gravity Draining, Underground, Within Buildings	Cast Iron or PVC
3 Pipe, Condensate Drain, Above Ground, within Buildings	Copper

12.5 Specifications. As a minimum, the Contractor shall edit and submit the following UFGS as defined in Section 01 10 12, Design After Award:

22 05 03	Pipes and Tubes for Plumbing Piping and Equipment
22 07 00	Plumbing Insulation
22 11 19	Plumbing Specialties
	Backflow Prevention Device Inspection and Maintenance Form
22 30 00	Plumbing Equipment
22 40 00	Plumbing Fixtures

### 13. FIRE SUPPRESSION

#### 13.1 CODES AND REFERENCES.

Provide fire detection/suppression systems that meet NFPA codes, including but not limited to NFPA 13 Standards for the Installation of Sprinkler Systems, and UFC 3-600-01.

#### 13.2 GENERAL.

Provide a fire detection/suppression system for the facility that meets OSHA regulations, NFPA codes and UFC 3-600-01. Design of the sprinkler system shall be in accordance with UFC 3-600-01, NFPA 13, NFPA 13R, and as specified herein.

#### 13.3 DESIGN.

a. Provide a new automatic wet pipe sprinkler system with new riser to serve the facility. Provide new fire department connections. New system will be electronically supervised with tamper switches on all major valves and will provide a signal to the fire department. Sprinkler heads shall be centered in each direction of the ceiling tiles and shall be semi-recessed. All sprinkler pipes, braces and hangers, etc., shall be designed to meet seismic requirements as stated in the Structural Section. Sprinkler rate of application, areas of application and hose stream allowances shall be as required by UFC 03-600-0.1. Hydraulic calculations shall include a safety factor of 5-psi or 10% (whichever is greater). Upright heads shall be used in mechanical rooms and open ceiling areas. Install inspector test connection. Test valves as well as all auxiliary drain valves shall be located in accessible areas. Any valves or other mechanical devices that maintenance personnel may need to access shall be marked on the ceiling grid with an approved marking system and a laminated index of markings shall be placed in the mechanical room.

b. The Design/Build Fire Protection Engineer (DBFPE) shall conduct flow tests to verify flow and pressure. These tests shall be conducted by the preparer of the Contract Documents (i.e., the DBFPE) under the supervision of the Contracting Officer's Representative and in accordance with the procedures contained in NFPA 291.

c. Design of sprinkled facilities shall be in accordance with UFC 3-600-01, which takes precedence over NFPA 13 and NFPA 20. NFPA 13 and NFPA 20 shall be applied where referenced by UFC 3-600-01 and where installation guidance is not covered by the UFC. The project Fire Protection Engineer shall review the 100% design submission of plans and specifications and shall certify in writing that the design is in compliance with the UFC and all applicable

criteria. The certification letter shall be submitted with the 100% design submission

d. NFPA 13, and NFPA 20 shall be incorporated into the design. The Contractor's design shall be prepared, signed and sealed by a qualified Fire Protection Engineer. A qualified Fire Protection Engineer shall be defined as: 1) A registered professional engineer who has passed the fire protection engineering written examination administered by the NCEES or 2) A registered professional engineer in a related engineering discipline with a minimum of 5 years experience, dedicated to fire protection engineering that can be verified with documentation. Qualifications shall be submitted for approval. Construction Drawings shall be prepared by a Fire Protection Specialist having obtained a Level III or IV certification as defined by the National Institute for Certification in Engineering Technologies (NICET) in the Automatic Sprinkler System Layout subfield of Fire Protection Engineering Technology in accordance with NICET 1014-7. The Construction Drawings shall be signed and sealed by the qualified Fire Protection Engineer.

e. The Fire Protection Specialist and the Fire Protection Engineer shall inspect the sprinkler system periodically during installation to assure that the sprinkler system is being provided and installed in accordance with the Construction Drawings. The Fire Protection Specialist and Fire Protection Engineer shall witness the preliminary and final tests and both shall sign the test results. The Fire Protection Engineer, after completion of the system inspections and a successful final test, shall certify in writing that the system has been installed in accordance with the Construction Drawings and the contract requirements. The hydraulic design plate shall be engraved to preserve the markings.

f. All fire extinguishers shall be housed in fire extinguisher cabinets for occupied areas or hung from brackets in mechanical rooms, sized for type 5 lb. BC fire extinguishers. Location shall be in accordance with NFPA code. Fire extinguisher cabinets shall not be lockable and shall not utilize plastic closers.

g. All applicable requirements of UFC 3-600-01 and UFC 3-600-02 shall be incorporated into design and installation.

h. The DBFPE is responsible for obtaining water supply data, developing the hydraulic analysis and developing a code analysis demonstrating compliance with NFPA codes and the model building code utilized prior to initial design submittals. The DBFPE shall utilize a 5 psi safety factor in the hydraulic analysis.

i. Submit the input data, hydraulic analysis, and code analysis from the computer program used to design the sprinkler system along with the design submittal to the Authority Having Jurisdiction (AHJ) for review. The computer software shall be compatible with FPE software or provide software used by Contractor if not compatible with FPE.

j. Piping for the fire suppression systems in this facility shall be Schedule 40 steel piping. All sprinkler piping shall be concealed. All piping shall be marked in accordance with AFOSH 91-501 Chapter 20. Schedule 10 piping shall not be allowed on this project.

k. A dielectric fitting shall be installed in the junction where dissimilar piping materials are joined (e.g., copper to steel). Dielectric fittings



shall not be required in the junction where sprinklers are connected to piping.

#### 13.4 DRAWINGS.

Detail drawings shall conform to the requirements established for working plans as prescribed in NFPA 13. All contract requirements that exceed the minimum requirements of NFPA 13 shall be incorporated into the design. The Contractor's submittal shall be prepared and sealed by a registered fire protection engineer or a registered professional Engineer with a fire protection background and who has had at least five years experience in fire protection\ detection design. Qualifications shall be submitted to and approved by the Contracting Officer's Representative.

13.5 Specifications. As a minimum, the Contractor shall edit and submit the following UFGS as defined in Section 01 10 12, Design After Award:

21 13 00	Wet- and Dry-Pipe Sprinkler Systems Backflow Prevention Device Inspection and Maintenance Form
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#### 14. ELECTRICAL SYSTEMS

##### 14.1 CODES AND REFERENCES.

UFC 1-200-01	Design: General 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 3-580-01	Telecommunications Building Cabling Systems Planning and Design
UFC 3-600-01	Fire Protection Engineering for Facilities
UFC 4-010-01	Design: DoD Minimum Antiterrorism Standards for Buildings
UFC 4-021-01	Mass Notification Systems
ANSI C2	National Electrical Safety Code
NFPA 70	National Electrical Code
NFPA 780	Lightning Protection Systems
IES	Illuminating Engineering Society Lighting Handbook
UL 96A	Installation Requirements for Lightning Protection Systems

##### 14.2 EXTERIOR ELECTRICAL REQUIREMENTS

14.2.2 Distribution System. The existing primary distribution system to the building shall remain.

14.2.2.1 The Contracting Officer's Representative shall approve all outages required for connection of new services to existing systems.

14.2.2.2 Transformers. The existing 225KVA pad mounted transformer, T950-1 shall be utilized for the electrical feed to the new building.

14.2.3 Exterior Lighting. No new exterior lighting shall be provided.

14.2.4 Existing underground electrical lines. An electrical manhole and underground secondary electrical lines are in the footprint of the building

and must be relocated. Panel T is located by the two semi-trailers and fed by 4-350MCM cables from the main panel in building 91024. This panel feeds the trailers and the antenna towers and must remain in operation during and after construction. There is no as-built of the electrical lines which feed the antenna towers from Panel T, but it can be assumed to be in the footprint of the building and will need to be relocated. The secondary for existing parking lot lights will remain and must be relocated.

14.3 Electrical Interior. Actual equipment electrical loads and demand factors, where known, shall be used for electrical calculation purposes. Where loads are unknown, the contractor shall utilize loading and demand factors outlined in NFPA 70. Branch circuits feeding receptacles of unknown loads shall be limited to 1200VA per circuit. The interior electrical distribution system shall be designed with a minimum of 25% excess load capacity in all switchboards, panelboards, and feeders after all load and demand factors have been applied to the electrical calculations. Additionally, all distribution panelboards shall have 25% excess physical space for future use. All electrical equipment shall be located in rooms, closets or spaces dedicated solely for this purpose. Article 110 of the National Electrical Code shall apply.

All panelboards serving workstations and critical electronic equipment shall have surge suppression devices. All service entrance equipment shall have built-in integral surge protection. Panelboards and circuits shall be suited to a wide range of utilization patterns. Circuit breakers within the distribution panels shall be fully rated for the available fault current. Panelboards serving nonlinear loads shall have double rated neutral buses. Motors connected to the same power source as nonlinear loads shall also be upgraded in size similarly.

14.3.1 Service Entrance/Equipment. The existing transformer provides 120/208V, 3 phase, 4 wire power.

14.3.2 Voltage Characteristics. Mechanical equipment and lighting shall be served from the 120/208V distribution system.

14.3.3 Panel Locations. Panelboards shall be located in mechanical room.

14.3.4 Branch Circuits. All circuits serving equipment with nonlinear loads shall meet the requirements of IEEE Std 1100 "Powering and Grounding Sensitive Electronic Equipment" and IEEE Std. 519 "Practices and Requirements for Harmonic Control in Electrical Power Systems". The use of 75 degree C (minimum) insulated conductors is required and shall be stated on the project drawings. Each branch circuit serving nonlinear loads shall have an individual neutral. Each branch circuit feeding a work station shall have an individual neutral.

Wiring shall be copper conductors. All wiring shall be provided and installed in conduit. Wiring system shall consist of insulated single conductors provided and installed in raceways as follows: Galvanized rigid steel conduit or IMC in concrete, masonry and areas subject to moisture. Electric metallic tubing (EMT) in concealed areas and exposed where not subject to physical damage. Non-metallic conduit (Type 40 PVC) in the ground and below concrete slabs. Wiring shall be concealed within the walls in all areas except equipment areas. Conduit shall be labeled with source and destination. Empty conduit shall have nylon pull rope installed in it with 10 additional feet of pull rope coiled at each end. A grounding conductor shall be provided and

installed with all feeders and with all branch circuit wiring to receptacles and equipment. Conductors shall be a minimum size of 12 AWG. UL instruction shall be applied when applying the ampacity tables of National Electrical Code. Article 110-3(b) states that "Listed or labeled equipment shall be installed, used, or both, in accordance with any instructions included in the listing or labeling." Since virtually all electrical equipment that meets the approval required by article 110-2 of the National Electrical Code is UL listed, the equipment must be installed in accordance with UL instructions. The basic rule of the UL Electrical Construction Materials Directory states that, in general; "The termination provisions are based on the use of 60 degrees C ampacities for wire sizes No. 14-1 AWG, and 75C ampacities for wire sizes Nos. 1/0 AWG and larger, as specified in Table 310-16 of the National Electrical Code." Higher temperature rated conductors than specified may be used if the size is based upon the previous statements. The ampacity derating for number of conductors in raceway and ambient temperature shall be based upon the National Electrical Code. The percentage of conductor fill in conduit shall be based upon National Electrical Code: one conductor maximum fill of 53 percent; two conductor maximum fill of 31 percent; and, more than two conductors maximum fill of 40 percent.

Receptacles: General purpose convenience outlets shall be specification grade, 20 amperes, 120V, duplex. In addition to the location requirements specified by NFPA 70, locate general purpose and dedicated outlets in accordance with the following:

- a. Mechanical Equipment: Provide receptacle within 25 feet of mechanical equipment on the interior and exterior of building.
- b. System Training Classroom: As a minimum, provide a quadplex adjacent to each row of desks and, at other walls, a duplex for every 12 feet of wall space at the floor line. Ensure one receptacle is located next to each voice/data outlet. Provide combination data/power floor boxes to provide receptacles at each workstation, if required.  
Exterior to the training classroom shall be a 5-20R on a dedicated 30A breaker.
- c. Provide power outlets throughout the facility to serve all proposed equipment, including government furnished equipment, and allow for future reconfiguration of equipment layout. Provide power connections to all ancillary office equipment such as printers, faxes, plotters, and shredders. Provide dedicated circuits where warranted.
- d. Corridors: One receptacle every 50 feet with a minimum of one per corridor.
- e. Server Room: Receptacles as needed for existing equipment currently located in the equipment yard trailers to be relocate to the new facility.
- f. All other rooms: (Conference Room, Offices). One for every 25 feet of wall space at the floor line. When 25 feet or less of wall at the floor line exists in a room, provide a minimum of two receptacles spaced appropriately to anticipate furniture relocations.
- g. Provide at the NIPRNet rack a 120V 20A dedicated quad receptacle circuit for the UPS.

Circuits shall be sized to limit voltage drops to no more than 3% at the worst condition. The design goals shall be to limit voltage drops to 2% on feeders and 3% on branch circuits.

14.3.4.1 Separate Circuits. Provide dedicated circuits for all printers, shredders, and any other equipment identified by the Users.

14.3.5 Exterior Outlets/Lights. Weather resistant, GFI type receptacles with weatherproof covers shall be provided every 100' along the exterior of the facility.

14.3.6 Lighting. LED fixtures shall be used. Lighting levels for all areas shall use UFC 3-530-01 and Illuminating Engineers Society (I.E.S.) recommended levels as average maintained levels of illumination. Provide point calculations for general and egress lighting as required by UFC 3-530-01. General and egress lighting calculations for each area shall utilize data from the actual fixture to be used. Calculations and layout of fixtures in open office areas shall consider shadowing effects. The engineer designing the lighting system shall maintain uniformity ratios equal to or better than that recommended by the I.E.S. standards. Task lighting shall not be used or considered in achieving the recommended illumination or uniformity ratios. Multiple switching of areas with multiple entrances shall be required at each entrance to that area. All areas shall be provided with their own light switches and occupancy sensor(s) as required by ASHRAE 90.1. Modular wiring system for lighting circuits shall be limited to 10 amps maximum or less if calculated voltage drop to the "end-of-line" fixture becomes a problem. The allowable voltage drop shall be 3% maximum from panel to "end-of-line" fixture and 5% from the "end-of-line" fixture to the transformer supplying that lighting panel. LED exit signs with battery backup shall also be used. Egress lighting shall comply with Life Safety Code NFPA 101. Emergency light fixtures shall be designated by a small permanent red mark on the fixture. Wall mounted emergency lighting shall not be used. Mercury vapor and incandescent lighting shall not be used.

Special Lighting/Other Requirements: Since this new facility shall accommodate operational areas utilizing computer work stations, the use of VDTs (video display terminals) shall be widespread. The design of the lighting system in these areas shall be such that glare on the VDTs shall be minimized. All lighting fixtures shall be LED type with a maximum color temperature of 3500 degrees Kelvin.

- a. Corridors shall utilize a lighting system of 2x2 recessed, direct/indirect lighting fixtures.
- b. Classrooms shall utilize linear, pendant mounted direct/indirect lighting fixtures.

Lighting controls: A complete lighting system consisting of area lighting with LED luminaires including ceiling mounted dual technology ultrasonic/passive infrared occupancy sensors shall be provided. Automatic lighting controls will be provided for all spaces except mechanical room. Override switches will be provided at each entry point to each room, space, or area. Occupancy sensor timed delay settings and auto shut off sensitivity settings shall be adjusted for optimal performance without undue inconvenience to Users. The lighting system shall be designed to use the most energy efficient type of luminaires and be in compliance with ASHRAE 90.1.

14.4 Lightning Protection. A conventional lightning protection system shall be designed and provided in accordance with NFPA 70 National Electrical Code and NFPA 780 Lightning Protection Code, UL 96 Lightning Protection Components and UL 96A Installation Requirements for Lightning Protection Systems. Exterior, exposed, down conductors shall not be utilized. The new lightning protection system for the new building shall be bonded to the existing lightning protection system currently installed on the adjacent building.

The lightning protection system shall consist of air terminals, roof conductors, down conductors, ground connections, and grounds, electrically interconnected to form the shortest distance to ground. Secondary conductors shall interconnect with grounded metallic parts within the building. Interconnections made within side-flash distances shall be at or above the level of the grounded metallic parts. The system furnished shall consist of the standard products of a manufacturer regularly engaged in the production of lightning protection systems and shall be the manufacturer's latest UL approved design. No combination of materials shall be used that form an electrolytic couple of such nature that corrosion is accelerated in the presence of moisture unless moisture is permanently excluded from the junction of such metals. Aluminum shall not contact the earth nor shall it be used in any other manner that shall contribute to rapid deterioration of the metal. Appropriate precautions shall be observed at connections with dissimilar metals.

a. The tip of air terminals shall be a minimum of 2 feet above the ridge parapet, ventilator or perimeter. Air terminals more than 2 feet in length shall be supported by a suitable brace, with guides, not less than one-half the height of the terminal. Terminals shall be rigidly connected to, and made electrically continuous with, roof conductors by means of pressure connectors or crimped joints of T-shaped malleable metal and connected to the air terminal by a dowel or threaded fitting. Air terminals shall be secured against overturning either by attachment to the object to be protected or by means of a substantial tripod or other braces permanently and rigidly attached to the building or structure.

b. Conductors shall be connected directly to the roof or ridge roll. Necessary turns shall have a radius of not less than 8 inches. Conductors shall preserve a downward or horizontal course and shall be rigidly fastened every 3 feet along the roof and down the building to ground. Metal ventilators shall be rigidly connected to the roof conductor at three places. All connections shall be electrically continuous. Roof conductors shall be coursed along the contours of roof in such a way as to join each air terminal to all the rest.

c. Conductors shall be electrically continuous from air terminals and roof conductors to grounding electrodes. Down conductors shall be coursed over extreme outer portions of the building. Facility shall have not less than two down conductors located as widely separated as practicable, at diagonally opposite corners. Additional down conductors shall be installed when necessary to avoid "dead ends" or branch conductors ending at air terminals. The exception is where the air terminal is on a roof below the main protected level and the "dead end" or branch conductor is less than 16 feet in length and maintains a horizontal or downward coursing. Down conductors shall be equally and symmetrically spaced about the perimeter of the structure. Down

conductors shall be protected where necessary, to prevent mechanical injury to the conductor.

d. Interconnection of Metallic Parts. Metal doors, windows, and gutters shall be connected directly to the grounds or down conductors using not smaller than No. 6 copper conductor, or equivalent. Conductors placed where there is probability of unusual wear, mechanical injury, or corrosion shall be of greater electrical capacity than would normally be used, or shall be protected. The ground connection to metal doors and windows shall be by means of mechanical ties under pressure, or equivalent. Metal bodies of conductance shall be protected if not within the zone of protection of an air terminal. All metal bodies of conductance having an area of 400 square inches or greater or a volume of 1000 cubic inches or greater shall be bonded to the lightning protection system using main size conductors and a bonding plate having a surface contact area of not less than 3 square inches. Metal bodies of inductance shall be bonded at their closest point to the lightning protection system using secondary bonding conductors and fittings. A metal body that exceeds 5 feet in any dimension, that is situated wholly within a building, and that does not at any point come within 6 feet of a lightning conductor or metal connected thereto shall be independently grounded.

e. Ground Connections. Connections comprising continuations of down conductors from the structure to the grounding electrode shall securely connect the down conductor and ground in a manner to ensure electrical continuity between the two. There shall be a ground rod connection for each down conductor. Metal water pipes and other large underground metallic objects shall be bonded together with all grounding mediums. A grounding electrode shall be provided for each down conductor. Ground rods shall be 60 feet, set not less than 3 feet, or more than 8 feet, from the structures foundation. The complete installation shall have a total resistance to ground of not more than 25 ohms. A counterpoise, where required, shall be of No. 4/0 copper cable or equivalent material having suitable resistance to corrosion and shall be laid around the perimeter of the structure in a trench not less than 2 feet deep at a distance not less than 3 feet nor more than 8 feet from the nearest point of the structure. All connections between ground connectors and grounds or counterpoise and between counterpoise and grounds shall be electrically continuous.

14.5 Specifications. As a minimum, the Contractor shall edit and submit the following as defined in Section 01 10 12, Design After Award:

26 05 00	Basic Electrical Requirements
26 05 19	Building Wire and Cable
26 05 26	Grounding and Bonding
26 05 29	Supporting Devices
26 05 33	Conduit
26 05 34	Boxes
26 05 53	Electrical Identification
26 12 00	Distribution Transformers
26 24 16	Panelboards
26 27 26	Wiring Devices
26 28 19	Disconnect Switches
26 35 33	Surge Suppressors
26 41 00	Lightning Protection Systems
26 51 00	Interior Luminaires
26 56 00	Exterior Lighting

15. ELECTRONIC SYSTEMS

15.1 Codes and References.

UFC 1-200-01	Design: General Building Requirements
UFC 3-580-01	Telecommunications Interior Infrastructure Planning and Design
UFC 3-600-01	Fire Protection Engineering for Facilities
UFC 3-600-02	Operation and Maintenance: Inspection, Testing, and Maintenance of Fire Protection Systems
UFC 4-010-01	Design: DoD Minimum Antiterrorism Standards for Buildings
UFC 4-021-01	Mass Notification Systems
NFPA 70	National Electrical Code
NFPA 72	National Fire Alarm and Signaling Code

15.2 Exterior Electronic Systems. The construction contractor shall install two new 4" communication conduits running from the new facility to a new traffic rated handhole at the main antenna area in the northeast corner of the yard. From the new handhole, another 4" conduit will run from the handhole to the existing underground communication pull boxes serving the antennas in the northeast corner of the yard. Two additional 4" conduits will run from the new handhole: one to each of two antenna areas in the southeast corner of the yard.

Existing communications conduits currently run underground from the trailers to the various antenna towers. The exact location of these conduits is unknown. If any of these conduits are discovered to run under the new facility footprint, the government will install temporary lines. After the facility construction is completed, new cables will be run by the government from the new facility to the antenna towers through the new 4" conduits.

15.3 Interior Electronic Systems:

15.3.1 Fire Detection and Alarm System. A complete fire detection and alarm system shall be provided for the new building. Design of the fire alarm system shall be carried out by a registered fire protection engineer. The fire alarm systems shall be remotely monitored through a Monaco transceiver. The fire detection and alarm systems shall consist of pull stations, smoke detectors, heat detectors, signaling devices, etc. System shall conform to UFC 3-600-01 Design Fire Protection Engineering for Facilities and the NFPA Codes. All fire alarm wiring shall be provided and installed in conduit. Equipment supplied shall be fully compatible with the existing fire alarm system equipment.

15.3.2 Maintenance Manuals. A minimum of four copies of the operating manuals shall be provided. The manuals shall include the following information, complete schematic diagrams, as-built drawings, technical cut sheets, and trouble shooting and programming manuals on all installed equipment. Provide a drawing of the total system including all ties from other equipment to the control panel.

15.3.3 Public Address System. Provide speakers in the new facility that are connected to the existing PA system in building 91024 to allow synchronized audio in both facilities.

15.4 Telephone and LAN Systems(Interior). The design drawing of the communications and security systems shall consist of detailed construction drawings detailing the exact requirements of the systems. Drawings shall include:

(1) Detailed floor plans showing all outlet locations and types (as-built drawings shall be revised to show outlet IDs).

(2) Telecommunications room layouts, showing at a minimum power outlet coordination, racks, cable try, conduit entrances, etc.

(3) Backboard and rack elevations showing at a minimum all protector blocks, patch panels, power outlets, horizontal and vertical cable management.

(4) These drawings shall not be generic in nature and shall reflect the actual rack and room design.

a. Local Area Network (LAN) cabling systems shall comply with the Electronic Industry and Telecommunication Industry Association standards.

b. All wiring and equipment shall be in accordance with Air Force Special Operations Command Instruction (AFSOCI) 33-105 and UFC 3-580-01 Telecommunications Interior Infrastructure Planning and Design.

15.4.1 Qualifications. The contractor designing the communications system must be BICSI certified Registered Communications Distribution Designer (RCDDR). All work under this section shall be performed by a certified Telecommunications Contractor, hereafter referred to as the Contractor. With the exception of furnishing and installing conduit, electrical boxes, and pull-wires, this work shall not be done by the Electrical Contractor. Contractor shall have a minimum of 3 years experience in the application, installation and testing of the specified systems and equipment. All supervisors and installers assigned to the installation of this system or any of its components shall have factory certification from each equipment manufacturer that they are qualified to install and test the provided products. General electrical trade staff (electricians) shall not be used for the installation of the premises distribution system cables and associated hardware. All installers assigned to the installation of this system or any of its components shall have a minimum of 3 years experience in the installation of the specified copper and fiber optic cable and components.

15.4.2 Minimum Manufacturer Qualifications. Cabling, equipment and hardware manufacturers shall have a minimum of 3 years experience in the manufacturing, assembly, and factory testing of components which comply with TIA-568-C.1, TIA-568-C.2 and TIA-568-C.3.

#### 15.4.3 Communications Infrastructure

a. Premises wiring shall consist of Category 6 copper cables for telephone and non-secure network cabling and fiber optic cables for all secure network cabling. Category 6 cabling shall be plenum rated for any plenum rated space. The use of non-plenum rated cable is acceptable per code. The complete cabling system shall be fully wired, terminated, labeled, and tested at both outlet and patch panel end.

b. A 1 meter minimum clearance shall be provided between all secure rack terminations and all non-secure equipment and cabling.



- c. Rack mounted Cat 6 rated RJ-45, TIA-568A, 48 port patch panels shall be provided for horizontal cable terminations. Provide 66 wall rack mounted blocks for patching for voice backbone connectivity. All patch panels and wiring blocks shall be 19" wide.
- d. Label all rack, ground bars, conduits, backboards, cables, and patch panels in accordance with ANSI TIA/EIA 606A Standard.
- e. All premise wiring pairs shall be tested using a Level III certified tester. Documentation of testing shall be provided to Contracting Officer.
- f. The electronic equipment that connects to the structured cabling systems shall be Contractor Furnished/Contractor Installed equipment. Coordinate with Base for required electronics.
- g. At all locations where furniture is not mounted adjacent to wall or in a manner that provides raceways to walls, provide recessed floor mounted boxes with recessed connectors and appropriately sized conduits to the nearest contractor provided cable rack or to the serving room. Conduits must be run IAW TIA standards and fill rates apply.
- h. Outside Plant

(1) Project Specific Details

Code and Reference  
ANSI/TIA-758-B  
ANSI-J-STD-607A

(a) Contractor will provide a 12 strand single mode fiber connection from the new facility to building 91023. Contractor will provide a 25 pair copper cable in the new facility to the nearest usable splice as designated by 1 SOCS. Copper and fiber cable must be one continuous length without any splices. Contractor will provide a minimum 2 each 4" inside diameter schedule 40 conduits from the new facility to the nearest usable manhole as designated by 1 SOCS for the cable pathway for the fiber and copper cable. If relocating a manhole the contractor will need to provide 4" schedule 40 or schedule 80 conduit (depending on existing conduit) for building 91024. Additionally, the contractor may need to provide additional fiber optic, copper cabling, and splice materials for building 91024 as determined by 1 SOCS.

(b) Contractor provide all duct and hand hole for the new facility and 91024. Handhole size to be 6'L X 4'W X 4'D (length, width, depth) and to be precast concrete. One (1) facility conduit will be provisioned with maxcell installed and maxcell will extend out from conduit ends 3' and be secured in facility and handhole. One (1) maxcell per conduit should have a tracer wire. Contractor to provide three (3) each three (3) cell maxcells in one (1) of the two (2) conduits between new handhole and facilities.

(c) Contractor provide all termination materials (splice trays, panels, inserts, pigtails, etc.) to terminate twelve (12) strand fiber in an SC configuration.

(d) Contractor provide twenty-five (25) pair protected copper terminal for the copper cable.

(e) Contractor provide grounding bar for all equipment and ground.

(f) Government will terminate copper cable in manhole. Contractor will terminate copper cable in new facility on Building Entrance Protector.

(g) Contractor will terminate fiber cable in new facility and in 91023. Contractor will need to be escorted in 91023 and must give the Govt. 7 day notice for escort request. Existing duct space availability must be verified by the Contractor and, if required, additional capacity shall be included in the project.

(2) General Specifications

(a) New Maintenance holes

(i) Maintenance holes with an American Association of State Highway and Transportation Officials (AASHTO) rating of H-20 are required. Maintenance holes shall be precast concrete.

(ii) Selected maintenance holes shall have a minimum interior dimension of 6'L X 4'W X 4'D (width, length, depth). Maintenance holes covers shall be labeled "COMMUNICATIONS". Cover must meet environmental conditions (heavy traffic, light loads, foot traffic, etc.)

(iii) Maintenance holes shall be equipped with:  
Corrosion resistant pulling irons  
Corrosion resistant cable racks  
Ground Rod

(b) Cable Racks and Cable Rack Supports. Cable racks shall be installed in new maintenance holes. Splices shall not be supported by the cables that enter each end of the splice case. Telecommunications industry standard cable hooks of the appropriate length shall be provided to support cables and splice cases. The cable hooks shall be secured using cable rack locking clips. All cables shall be supported using racking clips, cable racks, and cable hooks. Cable racks and supports shall be grounded.

(c) Communications maintenance holes and duct shall not be shared with electrical installations

(d) Underground Conduit Systems, Trade Size 4" Ducts.

(i) Composition. The ducts shall be corrosion resistant and 4-inch inside diameter (I.D.) round or metric equivalent. The ducts shall be made of EPC-80-PVC (Schedule 80) IAW NEMA TC-2. The ducts shall be appropriately labeled indicating the composition material. Ducts shall have a sleeve or bell end type coupling and shall be watertight when assembled.

(ii) Installation. Installation of underground conduits/ducts, shall be IAW RUS Bulletin 1751F-643; RUS Bulletin 1753F-151; and T.O 31W3-

10-22. Ducts across roads, sidewalks, parking areas, or areas to be paved, etc. shall be installed a minimum of 30" below grade, but should maintain a 36" below grade. In maintenance holes with knockouts, ducts shall start at the bottom knockout, allowing for upward expansion in the maintenance holes. All ducts not installed across roads, sidewalks, parking areas, or areas to be paved, etc. shall have a minimum of 30 inches ground cover, but should maintain a 36" below grade, where possible. The Contractor shall provide other protective measures, concrete cap, etc., in those areas where the minimum ground cover cannot be achieved. Grading of ducts shall be accomplished IAW RUS Bulletin 1751F-643.

(iii) Bends and Sealing. All bends between maintenance holes shall be a minimum 40-foot radius with the sum of bends in all directions not exceeding a total of 90 degrees. Only two 90-degree bends shall be allowed between maintenance holes. Ducts shall have bell ends and enter a maintenance holes perpendicular to the surface of the wall through which it is entering. All ducts/inner ducts entering maintenance holes must be sealed. Universal duct plugs or removable putty sealants may be used. Upon completion of conduit sections, a test mandrel  $\frac{1}{4}$ " (6.4mm) smaller than the inside diameter of the conduit shall be pulled through two diagonally opposite ducts to ensure proper alignment. In addition, all ducts shall be cleared of loose materials such as concrete, mud, dirt, stones, etc.

(iv) Pull Rope/Inner duct. All vacant ducts shall be provided with a waterproof corrosion resistant mule tape for future cable installation. The pull rope/mule tape shall extend into the maintenance hole and be secured to the cable rack or pulling iron, etc.

(v) Provide three (3) 3"-3-cell geo-textile flexible type inner ducts with mule tape (maxcell or equivalent) in one duct of the required ducts installed between each pair of maintenance holes or between building and first maintenance hole until reaching base manhole and duct system. If pulling multiple innerduct runs in one conduit pull all inner duct simultaneously through duct and flat to avoid wrapping of inner duct. Leave three feet of inner duct exposed in the maintenance hole for each inner duct provided and secure mule tape to cable rack or pulling iron, etc.

(vi) Spacers and Tracer Wire. Along the length of the duct run, if the ducts are installed by trenching, spacers shall be placed at an interval of four (4) spacers per 20 feet and cable warning tape shall be buried one (1) foot below the surface and shall follow the duct route. The tape shall be a minimum of three inches wide and orange in color with the appropriate warning message. At least one duct will have tracer wire or be otherwise locatable from the surface.

(vii) Entrance Conduits into Existing Maintenance holes. When new entrance conduits/ducts or sleeves are required, the Contractor shall bore and install the necessary holes and install the ducts or sleeves, if knockout doesn't exist. Penetration shall not be in such a location through the wall as to block use of existing ducts in the maintenance hole. New ducts will be a minimum of 18 inches from

either the maintenance hole floor or ceiling, if practical. The minimum bending radius for entry conduit/ducts shall be no less than 10 times the inside diameter of the conduit. Ducts and openings around ducts shall be sealed to prevent moisture and dirt from entering the maintenance hole.

(viii) Conduit Bends or Sweeps. Where a bend or sweep is placed in PVC nonmetallic duct bank between maintenance holes, the duct bank must be encased in concrete with a minimum compressive strength of 17,225 kilopascal (kPa) [2500 pounds per square inch (psi)].

(ix) Utility Separation. When communications ducts cross either power duct or buried power cable, maintain a minimum separation of 3 inches of concrete or 12 inches of well-tamped earth between the two or 12 inches of well tamped earth when parallel; for pipes (e.g., gas, water, oil) maintain 6 inches when crossing or 12 inches when parallel.

#### 15.4.4 Grounding

Grounding shall be in accordance with Article 250 of the National Electric Code and ANSI 607-A.

#### 15.4.5 Communications Outlets

- a. This project shall include conduit, cable tray, pull wire, junction boxes, and cable installation and all internal wiring connections in accordance with the listed references and base wiring standards. Communication room and system shall meet the requirements of Electronics Industries Association/ Telecommunications Industries Association (EIA/TIA) 568A. All terminations of Cat 6 cable shall be in the 568A configuration.
- b. Provide communications outlets quantities as a minimum per AFSOCI 33-105 (primary design reference document), per the room/user requirement sheets (Department Area Program Analysis), and ETL 02-12 (supplementary document) requirements. As a minimum (per AFSOCI 33-105), provide one quad-plex (3 port data, 1 port voice) communications service outlet 18" above finished floor in designated work locations. Ensure installation of a telephone/data modular outlet within 1 foot of an electrical 110 VAC outlet or every six (6) feet of linear wall space, whichever is greater. Provide an additional 10% outlets for User requirements discovered during final design. Provide communications outlets for all fax locations and LAN connections to each printer and copier.
- c. AFSOCI 33-105 must be utilized to define minimum required communications outlet/drop density. If the room/user minimum requirements should exceed the AFSOCI requirements, this is acceptable. If the AFSOCI minimum requirements exceed the room/user minimum requirements, this too is also acceptable, however there should never be a decrease in quantities.
- d. A one (1) inch minimum EMT conduit starting at the wall outlet location and extending back to the cable tray or serving closet - conduit sizing shall be in accordance with TIA standard fill rates. Continuous conduit runs installed by the contractor should not exceed 100 feet or contain more than 2 each 90° bends without utilizing appropriately sized pull boxes. All individual distribution cabling runs (outlet to patch panel

termination point) shall be comprised of one continuous section of cable. Splices in cabling shall not be accepted.

- e. Standard 18-inches AFF outlets: Category 6 cables shall be provided for each phone, fax, STE's, and NIPRnet. Copper outlets shall have Category 6 rated, eight conductor (eight-position/eight pin), RJ-45 jacks. The wall cover must be ivory thermoplastic faceplate and flush mounted. Each numbered outlet shall correspond with the number in the closet, in accordance with ANSI TIA/EIA 606A Standard. A drawing showing each numbered outlet and its location must be provided to the Contracting Officer. All terminations of Cat 6 cable will be in the 568A configuration.
  - (1) In general, each NIPRnet outlet shall consist of four Category 6 cables, each capable of telephone or data services and terminated on patch panels in the telecom room racks. One Category 6 cable is provided to the 66 blocks on the wall for voice service.
  - (2) Provide one NIPRnet outlet per space occupant and one per printer, fax machine, copier, etc. Provide one Category 6 cable and one RG6 CATV cable for televisions requiring IPTV of CATV service at the height of the TV.
- f. Wall phone outlets: Outlets must be single modular outlet having a push-in/slide-down type backplate. The wall mount jack must be mounted 60 inches above the finished floor. Each outlet shall be numbered to correspond with the number in the closet. A drawing showing each numbered outlet and its location must be provided to the Contracting Officer. Outlets must be eight-position/eight pin, RJ-45 jacks in 568A configuration.
- g. Provide NIPRnet network connection to each A/V system location. Outlets must be eight-position/eight pin, RJ-45 jacks in 568A configuration.
- h. The testing of all distribution cabling and components shall be certified and documented in accordance with standards listed below. The installer shall provide a master cable document listing all distribution cabling according to floor, room, location, node, and status length and test data. An 8 1/2 x 11-inch floor plan for each floor shall be provided showing all drops, racks, and conduit locations.

15.5 Mass Notification System. Provide a mass notification system for the facility in accordance with UFC 4-021-01, Design and O & M Mass Notification Systems and UFGS Specification Section 28 31 76 INTERIOR FIRE ALARM AND MASS NOTIFICATION SYSTEM.

15.6 Intrusion Detection System. Not Used.

15.7 Specifications. As a minimum, the Contractor shall edit and submit the following as defined in Section 01 10 12, Design After Award:

- 27 00 00 Telephone and LAN System
- 28 31 00 Fire Detection and Alarm Systems

#### 16 CORROSION CONTROL AND CATHODIC PROTECTION

Metal in soil or submerged in water shall be protected from corrosion to prevent waste, hazardous conditions, or contamination. For all metal facilities located in the atmosphere, soil, or water electrolytes, corrosion

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control shall be provided. A minimum coating thickness of 40 mils is required  
on all underground metal.

--End of Section--