

Design and Construction Standards for Shaw Air Force Base, South Carolina



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Change 2 dated 21 Aug 2018

Page 44 – Alarm wiring color changes
Page 43 – D. Fire Alarm and Mass Notification Systems
Page 46 - E. Telephone, CCTV, Electronic Access, Time Warner and
Data

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The following guidance is to provide the requirements for all Design and Construction related activities on Shaw Air Force Base (AFB), Wateree Recreation Area, Poinsett Electronic Warfare Range, and any areas under Shaw AFB jurisdiction. This includes the design and construction of all new facilities, remodeling of existing facilities, demolition and paving activities, site, and all utility work.

All Designers, Engineers, Planners and Contractors shall implement these requirements in the preparation of their design documents and/or of their Construction activities. This information shall also be provided to any Architect-Engineering (A-E) firms that are preparing project designs for the base in any capacity. This standard supplements or emphasizes established design criteria in government and industry publications including standards, codes, regulations, policies, directives, etc.

Coordination and Cross reference:

In addition to the references within this document, this document is to be used with the Shaw Air Force Base Installation and Design (ID2) Handbook. As applicable use this in coordination with the Simplified Acquisition of Base Engineer Requirements (SABER), as the SABER document addresses similar contractual topics.

A. Standards

- All designs shall comply with the Shaw AFB Installation Development and Design (ID2) handbook (Oct 2012). If this document disagrees with the ID2 then the document with the later date shall be used.
- All reference to the UFC's and ETL's shall be omitted from the design including specifications and drawings. The design itself shall capture these requirements in the design documents in lieu of incorporation by reference. Reference to the UFC's and ETL's are allowed as justifications to the information in the Basis of Design only.
- As a general design guide, reference the Whole Building Design Guide. <https://www.wbdg.org/>
- All designs shall comply with the latest editions of all South Carolina and federal laws, national and international codes, requirements of the EPA, OSHA as well as SCDHEC and including but not limited to the following codes and standards:
 - **National Fire Protection Association (NFPA)**, with particular attention paid to the following:
 - **NFPA 13**, "*Standard for The Installation of Sprinkler Systems*"
 - **NFPA 20**, "*Standard for the Installation of Stationary Pumps for Fire Protection*"
 - **NFPA 70**, "*National Electrical Code*"
 - **NFPA 70E**, "*Standard for Electrical Safety in the Workplace*"
 - **NFPA 72**, "*National Fire Alarm and Signaling Code*"
 - **NFPA 101**, "*Life Safety Code*"
 - **NFPA 110**, "*Standard for Emergency and Standby Power Systems*"
 - **International Code Council (ICC)** codes, with particular attention paid to the following:
 - **International Building Code (IBC)**
 - **International Mechanical Code (IMC)**
 - **International Energy Conservation Code (IECC)**
 - **International Plumbing Code (IPC)**
 - **ICC/ANSI A117.1**, "*Standard for Accessible and Usable Buildings and Facilities*"
 - **International Green Construction Code (IGCC)**
 - **ICC 500**, "*Standard for the Design and Construction of Storm Shelters*"
 - **American Concrete Institute (ACI) ACI 318**, **Building Code Requirements for Structural Concrete**
 - **American National Standards Institute (ANSI)**
 - **C2 National Electrical Safety Code (NESC)**
 - **American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)**
 - **ASHRAE 189.1**, "*Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings*"
 - **ASHRAE 90.1**, "*ANSI/ASHRAE/IES Standard 90.1-2013 -- Energy Standard for Buildings Except Low-Rise Residential Buildings*"
 - All State and Federal ADA/ABA Accessibility Guidelines, requirements and compliance
 - All State and Federal required permitting and notification requirements
 - All designs shall comply with the latest editions of the Unified Facilities Criteria (UFC) including but not limited to:
 - **UFC 1-200-01**, "*General Building Requirements*"
 - **UFC 1-200-02**, "*High Performance and Sustainable Buildings Requirements*"
 - **UFC 1-300-08**, "*Criteria for Transfer and Acceptance of DoD Real Property*"
 - **UFC 3-110-03**, "*Roofing*"

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- UFC 3-120-01, “Design” Sign Standards”
- UFC 3-310-04, “Seismic Design of Buildings”
- UFC 3-340-01, “Design and Analysis of Hardened Structures to Conventional Weapons Effects”
- UFC 3-580-01, “Telecommunications Building Cabling Systems and Design”
- UFC 3-600-01, “Fire Protection Engineering For Facilities”
- UFC 4-010-01, “DoD Minimum Antiterrorism Standards For Buildings”
- UFC 4-020-01, “DoD Security Engineering Facilities Planning Manual”
- UFC 4-021-01, “Design and O&M: Mass Notification Systems”
- UFC 4-023-03, “Design of Buildings to Resist Progressive Collapse with Change”
- UFC 3-450-01, “Noise and Vibration Control”
- UFC 6-600-01, “Fire Protection Engineering For Facilities”

UFC’s are available to download from the Construction Criteria Base of the Whole Building Design Guide. <https://www.wbdg.org/ccb/ccb.php>

- All designs shall comply with all Air Force Engineering Technical Letters (ETL) including but not limited to:
 - ETL 01-18, “Fire Protection Engineering Criteria-Electronic Equipment Installations”
 - ETL 02-15, “Fire Protection Engineering Criteria – New Aircraft Facilities”
 - ETL 04-3, “Design Criteria for Prevention of Mold in Air Force Facilities”
 - ETL 04-5, “Design Recommendations for Potable Water System Security”
 - ETL 07-1, “Design Criteria for Underground Electrical Distribution Systems Using Directional Boring (DB) Installation Methods for Installing High Density Polyethylene Electrical (HDPE) Conduits”
 - ETL 11-21, “Emergency and Standby Generator Design, Maintenance, and Testing”
 - ETL 12-15, “Light-Emitting Diode (LED) Fixture Design and Installation Criteria for Interior and Exterior Lighting Applications”
 - ETL 98.8(Change 1) “Fire Protection Engineering Criteria – Existing Aircraft Facilities”

ETL’s are available to download from the Construction Criteria Base of the Whole Building Design Guide. <https://www.wbdg.org/ccb/ccb.php>

- All renovations and new construction of must be designed to adhere to current standards set forth for resource protection, antiterrorism, information security and industrial security requirements in:
 - AFI 31-101, Integrated Defense, (OPR: 75 SFS/S5)
 - AFI 10-245, Antiterrorism, which references UFC 4-010-01, DoD Minimum Antiterrorism Standards For Buildings, (OPR: 75 ABW/AT)
 - AFI 31-401, Information Security Program Regulations, (OPR: 75 ABW/IPI)
 - AFI 31-601, Industrial Security Program Management respectively, (OPR: 75 ABW/IPD)
 - Military Handbook 1013/1A, Design Guidelines for Physical Security of Fixed Land-Based Facilities or the Civil Engineering Facility Manuals (OPR: 75 Security Forces and Civil Engineering)
 - AFI 32-7086, Hazardous Materials

Reference AFI 32-2009 Real Property Accountability and Reporting with respect to DD 1354 preparation. http://static.e-publishing.af.mil/production/1/af_a4/publication/afi32-9005/afi32-9005.pdf

Most AFI’s are available to download from the Construction Criteria Base of the Whole Building Design Guide. https://www.wbdg.org/ccb/browse_cat.php?c=123

B. Construction on Base (Doing Business at Shaw AFB)

- Shaw AFB Permits: Contractor shall submit requests, a minimum of 3 weeks prior to being required, for the following Shaw permits:
 - Utility Outages
- Shaw AFB Permits: Contractor shall submit requests, a minimum of 90 days prior to being required, for the following Shaw permits:
 - FAA Crane use
 - Airfield Waiver
- Field quality control shall be the Contractor's responsibility. The individual responsible for field quality control shall be identified in writing to the Government. This information shall be provided no later than 10 days after receiving receipt of the award.
- Daily reports are due at 0800 with all haul tickets from the previous day. Email the reports to the primary and alternate. The contractor shall use *Raken* software for the daily reports.
- Fuel cost rates are as follows for 2017. Electrical: Energy Charge - \$ 0.07751 per kilowatt-hour (blended annual energy and demand cost). Natural Gas: Commodity Charge Rate - \$ 6.65315 per thousand cubic feet. Water: Commodity Charge Rate - \$2.86116 per thousand gallons. Sewer: Commodity Charge Rate - 4.99180 per thousand gallons.
- All UFC's, ETL's, standards, regulations and codes used in the design of a project shall be the most current available at the time of bid. Any changes/updates to these design documents after the 35% submittal shall be considered out of scope for the designer and not required to be incorporated.
- Designers should contact the base to validate the room names and numbers during concept and or schematic design. Contractors to validate the rooms names and numbers with the Base Architect prior to signage and all equipment and systems labeling.
- Designers and contractors shall review the FORMS, DETAILS, and ENVIROMENTAL chapters to further coordinate Shaw AFB typical practices and standards as part of "How We Do Business at Shaw AFB".
- The Contractor shall obtain all permits necessary for the construction of projects including those required by the following, as a minimum:
 - South Carolina Department of Health and Environmental Control (SCDHEC)
 - South Carolina Department of Transportation (SCDOT)
 - Environmental Protection Agency (EPA)
 - Army Corps of Engineers(ACE)
 - Other state and local agencies
- The Contractor shall coordinate with 20 CES Environmental Flight for all permits. Examples of the types of permits that would be required include, but not limited to, the following:
 - National Pollutant Discharge Elimination System (NPDES) Permits
 - Air emission applications and permits (application must be made even though a permit may not be required) See appendix for typical forms.
 - Underground storage permits
 - Water system construction permits
 - Sewer system construction permits
 - Highway construction permits
 - Storm Water Pollution Prevention Permit (SWPPP) Applications

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- Recycle all possible materials to reduce landfill use. Recycling tickets shall be provided and shall meet the requirements outlined in other sections of this standard. Recycled material disposal tickets shall be submitted to the Government monthly on an AF Form 3000 (see form appendix). Tickets shall include as a minimum, disposal location, appropriate unit of measure, material description and actual quantity.
- During demolition, remove all underground utilities that are to be abandoned or as indicated in the Request for Proposal (RFP) Statement of Work.
- When removing the carpet, the contractor is to STOP Work immediately if any tile comes up or the tile is disturbed in any manner. The contractor is to contact the Contracting Office and project inspector immediately. No work shall proceed until the government has done an evaluation completed.

C. Forms

- Appendix E contains many of the forms used when doing business at SHAW AFB. The forms are for reference; actual forms may be created by the user or obtained from the CES service call, B252. Some notes follow for a few of the forms.

AF Form 103

- Contractors shall obtain an AF Form 103 "Work Clearance Request" prior to beginning any work on site. The contractor shall submit a Contractor Requested Dig Permit to 20CES.CEN.Dig-OutageRequests@us.af.mil
- This form shall be processed and approved prior to any construction activities, including ground disturbance. All requests shall be submitted electronically. The process may take up to three weeks to be completed. Prior to submitting this request, the contractor shall mark the area in white paint or stake the area where utilities are to be located.
- During construction, the contractor shall have the approved AF Form 103 and a colored map on site referencing the area of digging (this can be hard copy or electronic). The contractor is responsible for excavating three feet to either side of identified utilities to insure the site is clear of multiple utilities. Utilities shall be hand dug if exact locations cannot be identified. Upon obtaining the AF Form 103, the contractor is responsible for maintaining the utility markings through the entire construction period. The contractor is responsible for notifying PUPS (811).

DD Form 1354

- All design packages (including Design/Build) shall include a detailed, draft design based, DD Form 1354, at key review points (35%, 65%, 95%, etc.). A Draft DD Form 1354 establishes the level of detail and the different components of a project to forecast the changes to the real property inventory. Drafts can include: expected project costs to include planning and design; supervision, inspection and overhead; and estimated construction contract costs. Updates to drafts should occur upon the following: Changes in Scope, Changes in Cost Estimates, and Addition or Deletion of project components.
- For Drafts at 1% to 49% Project Completion: DD1354s must be drafted by the contractor and submitted to the CEN Inspector. The Inspector must review the DD1354 draft and work with the contractor for any required changes.
- For Drafts at 50% Project Completion (for construction progress payments): DD1354s must be drafted by the contractor, and submitted to the CEN Inspector. The Inspector must review the DD1354 draft and work with the contractor for any required changes.
- For drafts between 51% and 90% Project Completion (for construction progress payments): DD1354s must be drafted by the contractor and submitted to the CEN Inspector. The Inspector must review the DD1354 draft and work with the contractor for any required changes.
- At the 100% or the ready for construction submittal of the design, the Draft DD Form 1354 submitted shall be a design final. Design DD Form 1354's will not contain serial numbers, but will contain the spreadsheets

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showing the real property installed building equipment (IBE) and warranty dates. D/B design DD Form 1354's will contain the MFG and model number of the equipment. The contractor and manufactures warranty dates shall be listed on the spreadsheets.

- Final drafts are due 4 weeks prior to scheduling the final inspection (i.e. Placed In Service Date (PISD)): DD1354s must be drafted by the contractor and submitted to the CEN Inspector. The Inspector must review the DD1354 draft and work with the contractor for any required changes. Block 24 MUST be signed by the Construction Agent on or before the Placed In Service Date. Contractor will bring two signed copies of the DD1354 to final inspection for final acceptance by government.
- For multiple facility projects, a separate DD Form 1354 shall be completed for each building/facility. For multiple facility phased projects affecting multiple facilities, a separate Interim DD Form 1354 shall be completed for each phase of the project where a building/facility is accepted by the Government on the Asset (PISD).
- The Contractor shall be responsible for completing and providing a detailed Draft, Interim, and Final DD Form 1354 in accordance with UFC 1-300-08 "*Criteria for Transfer and Acceptance of DoD Real Property*" and download the instructions. Refer to the forms section for an example of DD 1354. Use the latest edition of the DD 1354. It can be downloaded here: <http://www.esd.whs.mil/Portals/54/Documents/DD/forms/dd/dd1354.pdf>. A copy of the Draft, Interim, and Final DD1354s must be submitted to the Contracting Officer for any progress payment, design, or construction milestones. Ensure the most current guidance, version of DD Form 1354 and AF Category Code book is used. Note that online sites change and it is the contractor's responsibility to request the current forms from the government if unavailable on line. Request current guidance at beginning of contract.
- All construction Contractors shall be responsible for submitting an interim, detailed construction DD 1354 prior to requesting payment past the 50% level of the contract. Prior to requesting a final inspection of any Construction project the Contractor shall submit the final 1354 incorporating all previous Government comments to the interim, modifications, field changes, design updates and RFI's. The detailed, final construction 1354 shall be submitted a minimum of 4 weeks prior to requesting the final acceptance
- The Contractor shall submit a list of all Government-Furnished and Contractor- Furnished/Contractor Installed Building Equipment (IBE) (aka Real Property Installed Equipment). Note that this property is to be reviewed prior to the Basis of Design/Final and requires a two-week government review. This list shall be attached to the DD Form 1354 and not duplicated on the face of the form. For each item include the following, as a minimum:
 - Complete nomenclature of each item
 - Manufacturer
 - Model Number
 - Serial Number
 - Electrical Rating
 - Capacity
 - Contractor and manufacturer warranty dates
 - Other pertinent information
 - Cost of each item

Passes

- Contractors, designers, and all deliveries shall submit a request, completed and typed, for all construction personnel, to the Government assigned sponsor. This request will be used to do background checks to determine if individuals are acceptable for work on Shaw AFB. Contact the project Construction Inspector assigned to the specific project for a sample request. The request format and information required may be changed at any time and the new requirements will be provided to the Contractor. Any request for passes shall be submitted at least two weeks prior to employee(s) arriving for work on Shaw AFB. There will be no escorts.

Concrete Wash Out

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- Onsite Temporary Concrete Washout Facility Concrete Transit Truck Washout Procedures. See Appendix for examples.
- Temporary concrete washout facilities must be located a minimum of 50 feet from storm drain inlets, open drainage ditches and streams.
- Install a sign adjacent to each washout facility to and inform concrete equipment operators to utilize the facilities.
- Temporary concrete washout facilities must be maintained to provide adequate holding capacity with a minimum freeboard of at least 4-inches for above grade facilities and 12-inches for below grade facilities. Maintaining temporary concrete washout facilities must include removing and disposing of hardened concrete and returning the facilities to a functional condition. Clean stone temporary concrete washout facilities must be designed with sufficient quantity and size to contain all liquid and concrete waste generated by washout operations to prevent all storm water runoff.
- Temporary washout facilities can be constructed using a pit which is bermed using appropriate materials to control storm water runoff, i.e., anchored hay bales, sand bags etc.
- Perform washout of concrete mixer trucks in designated areas only. Once concrete wastes are washed into the designated area and allowed to harden, the concrete should be broken up, removed and disposed of in accordance with SCDHEC Solid Waste Management Regulations.
- The concrete washout facility must be inspected daily and after heavy rains to check for leaks. Inspect concrete washout structures for damage and maintain for effectiveness. The washout facility shall never exceed 75 percent capacity of the containment pit.

Confined Space

- The contractor shall submit and follow a confined space plan/ program. The plan/ program shall be prepared by the company that will be performing the work. This shall be submitted for information only to the government via AF Form 3000. The permit shall be prepared by the company that will be performing the work. The contractor shall notify the fire department prior to entering the space as well as exiting. Permit-required confined space program (permit space program) means the employer's overall program for controlling, and, where appropriate, for protecting employees from, permit space hazards and for regulating employee entry into permit spaces. Permit system means the employer's written procedure for preparing and issuing permits for entry and for returning the permit space to service following termination of entry. OSHA and EM385 govern this. See Material Certifications, Safety Cards and Confined Space Rescue Plan forms in the Forms Appendix.

Schedule of Materials Submittals (AF Form 3000)

- A Schedule of Materials Submittals for all materials shall be prepared for each project. The template in the FORMS appendix may be used if the UFGS Specifications are not used. If UFGS specifications are used on the project then a submittal register shall be generated using that program and shall be used for the project. (See Base Architect for Template)

Design Review Comment Format

- Design reviews will be conducted using the standard form in the appendix. The form contains specific instructions for formatting and coding of comments that must be followed. The form in the attachment is an example. (Contact Shaw PM or Inspector for template)

D. Details

- Appendix F contains many of the standard details and conventions used when doing business at SHAW AFB. The details and graphic examples are for reference, actual details may be created by the user or obtained from the Shaw PM when available.

E. Environmental

- All design and construction work shall comply with all current SCDHEC environmental standards. Upon receipt of necessary permits the Contractor shall notify, in writing, the appointed Government representatives (Contracting Administrator and Construction Control Representative) 72 hrs in advance before performing abatement operations.
- Dispose of mercury containing thermostats, fluorescent tubes & HID lamps (including CFL) in a manner approved by SCDHEC and the requirements addressed herein.
- Removal of any and all Special Waste items (bulbs, ballasts, smoke detectors, emergency light batteries) All bulbs and ballasts and batteries will be removed by hand, packaged and stored on site until ready for disposal. Bulbs shall be disposed of in bulk in accordance with the 40 CFR 273.5 and SC DHEC regulations.
- When disposing of any waste material off base, the Contractor shall only use SC State permitted landfills. The Contractor shall also provide, from the disposal site, scanned copies of all trip tickets to verify that the waste materials were disposed of properly. These trip tickets shall be submitted to the Construction Representative upon disposal for entry into a log of the amounts of construction debris removed from the base. Provide a list of all deliveries with amounts noted at project completion for submission to the Government. Asbestos and lead-based paint waste debris tickets shall be submitted to Civil Engineering Asbestos Management.
- Contractors must obtain approval for the use of any radioactive source material (ordinarily used in density gages) through the base Radiation Safety Officer (RSO), at (803) 895-6196, before their materials are brought on base. In order to obtain this approval, the contractor must forward an application to the base RSO at least 30 calendar days before the planned date for commencement of activities on the installation.
- Hazardous Materials (HM): The following statements concerning hazardous material shall be included in the project specifications and documentation required in the AF Form 66: "AFI 32-7086, "Hazardous Materials Management", and the ACC supplement to AFI 32-7086, requires that all Hazardous Materials (HM) used on the base will be tracked by the AF-EMIS system. This includes HM used by a Contractor while working on Shaw AFB property. This clause shall be enforced by the Contractors QAE." This requirement applies to all contractors, including construction, performing studies or tests and service contractors, such as janitorial and maintenance. ALL MSDS's and quantities used are required to be submitted to HAZMART. All Contractors, if purchasing the HM under the contract with contract funds, SHALL provide a copy of each MSDS and the quantity used for each HM to HAZMART. This shall be done PRIOR to the end of each contract. For multi-year contracts, this shall be done annually. If you require assistance, please contact HAZMART at (803) 895-9931/9932."
- Materials determined to cause a hazard to health shall not be used in construction at Shaw Air Force Base. This list is not comprehensive.
 - Lead solder shall not be used for any application unless specifically allowed by the Project Engineer.
 - All paint used shall be lead-free, where lead-free is defined as 0.009% or less lead content in the dry film.
 - Asbestos Containing Material (ACM) shall not be used in any capacity on Shaw AFB including construction.

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- Copies of the base asbestos survey will be provided to the designer and contractor, when available, for determination of areas where asbestos removal will be required. Where this information is not provided, the Contractor shall perform asbestos surveys on material suspected of containing asbestos material. The government provided asbestos survey is for bidding purposes only. Unless otherwise noted, a new survey will have to be performed for each project prior to demo.
- All existing asbestos-containing material to be disturbed by construction shall be identified on the drawings.
- Encroachment permits may be obtained locally. The forms are on SCDOT Web site under doing business with SCDOT. They can be submitted locally at the SCDOT office to the Attention of Resident Engineer P.O. Box 417 Sumter, SC 29150 (803)778-5466.
- The SCDHEC issued the new South Carolina Construction General Permit for storm water land disturbance activities on October 15, 2012 and it will become effective on January 1, 2013. The permit has requirements for existing permitted ongoing construction projects. Existing projects will be granted coverage under the new CGP. All change to the SWPPPs must be implemented within 6 months after the effective date of the permit (January 1, 2013). Note that DHEC did not implement any numerical permit limitations on effluent discharges from construction sites; non-numerical limitations were imposed which consist of sediment controls (BMPs) installed to minimize discharge of sediments in storm water from construction sites. The definitions of the terms in the new permit, if viewed online, are located in Appendix A of the permit starting on page 68, and all of the abbreviations and acronyms are located on page 4.
- Storm Water Pollution Prevention Permit (SWPPP) Applications: Shaw AFB is a Municipal Separate Storm Sewer System (MS4) permit holder. As an MS4, Shaw is required to approve all SWPPP applications.
 - For projects disturbing at least 1 acre but less than 2 acres, 20 CES/CEIEC CG in environmental will review the Notice of Intent (NOI) and storm water management plans for completeness and validity.
 - Simplified Sediment and Erosion Control Plans shall meet the minimum requirements of SCR 72-300 H.
 - Project sites greater than 2 acres require a Stormwater Pollution Prevention Plan (SWPPP). Plans must be approved by a registered P.E. or a Certified Plan Reviewer. The SWPPP preparer and the Plan Reviewer shall provide a completed Stormwater Management and Sediment and Erosion Control Plan Review Checklist for Design Professionals with each SWPPP (available from SCDHEC) submitted. Contractor shall be responsible for payment of all SCDHEC fees associated with this permit.
 - For project sites greater than 25 acres, the NOI shall contain a written quantitative and qualitative assessment showing that selected construction and post-construction Best Management Practices (BMPs) will effectively prohibit any contribution to, or violation of, water quality standards by stormwater discharges from the construction and post-construction sites. Specifically, the application will consider the potential impact of construction site storm water discharges to Green Swamp, which is impaired with low levels of dissolved oxygen.
 - MS4 approval of the NOI is the responsibility of the Government. For applications which meet the requirements of SCR 72-305 thru 307, the Construction General Permit SCR100000, and the Storm Water Management Plan, the Government will prepare a letter of approval and submit the letter of approval, a copy of the NOI, and the permit fee to SCDHEC. Construction cannot commence until the permit is issued by SCDHEC.
 - During all phases of construction, compliance with the SWPPP and the Construction General Permit is mandatory until a Notice of Termination is received by SCDHEC. The SWPPP shall include a Government -approved construction site checklist to be routinely completed by a Certified Erosion Prevention and Sediment Control Inspector.

F. Antiterrorism Force Protection

- Criteria includes reference standard UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings. Also reference the Non-Nuclear Intrusion Detection Systems (IDS) Equipment Approval document in Appendix C. The narrative below lists the 21 standards in Appendix B of the UFC 4-010-01 followed by a brief description of how the standards are addressed. **The descriptions in italics indicated below are examples-each building must be evaluated** using the UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings.

Section B-1 Site Planning

- **B-1.2 Standard 1 – Standoff Distances**

The building is located within a controlled perimeter greater than 200 feet. Table B-1: Primary gathering building applicable level of protection= Low. Table B-1: Conventional construction standoff distance for load-bearing walls = column letter E.

Table B-1: Minimum standoff distance = 12 feet.

Table B-2: Metal Studs / brick veneer wall type, conventional construction standoff distance for column letter E = 75 feet.

- **B-1.2 Standard 2 – Unobstructed Space**

The building is located within a controlled perimeter; therefore, the unobstructed space will extend out to the conventional construction standoff distance for parking and roadways within a controlled perimeter (75 feet), but not less than the minimum standoff distance (12 feet).

Equipment and trash container enclosures: Not Applicable.

- **B-1.3 Standard 3 – Drive-up / Drop-off Areas**

Not Applicable.

- **B-1.4 Standard 4 – Access Roads**

The building is located within a controlled perimeter.

- **B-1.5 Standard 5 – Parking beneath Buildings or on Rooftops**

Not Applicable.

Section B-2 Structural Design

- **B-2.1 Standard 6 – Progressive Collapse Resistance**

Not Applicable.

- **B-2.2 Standard 7 – Structural Isolation**

Not Applicable.

- **B-2.3 Standard 8 – Building Overhangs and Breezeways**

Not Applicable.

- **B-2.4 Standard 9 – Exterior Masonry Walls**

Not Applicable.

Section B-3 Architectural Design

- **B-3.1 Standard 10 – Windows and Skylights**

Not Applicable.

- **B-3.2 Standard 11 – Building Entrance Layout**

Not Applicable.

- **B-3.3 Standard 12 – Exterior Doors**

The exterior metal door and hollow metal frame assembly shall comply with the testing requirements in accordance with ASTM F2247-11 for Category III (Level of Protection=Low).

- **B-3.4 Standard 13 – Mail Rooms and Loading Docks**

I: GENERAL

Not Applicable.

- **B-3.5 Standard 14 – Roof Access**

There are no direct means for external roof access.

- **B-3.6 Standard 15 – Overhead Mounted Architectural Features**

Not Applicable.

Section B-4 Electrical And Mechanical Design

- **B-4.1 Standard 16 – Air Intakes**

The sill height of Louver L-1 and brick vent are located above 10' from the adjacent grade.

- **B-4.2 Standard 17 – Mail Room and Loading Dock Ventilation**

Not Applicable.

- **B-4.3 Standard 18 – Emergency Air Distribution Shutoff**

Emergency air distribution shutoff is provided.

- **B-4.4 Standard 19 – Equipment Bracing**

Not Applicable.

- **B-4.5 Standard 20 – Under Building Access**

Not Applicable.

- **B-4.6 Standard 21 – Mass Notification**

Mass notification system is provided.

G. Climate Map

MONTH	Average # of Days of Rainfall a Shaw AFB, SC	Average Inches of Rainfall a Shaw AFB, SC
January	9	3.4
February	9	3.6
March	9	4.0
April	8	3.0
May	10	3.4
June	11	4.9
July	12	5.4
August	10	4.6
September	7	3.7
October	6	3.0
November	7	2.6
December	9	3.2
Annual	107	45.1

A. Concrete Paving and Foundations

- Airfield pavement shall be 650 PSI flex.
- Slabs for heavy forklifts shall be 750 PSI flex.
- Floor slabs shall be 3000 PSI concrete.
- Foundations shall be 4000 PSI concrete.
- Curbs and gutters shall be 4000 PSI concrete. Standard curb height shall be 8-inches unless otherwise directed.

B. Asphalt

- The asphalt for roads and streets shall be SCDOT Designations; Type B High Volume Primary, Type CM Low Volume Primary, Type C Secondary.
- The asphalt for parking lots shall be Type C SCDOT.
- Unless specified otherwise, asphalt pavement construction shall consist of a 6" compacted sub-base, 2" binder course, and a 1.5" wearing course.
- All pavements shall have painted lines in the size, color and appearance in accordance with this standard and the manual on Uniform Traffic Control Devices (MUTCD). Reflective beads shall be used on all roadway and parking lot painting/stripping.

C. Site Work

- The contractor or designer shall provide all surveying necessary to establish the existing site conditions, utilities and contours of the existing site to provide necessary data for design and construction.
- The contractor shall densify the structural areas (building footprint, pads, paving, etc.). Proof roll shall be performed and any discrepancies shall be reported to the inspector and contracting officer.
- Site preparation, compaction, and foundation construction shall be 95% of the standard laboratory proctor density for backfilling for ditches and trenches, and for cuts and fills.
- Airfield pavement compaction for subgrade shall be 95% modified proctor. Base course shall be 100% modified proctor.
- Trenches and any backfilled for utilities shall be compacted to minimum 95% standard proctor such that no settling will occur.
- The fill material used in any site work or trench backfilling shall be classified SC, SM, or SW on the Unified Soil Classification Chart, free from rock, scrap material, roots, silts, debris, soft unsound particles, organic material and/or deleterious or objectionable material.
- Boring under roadways and paved areas for utilities shall be required unless a cut and repair is requested and approved by the government.
- All downspouts shall be extended below ground and connected to an underground storm drainage system unless otherwise directed.

- All designs shall incorporate Low Impact Design (LID) practices to the greatest extent practical in accordance with requirements of UFC 3-210-10 and EISA Section 438 unless otherwise directed.

D. Field Quality Control

- The contractor's field quality control shall be provided on all work. All testing shall be provided by an independent certified laboratory.

E. Minimum Testing Requirements for Concrete

- 650 / 750 Flex – 4 beams for every 100 cubic yards or portion thereof unless specified otherwise by the contract. 3 beams shall be required for statistical average break at 7, 14, and 21 days for an average breaking strength.
- 3000 / 4000 PSI Concrete - 4 test cylinders for every 75 cubic yards placed per day or portion thereof. 3 test cylinders minimum shall be broke for a statistical average strength determination at 28 days.
- Test for Air Entrainment and slump shall be performed whenever cylinders or beams are collected. Additional testing may be required randomly depending on condition of concrete material at time of discharge from the truck either mixer or dump.

A. General

- Reference the ID2 document for the exterior finishes and the zones within the base. The following are guidelines specific for architectural design at Shaw AFB, but are not comprehensive and should be supplemented with the specifications, any specific contract language, the applicable UFC's, industry standards, codes, and best practices.

Accessibility

- Designs for Shaw AFB shall comply with the Architectural Barriers Act (ABA), Uniform Federal Accessibility Standards (UFAS) under Federal Government Facilities, the Federal ADA/ABA Accessibility Guidelines and the Americans with Disabilities Act (ADA). There are sometimes variations to these, therefore use the most stringent.

Miscellaneous

- Materials used for dumpsters and/or screen walls shall match the adjacent facility exterior (i.e., brick, split-rib, etc.). Do not have the opening in the dumpster screen wall facing primary roads. However, if no alternative exists, provide a wrought iron gate or similar material across the dumpster screen wall opening. Submit material for gate construction to the Base Architect for written approval. See typical screening and fence standards in the Appendix D.

B. Life Safety Design

Life Safety Code

- Life Safety Code analysis and Building Code analysis shall be included as separate plans including the following information:

Building Code Analysis

- Occupancy classification
- Required (or allowed) and designed
- Building area
- Building height
- Construction type
- Exterior exposure protection
- Height/area increase (provide calculations)
- Interior fire rated occupancy separation
- Internal fire area separations

Life Safety Code Analysis

- Occupancy classification
- Occupant load factor (s) (with calculations)
- Required (or allowed) and designed
- Common path of travel
- Dead-end corridor
- Egress capacity
- Exit discharge
- Flame spread/smoke development ratings for interior finishes
- Horizontal exits
- Number of exists
- Remoteness of exits
- Separation of exists and exit access
- Separation of hazardous areas
- Travel distance
- Total calculated load (per floor and total for building)
- Location of fire walls
- Location of extinguishers

C. Building Exteriors and Interiors

Pre-Engineered Metal Buildings

- Use metal siding only if it is compatible with surrounding facilities and then only with the Base Architects approval (minimum 22 gauge).
- Use masonry veneer in conjunction with metal siding where denting is likely, such as around doors and high traffic areas (8'-0" min).
- No metal buildings, including mini storage buildings, will be constructed on the west side of the base unless approved by the Base Architect. Storage buildings constructed on the west side of the base shall match the finish of adjacent facilities. However, metal building construction is allowed on the east side of the base, on a case by case basis.
- If metal buildings are allowed by the Base Architect, use pre-engineered metal structures.
- When adding to existing metal buildings, the colors of the metal sidings shall match. Require that the siding for the new addition be factory primed and field painted to match the existing metal siding.
- If pavement extends to the building, install bollards, bumper blocks, or curbs in the pavement to protect the metal skin from vehicles.

Walls

- Use durable, low-maintenance masonry that is integrally colored and textured such as brick, smooth-faced CMU, split-face CMU, and split-rib CMU or textured concrete panels. Grout used with colored block shall match the block color unless otherwise specified and approved by the Base Architect. Provide weeps and flashing in accordance with Construction Practices for Masonry. Manufactured concrete masonry units must meet the following ASTM specifications as applicable:
 - ASTM C-145, "Grade N-I Solid Load Bearing Concrete Masonry Units"
 - ASTM C-33, "Concrete Aggregates from Concrete Masonry Units"
 - ASTM C-90, "Grade N-I Hollow Load Bearing Concrete Masonry Units"
 - ASTM C-129, "Type-I Non-Load Bearing Concrete Masonry Units"
- Gypsum Wall board; Install 5/8", Type X, mold resistant wallboard, as a minimum. All gypsum wallboard shall be scored on an independent lab test conducted on gypsum panels at the time of manufacture, per ASTM D3274, "Standard Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Microbial (Fungal or Algal) Growth or Soil and Dirt Accumulation". The panels shall have achieved a score of Specify finish levels for drywall as noted (Reference GA-214-96):
 - Level 5 - Shall be used for all finish walls unless otherwise noted.
 - Level 4 - Acceptable for closets, storage areas, warehouse walls.
 - Level 2 - Acceptable for mechanical rooms.
 - Follow the International Building Code and the applicable UFGS guide specification for sheathing, gypsum wall board, wet conditions, and wet and dry tile conditions.
- Do not use vinyl wall coverings except where specifically permitted in writing on a case-by-case basis.
- Do not use an EIFS (Exterior Insulation and Finish System), as the main exterior wall surface, except where specifically permitted on a case-by-case basis. Renovation projects are an example where permission to use EIFS may be approved if using a high performance drainable rain barrier EIFS system-must be approved by Base Architect prior to design.
- High performance Stucco wall systems that include continuous insulation, high performance sheathing, fluid applied waterproof air barrier, drainage plane, reinforcement and at least 7/8" stucco may be considered by the Base Architect under certain conditions. The entire system must be by one manufacturer and include all systems and flashing.

III: ARCHITECTURAL DESIGN

- Chair rail shall be used in all conference rooms. Mount at the correct height to prevent chair backs from marring the wall surface, usually 30-32" above the finished floor. Chair rail shall be rubber material. In instances when wood is acceptable, it shall be stained. Paint wood only when approved through the Base Architect.
- Walls systems shall meet the current energy code and have continuous insulation. Reference ASHRAE 90.1.
- The building exterior and interior sound level requirements should be a factor in determining the thickness of the insulation. Specific noise level mitigation may need to be considered for the exterior envelope depending on the location of the project within the base. Any building design requiring reduction of exterior generated noises shall be done in accordance with the International Building Code, and the Shaw Air Force Base Air Installation Compatible Use Zone in the ID2. Any penetrations through an STC rated wall shall utilize flexible couplings within 12" of each side of the wall.
- Acoustic considerations for Interior walls shall follow the International Building Code and best practices for both noise reduction (NRC) and sound transmission (STC). When addressing a single room or adjacent room acoustics, attention should be focused on a balanced solution considering flanking noise, door and window systems, HVAC systems, penetrations, floor systems and ceiling systems.
- For exterior veneer systems, coordinate with the structural engineer to meet all applicable codes, the UFGS guide specifications, industry standards, and any seismic requirements.

Doors and Windows

- All windows and exterior glass doors shall be anodized bronze aluminum frames with double pane, gray tint, insulated, thermal pane glass. All glass shall be .25" minimum fully tempered glass or laminated. Use operable windows only where no air conditioning is provided. All operable windows shall have insect screens that match the dark bronze window frames. Consistently, designate in design specifications and on the drawings using the same language, the type of system used in each location; steel, hollow metal, aluminum windows, storefront, curtain wall, etc.
- Interior window sills shall be designed with hard surface materials such as a solid acrylic surface. Exterior sills shall be designed to drain away from the windows and shall be aesthetically compatible with the adjacent surface.
- All exterior window and door glass shall be low emissivity glass to match building and/or surrounding buildings. Windows, door glass, and doors shall be ENERGY STAR Rated and conform to ASHRAE 90.1 specific to the local climate zone. Refer to UFC 4-010-01 for blast resistant glass requirements and construction which will generally require a laminated system. Combined Blast and Energy glazing will generally be a laminated insulated glazing unit. General practices are to locate the low e coating on the #2 surface; however, each system will need to be evaluated. Typical tint is gray, reflective coatings are not preferred.
- Each room on an exterior wall shall have at least one window. Exceptions to this would include janitor's closets, conference rooms, secure rooms, computer rooms, restrooms, mechanical, electrical, communication, or any other type of room where security or privacy purposes do not permit windows.
- Use Best Lock system cores on all doors in base facilities. All cores shall be pinned as specified by the Base Locksmith and shall be shipped directly to the Base Locksmith. Coordination of the delivery of cores and the key plan shall be done directly through the Base Locksmith at phone # (803) 895-9671.
- Exterior metal doors shall have welded frames. Follow Steel Door Institute (SDI) standards for categorizing and labeling doors during design. Minimum for exterior doors shall be SDI extra heavy duty. Consider maximum duty with continuous hinges for extreme traffic conditions. All exterior doors including roll up type shall be insulated unless otherwise noted. All exterior doors shall conform to UFC 4-010-01 for blast resistant requirements
- Interior door vertical glass lite (4" x 24" x 1/4") in personnel entrance doors except as follows;
 - If is prohibited by another UFC or code.
 - It is a Mechanical, Electrical and/or Communications room door.
 - Blast glazing to meet UFC 4-010-01.

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- Interior doors shall have welded metal frames for new construction and renovations where possible. The doors shall be a minimum of SDI heavy duty category. Provide a glass lite for passage doors. Use non-wire rated safety glazing for rated doors and tempered glass for non-rated doors.
- All roll-up type doors shall come painted from the factory with a baked-on Kynar finish. Roll-up doors shall be designed with motorized controls. Standard color shall be dark bronze, unless requested otherwise
- Identify all fire resistive rated walls with signs stating the following; "Fire Wall Do Not Penetrate". For aesthetic reasons, this requirement does not apply to walls inside stairwells or public areas such as offices, lobbies, corridors, etc. that do not have drop ceilings. In areas with drop ceilings, paint notification on the wall above the drop/finished ceiling. In mechanical, electrical and other similar rooms, place signs at 8-feet (2.4 m) above finished floor level. Space signs at a maximum of 10-foot (3.0 m) intervals. In rooms with raised flooring, place signs on fire walls under the floor with spacing of signage reduced to 5 foot (1.5 m) intervals. Apply signs using florescent red or orange paint over stencils. Letters must be a minimum of 4-inches (100 mm) in height. Metal, plastic or paper decal signs are not acceptable. Take care when applying signage to prevent over-spray onto adjacent finishes.

Roofs

- Roofs shall have insulation with a minimum R-30 rating or as indicated by the current ASHRAE 90.1 standards. Continuous insulation will be required as described in ASHRAE 90.1.
- Sloped roofs up to 4 in 12 shall be used where the length of span permits. Slopes exceeding 4 in 12 shall be required to written approval, by the Base Architect. Minimum slope on metal roof systems shall be 1 in 12.
- Pre-engineered and standing-seam metal roofs shall be used on all new and renovated facilities. Non-occupied pre-engineered metal buildings may use a single structural standing seam roof panel, if approved by the Base architect, and must meet applicable building and energy codes. For all occupied buildings, use a minimum of 24-gauge metal for roof panels (wind may dictate a higher gauge) and 22 gauge for roof decks. Provide a manufactured ice and water shield system, minimum 40mil, on roof sheathing on the roof deck prior to panel installation for all metal roof systems when using a separate deck below the finished metal roof deck.
- Fiberglass shingles are used only when specifically allowed by the Contract or in writing prior to their use.
- Fascia, gutters, and downspouts shall match the roof color. Connect roof drains to existing UG storm drainage where available or where flooding of walkways occurs. Down spouts may be Dark Bronze as applicable to the overall design of the building.
- The standard low slope roof is SBS modified bitumen, fully adhered. Fully adhered to insulation and deck for concrete roofs, fully adhered to insulation and insulation mechanically fastened to metal deck roofs. Follow UFGS specifications for SBS modified bitumen. All low slope roofs must be approved prior to design by the Base architect.
- Where a built-up or membrane roof is authorized, a ¼" per foot minimum slope is required. Examples: BX, Commissary, and warehouses.
- Provide a permanent sign at each building, preference on the exterior of the mechanical room door, describing the roof type. See appendix for detail.
- Skylights with building daylighting controls are encouraged but should not be highly visible.
- Use ridge vents or gable vents, instead of roof-mounted rotating fan vents.
- Hip roofs are preferred over gable roofs.
- All roofs shall include a permanent horizontal lifeline (HLLs) anchorage system for use as a personal fall arrest system. The lifeline shall be designed, installed, certified, and labeled in accordance with Occupational Safety and

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Health Administration (OSHA) and American National Standards Institute (ANSI) standards. Locally manufactured HLLs are not acceptable. Lifeline materials shall be non-corrosive and compatible with roof components.

- Install HLLs along all roof ridges, hips, and gables. Anchorages shall be independent of any anchorage being used to support or suspend platforms and be capable of supporting at least 5,000 pounds per person attached. Design lifeline to support two (2) persons attached to the same lifeline. Contractor shall provide and install permanent raised letter stainless steel placard marker indicating load capacity and installation date at each anchor. Marker must be visible to user. Design shall include drawings, required clearances, installation instructions, use procedures and inspection requirements. Coordinate closely with structural engineer to ensure system is compatible with building structure.
- Install dark bronze colored metal awnings over exterior entrances and mechanical room doors to cover the stoop dimensions. Buildings designed with entrance vestibules may not need awnings. See electrical section for lighting requirements.
- When designing roofs on new buildings or renovating existing buildings installation of equipment on the roof is not allowed unless approved prior to installation in writing. If equipment is allowed to be installed on the roof then a separate support system from the building frame shall be provided and meet all seismic requirements.
- Where roof mounted antennas are identified, a steel mounting structure shall be designed and installed to provide rigid structure for their installation. Install an electrical conduit, sized for the planned antenna cable being used, from the structure location to the communication area.

Ceilings

- All spaces shall receive new acoustical ceiling tile or systems as indicated in the SOW. Basis of design. Armstrong Ceramaguard fine fissured panels with scrubbable plastic finish, resistant to moisture and staining: 24"x24", color: white. Square. 5/8" thick.
- The suspension grid is to match the color of the tiles. Grid System: Armstrong, Prelude XL HRC or approved equal. Narrow-Face, single-Web, extruded-Aluminum Suspension System with main and cross runners formed from extruded aluminum to produce structural members with 15/16" wide faces. Structural Classification: Heavy-duty system. Face Design: Screw-slot profile. Face Finish: Painted white. Reveal Finish: Match face finish.
- Hard ceilings are required in residential bathrooms, restrooms, and shower areas. Hard ceilings in all existing residential bathrooms shall be reworked to accommodate new lighting. Vinyl face ceiling tiles shall be used in areas such as kitchens, laundry rooms or other places where moisture is present, in the areas remaining that are not hard ceilings.
- Suspended ceilings shall be laid out so that no tile shall be less than 1/2 width. This includes ceilings being replaced. Each ceiling tile in the grid shall be whole and not cut into sections even to allow protrusion of any device including sprinkler heads. All ceilings shall be designed to meet all seismic requirements. Use of 7/8" channel with seismic clips is required, use of 2" channel is not allowed.
- Generally, use a high CAC ceiling material to achieve sound transmission control in offices and most spaces. High NRC values should be considered to absorb sound energy in large conference rooms and large spaces where reverberation is an issue. When using high NRC materials, run walls to deck if the adjacent space also requires sound transmission control.
- Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to CISC Seismic Zones 3 & 4 – Ceilings and Interior Systems Construction Association Guidelines for Seismic Restraint for Direct Hung Suspended Ceiling Assemblies – Category "D".
- Seismic Loads: Design and size components to withstand seismic loads in accordance with the International Building Code, Section 1621 for Category D, E, and F.
- Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

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- Retain one option in "Flame-Spread Index" Subparagraph below. Class A systems have a flame-spread index not exceeding 25 and a smoke-developed index not exceeding 50; Class B systems have a flame-spread index not exceeding 75 on face side; and Class C systems have a flame-spread index not exceeding 200 on face side. Most products available in the U.S. are Class A.
- Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
- 6. Smoke-Developed Index: 50 or less.

Colors

- Reference the ID2 for color of brick exteriors. For most buildings, the finishes shall match that of the existing surrounding structures.
- Miscellaneous metals that require painting shall be painted to match adjacent masonry or as specified by the base architect.
- Interior Design: Projects shall conform to the Air Combat Command (ACC) interior design guide, latest edition. Request this document from the base architect.
- Paint all exposed steel to match surrounding color.

Stairs

- For new construction, use a 7" maximum riser height and an 11" minimum tread depth.
- When aluminum handrails are specified, handrails shall have an anodized finish.
- Enclose the exterior stairwells on at least three sides for multi-floor facilities even if the code allows an open stairwell.
- Use solid slip resistant treads and landings on exterior stairs.

Signage

- All new facilities, major renovations and minor renovations with existing interior signage, shall include signs for all spaces including roof access.
- Exterior building number signage shall be installed and located on the front corner, visible from the street. If the building is along the flight line it shall have a number visible from the street side and flight line side. See UFC 3-120-01 and the Shaw Air Force Base Installation and Design (ID2) Handbook. The Shaw Air Force Base Installation and Design (ID2) Handbook shall take precedent for signage.
- Signage shall be only method used in parking areas. No painting or application of any signage shall be allowed on these pavements except where specifically requested.

Carpet

- Refer to UFGS 09 68 00 Carpeting as the current standard. Replaces earlier ETL's. Carpet shall, as a minimum, meet the following criteria:
- Type:
 - Carpet tiles are the standard unless noted otherwise.
 - Carpet Tiles Shall be a min of 24" x 24".
 - Broadloom carpet shall be a min of 12' width.
 - Carpet tile and broadloom will be the same manufacturers with coordinating patterns when both are used on a single project.
 - For Mission Critical Static Dissipative applications use industry standards for the appropriate application; such as ANSI/ESD S20.20.

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- **Construction:**
 - Tufted, Woven or Bonded.
 - Level-loop, Multilevel loop, and Random Sheared.
 - Fibers to be nylon continuous filament, nylon staple, triexta or PTT.
 - Pile height shall be no higher than 12.7 millimeters (0.5 inches), measured to the backing.
 - Backing must be synthetic material no jute backing is authorized
 - SBR Latex woven synthetic (lifetime warranty)
 - Salient characteristics of the roll (broadloom) carpet are as follows:
 - Solution dyed or bleach resistant
 - Tufted, woven, needle bonded
 - Nylon 6, 6 or nylon 6
 - Industry standard Warranty against edge raveling, snags, picks, runs, delimitation and 10 percent loss of face fiber.
 - Broadloom: Open-cell urethane or closed-cell vinyl backings. Attached cushion backing is only required when noted in statement of work.
 - Carpet tile. Urethane, PVC, and polyolefin backing.
 - Texture Appearance Retention Rating (TARR) is based on a 12,000-cycle Hexapod drum test performed in accordance with ASTM D5252. Carpet shall have a rating of Heavy: Classification greater than or equal to 3.0 ARR and Severe: Classification greater than or equal to 3.5 TARR. The TARR scale must be used in accordance with the recommended practice outlined in CRI (Carpet and Rug Institute) TM-101, Assessment of Carpet Surface Appearance Change Using the CRI Reference Sales.
- **Installation:**
 - Use 4" vinyl or rubber base with minimum 12" returns to avoid corner joints. Prefabricated corners are not allowed.
 - Carpet tiles shall be used over raised equipment floors, areas subject to excessive wear patterns, and areas subject to damaging spills. Computer floors shall not have screws that must be removed to remove the raised floor panel. Carpet tiles shall not overlap the raised floor panels. Remove carpet tile and remove the floor panel.
- **Testing:**
 - Meet Indoor Air Quality Test Criteria
 - All carpet must conform to CFR Part 1630, Standard for the Surface Flammability of Carpet and Rugs and/or ASTM D2859 (Methenamine Pill Test).
 - Carpet must be tested in accordance with ASTM E648, Standard Test Method for Critical Radiant Flux of Floor covering Systems using a Radiant Heat Energy Source.
 - Minimum average critical radiant flux of 0.45 watt per square centimeter (Class 1) where applicable. Minimum average critical radiant flux of 0.22 watt per square centimeter (Class II) where applicable.
 - Smoke density, when necessary to meet specific application, shall be tested in accordance with ASTM E662 and shall have a maximum specific optical density not exceeding 450 (flaming mode exposure).
 - Carpet shall meet a minimum rating of 8 using the AATCC red 40 stain scale after 2 HWE (hot water extraction) using the AATCC 171 (Carpet cleaning of Hot water extraction method, test method followed by the AATCC 175, stain resistance: pile floor coverings, stain test.
 - Maximum electrostatic Propensity is 3.5 kilovolts (kV) or less for general commercial areas and 2.0 kV or less for critical environments (equipment/technical rooms of communication facilities) as tested by AATCC TM 134
 - Carpet and floor adhesives should be certified as CRO "Green Label" or "Green Label Plus."
 - Carpet shall have no V.O.C. or asbestos in the latex backing or adhesive
- **Warranty:**
 - 20 year warranty, no static, no shock and a lifetime no stain, no fade, no exclusions warranty.

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Luxury Vinyl Tile

- Description:
 - A layered construction consisting of a tough, clear, vinyl wear layer protecting a high-fidelity print layer on a solid vinyl backing. Protected by a UV-cured polyurethane finish, the wear surface is embossed with different textures to enhance each of the printed visuals. Colors are insoluble in water and resistant to cleaning agents and light.
- Testing:
 - Luxury Solid Vinyl Tile shall conform to the requirements of ASTM F 1700, "Standard Specification for Solid Vinyl Tile", Class III, Type B – Embossed Surface.
 - ASTM E 648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
 - ASTM E 662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials
 - ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
 - ASTM F 1482, Standard Guide to Wood Underlayment Products Available for Use Under Resilient Flooring
 - ASTM F 1700 Standard Specification for Solid Vinyl Tile
 - ASTM F 1861 Standard Specification for Resilient Wall Base
 - ASTM F 1869 Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
 - ASTM F 2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
- Sizes:
 - Size: 36 in. x 4 in. , 36 in. x 6 in., 36 in. x 8 in., 48 in. x 6 in., 48 in. x 9 in. When noted in statement of work, other sizes may be used.
 - Min Wear layer thickness: 0.020 (0.5 mm)
 - Min Thickness: 1/8"/0.125 in. (3.0mm)
- Warranty:
 - Min 10 year commercial warranty

Tile

- Porcelain or ceramic tile shall be used in corridors, wet locations, break rooms, restrooms/showers, vestibules and other areas specified. Decorative patterns or accent tiles are recommended to add variation in large areas and long corridors. Use minimum grout width and seal all grout. Tiles shall be either Class 4 or Class 5 tile (as a minimum) and selected based on occupancy and foot traffic.
- For sloped floor wet locations, restrooms/showers, etc., use smaller tile to accommodate the slope. Follow UFGS guide specifications for the tile type and grouting.

Chemical Coatings and Sealed Concrete

- Chemical Resistant Urethane (CRU) coating shall be used in aircraft hangars, equipment and vehicle maintenance bays and any specialized area where corrosive chemicals are used. Urethane (CRU) and Epoxy coatings may be considered for specific applications with approval of the Base Architect.
- Seal all concrete floors that do not have a finish. Do not seal exterior concrete walks. Provide applied non slip finish as an added finish to areas designated as hazardous in wet conditions as indicated in the SOW. Slip resistant applications shall adhere to the UFGS specifications.

Interior/Exterior Paint: Paint for interior and exterior applications shall follow these guidelines.

- Only environmentally friendly (Green) paints shall be used. No interior paints used shall have any Volatile Organic Compounds (VOC's) unless the specified application does not have a material to meet this requirement.

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- All new work shall include (as a minimum) three coats. They shall be a prime coat, intermediate coat and finish coat. Follow the UFGS guide specifications and the MPI system for painting systems. Renovated areas shall follow the specified guidelines as recommended by the paint manufacturer.
- Completed work that does not have a uniform finish and that has holidays or other noted imperfections shall be repainted until an acceptable finish is achieved. This includes clear coat finishes such as varnish and polyurethane.
- Metal doors that are field painted shall be spray finished. Brush and roller finish is not acceptable. This includes touch up.
- Paint grade and quality shall be determined by facility type and occupancy. In no case shall less than the standard paint spec for Sherwin Williams, Benjamin Moore or other top of the line manufacturers be used. Upgrade paint specifications shall be used in areas specified by the Base Architect.

Exterior CMU

- Dry Block water proof shall be integral to the CMU.
- Water proof for the mortar joints will be added to the mortar on site.
- When requested provide masonry sealer for the CMU (two coats applied after the block is cleaned). Due to the high maintenance of using masonry sealers, use must be prior approved by Base Architect.

IV: STRUCTURAL

A. Design Codes and Standards

**** All codes to be used shall be the most current**

Design Codes and Standards including (but not limited to) the following:

- International Building Code, 2015 Edition
- ACI 318-14, Building Code Requirements for Structural Concrete
- ACI 360R, Guide to Design of Slabs-on-Ground
- ACI 302.1R, Guide for Concrete Floor and Slab Construction
- AISC 360-10, Specification for Structural Steel Buildings
- ASCE/SEI 7-10 Including Supplement No. 1, Minimum Design Loads for Buildings and Other Structures
- Steel Deck Institute; SDI DDM03, Diaphragm Design Manual, Third Edition
- Masonry Standard Joint Committee's (MSJC), TMS 402-13/ACI 530-13/ASCE5-13, TMS 602-13/ACI 530.1-13/ASCE 6-13, Building Code Requirements and Specifications for Masonry Structures
- Unified Facilities Criteria (UFC) 3-301-01, 1 June 2013 Change 2, 20 June 2016
- For Codes and Standards referenced above, the latest additions shall be implemented.

Minimum uniformly distributed and concentrated live loads per UFC 3-301-01 Table D-1 and 2015 IBC Table 1607.1.

Wind Speed (Ultimate, 3-sec gust) – as determined by ASCE/SEI 7-10 Including Supplement No. 1, Minimum Design Loads for Buildings and Other Structures

Snow Loads/Design Considerations as determined by ASCE/SEI 7-10 Including Supplement No. 1, Minimum Design Loads for Buildings and Other Structures

- Ground Snow = 10 psf
- Frost Penetration = 0 in

Seismic Loading Data (Risk Category I/II/III) as determined by ASCE/SEI 7-10 Including Supplement No. 1, Minimum Design Loads for Buildings and Other Structures

- Assumed Site Class D-“Stiff Soil”, (Verify with Geotechnical Report)
- SS = 0.504g S1 = 0.170g
- SMS = 0.704g SM1 = 0.360g
- SDS = 0.469g SD1 = 0.240g
- Deflection Criteria: Current IBC Sections and UFC 3-301-01.

B. General

Special Inspections

- The contractor shall perform special inspections and testing as specified in IBC on applicable work as identified in the project drawings and specifications by one or more approved inspection agencies.
 - Buildings equal to or greater than 2,000 square foot shall be designed as a pre-engineered structure (i.e. steel columns, purlins and roof structure) due to cost and construction efficiency.
 - All facilities shall be designed with fire suppression systems unless directed otherwise. See “Fire Suppression” section of this standard for additional information.
 - New buildings and major renovations shall be designed to meet the latest edition of the National Earthquake Hazard Reduction Plan (NEHRP) requirements and Federal Emergency Management Agency (FEMA) Manual 302.
 - Coordinate with the architect and specialty designer, the design of permanent horizontal lifeline (HLLs) anchorage system for use as a personal fall arrest system. The lifeline shall be designed, installed, certified, and labeled in accordance with Occupational Safety and Health Administration (OSHA) and

IV: STRUCTURAL

American National Standards Institute (ANSI) standards. Locally manufactured HLLs are not acceptable. Lifeline materials shall be non-corrosive and compatible with roof components.

- Coordinate with the architect the design of all veneer systems including seismic requirements.

Termite Control

- All new construction and additions to existing facilities to include sidewalks (attached to the facility), slabs, patios, stoops and porches shall have the area beneath and perimeter treated with a termiticide. The exterior of the foundation shall be treated after final grade work is completed. All work shall come with a five-year replacement damage guarantee warranty with provision for annual warranty renewal after the initial five years. Mixing and application of chemicals shall be coordinated through Base Entomology. Scheduling of treatment shall be done a minimum of 72 hours in advance by phoning 895-9723. A non-repellent termiticide shall be used and shall be applied at the maximum application rate allowed by the manufacturer and SCDHEC. Termidor is the preferred termiticide for use on Shaw AFB. The applicator must be licensed and card on person.

Houskeeping Pads

- Appendix D illustrates a typical detail of a housekeeping pad and a transformer pad. These can be used for housekeeping, equipment and the transformer pad. At minimum, 3000 psi concrete, rebar mat #4 at 6' each way and chafer the edges.

A. Buried Utilities Shall Conform to the Following Depth Table

Utility	Minimum depth*
Electrical (1000V >)	36" BFG
Electrical (1000V <)	30" BFG
Potable Water	36" BFG
Fire Main	36" BFG
Gas	36" BFG
Communications	36" BFG

*-Below Finished Grade (BFG)

B. Systems

- All components of the HVAC, power, plumbing and/or fire equipment in a building shall be considered one system. This applies whether it provides components serving a single area, several areas or the entire building and shall be turned over as one system. Unless approved in writing otherwise, the warrantee for a system shall begin once the entire and fully operational system has been completed and the Contractor requests from the Government a final acceptance of the system. Individual components, parts or sub-systems of the building system shall not be accepted unless the Government derives a benefit and is approved by the Government in writing 2 weeks prior to the request for final acceptance. HVAC systems shall be considered complete and operational once the Testing and Balance (TAB) report has been submitted and approved.

C. Sleeves

- All penetrations through walls, floors or roofs shall be sleeved with permanent, pre-manufactured steel sleeves installed in accordance with all the Manufacturers requirements and recommendations. Sleeves shall be as manufactured and sized properly for the duct, pipe, tray, raceway, equipment etc., being protected.
 - Sleeves shall be sized such as to adequately allow the passage of the intended penetrant(s) plus enough room to permit the practical installation and mounting of the penetrants as well as adequate room for firestops. This includes any insulation or covering.
 - Size pipe/conduit sleeves two Nominal Pipe Sizes (NPS) up from the diameter of the penetrant.
 - Where insulation is installed and/or required, the size of the insulation shall be taken into account in sizing the sleeve.
 - Sleeves in fire rated walls and/or floors shall meet or exceed the rating of the wall and/or floor.

D. Bollards

- Bollards shall be installed wherever required in this document, in the Contract documents or it is apparent that a danger exists to any device, equipment, valve, panel, box or other item installed under the Contract. Examples include post indicator valves, transformers, switches, and gas regulators. Bollards shall meet the following minimum requirements:
 - Concrete filled, 6" diameter, schedule 40, steel pipe.
 - Installed height of 5 feet above grade or as approved by the Government.
 - Prime and paint bollards with 2 coats of safety yellow exterior paint for traffic areas and 2 coats of dark bronze with safety yellow striping at the top for equipment areas. Install safety yellow, durable, flexible high density polyethylene or removable covers with two recessed red reflective stripes on each bollard, when specified.

E. Contractors Training

- Contractors installing new equipment shall provide training on the use, maintenance, and repair of that equipment. The Contractor shall also provide a copy of any software, with license, and any other tools necessary for the Government to have full access to the settings for the purpose of changing, updating and maintaining that equipment. Settings and passwords, current at the time of turnover, and any program information specific to the equipment, including O&M Manuals, Maintenance Manuals and the manufacturer's data sheets shall be provided in electronic format on a 5¼" CD-R or DVD-R. Equipment in this case is defined as any device, system, component, panel or controller that requires any combination of the following: passwords, codes, phrases, dongles, keys and/or specialized device required to allow access, update or change any setting in the system. Examples of equipment are fire alarm panels, mass notification panels, HVAC controllers, DDC controls, thermostats and components of these. Provide two sets of O & M or Maintenance Manuals including CD-R or DVD-R for each manual. Manuals are to be divided by discipline – HVAC, DDC Controls, Electrical, Fire Alarm, and Plumbing.

F. Above Ground Storage Tanks (AST)

- ASTs shall meet the industrial standards for construction and installment. The following standards shall be used but not limited to:
 - 40 CFR part 112, Steel Tank Institute (STI)
 - American Petroleum Institute (API)
 - National Fire Protection Agency (NFPA) 30 – Flammable and Combustible Liquids Code
 - National Electric Code (NEC)
 - Unified Facilities Criteria (UFC) 3-460-01 – Design: Petroleum Fuel Facilities
 - Unified Facilities Guide Specification (UFGS) 33 56 10 – Factory-Fabricated Fuel Storage Tanks
 - Manufacturer's instructions.
- The following requirements shall apply to the design of ASTs:
 - Pipeline and tank identification per UFC 3-460-01, 2-18
 - Liquid fuel tanks shall be double walled steel tanks. Liquid fuel lines shall be a minimum of schedule 40 cast iron.
 - Liquid fuel tanks shall be steel, double walled tank that meets UL 142 (or UL 2085 if tank is in a high risk zone).
 - All tanks shall be pressure tested after installation, to ensure integrity, per STI SP001-03.
 - Vents – designed per requirements of NFPA 30. Each tank shall have an atmospheric and emergency vent installed. The normal vent shall extend to at least 12' above grade. The emergency vent shall meet the ventilation requirements stated on the UL label. The interstice also needs an emergency vent that shall meet the UL label requirements. No vent shall discharge within 5' of a building opening. No attachments are allowed on any vents.
 - Gauges: Contractor shall install gauges on the tank(s). Gauges shall NOT be made of plastic, and have a 2 hour fire rating.
 - Leak detector for interstice (between tank walls) shall meet requirements of the level gauges above.
 - Fill port shall have a drop leg installed.
 - All tanks shall be grounded.
 - Install bollards to protect the tank.
 - Unless the destination of the fuel is higher than the tank, supply and return lines shall include anti-siphon and check valves.
 - Plastic shipping plugs shall be removed during installation and replaced with required hardware or metal plugs.
 - Tanks shall have 3 feet (minimum) of separation from each other and any surrounding equipment.
 - Tanks shall be located minimum of 50' from open flame or ignition source.
 - Label tank to include a NFPA 704 label (the fire diamond), UL label for the tank, No Smoking warning, tank ID number (supplied by the Government), tank capacity (in addition to the capacity on the UL label), fill port, vent ports, monitoring ports and any other feature on the tank.
 - All material/hardware used on the tank shall have a 2 hour fire rating.
 - Install a steel frame stand for a 25# fire extinguisher within 10 feet of the tank and no less than 5 feet.

V: GENERAL MECHANICAL, ELECTRICAL, AND COMMUNICATIONS

- Manholes shall be provided – one (1) for tanks up to 5,000 gallons and two (2) for tanks larger than 5,000 gallons.
- Tank shall be provided with, but not limited to the following components:
 - Lifting lugs
 - Spill box
 - Manual drain valve
 - Automatic overfill protection valve
 - Interior striker/impact plate
 - Ladders (interior and exterior as applicable)
 - Alarm Systems
 - Analog gauge
 - Strapping tables per UFC 3-460-01, 8-3.13
 - Water removal tube per UFGS 33-56-10, 2.7.4
 - Tank mounted fuel dispensing unit per UFGS 33-56-10, 2.11
 - 2" leak detection port
- The following tests shall be performed as a minimum:
 - Tank Tightness Test
 - Tank Fill Test
 - Corrosion Protection Test
- Use Training of the tank and associated systems shall be provided
- An equipment operations check shall be performed for any equipment (generator, boiler, etc.) supplied fuel from the AST.

A. Water, Gas and Fuel Systems

- Natural gas distribution lines shall be polyethylene pipe, yellow or orange in color, conforming to AGA standard PE 2406 or PE 2306.
- For water lines use copper pipe type K and/or (C)PVC schedule 40, C900 for water distribution mains. Interior water line above grade shall be type L copper, hard drawn, with brass or wrought copper fittings and Grade 95TA solder joints.
- For bathrooms, install valves above each bathroom so that water to the bathrooms can be shut off independent of the building as a whole.
- All floor drains will be equipped with trap primer connections and automatic trap primer device.
- All isolation valves and Plumbing equipment located above suspended ceiling systems shall have engraved stainless steel tags riveted to the ceiling grid. Each plate shall include device type, make, model number, voltage, # phases, size and drawing identifying nomenclature.
- Water meters and boxes shall be installed for new construction or in major renovation projects where a new main is run to a facility. Meters shall be central smart type (BACNet communication capable). A main valve shall be installed ahead and behind the water meter to allow for isolation. All valves shall be brass. Backflow prevention assemblies shall be installed on all incoming water lines tied to the potable system. Certification of backflow devices shall be procured prior to building acceptance.
- Electric water coolers shall be lead-free and CFC-free. Provide accessible models in accordance with ADA/ABA.
- Gas meters shall be installed for new construction or in major renovation projects where a new line is run to a facility. Gas meters shall be capable of communicating data over Utility Management and Communication System (UMCS). A main valve shall be installed ahead and behind the meter to allow for replacement.
- Install Anti-Freeze Hydrants (AFH) with vacuum break on the exterior of the facility. Insure that at least one anti-freeze hydrant is installed at the exterior mechanical equipment location for servicing equipment. Facilities shall have a wall hydrant located on each side.
- Where natural gas is available, boilers and water heaters shall be gas operable. Tankless style water heaters shall be used in renovations and new construction, unless specified otherwise.
- Fire hydrants shall be right hand operable.
- Toilets, urinals, faucets and showerheads shall be WaterSense labeled. See the EPA's WaterSense website at <http://www.epa.gov/watersense/> for more information.
- Toilets and Urinals; New construction, renovation and replacement shall require the installation of new toilet and urinal fixtures with the required features as follows:
 - All toilets and urinals shall be vitreous china, flush valve type. Tank type toilets shall not be used.
 - Flush valves for toilets shall be designed to use no more than 1.28 gpf and urinals 0.5 gpf.
 - Flush valves shall be battery operated automatic flush valves with internal filter and true manual override button. Batteries shall be replaceable.
- Faucets; New construction, renovation and replacement shall require the installation of new faucets with the required features as follows:
 - Lavatory faucets shall be sensor operated and rated for a maximum 0.5 gpm continuous flow or 0.25 gallon per metering cycle to include aerators.
 - Kitchen sink faucets shall be rated for a maximum 1.5 gpm flow to include aerators.
 - Service sink faucets shall be rated for a maximum of 2.5 gpm flow

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- Showerheads; New construction, renovation and replacement shall require the installation of new showerheads with the required features as follows:
 - Shall be brass and stainless steel construction
 - Showerheads shall be rated for no more than a 1.5 gpm flow.
 - Whenever a showerhead is installed or replaced, the shower control valve shall be replaced with an automatic temperature compensating valve even if one exists. The manufacturer of the showerhead and valve shall be the same.

B. HVAC Design Criteria

- All new construction and renovation projects with conditioned spaces greater than 8,000 SF shall include a life cycle cost and economic analysis in accordance with the latest edition of Unified Facilities Criteria (UFC) 1-200-02, "High Performance and Sustainable Building Requirements." Typically, spaces larger than 10,000 SF will require a Variable Air Volume (VAV) system. Exceptions will be considered on a case-by-case basis where strong justification is provided in writing. All designs shall investigate the use of geothermal HVAC systems.
- New chiller units 100 Ton or greater shall be designed to be water cooled.
- All chilled water systems shall be design with 4-pipe systems.
- The recommended manufacturer for chilled water and DX systems shall be Trane or Carrier.
- When dealing with high sensible loads that are associated with server rooms the contractor shall size the chiller in accordance with the units ability to handle sensible heat loads not just the total load.
- Ensure the system is designed to handle the high humidity conditions associated with the climate of the local area.
- System associated with server rooms shall provide dehumidification capabilities.
- HVAC design temperatures shall be in accordance with the following table:

Season	Outside (°F) DB/WB	Inside (°F)
Summer	92* / 76	76
Winter	25	68

NOTE: If the air-cooled condenser cannot be located in the shade, the design temperature may be increased 5 degrees Fahrenheit, at the discretion of the design engineer.

DDC Controls

- All HVAC systems shall have emergency force protection shutdown capability by installing base compatible DDC Controls. The system shall have the capability to enable emergency building HVAC shutdown by shutting off all air handlers and closing operable outside air dampers.
- All HVAC controls wiring shall be provided in 3/4" blue conduit.
- One DDC controller shall control multiple systems in a single building.
- The designer shall include a full set of control schematics and sequence of operation drawings prior to construction and shall be included in the as-built drawings.
- All DDC controllers that execute logic shall be BACnet and meet the requirements for ANSI/ASHRAE Standard 135, latest edition.
 - All software shall be capable of being loaded onto the Automated Logic (ALC current version) workstation/server and becomes property of Shaw Air Force Base.

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- All remote controllers shall be backed up to and editable/configurable from the remote Automated Logic (ALC current version) workstation/server.
- Minimum point list shall be provided with the sequence of operations. Reference Appendix D Forms: DDC Points Lists. In addition, the points list shall include the following:
 - Sensors at inlet and outlet of all coils, outside air temperature/RH, equipment status, loop temperatures, static pressures, and actuator/s feedback.
 - Points list shall include analog and digital inputs, analog and digital outputs, virtual points, and graphic display points.
- When installing a new system that will incorporate some of the existing facility controls, a BACnet Gateway shall be used to connect the space temperature controllers provided with the new system.
 - All status points used by the equipment controller, space temperature, discharge temperature, return air temperature, fan status, etc., shall be programmed in the EMCS system interface and displayed and accessible from the WEBctrl graphic screen for this equipment.
 - All control points used by the equipment controller, space temperature, heating and cooling set points, unoccupied set points, occupied and unoccupied modes, etc., shall be programmed in the EMCS system interface and displayed and accessible from the WEBctrl graphic screen for this equipment.
 - No schedules residing in third party equipment controllers shall be used to control the operation of equipment. The equipment shall operate from schedules residing in the LGR or other BACnet controllers containing programming logic fully accessible from the WEBctrl server and displayed and modifiable on the WEBctrl web pages.
- All DDC stand-alone controllers, except for controllers supplied as part of HVAC equipment and specifically approved and authorized by the Government to be accessed through a BACnet Gateway, shall contain programming logic fully accessible from the WEBctrl front end.
- The program logic of these controls shall be capable of being modified and configured from the WEBctrl server by using Eikon Logic Builder, or an approved equal, configuration software.
- The programming logic shall be displayed on a flow chart style web page, capable of monitoring the operation of the control sequences in real time. Control parameters shall be capable of being modified from this logic web page.
- The Supervisory Building Controller shall be an Automated Logic ME-LGR I Multi-Equipment Controller and Router, or an approved equal. This controller shall be able to communicate to the existing WEBctrl server over the base LAN.
- Fresh air intakes shall be located a minimum of 10 feet off finished grade for single story and 12 feet for multi-story buildings. All fresh air dampers shall be electrically operated, BACNet compatible and tied to the building DDC's.
- Energy saving programmable thermostats and timer devices shall be placed within easy access of the building user. Thermostats shall be ENERGY STAR Certified, latest edition and include programmable keypad lockout capability. Each thermostat shall have a visible room temperature indicator. In public areas such as clubs or lounges, thermostats shall have tamper-resistant covers installed.

HVAC Refrigerant Systems

- Designer shall indicate in the specifications that the contractor is responsible for the disposal of all removed HVAC units to include the disposal of all refrigerants according to all current laws and regulations. Contractors shall provide documentation to the Government representative of both reclaimed and installed refrigerant. Information provided, as a minimum, shall include amounts of refrigerant and type in addition to the facility number.
- HVAC refrigerant systems shall use the refrigerant R410. If R410 is unavailable, HFC 134A and other refrigerants may be submitted for approval by the design engineer.
- Mechanical, thermostatic type expansion valves shall be used, unless specified otherwise.

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- Provide training classes for government maintenance employees on complete HVAC system operations. Instruction shall include four hours training for basic systems and up to two full days for more complex systems. The design engineer will specify the allowed number of government attendees.
- Refrigerant and chilled water coils shall be copper tubing with copper or aluminum fins. Aluminum tubing shall not be used.
- Install low ambient operation kits on all HVAC systems to include chiller and heat pumps.
- All water piping loops shall include a minimum of one strainer in a location easily accessible and be of the type that provides minimum constriction to the system. Install valves before and after each strainer to allow for isolation.
- Provide electric heat wrap and insulation on all exterior installed chilled water piping.

Ductwork

- Ductwork shall be round in all new construction and whenever possible in renovations. Standard duct material is galvanized steel constructed in accordance with SMACNA guidelines.
- All HVAC installations shall use ducted returns. Return air plenums shall not be used unless specified otherwise. Install filtered grilles on all returns where Air Handler Units, Blower Coil Units and Fan Coil Units are mounted above suspended ceilings.
- No more than 4 feet of flexible ducting, with no more than one change of direction, shall be used at any air outlet.
- Take-offs from rigid duct to a flexible duct connection shall begin with a minimum of 6 inches of rigid duct or prefabricated galvanized fitting.
- Duct board shall not be used in HVAC systems or ducts.
- Hard duct must be used for 90 degree turns.
- Meet NFPA Fire Protection Criteria for in-duct smoke detector requirements.
- Ductwork shall be connected together with screws, sealed with mastic paste and taped at all connections, hips, elbows, and joints to prevent duct leakage.

C. Insulation

- Insulate all refrigerant lines and dual temperature lines. Insulation material shall be standard flexible, elastomeric thermal or polyethylene. Liquid lines and condensate lines in ceiling areas shall be insulated.
- Insulate all domestic cold and hot water plumbing lines with standard flexible, elastomeric thermal (expanded closed cell structure) such as Armaflex or an approved equal.
- Insulate all mechanical chilled and hot water lines with fiberglass wrap with foil vapor barrier. Indoor installations shall have a vinyl jacket on elbows and outdoor installations shall have an aluminum jacket with prefabricated elbows of the same material on the complete line.
- For ductwork, standard insulation material shall be fiberglass wrap with foil vapor barrier. Ductwork and insulation shall be sealed with vapor proof mastic.
- For high temperature water heating lines and steam lines, the standard insulation shall be calcium silicate with covering as recommended by the manufacturer.

D. Miscellaneous

- Asbestos containing materials (ACM) shall not be used; even ACM fully encapsulated in gasket material shall be unacceptable. No section of this standard shall be interpreted to allow any ACM.
- Contractor shall provide and install clean filters prior to system acceptance.
- Computer heat loads shall be based on 400W/server, workstations shall be based on 120W/workstation (special cases can occur), monitor heat generation is dependent on size. Non-Industrial UPS heat generation can be neglected when relatively small numbers are installed in spaces.
- Installation of HVAC equipment shall be pad mounted. See detail in Appendix D
- Gable vents shall be used instead of roof-mounted rotating fan vents. Where fans are required they shall also be gable mounted instead of roof mounting.
- Provide manufacturer's minimum clearance between facility and outdoor mechanical equipment and indicate values on the design drawings. Minimum clearance shall not be less than five feet.
- For air-to-air unitary heat pumps up to 19,000 BTUH, the minimum SEER is 14. For units over 19,000 BTUH, the minimum SEER is 15. If high efficiency units are available, specify high efficiency units with higher SEER and EER. All units shall include a BACnet interface.
- Contractor shall supply a new spare filter for each equipment item installed and turn them over to the Government at building acceptance.
- Design passive solar heating measures such as vestibules, roof overhangs, and appropriate building orientation to reduce cooling/heating loads.
- Air handlers shall be installed with auxiliary drain pan, auxiliary drain line with ball valve and overflow float switch that disconnects system power in the event of an overflow. Auxiliary drain line shall be run to the exterior of the building with the ball valve in the closed position.
- All hydronic devices shall have manual isolation valves in addition to modulating or two-position valves.
- Consult the most current ASHRAE Standards for indoor air quality, heating and cooling requirements, and other design criteria.
- All design work shall show compliance with 10 CFR 433
- All isolation valves and HVAC equipment located above suspended ceiling systems shall have engraved stainless steel tags riveted to the ceiling grid. Each plate shall include device type, make, model number, voltage, # phases, size and drawing identifying nomenclature.
- All split system unitary equipment shall have a variable speed air handler coupled with an outdoor unit that has a multi-stage compressor. Each split system HVAC unit shall be controlled by a programmable thermostat and a humidistat and have the capability to perform a dehumidification cycle.
- VFD's shall be installed for all equipment where offered either standard or as an option.
- Minimize or eliminate high water use processes, such as garbage disposals and high-flow pressure washers. Provide pulping machines and low-flow pressure washers respectively.
- Coordinate all ceiling devices with sprinkler and electrical plans and provide a complete reflected ceiling plan showing all devices.

A. Electrical Service

- Use underground electrical service and pad mounted transformers for all new facilities and for renovated facilities where the main service is being reworked and/or upgraded. See detail in Appendix E
 - Pad-mounted, primary transformers shall include the following options as a minimum:
 - Dead front, loop feed design.
 - Copper windings, super high efficiency.
 - Oil-Filled (non-PCB containing) with permanent non-PCB identification included on the steel nameplate from the manufacturer. Stickers are unacceptable whether from the manufacturer or not.
 - Bushing wells with inserts (two piece) for use with load break elbows.
 - Two 2-1/2% non-load break taps each above and below normal (five positions). Tap changer shall be hot stick operable.
 - Parking stands with bushings and dust covers.
 - Oil level, temperature, and pressure/vacuum gauges.
 - Bay-O-Net fusing.
 - Drain valve and sampling device.
 - Secondary low voltage bushings with NEMA Spade Lugs.
 - Complies with all IEEE, NEMA, and ANSI requirements.
 - Load Break Oil Immersed Switch (LBOR) to de-energize low voltage compartment.
 - Transformer signage.
- Exterior Transformer shall meet the following minimum requirements:
 - 8 inch thick (4 inches above grade and 4 inches below grade)
 - 3000 psi concrete with welded wire mesh or crack control fibers
 - Pad shall be rectangular with no edge of the slab closer than 6 inches from any part of the transformer including fins and lifting eyes.
 - Pad shall include cut-outs beneath the primary and secondary compartments.
 - All edges shall include a 1" chamfer.
 - Install a 4/0 AWG copper ground ring around the pad 2 feet off the edge. Install ground rods on each corner and turn up a pigtail from the ring into each the primary and secondary compartments of the transformer.
 - See Attachment 4.
- All pad-mounted switches, breakers, and sectionalizing cabinets shall be 3-phase devices, whether they feed three phase or single phase transformers.
- All switches, sectionalizing cabinets and breakers shall come with copper busses and be SF6 type devices.
- Install arc fault indicators and load break elbows with voltage indicators on all cable pedestal junctions, primary switches and transformers. Label all equipment by feeder number and the facility number they feed.
- All circuits above 1000V shall be installed in 4 inch Schedule 40 PVC duct with 4 inch (minimum) red dyed concrete on all sides and be 36 inches below grade. Install rigid steel turn ups to all above grade transitions.
- The main, primary electrical distribution duct shall consist of two 5 inch conduits each. Spare ducts are required. All conduits shall be installed a minimum of 36 inches below grade. All conduits shall have galvanized rigid steel (GRS) turn-ups and be GRS above grade with schedule 80 PVC (Schedule 40 PVC when encased in concrete) allowed 36 inches below grade.
- Contractor shall install ¼ inch pull rope in all empty conduits longer than 50 feet and pull strings in all others.
- Load break elbows shall be used.
- Load break Metal Oxide Varistor (MOV) type arrestors shall be used on the loop bushings of all new pad- mounted transformers

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- No transformer rated over 1000V shall be installed inside a facility unless specifically required to meet code or per direction from the Base Project Engineer.
- Secondary electrical service conduits shall not be encased in concrete.
- Install a central smart electrical meter (Square D ION8600 or approved equal) for each facility. Current Transformers (CT) are acceptable if the correct Current Ratio (CR) is used. The location for the meter shall be on the pad-mounted transformer.

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- Ground Rods shall be $\frac{3}{4}$ inch diameter X 10 feet (min) copper clad steel installed a minimum of 18 inches below grade.
- All ground connections made below grade shall be the exothermic weld type. Other ground connections made outside of panels shall be either non-reversible compression or exothermic weld type.
- For new and alteration projects, power for emergency lights, exit lights, and fire protection systems shall not be provided ahead of the main service disconnect and shall be on its own circuit.
- No Metal Clad (MC) type cable shall be used unless specifically allowed in writing by the Base Project Engineer.
- Flexible conduit, including weather resistant, shall only be allowed as noted or when specifically required by the NEC or UFC. No other use is allowed unless approved in writing by the Base Electrical Engineer. When allowed, no single length shall exceed 6 feet in length. Daisy chaining of lighting circuits is not acceptable. Acceptable uses for flexible conduit are as follows:
 - Recessed and semi-recessed lighting fixtures.
 - Equipment subject to vibration, noise transmission or movement.
 - Transformers and motors.
- All circuits shall be installed conduit. Minimum conduit size shall be $\frac{3}{4}$ inch unless specified otherwise.
- Unless otherwise directed by Engineering, all metallic conduit shall be steel. Below grade conduit, conduit in-slab, and conduit concealed within CMU shall be schedule 40 PVC in accordance with the NEC. Transitions from below to above grade (including inside the building footprint) shall be steel. No set screw type couplings or connectors shall be used - only compression type fittings are acceptable.
- No conduit shall be installed below or in slab except the main service to the facility shall be installed underneath the slab. All conduits shall be installed hidden / concealed unless specifically permitted by the Base Electrical Engineer. All raceway shall be installed parallel and perpendicular to the building walls including raceway located above lay-in / accessible ceilings.
- Panelboards: All panelboards shall have copper main and ground busses and utilize bolt-on type breakers. All panel boards shall have main breakers installed where out of site from the feeding panel. Provide 25% additional capacity and 10% additional spaces (a minimum of six) in each panelboard.
- Transformers: All transformers installed in a facility shall meet the following minimum requirements:
 - Dry Type
 - 3 Phase, Delta/Delta Wye
 - Copper windings
 - Copper ground strap
 - Where provided to serve harmonic producing loads (i.e. server equipment racks, UPS equipment, etc.); K-Rated transformers shall be provided as follows:
 - Where the harmonic current producing equipment is less than 15 percent, use a standard transformer.

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- Where the electronic equipment represents up to 35 percent of the load, use a K-4 rated transformer.
- Where the electronic equipment represents up to 75 percent of the load, use a K-13 rated transformer.
- Where 100 percent of the load is electronic equipment, use a K-20 rated transformer.

Final K-Rating of transformers shall be reviewed / approved by Engineer as part of design.

- Class 220 insulation level (220°C)
- Minimum 10kV BIL
- Department of Energy 2016 Efficiency Standards: Low Voltage Distribution Transformers
- Sound level shall be 3 db below rating recommended levels in NEMA ST 20.
- Full capacity, universal taps consisting of two 2-1/2% above normal and four 2-1/2% below normal
- Seismic qualifications shall meet the requirements of IEEE 693-2005, IBC and ASCE 7.05
- Installed on a reinforced, minimum 4" high concrete housekeeping pad in an electrical room unless otherwise directed by Engineering.
- Mount transformer so that vibrations are not transmitted to the surrounding structure. Flexible mounting may be required to prevent sound transmission.
- Transient Voltage Surge Suppressors (TVSS): All panelboards shall have installed an external TVSS connected to a breaker in the panel, sized and installed per the manufacturer's recommendations and requirements. The TVSS shall be permanently labeled and visible with the units Short Circuit Current Rating (SCCR). Do not confuse the SCCR with the surge current ratings on the TVSS as they are not the same. The panelboard circuit schedule shall be marked with the name of the TVSS manufacturer and the catalog number (or equivalent). The TVSS shall be Silicon Avalanche Suppression Diode (SASD) type.
- All conductors shall be copper; minimum 12 AWG for power conductors.
- All raceways, conduit, and cable tray shall include a green insulated copper equipment ground conductor.
- All 120 Vac standard receptacles and lighting switches shall be 20A, specification grade type, color ivory with brushed aluminum plates unless otherwise specifically allowed.
- All disconnects / safety switches shall be heavy-duty type with NEMA ratings suitable for the environment where installed. Where fusible disconnects / safety switches are required, properly rated fuses shall be provided in accordance with the NEC.
- Lights and receptacles shall not share circuits. Dedicated ground and neutral conductors shall be installed for each circuit.
- All electrical junction and outlet boxes shall be one piece steel. Gangable boxes are not allowed.
- Provide GFCI receptacle on exterior wall at each condensing units.
- All conduit runs installed above ceilings shall be labeled in black with the circuit number and panel identification within 6" of each junction box. Label all fire alarm conduit runs FA in red lettering and mass notification circuits MN in green lettering within 6" of each junction box. Labeling can be done using permanent marker but must be legible.
- Heat stamp or engrave each receptacle cover with panel and circuit number. Use black lettering for normal power and red lettering for receptacles operable under emergency power. Also label wiring at each receptacle with panel and circuit number in the outlet box.
- Stainless steel nameplates identifying the voltage and number phases for all major electrical equipment shall be provided.

C. Interior and Exterior Lighting

- Emergency lights and exit lights shall be arranged to come on when power is lost to the normal lighting branch circuit in the area served. Battery back-up ballasts shall be used in all office area troffer style fixtures in lieu of standalone emergency fixtures unless specifically required by the NFPA or UFC.
- Control lighting with time clocks, photocells, and vacancy type motion sensors such that lighting is only energized when needed.
- Unless otherwise noted, light fixtures shall utilize a LED light source and meet the following minimum requirements unless otherwise permitted by the Base Electrical Engineer:
 - Internal drivers shall comply with NEMA 410 including in-rush requirements and incorporate minimum 2.5kV surge suppression integral to the driver.
 - Minimum 0.9 power factor.
 - Minimum CRI 80.
 - Maximum total harmonic distortion (THD) of 20%.
- Dormitories: All dormitories shall have ceiling-mounted, general distribution compact LED fixtures in the sleeping rooms, with ceiling fans.

Roadway/Parking Lighting

- Roadway and Parking area lighting shall be LED type approximately 97-147W depending on the light calculations.
- Light poles to 30 feet in length shall be dark bronze-anodized aluminum, 4 inches square and non-tapered. Each pole shall contain an in-line fuse at the base.
- Poles longer than 30 feet shall be 6" steel square and non-tapered.
- If the design requires additional lighting poles in an area where a lighting system exists then the new poles and lights shall match the existing.
- Use fully shielded luminaires or IESNA full cut-off type for area and roadway lighting. The use of full cutoff luminaires may reduce uniformity and therefore require greater pole heights or spacing.
- See Attachment 5 for standard light pole base detail.
- Exterior building lighting: Shall be as follows, unless otherwise identified:
 - Dormitory porch lighting shall be wall mounted, 30W LED high cutoff fixtures.
 - Install high cutoff fixtures mounted adjacent to and above each door for all other facilities.
 - Cutoff, semi-cutoff, and non-cutoff luminaires may be used at low mounting heights if the lumen output of the lamp is limited to 4200 lumens.
- Use red LED type exit signs with battery back-up in extruded aluminum housing.
- Where ceiling heights exceed 10 feet in an office environment, utilize indirect lighting in lieu of direct lighting.
- All pendant and industrial strip type fixtures shall include wire cage, lens or other approved means to protect the occupants from falling components.
- Install LED fixtures in all rooms to include maintenance bays, hangars, or other industrial areas.

Interior Control

- Install vacancy sensors for lighting control in all areas occupied by more than 3 occupants.
- Install vacancy sensors in all bathrooms, break rooms and conference rooms.

VII: Electrical

- All other areas shall be controlled by 20A, 120Vac specification grade switches.
- Install day-lighting controls in facilities that have an adequate number and size of windows that will allow significant energy savings.

D. Fire Alarm and Mass Notification Systems:

- All new facilities shall include a class **A**, addressable combination fire alarm and mass notification system with emergency shutdown, in accordance with the UFC. All renovated facilities shall include a new system unless the Base Project Engineer specifically allows in writing for the existing system to be reused. Minimum wire size shall be #16 AWG.
- The fire alarm system shall be complete in all respects for operation and interface with existing building equipment related to or desired to be controlled by the fire alarm system. The FPEOR shall include in his/her design all work necessary to interface Heating, Ventilation and Air Conditioning shut-down, sprinkler monitoring and control, building systems monitoring, smoke management and other code specified supervisory functions. Any equipment, wiring, installation or other work necessary to finish all interface and output wiring or equipment shall be included.
- The fire alarm system shall be an **addressable** Fire Lite fire alarm control panel and the following transmitter equipment, manufactured by Monaco Enterprises Inc. (14820 E. Sprague Ave, Spokane, WA 99216-2191, (509) 926-6277), in order to communicate with the existing receiver at the base's Fire Station:
 - Assembly, BT-X Module Customer Option, qty. 1
 - Assembly, Antenna: BSA-1, qty 1, part #190-400-00
 - Mount, Antenna: 7 inches, Wall, Pair, qty 1, part #199-011-00
 - Kit, R-T Lightning Arrestor, qty 1, part #198-021-01
 - Enclosure: Metal, 4 inches H x 4 inches D x 12 inches W, NEMA 3R, qty 1, part #081-076-01
 - Assembly, Cable: Coax, 20 feet, 92/PL-259, qty 1, part #625-100-00
 - Assembly, Cable: Coax, 40 feet, BNC/PL-259, qty 1, part #626-000-02

Specifications shall specifically state the make and model of the transmitter as noted above to ensure communication to the existing base Fire Station is provided.

- The Fire Alarm Control Panel (FACP) and Mass Notification system shall be by the same manufacturer / brand.
- The FACP and MNS shall be wired and programmed to accept live voice from D-21. Live voice shall have priority.
- The FACP and MNS shall be UL or FM approved.
- All fire alarm and mass notification system devices shall be clearly shown on the floor plans including all waterflow switches, tamper switches, duct detectors, strobes, speakers, horns etc.
- Manual Pull Stations:
 - Manual pull stations shall only be provided at each exit when required by NFPA 101 for the occupancy.
 - Provide manual pull stations with key reset only. No other reset will be permitted.
 - Manual pull stations with glass rods are not acceptable.
- The FACP **shall be** located within a conditioned space accessible to the fire department when the building is not occupied. Confirm final FACP location with the fire department as part of design.
- Each facility shall have fire/mass notification audio- visual Speaker / Strobe combination devices inside and outside at each exterior egress in accordance with the UFC. Lens shall be clear.
- Provide duct mounted smoke detectors for air handling units in accordance with UFC 3-600-01, NFPA 90A, and NFPA 72.

VII: Electrical

- HVAC Duct Detectors: Air handlers shall have duct smoke detectors installed when required by the NFPA or UFC. The detectors shall meet the following requirements:
 - Detectors shall meet the requirements of NFPA 72 and UFC 3-600-01 and be placed on separate zones in the FACP.
 - When detectors are required then a detector shall be installed in both the discharge and return.
 - The location of duct detectors shall be shown on the zone map / floor plan mounted next to each FACP.
 - Duct detectors shall be installed so that they are unobstructed and adequate maintenance clearance is provided.
 - Provide Remote Annunciator Indicator Lights (RAILS) with key type switch for testing the annunciated device and locate in the nearest corridor or public area unless otherwise directed by the Base Project Engineer.
- Heat detectors, if required, shall be 135° combination fixed temperature / rate-of-rise, self-resetting type. Facilities or rooms that are not air-conditioned shall utilize 195° fixed temperature, self-resetting heat detectors.
- All system devices, panels and junction boxes shall have a unique identifier number which shall be:
 - Labeled on each device, panel and junction box with a durable label capable of surviving environmental conditions.
 - Labeled on all drawings
 - Labeled on all parts lists and required testing documentation.
 - The unique identifier numbering system shall be approved by the Base Project Engineer at the time of shop drawing submittals.
 - Label for smoke detectors shall be installed on the base and readable from the floor at a distance of 10 feet.

Note: The intent of this requirement is to have each and every device and component (except panel components) installed with a logical and unique number whereby all inventory, documentation and life effort can be tracked by the unique number. Device labels shall be designed and installed to have a survival life of 10 years.

- All fire alarm cabling shall be installed in conduit; minimum size shall be 3/4 inch. Except as noted below, all conduit shall be red and all junction boxes shall have their interior and exterior sides and covers painted red.
 - Where installed exposed in finished office spaces only, conduit shall match adjacent wall / ceiling finish.
- Each facility shall have fire and mass notification audio-visual Horn/Strobe combinations inside and outside at each exterior egress in accordance with the NFPA and UFC.
- Electronic Equipment Installations: Electronic facilities, computer work centers and server rooms shall comply with ETL 01-18. They shall include a Fire Suppression System and have smoke detectors both at ceiling and under the floor.
- VESDA/ASD Systems: A smoke detection system shall be installed under any raised floor and shall be a Very Early Smoke Detection Apparatus (VESDA) system unless prohibited by NFPA, ETL, or UFC.
 - VESDA systems are based on a highly-advanced technology, consisting of continuous air absorption and a system for the sampling and detection of smoke particles by means of a laser beam. The system detects invisible low-concentration particles (0.05%) and reacts to minor changes in the level of concentration 0.005% in m3, when the smoke concentration level at the fire initial phases is 1% by volume.
 - This system shall be used in offices, telecommunications rooms, computer rooms and any area with a raised floor that requires by UFC, ETL, or NFPA detection beneath it.
- Fire alarm system smoke detection and occupant notification shall be provided all sleeping quarters and dormitories in accordance with UFC 3-600-01, NFPA 72, and 101, as a minimum.
- Where new devices are added to an existing FACP, battery back-up shall be upgraded accordingly to support the new devices.

VII: Electrical

- Dedicated panelboard(s) shall be provided to serve all fire alarm, fire protection, and mass notification system loads in accordance with UFC 3-520-01, paragraph 3-2.7. The panel and circuit breakers shall be clearly labeled accordingly to indicate their intended purpose and the specific load(s) they serve.
- Color Coding for Addressable Fire Alarm System: Provide fire alarm unit conductors with color coded insulation, or use color coded tape at each conductor termination and in each junction box as follows:
 - Power Branch Circuit Conductors Black, Green, White
 - Initiating Device Circuit Red, Black
 - Detector Power Supply Violet, Brown
 - Notification Appliance Circuit White (positive), Blue (negative)
- Color Coding for Conventional Fire Alarm System:
 - Red/Black—Bell circuit
 - Yellow/Blue, Orange/Brown—Detector loop and pull stations
 - Black/White/Green—Power circuit to the fire alarm panel
- Color code for Mass Notification System (MNS):
 - Amber MNS Strobe: Yellow/Blue
 - MNS Audio: Pink/Purple
 - Addressable relay output or dry-circuit input to addressable module, no polarity: gray/gray
- Identify all circuit conductors at all terminal and junction boxes per NEC 760.10. Use the circuit designations, as indicated on the shop drawings.
- The mass notification system shall incorporate a minimum of seven messages in addition to any required messages defined by the UFC, see Appendix C for approved messages. All pre-recorded message must be wired to a BTX relay card and programmed to activate messages when the relay changes state. All MNS shall be programmed to accept and play live voice from the BT-X-Live. Live voice has priority.
- The mass notification tone shall be ANSI.
- The fire alarm / mass notification system installed shall have programming and updates to firmware and programming that are accessible by the Base personnel without prior approval from the distributor or fire alarm / mass notification system manufacturer.
- Training shall be provided for Base personnel (shop and fire department) on the operation and maintenance of the FACP and all fire alarm / mass notification system devices. Training shall include a minimum of 4 hours of instruction on two separate sessions to ensure all Base personnel can attend the training. Training shall be separate from the system testing.
- Specifications shall clearly indicate testing for the fire alarm / mass notification systems including how each system is to be tested and how is responsible for witnessing the test for acceptance. The testing plan shall be approved by the Contracting Officer prior to any testing.
- At the completion of the project, the fire protection engineer of record shall provide a letter stating the system installed is in full compliance with the Contract Plans and Specifications.

E. Telephone, CCTV, Electronic Access, Time Warner and Data

- Communications Closet: All facilities shall include an environmentally controlled communications closet. This closet shall include the facilities communications backboard, two quadplex outlets on a dedicated circuit and a #6AWG ground conductor tied to the ground buss in the facility's main distribution panel. The closet design shall include as a minimum a 3 feet x 7 feet lockable door, interior lighting, suspended ceiling, and walls that terminate to the roof deck. Install six (minimum) 4 inch PVC sleeves thru the closet wall into the facility, as located by the Base Project Engineer.

VII: Electrical

Unless specifically authorized the main communication room shall be a minimum of a clear interior of 6 feet wide and 4 feet deep, and shall include an interior entrance door.

- Install communications outlets 18" AFF. Subscripts on the design drawings shall denote telephone (T), data (D) or Cable TV (C). All outlets shall include a 4-inch square steel box and single-gang plaster ring with two each $\frac{3}{4}$ " conduits and pull string. Telephone conduit shall be run to the telephone board or cable tray if available. Computer conduit shall be stubbed above the ceiling.
- All facilities designed with more than 30 total telephone and LAN outlets shall include a central communication tray system installed from the communication room throughout the facility including halls, server rooms and other transitional areas. Coordinate routes and final locations with other trades.
- All new and renovated facilities shall utilize dedicated conduit runs from the jack location to the LAN/TELCO backboard. Above ceiling cable trays may be used where practical. **All conduits and cable trays must have jet line pulled through and secured at both ends.**
- The communications backboard shall consist of a $\frac{3}{4}$ inch x 4 feet x 8 feet sheet of A-C grade, plywood. Communications backboards shall be fire rated by manufacturing process and include clearly visible fire stamp.
- Communications Cabling:
 - LAN and telephone wiring is not included in the project unless specifically requested in writing. If required or requested then it shall be Cat 6 (minimum) cabling and meet Electronic Industries Alliance (EIA)/ Telecommunications Industry Association (TIA) standard 586. **All Cabling must be tested after installation and results given to 20CS/Abacus. All discrepancies must be fixed and retested prior to project completion.**
 - Outside Plant Cabling if required, cabling must be labeled with water proof cable tags one foot after entry to the building. Any cable pulled through Manhole/Hand-holes must be labeled upon entry and exit of each hole. Fiber Optic Cable shall be labeled using water proof cable tags as follows- Line one FO Building Cable originates to Building being installed to. Line two Strand count followed by Cable type either Single Mode SM or Multi Mode MM. (example: Line 1: FO 1109 to 1601 Line 2: 1-36 SM).
 - Cable TV wiring is included in all projects where outlets are required. RG6/U quad shield coaxial cable is the required cable for Cable TV. Install 2 runs from each jack location to the comm. room with the Cable TV entrance.
- All interior communication conduits shall be a minimum of $\frac{3}{4}$ inch EMT.
- Three 4 inch, schedule 40, PVC conduits (minimum) shall be installed from the bottom of the telephone board to 5 feet off the edge of the facility including sidewalks and paving. Only long sweep bends shall be used. The conduits shall be installed toward the nearest communications manhole as identified during the design.
- Intrusion Detection System (IDS) equipment and components shall be those approved by the Air Force and as listed within the memorandum dated 21 Apr 15 including the subject Non-Nuclear Intrusion Detection System (IDS) Equipment Approval. Refer to Appendix C.
- **Provide blank covers, approximately 8% for communication boxes that are not used.**

VIII: Fire Suppression Systems

- Existing and New Facilities shall be provided with fire sprinkler systems in accordance with Shaw AFB Installation Development and Design (ID2) handbook (Oct 2012).
- All products shall be Underwriters Laboratory listed or FM Global (Factory Mutual) approved.
- Fire protection drawings and calculations shall be sealed and signed by the Fire Protection Engineer of Record (FPEOR) registered in the state of South Carolina. Contractor shall provide a design analysis and 100% design submission as required by UFC 3-600-01 paragraph 1-4 and 1-4.1 for approval prior to any work.
- All systems shall be closed head, wet pipe systems unless specifically changed, by the Government in writing,
- If the Contractor wishes to deviate from these requirements then a request for deviation with strong justification is prepared by the FPEOR and submitted by the Contractor for Government determination.
- Sprinkler heads:
 - All installations shall use quick response type heads unless specifically dis-allowed by the UFC or NFPA.
 - All ceiling mounted heads shall be flush mounted, flat plate, concealed type.
 - All exposed heads shall include protective wire cages installed.
- Underground (UG) Main: Contractor shall test the underground fire lateral (main) and submit a completed and signed "Contractor's Material and Test Certificate for Underground Piping" sheet per NFPA 13 and prior to beginning any work on the facility sprinkler riser or system.
- Flexible sprinkler heads (FlexHeads) shall not be used except where permission is obtained prior to the design from the Government. The request for exceptive permission to install these shall include the specific manufactures performance and installation data sheets as well as written confirmation that the below requirements will be met as a condition of the approval:
 - All Manufacturers (MFG) handling, installation and preparation recommendations and requirements shall be strictly adhered to, as a minimum. If any below listed requirement violates the MFG installation procedures or requirements then the Contractor shall notify the Government, in writing, and identify what item(s) is (are) in violation and what the MFG recommendation(s) and requirement(s) are. This shall be part of the exceptive permission to install package with a individual report covering this.
 - The specific MFG performance data for the particulate units being installed shall be used in the sprinkler calculations. The Fire Protection Engineer Of Record (FPEOR) shall identify in the requirements letter, required by UFC 3-600-01, of the specific part number(s) used and certification that the MFG data from those specific part numbers were used in the calculations.
 - Lengths longer than 3' shall not be used.
 - Minimum diameter used shall be ¾".
 - Only 300 psig assemblies shall be used. 175 psig assemblies are not allowed.
 - No more than two 90-degree bends each with no more than a 4" radius per bend are allowed in each FlexHead installation. Bend radius shall not exceed the MFG requirements or 4" whichever is the less severe.
 - Do not bend within 2½" from the connection nut.
 - Ensure mounting bracket enables the sprinkler head to move in unison with the ceiling grid.
 - Light weight ceiling grids cannot be used. Heavy weight grids only are allowed for use with flex heads.
 - Suspended ceilings shall be designed and installed in accordance with the Ceilings & Interior Systems Construction Association (CISCA) recommendations for seismic Zones 3 and 4. Where rigid braces are used to limit lateral deflections, sprinkler heads and other penetrations shall have a 2" oversized ring, sleeve, or adaptor through the ceiling to allow for free movement of at least 1" of ceiling movement in all horizontal directions.
 - The sprinkler system and ceiling grid shall be designed and tied together as an integral unit. Ensure mounting bracket enables the sprinkler head to move in unison with the ceiling grid
- See Detail in appendix D for typical fire suppression riser detail with required accessories and placement of devices.
- All Sprinkler piping in the facility shall be steel schedule 40. C900 may be used underground only, if allowed by the UFC and NFPA. Schedule 40 steel shall be used where the PVC lateral turns up to the riser.

APPENDIX A: LIST OF ACRONYMS

ACC	Air Combat Command	D2 Board	Development and Design Review Board
ACCI	ACC Instruction	D/B	Design Build
ACM	Asbestos Containing Materials	DB	Dry Bulb
ADA	Americans with Disabilities Act	DDC	Direct Digital Control
ADP	Area Development Plan	DoD	Department of Defense
AE (or A-E)	Architect Engineer	DVR	Distinguished Visitor Route
AFB	Air Force Base	eGP	electronic General Plan
AFH	Anti-Freeze Hydrants	EIA	Electronic Industries Alliance
ALC	Automated Logic Control	EIFS	Exterior insulation and finishing systems
AIA	American Institute of Architects	EMCS	Energy Monitoring Control Systems
AMSL	above mean sea level	ESPC	Energy Savings Performance Contracts
ANSI	American National Standards Institute	ETL	Engineering Technical Letter
API	American Petroleum Institute	FACP	Fire Alarm Control Panel
APZ	Accident Potential Zone	FDC	Fire Department Connection
ASTM	ASTM International (or American Society for Testing and Materials)	FEMA	Federal Emergency Management Agency
AT/FP	Antiterrorism/Force Protection	FPEOR	Fire Protection Engineer of Record
BAS	Building Automation System	FW	Fighter Wing
BX	Base Exchange	GRS	Galvanized Rigid Steel
CCTV	Closed Circuit Television	HDPE	High Density Polyethylene
CD-R	Compact Disc-Recordable	HM	Hazardous Materials
CEV	Completion for Submission to Base Environmental	HQ	Headquarters
CFL	Compact Fluorescent	HVAC	Heating Ventilation and Air Conditioning
CFR	Code of Federal Regulations	IBC	International Building Code
CMU	Concrete Masonry Unit	ICC	International Code Council
CR	Current Ratio	ICRMP	Integrated Cultural Resources Management Plan
CSI	Construction Standards Institute	ID2	Installation Design and Development Handbook
CT	Current Transformer	ISA	Installation Sustainability Assessment
CZ	Clear Zone	LAN	Local Area Network
		LBOR	Load Break Oil Immersed Switch

	APPENDIX A: LIST OF ACRONYMS	
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LEED	Leadership in Energy and Environmental Design	SCE&G	South Carolina Electric & Gas
IGCC	International Green Construction Water Efficiency Provisions	SD&HPGBD	Sustainable Development and High Performance Green Building Design
LRS	Logistics Readiness Squadron	SF	Square Feet
MC	Metal Clad	SSES	Sewer System Evaluation Survey
MFG	Manufacturer	STI	Steel Tank Institute
MOV	Metal Oxide Varistor	SWPPP	Stormwater Pollution Prevention Plan
MS4	Municipal Separate Storm Sewer System	TCE	Trichloroethylene
MUTCD	Manual of Uniform Traffic Control Devices	TELCO	Telephone Company
NEHRP	National Earthquake Hazard Reduction Plan	THD	Total Harmonic Distortion
NESC	National Electrical Safety Code	TIA	Telecommunications Industry Association
NFPA	National Fire Protection Association	TLF	Temporary Living Facility
NOI	Notice of Intent	TVSS	Transient Voltage Surge Suppressor
NRHP	National Register of Historic Places	UESC	Utility Energy Service Contracts
PCB	Polychlorinated biphenyl	UFAS	Uniform Federal Accessibility Standards
PECR	Poinsett Electronic Combat Range	UFC	Unified Facilities Criteria
PIV	Post Indicator Valve	UG	Underground
QD	Quantity Distance	UPS	Uninterruptable Power Supply
RH	Relative Humidity	USGBC	United State Green Building Council
RPC	Regional Priority Credits	VAC	Volts Alternating Current
RSO	Radiation Safety Officer	VAV	Variable Air Volume
SASD	Silicon Avalanche Suppression Diode	VFD	Variable Frequency Drive
SCDHEC	South Carolina Department of Health and Environmental Control	W	Watt
SCDOT	South Carolina Department of Transportation	WB	Wet Bulb
		XREF	Cross-Referenced

APPENDIX B: Construction Documents

A. Introduction

- Design deliverables are 35%, 65%, 95% and 100% with record dwgs and close out documents, unless otherwise stated in the SOW or RFP.

B. Specifications

- Specifications for each project shall conform to the Construction Standards Institute (CSI) 2012 MasterFormat divisions' standard. The Unified Facilities Guide Specifications (UFGS) are published only in electronic format and are intended to be used with SpecsIntact software. The UFGS Master uses the latest CSI MasterFormat.

C. Quality Control

Introduction Design Quality Control (with reference to the BIM execution QA/QC)

- Design Quality Control (DQC) is an ongoing, interdisciplinary function, not simply a single, one-point effort or assignment to a separate DQC manager or department, and all team members participate in the DQC process. The following plan is to be used in tandem to the BIM execution plan and the Quality Control/Quality Assurance components of that application. The designer may obtain a series of Quality Control (QC) templates for each discipline from the Base architect at the initial project meeting or may provide their own templates as long as the Quality Control process is followed. An example of a typical template is in the FORMS appendix.
 - The Government User's design criteria have been defined within the contract and continual reference to this document should be done to determine compliance during the design phase.
 - Incremental reviews among the design team members. This will typically include an In-Progress Review, a 100% Review and Final Review prior to submission to the government.
 - Coordination between drawings, RFP technical specifications, and UFGS specifications edited for this project.
 - Adequacy and accuracy of details.
 - Consistency with local practices, materials, and conditions.
- Additionally, at predetermined intervals of a project, the drawings and specifications are scheduled for a technical review by the DQC team. This document review function parallels and supplements the normal checking procedures within each discipline involved - it does not replace it. At a minimum these quality control checks will precede the Concept, Interim, 100% and Final reviews or as required by the RFP.**

Lines of Authority - Design Quality Control Manager (DQCM)

- Reports directly to the Construction Quality Control (CQC) Systems Manager.
- Reports any field/construction QC issues to the contractor Quality Control Manager (QCM).
- Authority: Direct activities of DQC Team; review all work for conformance to standards; track project status; report noted deficiencies to Project Architect for correction. If corrections are not made, notify Principal-In-Charge.
- A typical DQC Team who will review the design submittals prior to submission to the Government for this project have been designated as follows:
 - Architecture:
 - Landscape:
 - Civil Engineering:
 - Structural Engineering:
 - Electrical Engineering:
 - Mechanical Engineering:

APPENDIX B: Construction Documents

- Plumbing Engineering:
- Communications:
- Fire Protection/Life Safety:

The DQCM will notify each above listed individuals a minimum of two weeks prior to each design submittal and provide instructions and checklists for review and completion. Review comments will be returned to the DQCM within 5 working days of the submittal due date.

Professionals - Sub Consultants

- Each DQC technician reports to respective Design Quality Control Professional and coordinates with design team(s) discipline's technicians, drafters and other Design Quality Control personnel.
- Authority: Review of discipline's drafting for conformance to standards and communicates deficiencies to design team and DQC professional.

Design QC Procedures

- Involvement of the Design Quality Control Team in the design process from its earliest stages.
- A series of "Plan, Do, Check, Act" cycles during the design process with input from the Design Quality Control Team at each milestone that begins and ends each cycle.
- Perform Interdisciplinary reviews of the design submittals.

Prior to each design submittal a complete set of documents will be obtained and circulated through each of the Discipline Quality Control staff for their review and comment. An in-house "on-board" review will be performed of the marked up documents before the submittal date with the entire design team and DQC team present to include representatives of the Design / Build Contractor. All comments are discussed and corrections agreed to. The DQCM keeps minutes of the meetings. Marked up documents are distributed to design team for their use in Design Quality Control.

At the end of the design phase, prior to the Final Corrected Consolidated Design submittal, a formal interdisciplinary review coordination check by DQCM and final review by the Design/Build Contractor is conducted.

Technical Reviews

- In addition to the ongoing and periodic reviews of the work, the Team will perform formal technical reviews (as applicable) of the Fast Track, 35%, 65%, 95%, 100% and the Final Consolidated Design submittals. This review includes use of a component checklist, which includes items of technical nature relative to the Project's materials and methods. Technical Review comments provided by the Independent Technical Review Team must be submitted with each design submittal. The approved completed checklists shall be submitted at each design phase as part of the project documentation.

Interdisciplinary Review

- Prior to a scheduled interdisciplinary final review, consultants are required to submit written checklists and marked-up drawings documenting that the technical review has been performed for their discipline.
- An interdisciplinary review is conducted with all consultants. The purpose of this review is to identify discrepancies within the construction documents through interfacing and coordination of all disciplines. All corrective measures are then implemented within the construction documents for the Final Consolidated Documents submitted to the Government.

Fabricator And Manufacturer Reviews

- In general it is anticipated that fabricator and manufacturer reviews will be conducted on an as needed basis during the design process. Participants will vary according to the work to be considered including project designers, and contractor personnel with the fabricator or manufacturer representatives. Ideally, issues of concern will be distributed beforehand to facilitate discussion and decisions during reviews.

Reporting

- The Design Quality Control Plan will be submitted to the Contracting Officer or Base Architect.
- DQC Meeting Minutes and Reports will be sent electronically and followed by an original after any meeting or decision.

APPENDIX B: Construction Documents

is made. This report shall include copies of any meeting minutes that take place and /or the minutes of the Design Status meeting. Is it assumed that this reporting does not include typical coordination issues between the designers. This reporting would certainly include matters that involve interpretation of the RFP requirements, RFI's, schedule, or changes in previously issued documents to the Government.

- DQC documentation is required in this Contract. The DQC Manager will provide DQC reports which include the minutes and status of all site visits, inspections, and schedule related activities as required by the Contract.
- The DQC Manager will provide QC certification for design compliance.

Design Quality Control (Tracking Deficiencies)

- Review of minutes of the previous meeting to ensure major points noted have been followed.
- Review of previous review sets of documents, which are returned to the DQCM after corrections have been made.
- A red- yellow- green-method of checking documents wherein yellow meets requirements, red required corrections, and green indicates that corrections have been acted upon.
- Verify incorporation of Government review comments.

Design Documents: Preliminary Review – Final Review Phase(S)

- These procedures apply to the Design Quality Control of design documents (as applicable) for the Concept Design, Fast Track, 35%, 65%, 95%, 100% and the Final Consolidated Design submittals. The design schedule will be developed in support of the project overall design/construction schedule.
- The actions necessary to produce project design documents include:
 - Review project Request for Proposal (RFP) to insure all requirements are understood and included in the design documents. Where RFP requirements are in conflict with Government Standards or other Building Code requirements, bring the conflict to the immediate attention of the Government through the General Design/Build Contractor.
 - Establishing and maintaining a system to produce written records of design coordination and design data "needs" list;
 - Verifying design document format(s), including file, drawing and specification numbers and CADD file names;
 - Participating in the development of the preparation of a detailed project design schedule showing the design activities;
 - Conducting weekly design schedule/progress reviews with design checklist and control manager;
 - Responding to Government review comments.
 - Preparing a Design Analysis in accordance with UFC 1-300-10N.

Project Manager/Design Quality Control Manager (DQCM)

- Responsible for assisting the Designer of Record (DOR) in the development and management of the project design, including adherence to project budget and schedule and for ensuring that all design activities and DQC checks are completed before/on schedule and are properly documented.

Checklist and Control Managers

- Checklist and Control Managers are responsible for ensuring that the work done by the team under their day-to-day supervision is done in accordance with applicable Policies and Procedures, that the work is accurate, and accomplished on budget and on schedule.

CADD Team Leader

- The CADD Team Leader is appointed by the project manager and is accountable for electronic document management and compliance with CAD standards.

Shop Drawing and Material Submittal Review and Certification

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- Both the DQC and the QC Managers must certify design submittals for compliance with the RFP.
- Note date on which submittal was received from Contractor on each submittal.
- Review each submittal, and check and coordinate each submittal with requirements of work and contract documents.
- Review submittals for conformance with project design concepts and compliance with contract documents.
- Act on submittals, determining appropriate action based on QC organization's review of submittal. Forward submittal to Government with certifying statement or return submittal marked "not reviewed" or "revise and resubmit" as appropriate. The QC organization's review of submittal determines appropriate action.
- Ensure that material is clearly legible.
- QC organization shall certify submittals forwarded to Contracting Officer or Base Architect with the following certifying statement:

"I hereby certify that the (equipment) (material) (article) shown and marked in this submittal is that proposed to be incorporated with Contract Number _____, is in compliance with the RFP, can be installed in the allocated spaces, and is submitted for Government acceptance.

Certified by Design Quality Control Manager _____,

Date _____

Certified by QC Manager _____,

Date _____

- Sign certifying statement. The persons signing certifying statements shall be the QC organization members designated in the approved QC plan. The signatures shall be in original ink. Stamped signatures are not acceptable.
- Retain a copy of approved or accepted submittals at project site.
- Note that the Government may withhold construction release authority on the Issued for Construction (IFC) documents until all changes/comments have been resolved and incorporated into the design. Proceeding with construction with submittal approval is not authorized.

D. Basis of Design and Calculations

General Basis Of Design (Excerpts from UFC 1-300-09)

General Requirements

- The Basis of Design (BOD) is a narrative presentation of facts, sufficiently complete, to demonstrate that the project concept is fully understood, and that subsequent design details, and their ultimate presentation in the final drawings and specifications, will be based on sound architectural and engineering decisions. For Design-Build RFP Development, the Basis of Design requirements are typically provided in the Project Program.
- Submit the Basis of Design required at each design stage in accordance with the contract, the Core UFC's, and the additional Discipline requirements herein. For each Discipline in the Core UFC and contract, provide a discussion and description of the design.

Format

- Format the Basis of Design as an 8 ½ x 11 inch (216 x 279 mm) document, organized by Discipline. Provide a cover

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sheet identifying the document as the Basis of Design, and include the submittal stage, the project title, the location, the A-E Contract or Construction Contract number (Post-Award DB Contracts only); the Work Order Number; the Firm's name, the Command, or the Contractor name; and the date.

Sustainability

- When required as part of the SOW, provide a Sustainability section in the Basis of Design that summarizes how the design will achieve the requirements for Guiding Principles, and Third Party Certification (TPC) (where applicable) in accordance with UFC 1-200-02. The summary must state the level of Guiding Principle compliance, and elaborate on the various requirements from UFC 1-200-02. Provide narrative, Sustainable Energy Data Record Card/High Performance Sustainable Building Checklist, Third Party Commissioning (TPC) Checklist (where applicable), and justification (where applicable). Update at each phase of design. No variations or substitutions to the Checklist are allowed without Government approval.

Guiding Principles Validation

- When required as part of the SOW, provide for all projects in accordance with UFC 1-200-02. It is the responsibility of the DOR to verify Guiding Principles Validation requirements, by including design requirements in the contract documents and verifying construction submittals when required by the contract. For each of the Guiding Principles Requirements that is not attempted or achieved, provide narrative explaining how effects on the project for each Guiding Principle precludes achieving specific sustainability requirement or goal. Provide analysis of particular requirement and level to which project is able to comply.

Pre-award commissioning services

- When the project requires pre-award Commissioning services, incorporate all comments, reports, Owner Project Requirements (OPR), and any other documentation related to commissioning effort.

Third-party certification (tpc)

- For projects requiring TPC Certification, project must also achieve all Guiding Principles Validation (GPV) in accordance with UFC 1-200-02.

Antiterrorism (AT/FP)

- Provide an Antiterrorism (AT/FP) section in the Basis of Design that summarizes how the design complies with the DoD minimum AT standards in UFC 4-010-01 and the applicable Geographic Combatant Commander's AT Construction Standards. As a minimum, include the following in the summary:
 - Facility description including occupancy (low occupancy, inhabited, primary gathering, or billeting)
 - Applicable explosive weights (I, II, or III)
 - Level of Protection
 - Narratives of how each applicable standard is met
 - Site plan dimensioning standoff distances
 - Protective measures above the minimum

Note – Identify explosive weights as explosive weight I, II, or III as described in UFC 4- 010-02, to avoid disclosure of FOUO information.

Geotechnical

- The Basis of Design must include a paragraph briefly describing the geotechnical investigation program, the recommendations for the site preparation, and the recommendations for the building foundation and pavement design. It is preferred that the geotechnical report be included in the BOD as an appendix. However, the schedule may preclude the completion of the field investigation prior to the submittal of the BOD. If this is the case, describe the assumed basis of design for the foundations and pavement, and submit the geotechnical report as soon as possible,

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and as acceptable to the Government.

Civil.

- Identify the governing codes and criteria including federal and military handbooks being used for the design. References may be noted in the related sections listed below. Include reference titles and date of publications. Provide BOD with adequate narrative to describe design logic and assumptions. Show adherence to scope of work.

Existing Conditions

- Include the following:
 - Describe general site topography and vegetation type (grass, lightly wooded, brush). Describe existing site features.
 - Identify whether existing underground features, such as footings, foundations, or steam pits, exist, and describe.
 - Describe existing soil conditions.
 - Describe existing utilities, including size, type, and general location.
 - Discuss impact that this, and future projects, will have on utility systems.
 - Identify predominant drainage features, including any required downstream improvements. State whether field survey has been coordinated with delineation. Indicate the parties that have been notified of the presence of wetlands and are actively involved in this issue.
 - Identify and describe if endangered species inhabit area.
 - Identify and describe existing traffic patterns on and around site.
 - Provide horizontal and vertical datum and other pertinent survey information. Demolition.
- Discuss demolition relating to Civil issues only, typically 5 feet (1.5 m) outside of building line. Identify all buildings slated to be demolished by building number. Generally, describe structure types (i.e. 1-story frame, 2-story block); include building specifics under the Architectural BOD. Describe pavement to be demolished, including existing pavement section. Describe underground and overhead utility demolition, relocation, and abandonment. Describe other features to be removed (i.e. play equipment or fencing).

New Site Work

- Describe new building and its function with respect to civil issues, such as vehicle ingress/egress and pedestrian movement. Address internal functions under Architectural BOD. Describe pedestrian access. Identify number of parking spaces; include stall and aisle widths. Describe handicap access in and around site, number, and size of handicap parking spaces. Identify physical security requirements, such as intrusion detection provisions, fencing type and height, and lighting requirements. Also identify antiterrorism standoff distance requirements for the specific site conditions. Identify vehicle type expected on project site; note non-standard vehicle sizes and weights. Identify design wheel loading. Define projected traffic volume. Define new pavement types and sections. For airfield pavement, discuss design parameters, including pavement use, loadings, design life adopted in design, design methodology to be used, and availability of materials anticipated for construction, and possible impacts construction may have on airfield operations, such as haul routes and closures. For railroads and crane rail, state type of service for which rail track will be provided; anticipated volume and type of traffic; the ruling grade and the maximum curvature. Describe proposed type, source and thickness of ballast, weight of rail and source, treatment and dimensions of ties. For small arms ranges, list expected weapons and ammunition including the most powerful weapons/ammunition combination that the design is based on. Discuss critical features such as impact berms (including height and slope), side berms, firing lines, firing directions, target locations, bravo flag poles, road gates, fencing, access roads, supporting facilities, and any other prominent feature. Do not include the Source Danger Zone (SDZ) since this has nothing to do with the construction project

Water Supply

- State design parameters; include domestic and fire flow, residual pressure, and recent flow test data. State anticipated demand. Fire flow requirements must be established by the DOR's fire protection engineer. Describe water main and supply line sizes and capacities. Identify connection points. Identify connection methods. Identify

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whether existing infrastructure has capacity to support project. Identify requirements for backflow protection and freeze protection. Identify needs for metering. Identify need for booster pumps or pressure reducing valves. State number of new fire hydrants. Coordinate with the DOR's fire protection engineer. Provide number of wells and proposed pump rates.

Sanitary Sewer

- Describe waste stream and whether it is from domestic or industrial source. Include sources of any hazardous substances. Identify design population, peak and average flows. State whether sewer will be gravity or force main. Identify pre-treatment requirements and solutions. State minimum pipe slopes and velocities. Identify special installation requirements. State new pipe sizes and capacities. Identify pump station type, wet/dry well, types of pumps, pump capacity and total dynamic head, horsepower, telemetry requirements and compatibility with existing on-base systems, backup power requirements, and assumed response time by Activity personnel. Consult Activity as to whether existing system is operating at or near capacity. Discuss adequacy of existing system to handle current and future flows.

Wastewater Treatment

- Identify completed treatability studies. Briefly describe recommended process noting deviations from the treatability study. Define impact of stream condensation and cooling water discharges on sewer piping and treatment plants and the estimated cost of distribution and treatment of this additional loading.

Storm Drainage System

- Identify factors such as receiving waters, classification (if applicable), storm frequency, and C factors. Discuss adequacy of existing storm system and its effects on downstream facilities and systems. Discuss whether existing system will require upgrades. Identify use of collection system versus sheet flow. Describe materials and pipe sizes. Describe how upstream flows that impact site will be handled.

Stormwater

- Management Identify Integrated Management Practices (IMP's) and approach to stormwater management. Discuss compliance with UFC 3-210-10, LID Policy, Activity, State, and local requirements.

Erosion & Sediment Control

- Identify total disturbed area acreage. Discuss erodibility of soil, devices or methods to be used to control erosion and sediment losses, and protection devices at outfalls. Discuss compliance with Activity, State, and local requirements.

Permits

- Identify the permits necessary for both construction and operation of facilities. Identify fees associated with each permit. Submit PROD form with BOD.

Structural

- Provide a narrative report on how the design concept satisfies the customer's requirements, meets criteria and is cost effective. Include statements on the following:
- List a summary of the criteria upon which the structural design is based. Including a statement of all loads: dead, live, wind, snow, earthquake and any other significant load.
- List all assumptions required for the structural design where the design criteria is undefined, unclear, conflicting or unknown. State the basis of the assumption made.
- Describe the structural floor and roof systems. Include a discussion of both the gravity and lateral force resisting systems. Clearly describe the gravity and lateral load paths providing all pertinent information such as, capacity, size, dimensions, materials and design strengths. Define how foundations and slabs on grade are used to distribute lateral forces between the structure and the ground.
- Provide a narrative summary of the foundation system, including method for determination of the bearing capacity, maximum allowable bearing capacity, and lateral force capacity of the foundation, as well as other soil parameters used in the design. Provide all pertinent information, such as capacity, size, dimensions and a list of materials with design strengths.

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- When appropriate, provide a statement of any special considerations that affect the design (e.g. “superflat floors” for high stack warehouses, special corrosion resistance requirements, fire-resistive requirements, or crane or monorails). Describe applicable special inspections, testing, and observations required in accordance with IBC Chapter 17, as modified by [UFC 3-301-01](#), and IEBC, as modified by UFC 3-301-01. The generic schedule of special inspections is maintained on the WBDG as referenced in paragraph 17-10 “Statement of Special Inspections.
- When using U.S. Geological Survey seismic information, provide a map showing the Latitude and Longitude of the project site.
- Provide a narrative summary of the Serviceability limits for the structure.
- Include the lateral drift limit for the primary lateral load resisting system for wind or seismic, roof framing deflection limit for DL + LL and LL only, floor framing deflection limit for DL + LL and LL only, and composite floor framing deflection limit for DL + LL and LL only.

Fire Protection

- Provide fire protection design in accordance with the contract and [UFC 3-600-01](#).

General Calculations

- General Requirements
 - Submit design calculations required at each design stage in accordance with the contract, the Core UFC’s, and the additional Discipline requirements listed herein.
 - Prepare calculations in metric units when metric design is required. Provide reference to the source to produce the calculations.
 - Computer generated calculations.
 - Provide the software program name, version and source used to produce each computer output or report.

Format

- Format calculations as an 8 1/2 by 11-inch (216 by 279 mm) document. Provide a cover sheet with the title “Calculations;” the stage of the submittal; the project title and location; the A-E Contract or Construction Contract number; the Work Order Number; the Firm’s name, Command, or Contractor’s name; and the date. Organize calculations by Discipline, in the same order as the drawings, and in a manner appropriate for the number of sheets provided. Number all sheets. Provide an index, following the title sheet, with sub-indexes for disciplines having a very large number of sheets, and include Discipline name and page numbers.

Sustainability and energy

- When required as part of the SOW, provide calculations in accordance with UFC 1-200-02 for life cycle cost analysis

Geotechnical Requirements

- The geotechnical calculations normally appear in the geotechnical report; however, they may be in a separate package if another consultant other than the geotechnical consultant prepares the calculations for foundations or pavement. The calculations must indicate the loadings, capacities, the safety factors, and the text from which the calculations were based for the foundation and pavements. Graphs and formulae must be clearly indicated along with the derivation of curve slopes and data derived from the laboratory testing.

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Civil

- Provide design calculations for erosion and sediment control, stormwater drainage system, stormwater management, pavement and utility systems. Calculations must be legible, orderly and easily understood and checked by a registered practicing civil engineer.

Low Impact Development (LID).

- When required as part of the SOW, comply with UFC 3-210-10. If the project footprint exceeds 5000 SF (464.5 SM) the project must be documented on the Low Impact Development (LID) Data Card approved by the Government's civil reviewer who will document on the LID tab. LID policies sets a goal of no net increase in stormwater and sediment or nutrient loading from major renovation projects and construction projects. Major renovation projects are defined as having a storm water component and exceeding \$5 million and major construction projects are defined as exceeding \$750,000. If LID is not implemented to the METF as defined in UFC 3-210- 10, a waiver must be obtained from the Regional Engineer. Projects exceeding the dollar values above must be documented and approved by the Government's civil reviewer, who will then document in the LID tab.
- Coordinate waiver review and approval with Civil Technical Discipline Coordinator (TDC).

Structural Requirements

- Provide calculations to support all items and details outlined on the drawings and specifications. Include calculations for the main framing systems and all beams, columns, walls, foundations, bracing, diaphragms, equipment supports, and component inter-connections to provide a safe, stable efficient and cost-effective structural system, considering all design loads and criteria. They must be legible, orderly and easily understood and checked by a registered practicing structural engineer.

Also Include the Following:

- A cover sheet indicating the project title, location, construction contract number and names of the persons originating and checking the calculations.
- Table of contents.
- A brief statement describing the structural system, significant design parameters and any restrictions that may affect the design.
- Applicable design criteria.
- Loads: Include all loadings, forces, temperature changes, induced settlements, and other internal and external actions that may affect the design of the structure. The list must include the orientation and location, magnitude and units of measure for each load.
- Restrictions: Include all limiting factors such as horizontal and vertical deflections limits, height restrictions, installation or operating tolerances for equipment or building components and any other limits to the structural system.
- Materials: Include all materials used and their allowable stress limits, yield strengths, type, grade, class or other applicable material properties.
- References: Include all criteria, accepted standards, manuals, codes, texts, papers, or other references used in the analysis and design that are accepted in a public domain. All references must be appropriately identified; abbreviations such as AISC, ASTM, and ACI are acceptable. Document the origin of all customer specific criteria in the calculations.
- Sketches with sufficient detail and clarity to communicate design intent.

Note: assumptions and references to codes, standards, criteria drawings and computer output.

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Calculations and Test Reports for Antiterrorism

- Provide Calculations or test reports for the following systems demonstrating compliance with applicable Antiterrorism (AT/FP) requirements:
 - Blast resistant window systems
 - Structural analysis of building elements where stand-off distances are less than the conventional stand-off distance
 - Progressive collapse calculations

Note: Identify explosive weights as explosive weight I, II, or III as described in UFC 4- 010-02, to avoid disclosure of sensitive information.

Design for Lateral Forces

- Design for lateral forces must include design calculations for wind, seismic, and other potential loadings. The construction drawings must depict the governing design elements base on both seismic and wind design requirements.

Computer Generated Calculations

- Provide input data, including loads, loading diagrams, node diagrams, and adequate documentation to illustrate the design. The schematic models used for input must show, as a minimum, nodes/joints, elements/members, materials/properties, and all loadings, induced settlements/deflections, and a list of load combinations. Results must include an output listing for maximum/minimum stresses/forces and deflections for each element, and the restrictions for each loading case and combination. If required, submit narratives. In addition, provide the following:
 - Submit graphical plots of structural models which must include, but not be limited to, main structural elements, boundary conditions, loading diagrams, and deflected shapes. Submit graphical plots with each deliverable at each submittal stage. Provide in both native, editable format and in PDF.
 - If a modal analysis is performed, submit plots of mode shapes and a listing of the dominant natural frequencies.
 - If blast or progressive collapse analysis is performed, submit comparison tables of computed rotations/residual strength ratios and response limits listed in [UFC 3-340-01](#) and [UFC 4-023-03](#).
- If software not commonly commercially available, or widely accepted in the structural community, is used, submit validation documentation of the software (e.g. hand verification of the software solution of a significant, representative portion of the structure).

Fire Protection Calculations

- Provide calculations at the earliest possible stage in design, but no later than the Design Development Submittal and as further required by Chapter 15 of this FC. Comply with [UFC 3-600-01](#).

Concept Basis Of Design.

- Submit a preliminary version of the Basis of Design addressing items defined in the contract, the Core UFCs, and as follows.

Geotechnical

- Include the Geotechnical Report, if available, as an appendix. It is encouraged to have this report at this submittal to obtain any review comments at the earliest possible date.

Sustainability

- When required as part of the SOW, provide Sustainability Action Plan, Checklist, TPC Checklist (where applicable), copy of TPC registration information (where applicable), and narrative.

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Calculations

Provide calculations complete and in sufficient detail to support the items outlined in the preliminary Basis of Design, as indicated on the drawings, in accordance with the Core UFCs and herein.

Sustainability Notebook.

- When required as part of the SOW, maintain an up-to-date Sustainability Notebook that contains the electronic files of the deliverables required for the project. The amount of information in the Sustainability Notebook is based on the level of Guiding Principle compliance tracking required, and may also be used in the Basis of Design. The Sustainability Notebook contains the following components:

Sustainability Action Plan

- When required as part of the SOW, provide the Sustainability Action Plan with each submittal. The amount of planning and documentation in the Sustainability Action Plan is based on the level of Guiding Principle compliance tracking required for the project. Provide, as a minimum, a description of how DOR intends to achieve each GP requirement and other sustainability goals for the project.

Design Development Submittals (35% - 50%)Basis Of Design.

- Update and submit a complete Basis of Design addressing items defined in this document and the Core UFCs.
- Update to Sustainability when required as part of the SOW
- Provide updated Sustainability Action Plan, Checklist, TPC Checklist (where applicable), and updated narrative, when required as part of the SOW.
- Outline specifications
- Provide outline specifications, in the form of a list of specifications sections the DOR intends to use in the job.
- Use Unified Facilities Guide Specifications, provide a listing of the UFGS used in the job by Section Number, Title, and Section Date. Follow the Order of Precedence for choosing UFGS master guide specifications, unless required otherwise by the contract.

Calculations

- Provide calculations complete, and in sufficient detail to substantiate the design level in this concept Basis of Design, as indicated on the drawings, in accordance with the Core UFCs and herein, and any updated from the previous design phase.

Structural and Geotechnical

- Provide Structural and Geotechnical calculations in sufficient detail to support the items outlined

Civil

- Provide calculations in sufficient detail to indicate compliance with LID criteria when required as part of the SOW, and state or local stormwater regulations. Provide calculations for utility systems and pavements in sufficient detail to support items outlined in the Basis of Design and indicated in the drawings

Architectural.

- Provide acoustical calculations in accordance with [UFC 3-101-01](#).

Mechanical

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- Provide a bookmarked Adobe PDF, on CD-R or DVD-R media, of all input and output data, and summary sheets for Energy Analysis, Life Cycle Cost Analysis, Building Heating and Cooling Loads, and ASHRAE 90.1 Compliance Calculations as required by [UFC 3-410-01](#).

Energy Analysis.

- Provide an Adobe PDF copy of the computerized energy analysis that includes input and output data in their entirety.

Life Cycle Cost Analysis

- Submit the computerized LCC analysis utilizing the latest edition of the NIST Building Life-Cycle Cost Program.

Building Heating and Cooling Load

- Provide an Adobe PDF copy of the computerized load calculations with input and output data in their entirety.

ASHRAE 90.1 Compliance Calculations

- Submit calculations and compliance forms indicated in the Basis of Design.

Plumbing Calculations

- Provide Design Basis as required by [UFC 3-420-01](#).

Electrical

- **Provided calculations required by Core UFCs and also include:**
 - Lighting: Interior and Exterior Foot-candles.
 - Load Analysis.
 - Service size.
 - Feeder size.
 - Larger special circuit sizes.
 - Lightning Risk Assessment.

Fire Protection

- Submit all calculations supporting all fire suppression and fire alarm/detection systems for the project. Calculations for systems, features, or elements other than fire suppression or detection will be required as applicable. Fire suppression system calculations must be prepared using commercially available computer software.

Environmental Report

- Provide reports as required in [UFC 3-800-10N](#).

PRE-FINAL DESIGN SUBMITTALS (100%) BASIS OF DESIGN.

- Submit revised Basis of Design including updated information and incorporating responses to previous government review comments.

Geotechnical

- The Geotechnical Report, if modified during the previous review, must be re-submitted as an appendix to the Basis of Design; otherwise, do not submit.

Sustainability

- Provide updated Sustainability Action Plan, Checklist, TPC Checklist (where applicable), and updated narrative, when required as part of the SOW.

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Specifications

- Provide edited, marked-up specification sections, using the SpecsIntact “Show Revisions” function when editing and printing, to show deletions from and additions to the UFGS master sections. Use the default settings in SpecsIntact that displays deletions lined out and additions underlined. Run all verification reports when printing. Print project specification sections, using the SpecsIntact “Show Section Dates” function, to display the official date of release of the master guide specification and version of the specification used. This date appears immediately below the specification section title. Design submittal must be complete at this stage and require only minor corrections if any. Provide a submittal register with the specifications.

Sustainability

- Attach Checklist and Third Party checklist (where applicable) to UFGS 01 33 29, Sustainability Reporting, when required as part of the SOW.

Environmental Specifications

- Provide additional requirements for Environmental specifications as required by [UFC 3- 800-10](#).

Structural Interior Design (SID)

- Include the following:
 - Interior and Exterior Material and Finish samples submitted in presentation board or binder format.
 - Signage plans and details.
 - Furniture and Equipment (FF&E) Plan indicating built-in and movable items.
 - FF&E Summary List corresponding to the FF&E Plan with estimated item costs.

FF&E

- Provide Preliminary FF&E to include the following, and present to the Activity personnel:
 - Cover Title Page (project name, project #, submittal date, submittal title).
 - FF&E list (Cost Summary).
 - Furniture placement plans coded to the FF&E list and furnishings specifications.
 - Specifications and procurement data sheets (i.e. furniture, furnishings), indicating final finish and fabric selections.
 - Catalog cuts and finish samples for all specified items.
 - 16 x 20 inch (406 x 508 mm) color boards of furniture/furnishings and finishes specified for Activity presentation to indicate overall design intent.
 - Best Value Determination (BVD) Analysis including copy of the BVD Analysis cover letter, performance specifications, project specific typical, pricing spreadsheet and questionnaire.

Calculations

- Provide calculations, updated from previous submittal, to substantiate design level and to reflect resolution of all previous government review comments, and in accordance with the Core UFCs. Provide design analysis that is 100% complete. In addition, provide the following:
 - **Mechanical**
 - Submit calculations to support the plumbing and mechanical systems and the major equipment comprising those systems. Submittals must include, but not be limited to, cooling loads, heating loads, air balance, and outside air calculations. Update the energy analysis, provided at the Design Development phase, with the equipment efficiencies scheduled on the drawings.

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- **Electrical**
 - Provide updated and complete calculations required by Core UFCs, and include photometric calculations for interior and exterior lighting.
- **Statement of Special Inspections**
 - Prepare special inspections specification UFGS 01 45 35 (DBB) or UFGS 01 45 35.05 20 (DB). These specifications contain the DOD process for implementing the special inspections, testing, and observations required per IBC Chapter 17 as modified by [UFC 3-301-01](#) and the International Existing Building Code as modified by [UFC 3-301-01](#). The generic schedule of special inspections is maintained on the WBDG at the following location: http://www.wbdg.org/ccb/browse_cat.php?c=6.
- **Final Design Submittals Basis Of Design**
 - Submit final, revised and updated, Basis of Design.
- **Sustainability.**
 - When required as part of the SOW, provide updated Sustainability Action Plan, Checklist, and updated narrative. Provide updated TPC Checklist (where applicable) as a separate PDF.
- **Sustainability Notebook.**
 - No later than 60 days after providing the Final Design Submittal, provide Sustainability Notebook.

E. Drawings

- The following are the minimum required drawings and support information a project. These shall apply to every required deliverable. These requirements shall be met when work in the area designated is being accomplished: These drawings shall be submitted electronically in Architectural D or E size and in AutoCAD version 2014 or earlier, Revit 2014 and as PDF format at each submittal phase. Drawings shall also be submitted in ½ and full size as a minimum-other contractual requirements may increase this quantity.

Title Sheet includes as a Minimum

- Project title
- Project number
- Drawing index
- Base map vicinity plan
- Base map
- Project location
- Haul routes
- Civil Engineering (B250), and Contracting Office (B216) locations
- Shaw AFB title block with the appropriate information included

Site Plan Existing and Proposed

- Facilities
- Utilities
 - Transformer
 - Chillers
 - Condensers
 - Generator & support equipment (ATS, manual bypasses, fuel tank, etc....)
- Pavements
 - Roadways
 - Access drives
 - Sidewalks (identify ADA/ABA access)

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- Parking
- Fire department access-must be delineated on the plans including clearances and any improved pavement.
- Pads (dumpster, patio, etc....)
- Demolition
- Area, parking and roadway lighting
- Landscaping
- Fire suppression system and Fire hydrants
 - Fire Hydrants (ensure one is a minimum of 350' from the new or renovated facility)
 - OS&Y Valve
 - PIV Valve
 - Roadway valves
- Utility entrances (conduit, ducts, pipe ...) into the facility and their termination location
- A separate sheet designating the AT/FP design, setbacks, clear zones, and other pertinent site AT/FP information. This drawing shall only have details, notes, references and items dealing with AT/FP. Do not include any extraneous information.

Foundation/Footing Plan

- **Floor Plan;** includes existing, final floor plan and dimensions
- **Demolition Plan;** separate from floor plan for each building.
- **Life Safety Plan;** include all information regarding life safety. Use the symbols located in the appendix for life safety. Separate plan for each building
- **Hazardous Material Plans;** indicate abatement etc....
- **Reflected Ceiling Plan;** includes as a minimum, HVAC diffusers and returns, speakers, annunciators, alarms, lights, detectors and any other appurtenances remaining or required by the contract. This is to help ensure proper layout of all disciplines.
- **Roof Plan;** includes as a minimum, all vents, supports or any other type of approved roof penetration. The arrestor fall system shall be shown also.
- **Elevation Plan;** include dimensions, details, schedules for finishes that match the specification language, and all section and enlarged reference cuts.
- **Schedules;** Finish, Window, and Door as a minimum. Use SDI system for doors and indicate distinctly the systems designed such as Hollow metal, Steel, Aluminum windows, Storefronts and Curtain Walls as an example.
- **Equipment Plans;** Include plans with all equipment and furnishings on one plan for a complete coordinated set. Highlight the equipment and screen items not scheduled for that plan. Provide a schedule for the items on the plan and indicate who provides the items.
- **Furnishing Plans;** Include plans with all furnishings and equipment on one plan for a complete coordinated set. Highlight the furnishings and screen items not scheduled for that plan. Provide a schedule for the items on the plan and indicate who provides the items.

Plumbing Plan And Schedule; Includes As A Minimum

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- Plumbing Fixture Schedule
- Domestic Water piping plans
- Waste & Vent piping plans
- Isometric and riser diagrams

HVAC Plan And Schedule; Includes As A Minimum

- Mechanical equipment schedules and details
- Ductwork plans with airflow quantities
- Mechanical Piping plans
- DDC control schematics with points list
- Sequence of operations
- Control and riser diagrams

Power Plan And Riser Diagram; Includes As A Minimum

- kVA and voltage for all motor control centers, panels and transformers
- Short Circuit information for service transformer and panel
- Single line diagram of the system including all conduit and wire sizes

Lighting Plan And Fixture Schedule; Includes As A Minimum

- Photometric data and drawing
- Voltage, wattage and lumens of all luminaries
- Type of light source
- Exit sign and emergency lighting locations

Electrical Schedule And Details;

Communication (Phone/Data/Cable TV/CCTV/VCT); includes as a minimum:

- Systems single / riser diagrams
- Elevations and details for specialty systems

Fire Detection/Annunciation and Mass Notification System Plan(s)

- (The approved stamped drawings from the design Fire Protection Engineer with FPE letter shall be submitted as part of the as-built set.); includes as a minimum:
 - Floor plans including device locations (e.g. fire alarm notification devices, mass notification system devices, initiating devices, panels, etc.)
 - Candela ratings for visual notification devices.
 - System riser diagrams including all power connections, initiating devices, typical alarm devices, and any interconnections to alternate systems requiring control and or integration of the fire alarm / mass notification system (e.g. AHU shutdown, magnetic door release, etc.)
 - Details / matrix for system operation

F. DRAFTING

Specific Drafting Requirements

- This standard has been developed to ensure contractor drawings meet or exceed the Shaw AFB requirements. The latest edition of the **CAD/BIM Technology Center's**, "*A/E/C CAD Standard*" is the base requirement for all project drawings CAD requirements. Any deviation to that standard as required by the base is identified in this document. Additional requirements are identified in the **United States National CAD Standard** (latest edition) for items not included in the *A/E/C CAD Standard*. If there is a discrepancy

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between the A/E/C and United States National CAD standards then the A/E/C shall be used. These are basic requirements and are not meant to be all-inclusive. If you wish to deviate from these standards please identify, in writing, the requested changes prior to making them and submit them Contracting Officer for determination. If you should have questions concerning any of these guidelines, please contact the Civil Engineer Drafting Shop at (803) 895-9632/9630 during normal duty hours.

- The "A/E/C/ CAD Standard" can be provided upon written request.
- United States National Cad Standard can be found at www.nationalcadstandard.org.

Electronic Media

- When submittal of electronic files is required the official copy shall be on CD-ROM's or DVD-R discs labeled. Contractor shall label all electronic media with the following information: the 6 digit project number (VLSB), project title, contract number, date and sequence, in the event of multiple media sources.

File Names

- Files shall be named in the following format: (6 digit project number)(discipline sheet number)(sheet number in sequence of total sheets). As an example see the following: 980006S15 (Project #98-0006, Sheet 15). Files shall be provided in AutoCAD 2014, or earlier.

Drawing Size

- ALL drawings shall be drawn full scale. This is to include all work, whether done in Paper Space or Model Space. All borders shall be drawn at 36" x 24". Should a larger size be necessary, please obtain approval from the project engineer. The Shaw AFB Title Block shall be used for all design drawings. The format and title block shall be requested from 20CESEngineering@us.af.mil.

PaperSpace/ModelSpace/XREF

- All drawings shall be set to print using layouts. All drawing objects pertaining to anything EXCEPT Title Blocks and Border drawings shall be done in Model Space. This includes floor plans, dimensioning, text leaders, site plans, details, and all objects which could possibly need to be dimensioned. Paper Space shall be reserved for sheet layout using Model Space viewports scaled appropriately.
- Should a project require certain drawings to be shown many times, as is usually the case with most floor plans, the drawing in question shall be XREF'd, or referenced, into other sheets as an overlay. This shall be done in Model Space ONLY and allows changes on the floor plan drawing to reflect on other sheets without modifying multiple drawings. Should a reference file be used that is not typical, such as section symbols, include these as well.

For final as-built submittal all XREF's shall be BOUND.

Coordinately Correct Drawings

- All civil drawings shall be coordinately correct using at least two known points of reference. Survey coordinate data, such as benchmarks, will be provided by the Engineering Support section upon request. All coordinate data shall be provided in accordance with the NAD83 datum, international US foot for SC.

Colors/Line Weights

- Colors and line weights are left to the discretion of the A-E. However, care should be taken to ensure that object line weights are standardized and, if necessary, the proper pen table should be included to enable proper plotting. The proper layer standards and pen tables for Shaw AFB will be provided upon request.

Dimension/Text Styles

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- All text shall be accomplished using two separate fonts. Both of these fonts are included with AutoCAD. Aftermarket fonts shall not be used. Font style ROMAND.SHX shall be used for all titles of details, sections, plans, etc. Font style ROMANS.SHX shall be used as the standard font for all other text, including dimension text. ROMAND.SHX shall be .25" high and ROMANS.SHX shall be .125" high.

Dimension Scales

- All dimensions shall be scaled to properly display as follows:
 - Closed filled arrowheads shall be 1/8" when plotted. The use of architectural ticks in lieu of arrowheads for dimensions is acceptable as long as the use is maintained throughout the project drawings and the appearance is neat.
 - Lettering shall be 1/8" when plotted
 - ALL dimensions shall retain their associativity, they shall not be exploded.

Graphical Scales and Point of compass:

- All drawing sheets shall be provided with a graphical scale and point of compass unless there are no scalable items.
 - If multiple scales are used on a single drawing sheet, then a graphical scale shall be provided for each scale used.
 - The graphic scale and point of compass shall meet the requirements of NFPA 13.

Layering

- Layering shall be in accordance with the **A/E/C Cad Standard** (latest release). It establishes layering in the following format:
 - A-WALL-EXTR-XXXX
 - **User defined** (4+ char): (optional). Used to accommodate special project requirements.
 - **Modifier** (4+ char): Further breaks down minor group into specific types, i.e. **exterior** wall.
 - **Minor group**: Specific construction system, doors, ceilings, power, etc. **Wall** in this example.
 - **Major group**: Identifies the design discipline associated with this layer. **Architectural** in this example.
 - All layers shall be logically abbreviated so as to make sense.

Revisions/Submittals

- All sheets shall have a revision block above the main title block. Civil Engineering will provide a sample drawing as a reference, upon written request. Revision block shall be filled in for changes made to any drawings after the 100% design submittal. Upon 100% design, ALL title block dates shall match the date of drawing submittal. Upon submittal, annotate the title sheet revision block to identify the set as 100% designed. Furthermore, all project drawing files, including XREF's and any miscellaneous blocks, shall be included to ensure a complete set of project drawings.

G. BUILDING INFORMATION MODELING (BIM)

Instructions And Reference Information

- This template is a tool that is provided to assist in the development of a BIM Project Execution Plan (PxP) as required per Awarded Contract or Proposal Submission Requirements. It was adapted from the National BIM Standard (NBIMS) – US Version 2, Section 5.4 BIM Project Execution Plan Content – Version 2.1, BIM Project Execution Plan Template. For Reference Information only on content in this template, such as BIM Use definitions please see the NBIMS Chapter 5 Practice Documents and related Section 5.3 BIM Project Execution Planning Guide at www.nationalbimstandard.org.

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- The U.S. Air Force is an Alliance Sponsor Member of the National Institute of Building Sciences (NIBS) <http://www.nibs.org/?page=organizations>. NBIMS is a product of the Building SMART Alliance which serves as a Council of NIBS <http://www.nibs.org/?page=bsa>.

Instructions and examples to assist with the completion of this guide are currently in red. The text can and should be modified to suit the needs of the organization filling out the template. If modified, the format of the text should be changed to match the rest of the document. This can be completed, in most cases, by selecting the normal style in the template styles.

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Section A: Project Information

- To successfully execute Building Information Modeling (BIM) on a project, use this detailed BIM Project Execution Plan. The BIM Project Execution Plan defines uses for BIM on the project (e.g. design authoring, design reviews, 3D coordination, and record modeling), along with a detailed process for executing BIM on this project.

U.S. Air Force BIM Mission Statement

- U.S. Air Force Strategic BIM Goals and Objectives are aligned to directly support the Air Force Civil Engineer (CE) mission identified in the 2011 CE Strategic Plan: "...provide, operate, maintain and protect sustainable installations as weapon-system platforms through engineering and emergency response services across the full mission spectrum."
- The Civil Engineer Strategic Plan identifies three Goals as the foundation of the CE Strategy:
 - Build Ready Engineers
 - Build Great Leaders
 - Build Sustainable Installations
- The project goals and BIM Uses identified in Section C have been developed to support the CE Strategic Plan. Except for some minor modifications in Section C, the BIM Uses were previously developed for the National BIM Standard. The identified BIM Uses are selected to meet the USAF goals that were developed to support the CE Strategic Plan
 - Facility Intended End User: Us Air Force
 - Project Name:
 - Project Location:
 - Contract Type:
 - Facility Type:
 - Brief Project Description:
 - Additional Project Information: N/A
 - Agent:
 - Project Numbers: See Below

PROJECT INFORMATION	NUMBER
AGENT CONTRACT NUMBER:	
TASK ORDER:	
AGENT PROJECT NUMBER:	
CONTRACTOR INFORMATION	NUMBER
PROJECT NUMBER:	
PROJECT NUMBER	

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Section B: Key Project Contacts

ROLE	ORGANIZATION	CONTACT NAME	LOCATION	E-MAIL	TIME ZONE	PHONE
Project Manager	USAF				Eastern	
BIM Manager	USAF				Eastern	
Regional Manager						
Senior Project Manager						
BIM Manager						
Architecture Lead						
Senior Project Manager						
Architecture BIM Manager						
Landscape Lead						
BIM Collaborator						
Interior Lead						
Structural Design Lead						
Civil Lead						
MEP Lead						
MEP BIM Manager						
Life Safety Fire Sprinkler Lead						

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Section C: Project Goals / Bim Objectives

▪ Major BIM Goals / Objectives:

BIM GOAL	DESCRIPTION
Integrate project-level BIMs with current and projected software tools.	Integrate BIM data with AF Facility Management and GeoBase geospatial tools through Construction Operations Building Information Exchange (COBie) data to populate Tririga and BUILDER databases and to geo-locate BIM models
Support the Total Force Civil Engineer team by providing NexGen IT integrated software tools	Project-level BIMs must utilize and integrate with approved AF software tools
Support sustainable installations and asset management	Provide BIM and software tools to support lifecycle-based program management aligned with other federal government entities and universally adopted standards. Implement BIM-based planning, design and construction and by delivering a BIM model that integrate with approved facility management tools/software Apply BIM-enabled FM systems to optimize management of RP resources. Implement BIM-based energy modeling during Programming/Requirements Development and Design phases and implement BIM-based EMCS sensor planning/monitoring
Eliminate conflicts	Clash Detection software is used during the design and construction phases to identify conflicts by comparing 3D models of building systems. The goal of clash detection is to eliminate the major system conflicts prior to installation. The information model is then used to create detailed control points to aid in assembly layout. An example of this is layout of foundations using a total station with points preloaded and/or using GPS coordinates to determine if proper excavation depth is reached.
Accurate 3D Record Model for FM Team	The Record Model shall, at a minimum, contain the culmination of all the BIM modeling throughout the project, including linking Operation, Maintenance, and Asset data to the as-built model (created from the Design, Construction, 4D Coordination Models, and Subcontractor Fabrication Models) to deliver an accurate Record Model to the Air Force asset manager. Additional information including equipment (computer racks, UPS, material handling; where applicable) and space planning system shall be included to ensure they interface properly with building systems.

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BIM Uses:

- (X) are required by USAF BIM Requirements.
- (C) additional BIM Uses for the project selected as Contractor Electives.

PLAN (NIC)		DESIGN		CONSTRUCT		OPERATE (NIC)	
PROGRAMMING	X	DESIGN AUTHORIZING		SITE UTILIZATION PLANNING		BUILDING SYSTEM ANALYSIS	
SITE ANALYSIS	X	DESIGN REVIEWS		CONSTRUCTION SYSTEM DESIGN		ASSET MANAGEMENT	
	X	3D COORDINATION - INTERFERENCE MANAGEMENT	X	3D COORDINATION - INTERFERENCE MANAGEMENT		SPACE MANAGEMENT / TRACKING	
		ENGINEERING ANALYSIS - STRUCTURAL	C	DIGITAL FABRICATION		DISASTER PLANNING	
		ENGINEERING ANALYSIS - LIGHTING	X	3D CONTROL AND PLANNING / DIGITAL LAYOUT			
		ENGINEERING ANALYSIS - ENERGY	X	RECORD MODELING		RECORD MODELING	
	C	PROGRAM VALIDATION	C	FIELD / MATERIAL TRACKING			
		ENGINEERING ANALYSIS - MECHANICAL					
	X	3D CONTROL AND PLANNING (DIGITAL LAYOUT) - GEOLOCATING THE PROJECT					
		SUSTAINABILITY (LEED) EVALUATION					
		ENGINEERING ANALYSIS - OTHER (PER CONTRACT REQUIREMENTS)					
	C	CODE VALIDATION					
PHASE PLANNING (4D)		PRELIMINARY CONSTRUCTION SCHEDULING (4D)	X	CONSTRUCTION SCHEDULING (4D)		BUILDING (PREVENTIVE) MAINTENANCE SCHEDULING (4D)	
COST ESTIMATION (5D)	X	COST ESTIMATION (5D)		COST ESTIMATION (5D)		COST ESTIMATION (5D)	
EXISTING CONDITIONS MODELING		EXISTING CONDITIONS MODELING		EXISTING CONDITIONS MODELING		EXISTING CONDITIONS MODELING	
CONSTRUCTION OPERATIONS BUILDING INFORMATION EXCHANGE (COBie)	X	CONSTRUCTION OPERATIONS BUILDING INFORMATION EXCHANGE (COBie)	X	CONSTRUCTION OPERATIONS BUILDING INFORMATION EXCHANGE (COBie) BUILDER and Omniclass as required		CONSTRUCTION OPERATIONS BUILDING INFORMATION EXCHANGE (COBie) BUILDER and Omniclass as required	

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BIM Use: Construction Operations Building Information Exchange

▪ Description

- This is an interim process to achieve the Asset Management BIM Use by populating Record Model attributes and COBie spreadsheets to provide facility information to the USAF's NextGen IT Facilities Management system. Facility data shall include all information associated with the Design and Constructions worksheets as well as the Spares worksheet from the Operations and Maintenance worksheets.

Potential Value

- Store operations, maintenance owner user manuals, and equipment specifications for faster access.
- Maintain up-to-date facility and equipment data including but not limited to maintenance schedules, warranties, cost data, upgrades, replacements, damages/deterioration, maintenance records, manufacturer's data, and equipment functionality

Resources Required

- Record Model
- COBie database

Team Competencies Required

- Pre-design knowledge of which assets are worth tracking, whether the building is dynamic vs. static, and the end needs of the building to satisfy the end user
- Knowledge of the asset management system

Selected Resources

- NIST (2007) General Buildings Information Handover Guide: Principles, Methodology, and Case Studies
- BUILDER Remote Entry Database (BRED) Data Dictionary

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Section D: Organizational Roles / Staffing

DESIGN PHASE BIM USE	ORGANIZATION	LOCATION(S)	LEAD CONTACT
DESIGN AUTHORIZING			
PROGRESS REVIEWS			
DESIGN 3D COORDINATION			
3D CONTROL & PLANNING (GEOLOCATING THE PROJECT)			
COST ESTIMATION (5D)			
COBIE			
PROGRAM VALIDATION			
CODE VALIDATION			

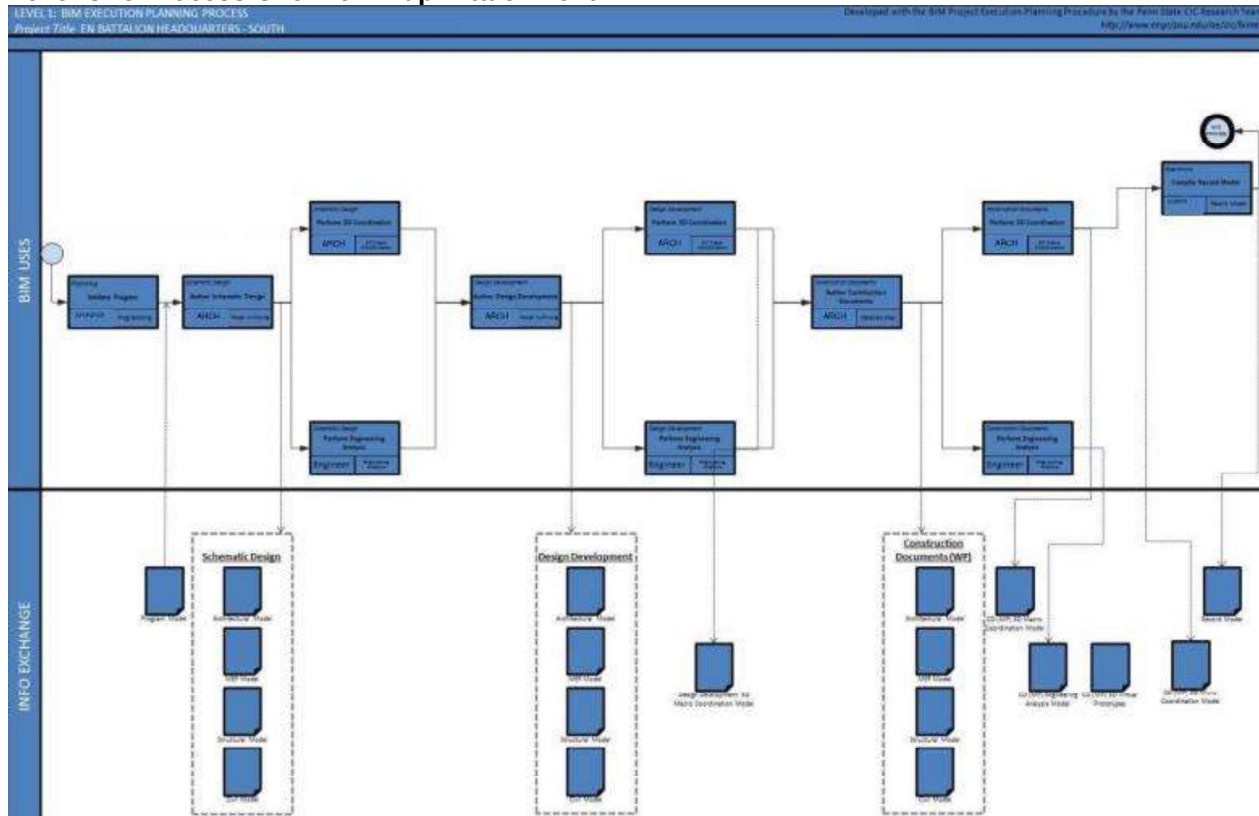
CONSTRUCTION PHASE BIM USE	ORGANIZATION	LOCATION(S)	LEAD CONTACT
CONSTRUCTION 3D COORDINATION			
3D CONTROL & PLANNING			
RECORD MODELING			
COBIE			
DIGITAL FABRICATION			
FIELD / MATERIAL TRACKING			

SELECTED BIM USE ENHANCEMENT	DESCRIPTION / ADDED VALUE
PROGRAM VALIDATION	Quantity takeoff from the model to match the furniture program requirements.
CODE VALIDATION	Clash detection on Accessibility requirements for Egress paths and restrooms.
DIGITAL FABRICATION	Enhanced Shop Drawing Accuracy and Approval
FIELD / MATERIAL TRACKING	Enhanced Material Tracking and Placement to included Shop Drawing Approval

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Section E: BIM Process Design

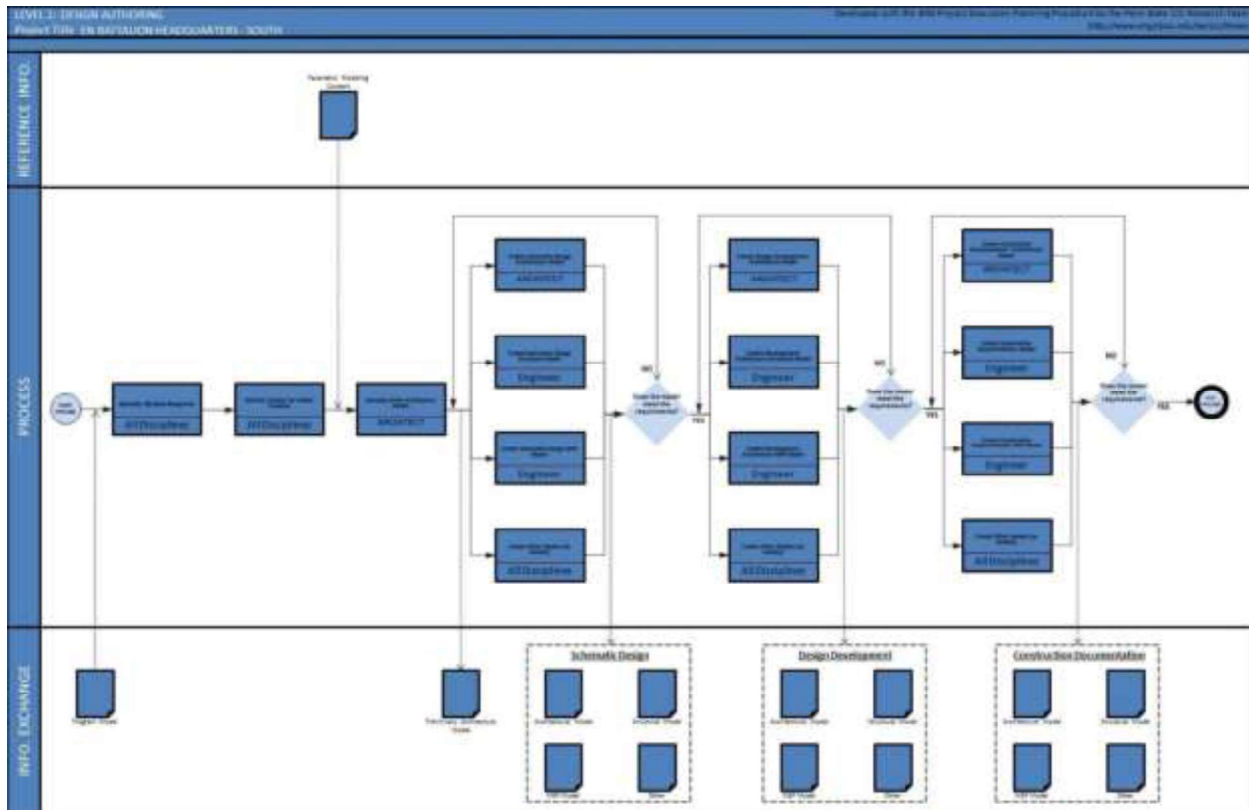
Level One Process Overview Map: Attachment 1



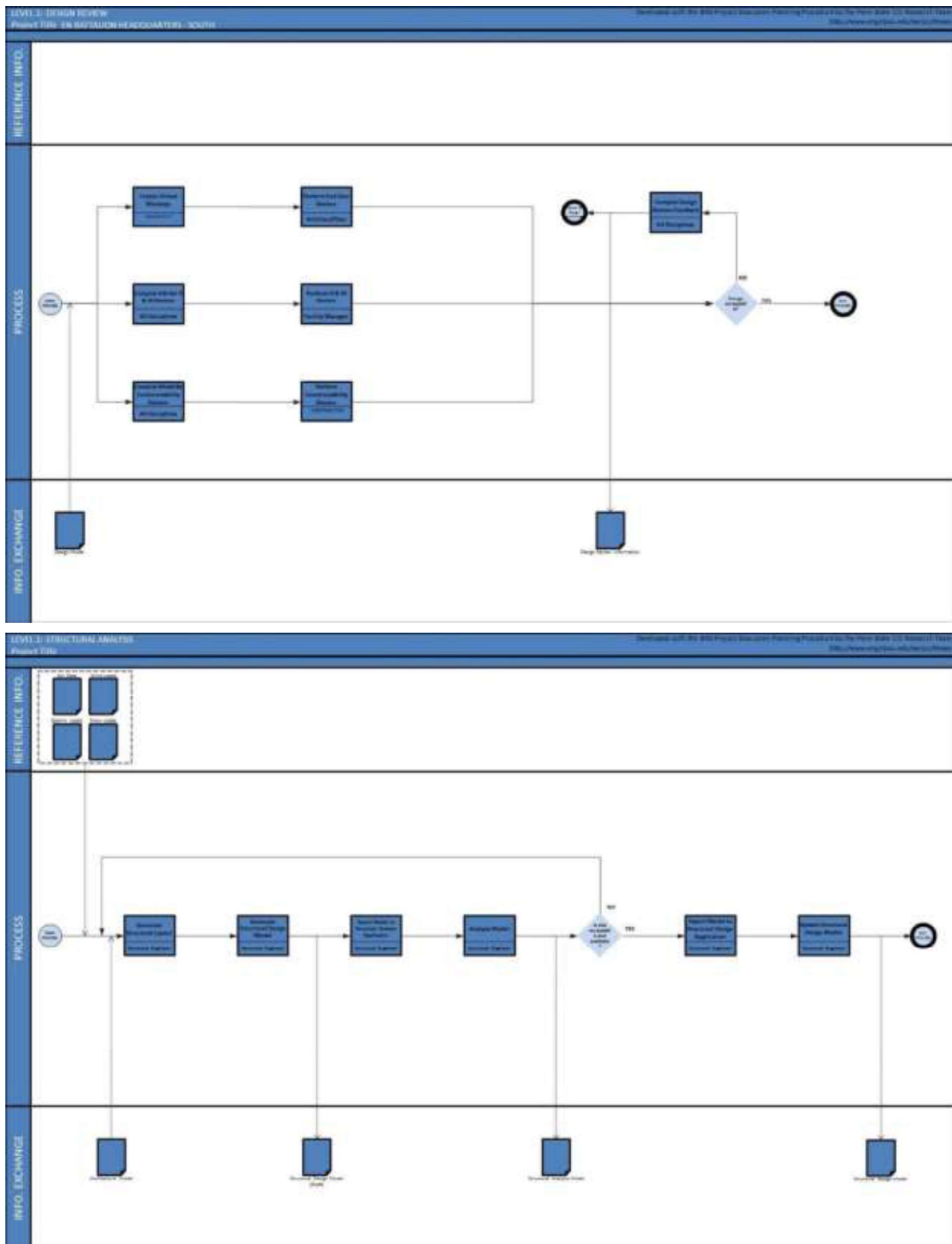
APPENDIX B: Construction Documents

Level Two Detailed Process Map: Attachment 2

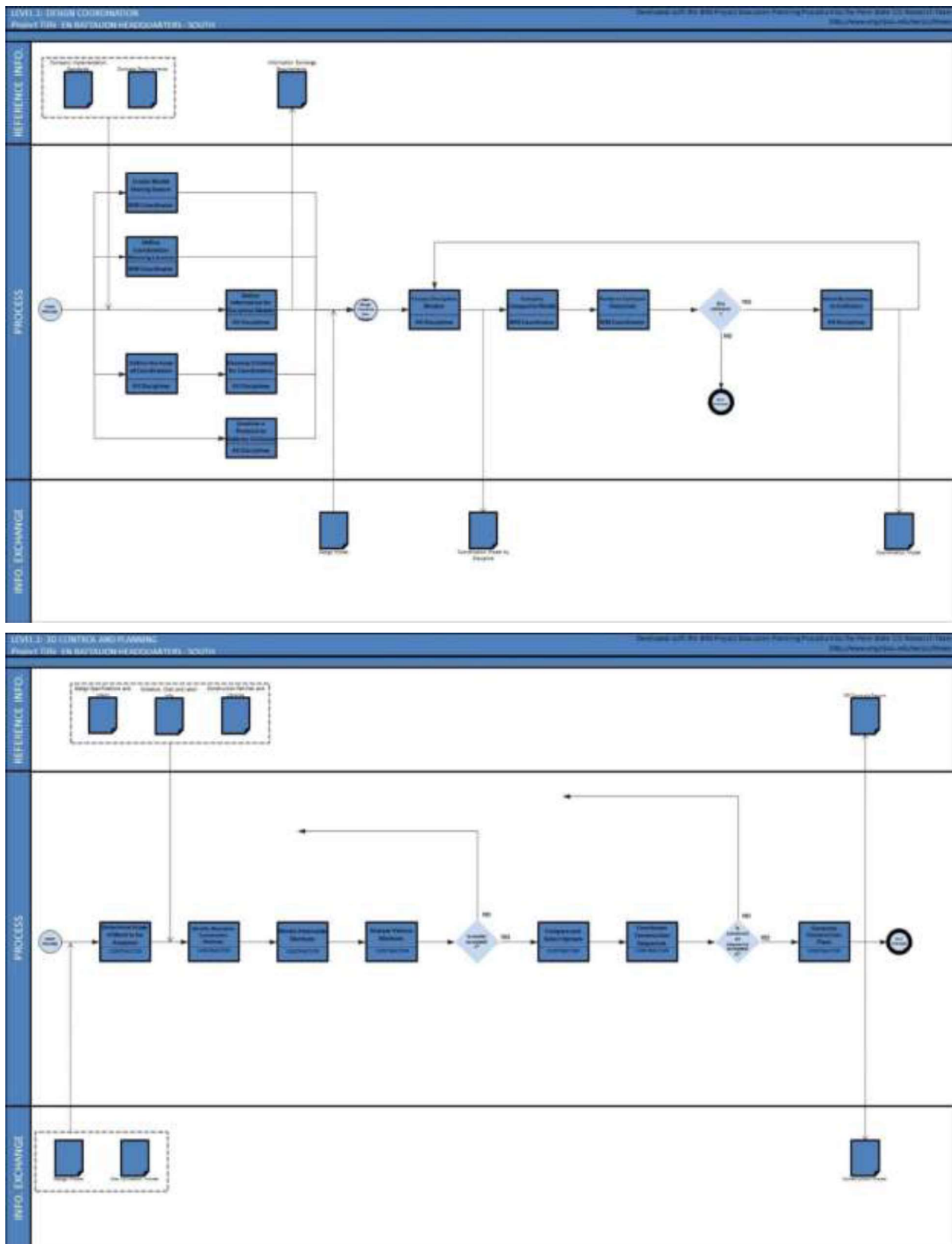
Level 2 Detailed BIM Use Process Map(S) [From Section F]



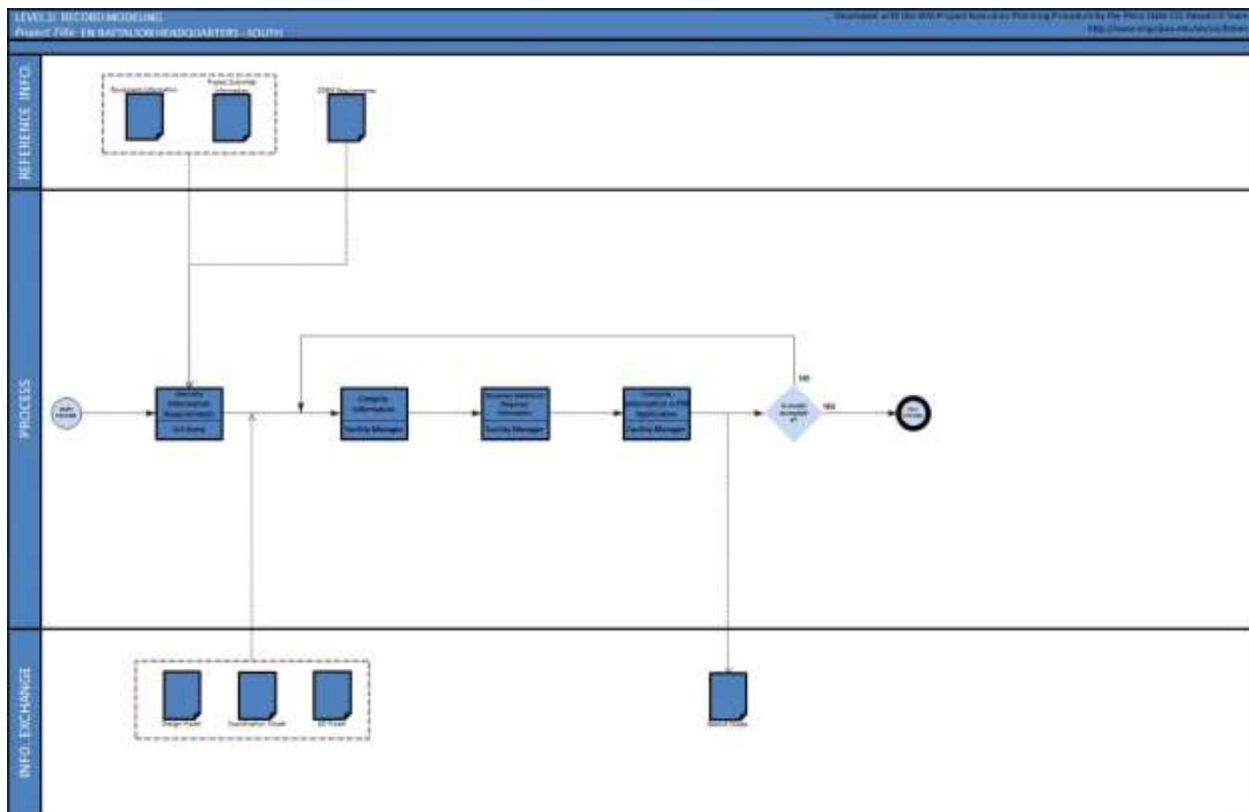
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Section F: BIM Information Exchange Worksheet

List Of Information Exchange Worksheet(s):

BIM Use*	Value to Project	Responsible Party	Value to Resp. Party	Capability Rating			Additional Resources / Competencies Required to Implement	Notes	Proceed with Use
	High / Med / Low		High / Med / Low	Scale 1-3 (1 = Low)					YES / NO / MAYBE
				Resources	Competency	Experience			
Record Modeling	HIGH		MED	1	3	1			YES
			HIGH	1	2	1			
			MED	3	3	3			
3D Coordination (Construction)	HIGH		HIGH	1	1	1			YES
			MED	3	3	3			
Structural Analysis	HIGH		HIGH	2	2	2			YES
			MED	2	2	2			
Design Reviews	MED		MED	1	2	1		Reviews to be from design model	YES
3D Coordination (Design)	HIGH		HIGH	2	2	2		Contractor to facilitate Coord.	YES
			HIGH	2	2	1			
Design Authoring	HIGH		HIGH	3	3	3			YES
			HIGH	3	3	3			
COBie	MED		HIGH	1	2	1		Contractor to facilitate Coord.	YES
			HIGH	1	2	1			
			MED	1	2	1			

* Additional BIM Uses as well as information on each Use can be found at <http://www.engr.psu.edu/ae/cic/bimex/>

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Section G: Minimum Modeling And Data Requirements

Minimum Modeling Matrix (M3): Attachment 4

- Column 'F' of the M3 shall represent the actual scope of work and should not be filled out according to Contractor preference. The Contractor shall identify items in Column 'F' which are NOT included in the project scope for the facility and site. Note the excel ME file is attached for contractor review confirmation of project scope to be submitted with the BIM Execution Plan (BEP).

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Minimum Modeling Matrix (M3)										DESIGN MODEL COMPLETION 100-00-00-00		RECORD MODEL 100-00-00-00		JOB NUMBER OR PROJECT NUMBER (M3) 100-00-00-00-00-00	
Version: 1.3 (SEPT-19-2014)															

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Minimum Modeling Matrix (M3)

Version: 1.3 (SEPT-19-2014)

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APPENDIX B: Construction Documents

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Minimum Modeling Matrix (M3)

Version: 1.3 (SEPT-19-2024)

										DESIGN MODEL CONSTRUCTION (CONCRETE)	RECORD MODEL (AS-BUILT)	JOB SHEET OR CONNECTION DETAILS (SEE JOB CONSTRUCTION DOCUMENTS)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
Level	Element ID	Element ID	Uniform ID	Element 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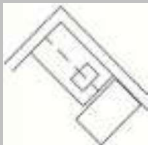
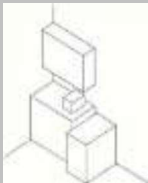
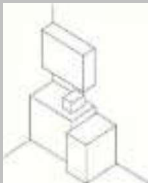
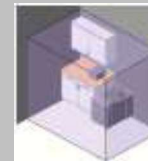
 **Minimum Modeling Matrix (M3)**
Version: 1.1 (SEP-19-2014)



Level	Itemized List	Standard Cost (\$)	Unit/Format (\$)	Standard Format (\$)	Included in Facility as Bldg (Change to Air Force gulf construction costs)	DESIGN MODEL CONSTRUCTION DOCUMENTS			RECORD MODEL CONSTRUCTION DOCUMENTS	Other Notes and Construction Documents (Not a Construction Document)	Notes
						LEAD	GRADE	ASBAG			
Level 0	Architectural Records	21-07-90-02-1A	20000.00		Yes	000	0	000	000	Primary Functions This will allow the user to identify discipline specific areas of interest	
Level 0	Architectural Records	21-07-90-02-1B	20000.00		Yes	000	0	000	000		
Level 0	Architectural Records	21-07-90-02-1C	20000.00		Yes	000	0	000	000		
Level 0	Architectural Records	21-07-90-02-1D	20000.00		Yes	000	0	000	000		

APPENDIX B: Construction Documents

Elective Modeling Enhancements

Level of Development (LOD)						
Level Of Detail / Description	100 2D	200 3D Place Holder	250 3D Place Holder – Basis of Design	300 3D Actual Object	400 3D Actual Object with Fabrication Details	500 3D Actual Object with Fabrication Details, Installation Area, and Space Protection
Model Content Requirements	Overall building massing indicative of area, height, volume, location, and orientation may be modeled in three dimensions or represented by other data.	Model Elements are modeled as generalized systems or assemblies with approximate quantities, size, shape, location, and orientation. Non-geometric information may also be attached to Model Elements.	Model Elements are modeled as assemblies consistent with the basis of design in terms of approximate size, shape, location, and orientation.	Model Elements are modeled as specific assemblies accurate in terms of quantity, size, shape, location, and orientation. Non-geometric information may also be attached to Model Elements.	Model Elements are modeled as specific assemblies that are accurate in terms of size, shape, location, quantity, and orientation with complete fabrication, assembly, and detailing information. Non-geometric information may also be attached to Model Elements.	Model Elements are modeled as constructed assemblies actual and accurate in terms of size, shape, location, quantity, and orientation. Non-geometric information may also be attached to modeled elements.
Illustration						
Design and Coordination	Massing and/or Non-geometric data or line work, areas, volumes, zones, etc.	Generic elements shown in 3D plus: • Maximum size • Purpose • Material rating • Element ID	Basis of Design elements with worst case object geometry: • Dimensions • Capacities • Connections • Material	Specific elements with confirmed 3D object geometry: • Dimensions • Capacities • Connections • Material • Element ID	Shop drawing / fabrication: • Purchase info • Manufacturer • Install • Specified	Generic shapes shown in 3D to represent and maintain required clearances for: • Installation • Construction • Operation Add to any Level

APPENDIX B: Construction Documents

Section H: Collaboration Procedures

- Collaboration Strategy
 - The collaboration strategy for the Design-Build team includes the following meetings:
 - Internal design team meetings on a biweekly basis.
 - Design and construction team meetings for review of progress with subcontractors multiple times between submittals.
 - Design and construction team meetings as needed.
 - Submission review meetings with the CoE and Installation personnel.
 - CoE and D-B team meetings on a bi-weekly basis.
- Aside from the meeting times above, the design team works hand in hand on a continual basis during the design development. The model files all reside on a common ftp updated bi-weekly, accessible to all design team members.
- Internal design teams meetings will be held on a bi-weekly basis. The models will be reviewed and coordinated on a bi-weekly basis to address any design conflicts. We will have 2 meetings with the design team, General Contractor and sub-contractors.
- **Collaboration Activities**

ACTIVITY TYPE	REQUIRED PER CONTRACT	PROJECT STAGE	FREQUENCY	PARTICIPANTS	LOCATION
BIM REQUIREMENTS KICK-OFF	YES	D-B DESIGN KICK-OFF	ONCE	w/ USACE DISTRICT BIM MANAGER AND END USER REPRESENTATIVE	WEB MEETING OR AGREED LOCATION
BIM EXECUTION PLAN DEMONSTRATION	YES	D-B DESIGN KICK-OFF	ONCE	w/ USACE DISTRICT BIM MANAGER AND END USER REPRESENTATIVE	WEB MEETING OR AGREED LOCATION
DESIGN COORDINATION	YES	D-B DESIGN	WEEKLY	A-E	WEB MEETING OR AGREED LOCATION
OVER-THE-SHOULDER PROGRESS REVIEWS	YES	D-B DESIGN	MONTHLY	w/ AGENT	WEB MEETING OR AGREED LOCATION
DESIGN REVIEW CONFERENCE	YES	D-B DESIGN	EACH REVIEW CONFERENCE	w/ AGENT AND END USER REPRESENTATIVE	ON SITE

APPENDIX B: Construction Documents

Section I: Quality Control

■ Overall Strategy For Quality Control

- The team will have a central access of all record Models on a bi-weekly basis. The purpose of the team meetings is to allow for all team to review in the interest coordination purposes. The priority is to have a process is for all team members to check the progress of design disciplines and to verify that all accuracy of design and that discussion will allow for changes to be implemented in assuring a smooth construction process. The meetings we will have will have 3 areas of focus.
 - To discuss if we are all able to merge all the models together seamlessly and if anyone has difficulty seeing model elements or items missing.
 - Review and analyze Building Conflict Reports encountered when models are merged for review and reporting. During review and coordination, immediate adjustments will be made to the models and reports will be generated to assure a clean collision report.
 - Generating models to be turned over to the General Contractor for Constructability purposes in delivering a high level of accuracy of BIM geometry and allowing the opportunity for contractor access to BIM metadata extractions, clean collision reports and applying 4D, 5D concepts, and BIM to Shop and CNC fabrication for the project.

■ Quality Control Checks

The following checks shall be performed to assure quality.

CHECKS	DEFINITION	RESPONSIBLE PARTY	SOFTWARE PROGRAM(S)	FREQUENCY
VISUAL CHECK	Ensure there are no unintended model components and the design intent has been followed		REVIT / REVIT STRUCTURE / REVIT MEP / AUTOCAD / AUTOCAD CIVIL 3D	BI-WEEKLY
INTERFERENCE CHECK	Detect problems in the model where two building components are clashing including soft and hard		Navisworks	BI-WEEKLY
STANDARDS CHECK	Ensure that the BIM and AEC CADD Standard have been followed (fonts, dimensions, line styles, levels/layers, etc.)		REVIT / REVIT STRUCTURE / REVIT MEP / AUTOCAD / AUTOCAD CIVIL 3D	BI-WEEKLY
MODEL INTEGRITY CHECKS	Describe the QC validation process used to ensure that the Project Facility Data set has no undefined, incorrectly defined or duplicated elements and the reporting process on non-compliant elements and corrective action plans		REVIT / REVIT STRUCTURE / REVIT MEP / AUTOCAD / AUTOCAD CIVIL 3D	AT EVERY SUBMITTAL
VERSION UPDATING CHECK	Ensuring that all users are using the agreed upon version of the software and the method by which changing software version is completed		REVIT / REVIT STRUCTURE / REVIT MEP / AUTOCAD / AUTOCAD CIVIL 3D	AT EVERY SUBMITTAL
REVISION AUTHORITY CHECK	Describe the method by which all users will be given access and extent of revision authority to versions of the model as updated.		REVIT / MICROSTATION V8	AT EVERY SUBMITTAL

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Section J: Technological Infrastructure Needs

▪ Software

All submitted BIM Models and associated Facility Data shall be fully compatible with Autodesk Revit file format and the Autodesk Revit BIM Template for U.S. Air Force Projects. List software used to deliver BIM. Remove BIM Use and software that is not applicable. Describe procedure for changing the software version during project execution.

BIM USE	USER	SOFTWARE	VERSION
DESIGN AUTHORIZING	ARCHITECTURAL	Autodesk Revit	2014
DESIGN AUTHORIZING	STRUCTURAL	Autodesk Revit	2014
DESIGN AUTHORIZING	MECHANICAL	Autodesk Revit	2014
DESIGN AUTHORIZING	ELECTRICAL/TELECOM	Autodesk Revit	2014
DESIGN AUTHORIZING	PLUMBING	Autodesk Revit	2014
DESIGN AUTHORIZING	FIRE PROTECTION	Autodesk Revit	2014
DESIGN AUTHORIZING	CIVIL	Autodesk CAD Civil 3D	2014
DESIGN AUTHORIZING	ANTI-TERRORISM FORCE PROTECTION	Autodesk Revit	2014
DESIGN AUTHORIZING	INTERIOR	Autodesk Revit	2014
3D COORDINATION	CONTRACTOR /ARCHITECTURAL	Autodesk Revit/Navisworks Manage	2014
DESIGN REVIEWS	CONTRACTOR /ARCHITECTURAL	Autodesk Revit/Bluebeam Revu//Navisworks Manage	2014

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■ BIM AND CAD Standards:

Autodesk Revit BIM Template for US Air Force projects Version 2013 http://www.wbdg.org/references/afbim_tools.php

STANDARD	VERSION
BIM Workspace:	Revit 2014
CAD Standard:	AEC CAD Standard 6.0/Graphic Standard 2.0 (August 2015)
Industry Foundation Class:	IFC2x3
COBie:	COBie 2.24

Section K: Model Organization

■ File Naming Standard:

- Match Base file naming for Revit files
 - ARCH14-xxxxxxxx-xxxxxx xxxxx
 - ELEC14- xxxxxxxx-xxxxxx xxxxx
 - MECH14- xxxxxxxx-xxxxxx xxxxx
 - STRUCT14- xxxxxxxx-xxxxxx xxxxx
 - COMM14- xxxxxxxx-xxxxxx xxxxx
 - CAD files per AEC CAD Standard 6.0/Graphic Standard 2.0 (August 2015)

■ Model Structure:

The model will be divided by discipline authors. There will be no further division of the model per files.

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Model Name	Model Content	Project Phase	Authoring Company	Authoring Tool
Architectural Model	Architectural elements that define the Design Intent. (e.g. Levels, Grids, Walls, Roofs, Floors (depending on ownership), Ceilings, Doors, Windows, Millwork, Casework, Fixtures, Stairs,)(refer to LOD)	DD, CD, Construction, and Turnover		Autodesk Revit 2014
Structural Model	Structural elements that define the design intent of the structural frame of the Project. (e.g. Foundations, Structural Steel, Concrete walls and slabs, Misc. Steel, Stairs, and Bridges)	DD, CD, Construction, and Turnover		Autodesk Revit 2014
MEP Models	Provide Model(s) of major MEP design complexity or congestion, such as mechanical rooms or key transition points between vertical distribution shafts and horizontal distribution. (e.g. Fire Protection, Air Terminals, Diffusers, Ductwork, Piping, Water Distribution, Electrical Distribution, Conduit/conduit zone of influence, Permanently Fixed Lighting Fixtures, etc.)	DD, CD, Construction, and Turnover		Autodesk Revit 2014
Civil Model	Shall include 3D geometry, physical characteristics and product data needed to verify clearances, analyze conflicts, and construct utility systems to within 5' (five feet) of the Project building envelope. Include site and existing obstructions that are adjacent to the systems; model existing utilities as needed.	Construction and Turnover		Autodesk AutoCAD Civil 3D 2014
Construction Model	Provide Model(s) that fully and accurately describe all items not represented in the Design Team Models that are historically "means and methods" and are required for constructability review and systems coordination. (e.g. Structural Framing, Equipment Framing, Temporary Construction, Logistics, Sheeting, Material Staging, Phasing / Sequencing, etc.)	Construction and Turnover		Autodesk Revit 2014
MEP/FP Fabrication Models	Provide Model(s) that fully and accurately describe all As-Built Mechanical, Plumbing, Fire Protection, Electrical, Lighting, Electrical Equipment, Switchgear, Conduit, Cable Trays, etc.	Construction and Turnover	For MEP JPHES For Fire Protection Subcontractor	TBD (Native and DWG files req'd at minimum, Revit optional)
Coordination Model	Model(s) derived from compiled Design Models, Construction Models, and all Fabrication Models for use in Systems Coordination / Clash Detection	Construction and Turnover	All Parties	Navisworks 2014
Record Model	Compiled Design Models filtered and structured	Construction and Turnover	All Parties	Navisworks 2014 AutoCAD (DWG) Revit File (RVT)

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Measurement And Coordinate Systems

- The Project Coordinate System shall be controlled by survey data as defined on Construction Documents. The Project Coordinate System will be related to the Model Reference Point so that the Project Team is working off the same Coordinate System. Imperial dimensions will be used as measurement.

Section L: Project Deliverables

BIM SUBMITTAL ITEM	STAGE	FORMAT	NOTES
The Model, Facility/Site Data, Workspace in the native format and DWF format	ALL	.RVT; .NWF; .DWF	
CAD files in the native format and DWF format	ALL	.DWG; .DWF	
COBie data extract in Excel format (COBie File)	Architectural Design Phase (50% Design Submittal); Horizontal Coordinated Design Phase (100% Unreviewed Design Submittal); Construction Documents Phase (100% Reviewed Design Submittal); Construction 60% Fiscally Complete; Beneficial Occupancy Phase; Fiscal Completion Phase.	.XLS	
Interactive Review Autodesk Navisworks	ALL	.NWF	
Revit Compare Tool report	CONSTRUCTION	.PDF	
QA/QC reports – Model Standards Check Report	ALL	.PDF	
QA/QC reports – CAD Standards Check Report	ALL	.PDF	
QA/QC reports – Model Integrity Validation	ALL	.PDF	
QA/QC reports - Visual Check Report	ALL	.PDF	
QA/QC reports - Interference Management Checks	ALL	.PDF	
IFC Coordination View	ALL	.IFC	
QA/QC reports - Other Design QA/QC Reports	ALL	.PDF	

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List of all submitted files (Excel spreadsheet preferred)	ALL	.XLS	
Final BIM Execution Plan	Kickoff	.PDF	

Section M: Attachments

- **Level 1 Process Overview Map** [From Section E] – Reference Section E
- **Level 2 Detailed Bim Use Process Map(S)** [From Section E] - Reference Section E
- **Information Exchange Requirement Worksheet(S)** [From Section F] - Reference Section F
- **Minimum Modeling And Data Requirements (M3)** [From Section G] - Reference Section G
- **File Naming Standard** [From Section L]
- **Other** [As Applicable]

H. CLOSE OUT

- Note that the items listed shall be received **prior to the Contractor requesting a final acceptance inspection:**
 - Provide a list of all equipment / materials / services with extended manufacturer's warranties. Include the duration of the warranty period for each item noted.
 - Commissioning inspections log with times, dates and attendance record for each system.
 - Final test reports and certifications.
 - O & M manuals submitted both electronically on CD and hardcopy (2EA). Label discs with contract number, project number and project title and date. Provide serial numbers / model numbers for all equipment installed in a spreadsheet format.
 - Submit a list of self inspection items along with written request to Base Contracting for final acceptance inspection. Include date and time requested.
 - Submission of DD Form 1354 as required per UFC.
 - Submission of as-built drawings as required UFC.

Preparing As-Built Drawings(Record Documents)

- (Extracted from Content written by USACE, Sacramento District, Engineering Division)
- This instruction covers preparing high-quality As-Built drawings to show changes made to the project during construction. As-Built drawings are an official record of the project at the time of construction completion. The original "as-designed" contract drawings and specifications are modified to show all additions, deletions and other changes made during construction. Accurate as-built drawings are very important for project operation and maintenance, and future modifications, particularly for plumbing and electrical systems, which are hidden from view.

Contractor Markups

- Drawings that are marked and annotated to show the project As-Built and constructed by the contractor. They are part of the working as-built set.

As-Built Drawings

- The amended "As-designed" drawings revised to show the project as the contractor built and constructed it. The revisions from Contractor Markups and field inspection notes are transferred to the Final as-built set of drawings. The final as-built drawings include modifications during construction, field requested changes, shop drawing modifications, and contractor designs.

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- As-Constructed Drawings - These are As-Built Drawings for Civil Works Projects. The term As-Built used in these instructions is synonymous.

Working As-Built

- The Contractor shall maintain 2 sets of paper drawings and specifications (marked-up prints) to track changes, additions or deletions from the original design during construction. Working as-built drawings shall be kept current on a weekly basis and at least one paper set of as-built drawings shall be available on the jobsite at all times.

Areas of Concern

- There are some general items that need some special checking to ensure that the marked-up prints are complete and accurate. The working as-built shall show, but shall not be limited to, the following:
 - The actual location, kinds and sizes of all of existing and new utility lines, especially underground lines within the construction area. Measurements will be shown for all change of direction points and all surface or underground components such as valves, manholes, drop inlets, clean outs, meters, etc. The descriptions of exterior utilities shall include the actual quantity, size, and material of the utility lines. In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, the as-built drawings shall show, by offset dimensions to two permanently fixed surface features, the end of each run including each change in direction. Valves, splice boxes and similar appurtenances shall be located by dimensioning along the utility run from a reference point. The average depth below the surface of each run shall also be recorded.
 - The location and dimensions of any changes within the building structure.
 - Layout and schematic drawings of electrical circuits and piping.
 - Correct dimensions and details transferred from shop drawings.
 - Correct grade, elevations, cross section, or alignment of roads, earthwork, structures or utilities if any changes were made from contract plans.
 - Actual location of anchors, construction and control joints, etc., in concrete.
 - Changes in location of equipment and architectural features.
 - Where contract drawings or specifications present options, only the option selected for construction shall be shown on the final as-built prints. Cross out such words and phrases as "optimal requirement," "or equal," etc., and list specifically the items of material provided.
 - Unusual or uncharted obstructions that are encountered in the contract work area during construction.
 - Location, extent, thickness, and size of stone protection particularly where it will be normally submerged by water.
 - Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor; including but not limited to fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment foundations, etc.
 - The topography, invert elevations and grades of drainage installed or affected as part of the project construction.
 - If borrow material for this project is from sources on Government property, or if Government property is used as a spoil area, the Contractor shall furnish a contour map of the final borrow pit/spoil area elevations.
 - Systems designed or enhanced by the Contractor, such as HVAC controls, fire alarm, fire sprinkler, and irrigation systems
 - Changes or modifications that result from the final inspection.

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Mark-up Guidelines

- The following information is provided to improve the quality of the marked-up prints and thereby facilitate preparation of final as-built drawings. The most important guideline is that the marked-up changes on the prints shall be complete and understandable. Visits to the site by the draftsman, or visits to the draftsman by the construction superintendent, can be minimized by providing complete and understandable marked-up prints.
 - Frequently use written explanations on As-Built drawings to describe changes - do not rely totally on graphic means to convey the revision.
 - Legibility of lettering and digit values shall be precise and clear when marking prints, and clarify ambiguities concerning the nature and application of change involved.
 - Wherever a revision is made, make changes to affect related section views, details, legend, profiles, plans and elevation views, schedules, notes and call-out designations, and mark accordingly to avoid conflicting data on all other sheets.
 - When changes are made, cross out all features, data and captions that relate to that revision.
 - When changes are required on small-scale drawings and in restricted areas, suggest large-scale inserts be drawn or sketched, with leaders to the location where applicable.
 - Provide a legend if colors other than the "base" colors of red, green, and blue are used.
 - Be sure descriptive markings conform to legend symbols shown.
 - Be sure to add and denote in legend, any additional equipment or material facilities, service lines, etc., incorporated under As-Built Revision if not already shown in legend.
 - When attached prints (or sketches) are provided with marked-up print, indicate whether:
 - Entire drawing shall be added to contract drawings or
 - Whether the contract drawings shall be changed to agree, or
 - For reference only to further details not required for initial design.
 - Make the comments on the drawing complete without reference to letters, memo's, or materials that are not also a part of the As-Built. Annotating the drawing, "Per Change Order #42," means nothing when the actual change order states, "added an additional 12 duplex" outlets or similar statements. The same is true when the drawing is marked "changed per CO instructions." This office and ultimately the using organizations must know what was changed, how it was changed, where the items(s) were relocated to and how the affected connections were altered. Change Orders usually do not provide information as to how the facility was changed, only what was changed.
 - The markups shall be accomplished on blue or black line prints of the **most current originals**.
 - Shop drawings are to be incorporated into the As-Built drawings. They will be provided in electronic CADD file format and conform to the A/E/C CADD Standards. Hand drawn or plotted paper shop drawings **will not** be accepted as submittals.
 - The hand drawn or plotted paper shop drawings are not usable as original drawings for several reasons.
 - The drawings are not of an adequate scale or are drawn to no scale and are not transferable to the drawings due to lack of information.
 - The limited numbers of reproducible shop drawings that have been received have not been on standard sheets sizes making it difficult to convert these drawings to standard drawings.
- Any drawing provided will be drawn in CADD. Sheets shall be drawn at the same scale as similar drawings in the set (example: Fire alarm systems shall be drawn to the same scale as the plumbing or electrical drawings). The drawing shall meet the same standards required for the rest of the drawings set. Sheet number, detail number, etc. shall tie details and sketches to existing drawings.

Final As-Built Drawings

- The contractor will transfer the changes from the working as-built marked prints to the original electronic CADD files. Final as-built drawings shall be prepared after the completion of each definable feature of work as listed in the Contractor Quality Control Plan (Foundations, Utilities, Structural Steel, etc., as appropriate for the project). The Base Architect and the Contractor will jointly review the working as-built marked prints, printouts from working as-built CADD file drawings, and final as-built drawings for accuracy and completeness, prior to submission of each

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monthly pay estimate. Monthly review of working as-built CADD printouts shall at minimum cover all sheets revised since the previous review.

Drafting Standards

- Standard professional engineering drafting practices shall be utilized in correcting the original electronic CADD drawings to show as-built conditions. In general, the letter styles, line thickness, and scale will be the same as the original drawings. When shop drawings or other sheets are added, they will be drawn in electronic CADD.

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CADD Standards

- File Naming Convention will be maintained on all existing CADD files and followed for any new files added. The Contractor shall revise CADD files as-built drawing layers, to show the as-built conditions during the prosecution of the project. All as-built "triangle" changes shall be on a separate single layer, using a single color, with an associated medium pen width. The local agency may override these conventions-the the conventions of the local agency in that case.
 - Name the layer AS-BUILT for AutoCAD files (DWG).
 - MicroStation files (DGN) use:
 - Level #63
 - Level/Layer Name contains: ANNO-REVS
 - Level/Layer Description: Revisions
- The following specific requirements apply to the preparation of as-built drawings:
 - The Title Sheet (first sheet)
 - The first sheet will be labeled with the word AS-BUILT. The words CONTRACT NUMBER and the actual contract number will be entered. The contract number contains the Fiscal Year, the letter C (for construction), and the sequence number (example: 96-C-0000). No other work need be done on this sheet unless sheets are being added or deleted from the List of Drawings or other actual changes are made on this sheet. (See
 - The Second and Subsequent Sheets
 - All the sheets following the title sheet will be labeled with the AS-BUILT stamp.
 - Signature Representation
 - (CADD files only): All signatures that appear on the approved original design drawings need to be represented on all the electronic as-built files. The format for these are Name (i.e. /s/Raymond Dennis).
 - Revisions Block Entries
 - Those sheets, which have no changes, will only be labeled AS-BUILT as described above. Those sheets which have changes shown on them will have REVISED
 - AS-BUILT entered in the first available space. This will be revision one and a number 1 will be entered in the triangle at the beginning of that line. In the event the sheet has already been revised and a number and revision appear in the revision lines the next sequential number will be used. Normally the first entry is made in the first line. The completed originals CADD file drawings will be reviewed for accuracy and initialed by the Contractor.
 - Marking Revisions
Place an equilateral triangle (3/8" per side) near the area revised for all changes. One triangle may be placed near the table or detail title where several items in a table or detail are changed or completely redrawn. This same method may be used for general revisions to floor plans and system plans (plumbing, electrical, a/c, heating); when a major portion of the drawing is changed, the triangle may be placed near the diagram, detail, section or plans title. A triangle will be placed near each item when only a few items are revised, added or deleted. The triangles will contain the same number as the As-Built revision on that sheet.

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Revision Annotations

- **Deletion** - to show an item was not installed, cross the item out on the drawing along with any associated devices, connecting lines, ducts, pipes etc., including notes and dimensions. To show a detail is not being used, box the detail and letter NOT USED across the detail. A box will be drawn on the sheet with an X. The words NOT USED will be in heavy block lettering a minimum of 5/8" high. Place a triangle and revision number inside the box where notes are indicated as not being used.
- **Notes** - draw a line thru the note or line item in a table in lieu of erasing the line item or note. A triangle and number will be placed near the deleted item.
- **Additions** - show a new or additional item or items and associated connections made if the print indicates such connections. A triangle and number will be placed near the new item. All lettering **will conform** to the existing lettering on each sheet.
- **Relocations** - draw the item in the new location and erase it from the old location. All connections will be transferred if applicable, such as wiring, piping, and ducts. Revision triangles with appropriate number will be shown at the new and old location.

Drawing Continuity

- The applicable drawings shall be marked-up when a change was made, although this will not always be the case. Final responsibility for drawing continuity is with the person doing the As-Built. When one floor plan indicates a wall, room, doors etc., has been changed, the same change shall be made on all other applicable drawings. When the change is applicable to only one discipline such as electrical and does not directly affect other discipline sheets, a note may be added to other discipline sheets such as "See sheet for As-Built Conditions."

Shop Drawings

- When shop drawings are added to the original contract drawing set they need to be appropriately labeled with the Shaw AFB file number, and discipline and sequence sheet number. The Index of Drawings will also need to be revised to show the additional sheet(s) with the appropriate sheet title. In the case where the shop drawing are smaller than the Corps standard sheet size (i.e. 8.5"x11" or 11"x17" etc.) the sheets will be cut into a standard Corps sheet size border sheet and appropriately labeled. (For additional information refer to Mark-up Guidelines, Shop drawings above.)

Distribution

- Distribution is to the Base Architect or as otherwise noted in the contract.
- Activity Preface
- These tasks are performed whenever changes, additions or deletions from the original "as- designed" contract drawings and specifications are made during construction.

Contractor

- Print two sets of paper drawings and specifications for working as-built.
- The Contractor shall maintain 2 sets of paper drawings and specifications (marked-up prints) to track changes, additions or deletions from the original design during construction.
- Mark working as-built set to show changes, additions or deletions.
- Place an equilateral triangle (3/8" per side) near the area revised for all changes. One triangle may be placed near the table or detail title where several items in a table or detail are changed or completely redrawn. This same method may be used for general revisions to floor plans and system plans (plumbing, electrical, a/c, heating); when a major portion of the drawing is changed, the triangle may be placed near the diagram, detail, section or plans title. A triangle will be placed near each item when only a few items are revised, added or deleted. The triangles will contain the same number as the As-Built revision on that sheet.

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- Changes, additions or deletions will immediately be noted on each of the working as-built set by redline process. No other marks, doodles, notes, or annotations shall be put on these sets of working as-built prints. All changes from the contract plans, which are made in the work, or additional information which might be uncovered in the course of construction will be accurately and neatly recorded as they occur by means of details and notes.
- All changes and/or required additions to the paper prints will be clearly identified in color contrasting to black, as follows:
 - Colors shall be the "base" colors of red, green, and blue. Color code for changes shall be as follows:
 - Deletions (red) - Deleted graphic items (lines) shall be colored red with red lettering in notes and leaders.
 - Additions (Green) - Added items shall be drawn in green with green lettering in notes and leaders.
 - Special (Blue) - Items requiring special information, coordination, or special detailing or detailing notes shall be in blue.
 - The working as-built sets will be annotated in as much detail as necessary to clarify exactly what construction changes were performed.
- Transfer the changes from the working as-built marked prints to the "as-designed" electronic CADD files.
 - The contractor will transfer the changes from the working as-built marked prints to the original electronic CADD files on a monthly basis. Final as-built drawings shall be prepared after the completion of each definable feature of work as listed in the Contractor Quality Control Plan (Foundations, Utilities, Structural Steel, etc., as appropriate for the project).
- Submit As-Built drawings for review.
 - The contractor shall submit the Final As-built conditions on a new CD to the Base Architect in the customer specified electronic format as a Government required submittal.

ATTACHMENT:
REAL PROPERTY DD FORM 1354 (FRONT PAGE)

Adobe Designer 9.0

APPENDIX C: Forms

ATTACHMENT: REAL PROPERTY DD FORM 1354 (BACK)

27. CONSTRUCTION DEFICIENCIES <i>(Attach blank sheet for continuations)</i>	28. PROJECT REMARKS <i>(Attach blank sheet for continuations)</i>
INSTRUCTIONS GENERAL. This form has been designed and issued for use in connection with the transfer of military real property between the military departments and to or from other government agencies. It supersedes ENG Forms 290 and 290B (formerly used by the Army and Air Force) and NAVDOCKS Form 2317 (formerly used by the Navy). Existing instructions issued by the military departments relative to the preparation of DD Form 1354 are applicable to this revised form to the extent that the various items and columns on the superseded forms have been retained. The military departments may promulgate additional instructions, as appropriate. For detailed instructions on how to fill out this form, please refer to Unified Facilities Criteria (UFC) 1-300-08, dated 16 April 2009 or later. SPECIFIC DATA ITEMS. 1. From. Name of the transferring agency. 2. Date Prepared. Date of actual preparation. Enter all dates in YYYYMMDD format (Example: March 31, 2010 = 20100331). 3. Project/Job Number. Project number on a DD Form 1391 or Individual Job Order Number. 4. Serial Number. Sequential serial number assigned by the preparing organization (e.g., 2010-0001). 5. To. Name and address of the receiving installation, activity, and Service of the Real Property Accountable Officer (RPAO). 6. RPSUID/SITENAME/INSTCODE/INSTNAME. Site Unique Identifier and name or installation code and name where the constructed facility is located. 7. Contract Number(s). Contract number(s) for this project. 7a. Placed-In-Service Date. RPA Placed In Service Date. This is the date the asset is actually placed-in-service. 8. Transaction Details. a. Method of Transaction. Mark (X) as many boxes as apply. b. When/Event. When or event causing preparation of DD Form 1354. X only one box. c. Type. Draft, interim, or final DD Form 1354. X only one box. 9. Item Number. Use a separate item number for each facility, no item number for additional usages. 10a. Facility Number. Assigned in accordance with the Installation/Base Master Numbering Plan. 10b. RPUID. Identified in Real Property Inventory. 11. Category Code. The category code describes the facility usage. 12. Catcode Description. The category code name which describes the facility usage. 13. Type. Type of construction: P for Permanent; S for Semi- permanent; T for Temporary. 14. Sustainability Code. Reports whether or not an asset meets the sustainability guidelines set forth in Section 2(g) of Executive Order 13514. Valid values are: 1 (asset meets the guidelines); 2 (asset does not meet the guidelines); 3 (asset not evaluated); 4 (asset not subject to guidelines). 15. Area. UM 1. Area unit of measure; use the unit of measure associated with the category code selected in 11. 16. Total Quantity UM 1. The total area for the measure identified in Item 15. Use negative numbers for demolition. 17. Other: UM 2. Unit of Measure 2 is the capacity or other measurement unit (e.g., LF, MB, EA, etc.). 18. Total Quantity UM 2. The total capacity/other for the measure identified in Item 17. 19. Cost. Cost for each facility; for capital improvements to existing facilities, show amount of increase only. If there is no increase for the capital improvement, enter N/A. 20. Fund Source. Enter the Fund Source Code for this item. 21. Funding Organization. Enter the code for the organization responsible for acquiring this facility. 22. Interest Code. Enter the code that reflects government interest or ownership in the facility. 23. Item Remarks. Remarks pertaining only to the item number identified in Item 9; show cost sharing. 24. Statement of Completion. Typed name, signature, title, and date of signature by the responsible transferring individual or agent. 25. Accepted By. Typed name, signature, title, and date of signature by the RPAO or accepting official. 26. Property Voucher Number. Next sequential number assigned by the RPAO in voucher register. 27. Construction Deficiencies. List construction deficiencies in project during contractor turnover inspection. 28. Project Remarks. Project level remarks and continuation of blocks.	

DD FORM 1354 (BACK), AUG 2013

APPENDIX C: Forms

ATTACHMENT: REAL PROPERTY DD FORM 1354 (example)

TRANSFER AND ACCEPTANCE OF MILITARY REAL PROPERTY															Form Approved OMB No. 0704-0188	
															PAGE 1 OF 2 PAGES	
The public reporting burden for this collection of information is estimated to average 30 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to the Department of Defense, Executive Service and Communication Directorate (334-0188). Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.																
PLEASE DO NOT RETURN YOUR COMPLETED FORM TO THE ABOVE ORGANIZATION																
1. FROM: (Organization Name) Global General Contractors, LLC 111 W. 39th Avenue, Third Floor Anchorage, AK 99501			2. DATE PREPARED (YYYYMMDD) 20180515		3. PROJECT/JOB NUMBER VL5B 14-0098		4. SERIAL NUMBER		5. TRANSACTION DETAILS a. METHOD (a all that apply) b. WHEN EVENT OR USE ☐ NEW CONST. ☐ TOTAL ASSET PLACED-IN-SERVICE ☐ TRANSFER ☒ PARTIAL ASSET PLACED-IN-SERVICE ☒ CAPITAL BKR ☐ INV ALL ☐ INV ALL							
6. TO: (Organization - Installation Code and Name) 20 Civil Engineering Squadron 428 Chapin Street Shaw AFB SC 29152-5123			9. RPSUD/STNAME/INST CODE/INST NAME 3298 Shaw Air Force Base Site 1 VL500001		7. CONTRACT NUMBER(S) FA8503-14-C-0022		7a. PLACED-IN-SERVICE DATE (YYYYMMDD) 800		6. TYPE (a one) ☐ DRAFT ☒ APPROVE ☐ FINAL							
8. FROM NO.	10. FACILITY NO.	11b. RPSUD	11. CATEGORY CODE	12. CATEGORY DESCRIPTION	13. TYPE CODE	14. SSET CODE	15. PRIMARY UN	16. PRIMARY UN QUANTITY	17. SECONDARY UN	18. SECONDARY UN QUANTITY	19. COST	20. FUND SOURCE	21. FUND ORG	22. INTER-EST CODE	23. REMARKS	24. SER
1	5411	516722	890121	AIC PLT 3-25	P	3	TR	20.00			\$61,108.00	30	57	1	See Attached	
2	5411	516722	890121	AIC PLT 1B & 1N	P	3	TR	30.00			\$61,108.00	30	57	1	See Attached	
3	51411	516722	132130	PAQ EQUIP	P	3	RY	4.187			\$64,430.00	30	57	1	Part is for M813000 VRF Equipment	
4	5411	516722	740310	RECREATION CENTER	P	3	SP				\$1,322,023.00	30	57	1	Lease: GFC, RMR 1507A, Degr: 307	
5	1947	184884	810011	ADMIN OFF NON-AF	P	3					\$841,072.00	30	57	1	SEE AFF 121 FOR CHANGE IN SPACE USE	
6	216	519122	442758	WHSE SUP & EQUIP BSE	P	3					\$283,270.00	30	57	1	SEE AFF 121 FOR CHANGE IN SPACE USE	
7	1118	516314	810243	HQ GROUP	P	3					\$127,134.00	30	57	1	SEE AFF 121 FOR CHANGE IN SPACE USE	
8	1129	516320	131111	COMM FACILITY	P	3					\$227,704.00	30	57	1	SEE AFF 121 FOR CHANGE IN SPACE USE	
9	1923	983000	141454	OPS SP	P	3					\$127,168.00	30	57	1	SEE AFF 121 FOR CHANGE IN SPACE USE	
10	1130	516322	890121	AIC PLT 3-25	P	3	TR	30.00			\$138,875.00	30	57	1	Leibert Unit Model CR039RA1ATL020RMC040E1ADC988	
11	1130	516322	910205	HQ NUMBERED AF	P	3					\$1,847,649.00	30	57	1	Leibert Unit Model CR039RA1ATL020RMC020E1ADAM96	
12	1921	983008	610285	HQ NUMBERED AF	P	3					\$63,560.00	30	57	1	Construction Regime	
13																
14																
15																
16																
17																
18																
19																
20																
21											\$4,196,386.00					
22																
23																
24. STATEMENT OF COMPLETION: The facilities listed herein are in accordance with plans, drawings, and specifications and change orders approved by the authorized representative of the using agency except for the deficiencies listed on the reverse side.										25a. ACCEPTED BY: (Typed Name and Signature)				26. DATE SIGNED: (YYYYMMDD)		
a. TRANSFERRED BY: (Typed Name and Signature) Jacob Holfield										b. DATE SIGNED: (YYYYMMDD) 2018/08/11				c. TITLE: (Area Engr./Base Engr./DPW) Project Engineer		
d. TITLE: (Area Engr./Base Engr./DPW)										e. TITLE: (Area Engr./Base Engr./DPW)				27. PROPERTY VOUCHER NUMBER		

APPENDIX C: Forms

ATTACHMENT: REAL PROPERTY DD FORM 1354 (example)

1354 SUPPLEMENTAL ATTACHMENT				
NEW EQUIPMENT INSTALLED AT B1411 SWING SPACE FOR B1130 OCCUPANTS SHAW AFB				
MATERIAL DESCRIPTION	MODEL	SERIAL NUMBER	BRISTOL WARRANTY	MANUFACTURER WARRANTY
Outdoor Unit (Tag: Outdoor Unit 1)	PURY-P240TSKMU-A	4YW01915		
BC Controller (Tag: BS-02)	CMB-P1016NU-HA	4YW01920	7/6/2015-7/6/2016	6/9/2025
Indoor Unit (Tag: VRF-202A)	PLFY-P12NCMU-E	4YW04435	7/6/2015-7/6/2016	6/9/2025
Indoor Unit (Tag: VRF-202B)	PLFY-P12NCMU-E	44M01659	7/6/2015-7/6/2016	6/9/2025
Indoor Unit (Tag: VRF-204)	PLFY-P12NCMU-E	43M01143	7/6/2015-7/6/2016	6/9/2025
Indoor Unit (Tag: VRF-203)	PLFY-P12NCMU-E	44M01497	7/6/2015-7/6/2016	6/9/2025
Indoor Unit (Tag: VRF-201)	PLFY-P12NCMU-E	41M00324	7/6/2015-7/6/2016	6/9/2025
Indoor Unit (Tag: VRF-218B)	PLFY-P12NCMU-E	41M00330	7/6/2015-7/6/2016	6/9/2025
Indoor Unit (Tag: VRF-218A)	PLFY-P12NCMU-E	44M01494	7/6/2015-7/6/2016	6/9/2025
Indoor Unit (Tag: VRF-217)	PLFY-P12NCMU-E	42M00668	7/6/2015-7/6/2016	6/9/2025
Indoor Unit (Tag: VRF-216)	PLFY-P12NCMU-E	44M01483	7/6/2015-7/6/2016	6/9/2025
Indoor Unit (Tag: VRF-215)	PLFY-P12NCMU-E	44M01482	7/6/2015-7/6/2016	6/9/2025
Indoor Unit (Tag: VRF-214)	PLFY-P12NCMU-E	41M00304	7/6/2015-7/6/2016	6/9/2025
Indoor Unit (Tag: VRF-213)	PLFY-P12NCMU-E	41M00310	7/6/2015-7/6/2016	6/9/2025
Indoor Unit (Tag: VRF-212)	PLFY-P12NCMU-E	43M01144	7/6/2015-7/6/2016	6/9/2025
Indoor Unit (Tag: VRF-210)	PLFY-P12NCMU-E	44M01656	7/6/2015-7/6/2016	6/9/2025
Indoor Unit (Tag: VRF-209)	PLFY-P12NCMU-E	44M01481	7/6/2015-7/6/2016	6/9/2025
Indoor Unit (Tag: VRF-208)	PLFY-P12NCMU-E	44M01484	7/6/2015-7/6/2016	6/9/2025
Controller	GB-50A	41M00328	7/6/2015-7/6/2016	6/9/2025

NEW EQUIPMENT INSTALLED AT ANNEX, SWING SPACE FOR B1130 OCCUPANTS SHAW AFB				
MATERIAL DESCRIPTION	MODEL	SERIAL NUMBER	BRISTOL WARRANTY	MANUFACTURER WARRANTY
Liebert 5 Ton CRV Unit (Indoor Unit)	CR020RA1A7L920	Y15BBM0005	7/2/2016	7/2/2016
Liebert 5 Ton CRV Unit (Outdoor Unit)	MCS028E1ADA496	Y15BAX0006	7/2/2016	7/2/2016
Liebert 10 Ton CRV Unit (Indoor Unit)	CR035RA1A7L920	Y15BBM0006	7/2/2016	7/2/2016
Liebert 10 Ton CRV Unit (Outdoor Unit)	MCM040E1ADC566	Y15BAY0028	7/2/2016	7/2/2016
Pioneer Transformer Co. 75 KVA Dry Type Floor Mounted Transformer	GP 75KVA Trans	44-75-563HK4	6/30/2016	6/30/2017

	APPENDIX C: Forms	
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**ATTACHMENT:
FPE CERTIFICATION LETTER TEMPLATE**

ENGINEER/COMPANY LETTERHEAD

Date

Name: *(Project manager)*

Subject: VLSB # *(Project number)*, Title

Contract #

As the Fire Protection Engineer of Record, I have reviewed the design for ***(Insert Title of project)*** and I certify that all fire protection/life safety criteria outlined in UFC 3-600-01, the NFPA Standards and the Shaw AFB Design Standards are incorporated. This includes all fire suppression, fire alarms, Life Safety Code criteria as well as the requirements of the Shaw AFB Design standards ***(Edition date)***.

I have reviewed the design for compliance to the standards referenced in this letter and find it to be in full compliance to those codes. I affirm this with the stamp and signature affixed on this letter.

(Name and Title with Company Name and signature)

(PE Stamp w/signature)

	APPENDIX C: Forms	
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**ATTACHMENT:
CFC REFRIGERATION FORM**

1) Technician's Name: _____

2) Technician's Address: _____

3) Telephone: Commercial _____ Cell _____

4) Date of Service: _____

5) **Description of Work:** (installed or removed refrigerants, building or project, and general description of the refrigerant work performed by the contractor)

6) **Refrigerants:** Identify those added or removed (indicate added or removed)

Type: _____

Quantity: _____

7) Equipment:

Type of equipment: _____

(Commercial or Industrial Refrigeration Appliance, Comfort Cooling Appliance or other type of refrigeration)

Equipment Manufacture Name: _____

Serial Number: _____

Model Number: _____

8) Contractor accepts responsibility for disposal of refrigerant containing equipment.
Contractor turns over all removed refrigerant to 20 CES/CEOIH

Signature of responsible person

	APPENDIX C: Forms	
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**ATTACHMENT:
CFC REFRIGERATION FORM INSTRUCTIONS**

8) Copies of Certificates Attached: Check Appropriate Item(s)

- ☐ Technician (refrigerant certification card)
- ☐ Disposal of refrigerant
- ☐ Disposal of Equipment
- ☐ Other _____

To Document Compliance with Ozone Depleting Substances (Clean Air Act § 608)

This form applies to any project which add or removes refrigerants

See form for providing information. The form may be hand written but must be printed, neat and legible. (PDF version of this form is available upon request)

Provide the name, address, telephone number, and copies of technician certification of each person employed by the project, including all, who has serviced, repaired, installed, removed, maintained and/or disposed of any equipment containing and/or using a class I or class II substance as a refrigerant.

Provide the quantity of refrigerants, type added or removed under this project, and dates of service.

Provide the type of appliance, i.e., commercial refrigeration appliance, industrial refrigeration appliance, comfort cooling appliance or other type of refrigeration.

Provide the manufacturer name, serial number, and model number of all equipment installed and/or removed.

Provide a complete description of service i.e., installation, removal, and disposal. Include certificates of disposal if refrigerants or equipment are disposed.

Copies of certificates are to be attached to this form. Use as many copies of the attached form as needed.

Indicate the contractor accepts responsibility for disposal of all refrigerant containing equipment and turns over all refrigerants to the 20 CES/CEOIH.

Provide copies to construction representative before request for project final acceptance to the Government.

All recovered refrigerant shall be turned over to 20 CES/CEOIH.

APPENDIX C: Forms

ATTACHMENT: MATERIAL CERTIFICATIONS - AF Form 3000

Example

MATERIAL APPROVAL SUBMITTAL (See Instructions on Reverse)				Form Approved OMB No 9000-0062 Expires May 31, 2005		
Public reporting burden for this collection of information is estimated to average 20 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to the Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0905-0362), Washington DC 20503. Please DO NOT RETURN your form to either of these addresses. Send your completed form to: SAFRAQCF, 1060 Air Force Pentagon, Washington DC						
TO: (Contracting Officer)		FROM: (Contractor)		DATE (YYYYMMDD)		
Barbara Bonnette		Boykin Contracting, Inc.		20140710		
CONTRACT NUMBER		SUBMISSION NUMBER		SUBMITTAL		
FA4803-09-D-0008/0033		06		☒ NEW ☐ RESUBMITTAL		
PREVIOUS SUBMISSION NUMBER		PROJECT NUMBER				
		VLSB 11-0073 Rpr Sewer Lines and Manholes BCI 73533				
TO BE COMPLETED BY CONTRACTOR			FOR GOVERNMENT USE ONLY			
ITEM NO.	SPECIFICATION SECTION/ PARA NO./DRAWING NO.	DESCRIPTION OF MATERIAL (Include Type, Model Number, Catalog Number, Mfg., etc.)	AP- PROVED	DISAP- PROVED	SFF REVERSE	INITIAL
01		Chris Davis Certifications	☒	☐	☐	
02			☐	☐	☐	
03			☐	☐	☐	
04			☐	☐	☐	
05			☐	☐	☐	
06			☐	☐	☐	
07			☐	☐	☐	
08			☐	☐	☐	
09			☐	☐	☐	
10			☐	☐	☐	
11			☐	☐	☐	
BY COMPLETING THIS FORM, THE UNDERSIGNED CONTRACTOR CERTIFIES THAT THE MATERIAL COMPLIES WITH ALL SPECIFICATIONS OF SUBJECT CONTRACT.						
DATE (YYYYMMDD)		TYPE OR PRINT NAME AND TITLE		SIGNATURE		
20140710		Mike Milke Project Manager				
FOR GOVERNMENT USE ONLY						
TO: (Base Civil Engineering Officer)						
For Evaluation and Action						
DATE (YYYYMMDD)		TYPE OR PRINT NAME AND GRADE		SIGNATURE		
TO: (AF Contracting Office)						
RECOMMEND		APPROVAL		DISAPPROVAL AS INDICATED ABOVE AND SUBJECT TO ANY APPLICABLE COMMENTS ON THE REVERSE		
DATE (YYYYMMDD)		TYPE OR PRINT NAME AND GRADE		SIGNATURE		
TO: (Contractor)						
☐ APPROVED ☐ DISAPPROVED AS INDICATED ABOVE AND SUBJECT TO ANY APPLICABLE COMMENTS ON THE REVERSE SIDE. REQUEST RESUBMITTAL ON DISAPPROVED ITEMS WITHIN _____ DAYS OF DATE SHOWN BELOW.						
DATE (YYYYMMDD)		TYPE OR PRINT NAME AND GRADE		SIGNATURE		

AF IMT 3000, 20030901, V1

PREVIOUS EDITION IS OBSOLETE.

APPENDIX C: Forms

ATTACHMENT: MATERIAL CERTIFICATIONS - Confirmed Space Training

Example

	CERTIFICATE IN RECOGNITION OF	Christopher Davis		WHO HAS ATTENDED THE ACCREDITED COURSE IN	_____ Doug Barnes INSTRUCTOR	_____ <i>Tan Cole</i> PRESIDENT
					_____ Confined Space Training 29CFR 1910.146 CLASS TYPE	_____ July 28, 2011 DATE

APPENDIX C: Forms

ATTACHMENT:

MATERIAL CERTIFICATIONS Trench and Excavation Competent Person Training

Example

	CERTIFICATE IN RECOGNITION OF	Christopher Davis		WHO HAS ATTENDED THE ACCREDITED COURSE IN	
Trench and Excavation Competent Person Training 29 CFR 1926 Subpart P Standard		Doug Barnes		INSTRUCTOR	
CLASS TYPE		July 28, 2011		DATE	
6 Contact Hours		HOURS		PRESIDENT	

APPENDIX C: Forms

ATTACHMENT: DESIGN REVIEW COMMENTS – Example with Instructions

DESIGN REVIEW COMMENTS					
PROJECT: Project Number XXXX, Project title XXX, Bldg XXXXX, Shaw AFB, SC					
SUBMITTAL: Package (Schematic SC, Design Development DD, 35%, 65%, 90%, 100%) Date: XXXX, XX, XXXX					
Comment ID	Drawing or Paragraph #	Reviewer	Comment	Response	Comment Closed By Reviewer (Y/N)
Example	Example	Example	Example	Example	Example
CSC 002	DWG, CS101	John Smith, Civil, Civil Eng Inc., 888 888 8888	The site plan needs to indicate pavement patching due to the installation of new utilities (C2 001).	Designer will indicate areas of pavement patching on the plans and reference the type of patching.	Y
<i>Instructions: Use acronyms of the Discipline combined with the Submittal Phase acronym from Selection above, followed by a sequential number for the comment.</i>					
<i>Example for Civil: CSC 001 CDD 001 C35 001 C65 001 C90 001 C100 001</i>					
<i>Provide Dwg Sheet and detail, or Title, page and exact reference to locate item</i>					
<i>Provide name, discipline, organization, and contact number for follow up as needed.</i>					
<i>Provide clear and descriptive comment, worded so that an acceptable response can be provided. If applicable provide the solution or answer anticipated if asking for a clarification.</i>					
<i>Provide clear and descriptive response, worded so that the there is a conclusion that does not lead to more questions. If applicable provide additional information for concurrence.</i>					
<i>Provide a Y or N. This column must be closed to proceed to the next Design Phase. Please ensure that this is completed to avoid delays.</i>					

Civil Page 1 of 2

General G, Life Safety LS, Civil C, Structural S, Architectural A, Interiors ID, User Comments UC, Fire Alarm FA, Plumbing P, Mechanical M, Electrical E, Security Communications SC, Fire Protection FP, Lead L, Commissioning C, Provide other, Acronyms as needed.					
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	APPENDIX C: Forms	
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**ATTACHMENT:
CONFINED SPACE RESCUE PLAN**

Example

**Confined Space - Man Hole
Rescue Plan for T2 Contracting, Inc.**

- Confined Space for Man Hole Rehab Rules;
 - Notify Shaw Fire Dept 803-895-4600 the location and Man Hole number Prior to Entry
 - Atmosphere Test
 - Rescue Tri-Pod and Harness
 - Entrant Ready, Permit Filled out, No Entrant is permitted to travel Horizontal in our scope of work, always remain in "Line Of Site" of Attendant while in Man Hole.
- Vertical Non-Entry Rescue
 - In the event the entrant requires assistance exiting the space:
 - Communicate with the entrant and identify the nature and cause of the injury.
 - Extract the individual from the space using the mechanical advantage lifting device.
 - Contact Shaw Fire Department at 803-895-2444 to summon medical assistance or emergency medical services to the site if required.
 - Complete primary and secondary assessment on injured individual and provide assistance and first aid as may be required.

Note: If entrant is unconscious and not communicating, No employee of T2 is authorized to make entry in attempt of rescue. Atmosphere has rapidly changed and this could result in loss of your own life, immediately contact Shaw Fire Department at 803-895-2444 for Assistance immediately. Continue to make every effort to retrieve entrant with extraction lifting device.

APPENDIX C: Forms

ATTACHMENT: CONFINED SPACE RESCUE PLAN



CONFINED SPACE PRE-ENTRY CHECKLIST

LOCATION _____ DATE _____ TIME _____

ENTRY SUPERVISOR _____ PHONE _____

Mark the appropriate column: <u>X</u> Yes, <u>X</u> No, or <u>X</u> N/A Not Applicable	Yes	No	N/A
1. Is a "DANGER CONFINED SPACE" sign posted to identify the site as requiring a confined space entry permit to occupy the area?			
2. Is a written permit space entry program developed and implemented that complies with Section 1910.146(c)(4)?			
3. Is the written program available for inspection by employees and their representatives?			
4. Have all ENTRANTS been provided training and acquired the understanding, knowledge and skills necessary for the safe performance of the duties assigned in Section 1910.146(h)?			
5. Have all ATTENDANTS been provided training and acquired the understanding, knowledge and skills necessary for the safe performance of the duties assigned in Section 1910.146(i)?			
6. Have all ENTRY SUPERVISORS been provided training and acquired the understanding, knowledge and skills necessary for the safe performance of the duties assigned in Section 1910.146(j)?			
7. Is the only hazard an actual or potential hazardous atmosphere?			
8. Will continuous forced air ventilation alone be sufficient to maintain the permit space safe for entry?			
9. Has monitoring and inspection data been developed to eliminate the hazardous atmosphere through forced air ventilation?			
10. Has the permit space been isolated?			
11. Have steps been taken for purging, inerting, flushing or ventilating the permit space to eliminate or control atmospheric hazards?			
12. Is monitoring available to verify that conditions are acceptable for entry throughout the duration of an authorized entry?			
13. Are employees trained on how to maintain and properly use testing and monitoring equipment?			

APPENDIX C: Forms

ATTACHMENT: CONFINED SPACE RESCUE PLAN (cont)



Mark the appropriate column: <u>X</u> Yes, <u>X</u> No, or <u>X</u> N/A Not Applicable	Yes	No	N/A
14. Is ventilating equipment needed to obtain acceptable entry?			
15. Is communication equipment necessary and available for use between attendant and entrant?			
16. Are the entrants provided with personal protective equipment to be adequately protected insofar as feasible engineering and work practice controls allow?			
17. Has adequate lighting equipment been supplied to allow a safe work area and allow a quick exit in an emergency?			
18. Has the area been secured with barriers and shields from pedestrian, vehicle or other barriers to protect the entrants from external hazards?			
19. Is the confined space provided with equipment, such as ladders, needed for safe ingress and egress by authorized entrants?			
20. Is there other training, equipment or services needed to provide safe confined space entry?			

SAFETY EQUIPMENT CHECKLIST

_____ Safety Harness with Attached Life Lines _____ Respirator and type _____ _____ Hard Hat _____ Eye Protection _____ Hand Protection _____ Other(specify) _____	_____ Ear Protection _____ Foot Protection _____ Protective Clothing _____ Ventilator _____ Resuscitator _____ Communications Equipment _____ Gas Tester with Alarms
--	---

APPENDIX C: Forms

ATTACHMENT: CONFINED SPACE RESCUE PLAN



GAS TEST TAKEN

GAS	PERMISSIBLE ENTRY LEVEL	YES	NO	INSTRUMENT USE	ACTUAL READING	TESTED BY
1. Oxygen%	19.5% to 23.5%					
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						

Calibrated direct-reading instruments used to test confined space atmosphere:

1. Name _____ Name _____
 Make _____ Make _____
 Serial _____ Serial _____
 Last Calibration Date _____ Last Calibration Date _____

RESCUE AND EMERGENCY SERVICES

1. Contacts in the event of an emergency include name and telephone number.

A. _____ C. _____

 B. _____ D. _____

2. Rescue service available for this confined space entry.

____ employee _____ outside rescue service

	APPENDIX C:	
	Forms	

ATTACHMENT:
CONFINED SPACE RESCUE PLAN (cont)



3. Rescue Equipment Available:

- | | |
|--|--|
| ☐ Oxygen | ☐ Chest/full body harness |
| ☐ Resuscitator- Inhalator | ☐ Retrieval line properly installed |
| ☐ First Aid Equipment | ☐ Wristlets when it is the safest and |
| ☐ De-Fibrillator | most effective alternative |

Additional rescue equipment available

NOTES

APPENDIX C: Forms

ATTACHMENT: TANK CHECK LIST

TANK CHECKLIST						
NFPA 704 SIGN (NFPA 30-21.7.2)		INTERIOR LADDERS				
US FUEL DESIG		EXTERIOR LADDERS				
NATO FUEL DESIG (UFC 3.460.01@2-18)		GROUNDING				
NO OPEN FLAME OR IGNITION SOURCE WITHIN 50' (OSHA)		ALARM SYSTEM				
FUEL LINE MARKING (UFC 3.460.01@2-18)		ANALOG GAUGE				
MANUFAC NAME PLATE						
LIFTING LUGS		CALB CHART (AFI32-7044@1.8.2 and UFC3-460-01@8-3.13)				
PAINT EXISTING TANK		WATER REMOVAL TUBE (UFGS 33-56-10@2.7.4 and UFC3-460-01@Table 8-1,bb)				
IMPACT PROTECTION BOLLARDS		TANK MONTED FUEL DISP UNIT (UFGS 33-56-10@2.11)				
TANK LOCATION (NFPA30-22.4)		2" LEAK DETECTION PORT				
SPILL BOX						
MANUAL DRAIN VALVE		TANK TIGHTNESS TEST (NFPA 30-21.5.2)				
AUTOMATIC OVERFILL PROTECTION VALVE		TANK FILL TEST (UFGS 33-56-10@3.4)				
NORMAL VENT NFPA30-21.4.3		CORROSION PROTECTION SYSTEM TEST (AFI32-7044@2.6.1.2)				
PRIMARY EM VENT NFPA 30-22.7		USER TRAINING				
SECONDARY EM VENT NFPA 30-22.7		GENERATOR / BOILER OPERATIONS CHECK				
INTERIOR STRICKER IMPACT PLATE		LEAK DETECTION				
MAN-HOLE(S) one 1-5k, two >5k		PRESSURE PIPING				

APPENDIX C: Forms

ATTACHMENT: SCHEDULE OF MATERIAL SUBMITTALS

Example

SCHEDULE OF MATERIAL SUBMITTALS													PROJECT NUMBER	PROJECT TITLE	SOLICITATION/CONTRACT NUMBER					
													SHA 04-0128	Replace Two Boilers at Heat Plant B403						
TO BE COMPLETED BY PROJECT ENGINEER													TO BE COMPLETED BY CONTRACT ADMINISTRATOR							
Line Number	ITEM OR DESCRIPTION OF ITEM, CONTRACT REFERENCE, TYPE OF SUBMITTAL	CERTIFICATION OF COMPLIANCE	NUMBER OF COPIES REQUIRED								REQUIRED SUBMISSION DATE	DATE RECEIVED IN CONTRACTING	DATE TO CIVIL ENGINEERING	RETURN SUSPENSE DATE	SUBMITTAL NUMBERS	DATE CONTRACTOR NOTIFIED		CONTRACTOR SUBMITTAL	FINAL APPROVAL	REMARKS
			SHOP DRAWINGS	SAMPLES	COLOR SELECTION	MANUFACTURERS RECOMMENDATIONS	FINISHES	WARRANTY	CATALOG DATA	OPERATING INSTRUCTIONS						Other	Other			
1	Sect 01000, para 1.03A, Boiler Information										3									
2	Sect 01000, para 1.03A, Fuel Burning Application										3									
3	Sect 01000, para 1.10B, List of Materials										3									
4	Sect 01000, para 1.15, Record Drawings (3 copies bond & 1 mular)										4									
5	Sect 15050, para 1.3, Permits and Certificates		3								3									
6	Sect 15050, para 1.3, Shop Drawings		3																	
7	Sect 15050, para 1.10A, Material Lists										3									
8	Sect 15050, para 1.15A, Warranties						3													
9	Sect 15050, para 3.3, Statement of Completion										3									
10	Sect 15250, para 1.2A, Product Data							3												
11	Sect 15520, para 1.5A,B, Product Data							3												
12	Sect 15520, para 1.5C, Welders Certificates	3																		
13	Sect 15556 para 1.2A,B, Product Data							3												
14	Sect 15556, para 1.2C, Manufacturer's Instructions					3														
15	Sect 15556, para 1.3A, Operation and Maintenance Data									3										
16	Sect 15556, para 1.6A, Warranty						3													
17	Sect 15576, para 1.2A, Shop Drawings		3																	
18	Sect 16050, para 1.13, Electrical Information										3									
19	Sect 16050, para 1.20A, Warranties						3													

**APPENDIX C:
Forms**

**ATTACHMENT:
ELECTRICAL OUTAGE COORD SHEET**

**Electrical Outage Coordination Sheet
(Base Area)**

Requested Date of Outage: _____

Estimated Time Duration: _____

Office	Print Name	Signature	Date
Facility Manager(s)			
Fire Department (Alarm Room)/ CEF			
Electrical Systems			
Infrastructure Chief/ CEOI			
Mechanical Chief			
Heavy Repair Chief/ CEOH			
Deputy Ops Chief/ CEOD			
Ops Chief/ CEO			
Commander/ CC			

This outage will affect the following buildings:

**For further information please contact the Electric shop foreman at
(803) 895-5252.**

**APPENDIX C:
Forms**

**ATTACHMENT:
WATER OUTAGE COORDINATION SHEET**

**Water Outage Coordination Sheet
(Base Area)**

Date of Outage: _____

Estimated Time Duration: _____

Responsible Office	Print Name	Signature	Date
Utilities Shop			
Facility Manager(s)			
Fire Prevention Element/ CEFP			
Infrastructure Chief/ CEOI			
Mechanical Chief			
Heavy Repair Chief/ CEOH			
Deputy Ops Chief/ CEOD			
Ops Chief/ CEO			
Commander/ CC			

This outage will affect the following buildings:

For further information please contact 20CES/CEOU Utilities shop foreman at extension (803) 895-9667.

NOTE: When affecting a Fire Suppression System, the Contractor shall contact the base Fire Department prior to shutdown and reactivation at (803) 895-4600.

APPENDIX C: Forms

ATTACHMENT: BASE ACCESS FORM

DATE: 10 Jun 13

TO: 20 SFS / S-2, Investigations, 895-3600

FROM: 20 CES/CEPM

SUBJECT: Contractor(s) needing access to Shaw

WHO (Company/Individual):

WHAT FOR: (Construction, deliveries etc.):

WHERE: (bldg number, street name, job site etc.): If base wide give justification:

WHEN (Dates/Times/Days) 07 JUNE 2013 – 07 JUNE 2014 – Monday – Friday, 0600 – 1800 hours

SPONSOR: Terry Wells, Sue Delgado, Tim Varner

DAY PASS: YES OR NO (CIRCLE)

CONTACT INFO:

The information below is protected under Privacy Act 1974 and will only be used to process Criminal Background History Checks to grant or deny access to Shaw AFB. It is further understood that anyone abusing approved privileges could, at a minimum, lose said privilege and possibly face criminal charges.

NAME

SSN

DOB

ST-DL NO.

US CITIZEN

Mickey Mouse

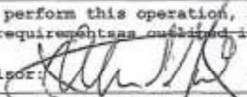
I UNDERSTAND THAT AS THE SPONSOR I AM RESPONSIBLE FOR THE PERSON(S) LISTED ON THIS FORM, AND FOR ENSURING THE ABOVE NAME INDIVIDUAL(S) TURNS IN THE DBIDS PASS OR I RETRIEVE THE PASS ONCE THE INDIVIDUAL(S) ARE TERMINATED, QUIT, OR NO LONGER REQUIRES ACCESS. IF I AM NOT ABLE TO RETRIEVE THE PASS I WILL NOTIFY SECURITY FORCES TO HAVE THE INDIVIDUAL(S) PASS DEACTIVATED IN DBIDS.

Must be Authenticated and received through 20sfs.backgroundchec@shaw.af.mil from the actual sponsors email account.

APPENDIX C: Forms

ATTACHMENT: HOT WORK PERMIT – AF Form 592

Example

HOT WORK PERMIT		1. Control Number 1130
2. Date Permit Issued 10192015	3. Time Permit Issued 1400	4. Expiration 10192016
5. Company/Organization Bristol		6. Phone Number 9104787808
7. Location: 1130		Other Location:
Facility Number 1130 ☐ Inside Hanger Floor Number ALL ☐ Outside Hanger Room Number _____ Aircraft Tail Number _____		
8. Description of Work (Event)		
☒ (Welding) ☒ (Cutting) ☒ (Brazing) ☒ (Soldering)		
9. Fire Watch Required: ☐ Yes ☒ No		
Performed By: ☐ Permit Authorizing Individual (PAI) ☐ Operator/Supervisor		
10. Before Approving hot work Permit The PAI shall inspect the work area and confirm that precautions have been Taken to prevent fire IAW AFI 91-203 and NFPA 51b Sprinklers in service Portable fire extinguishers provided Adequate ventilation Pressure cylinders are secured properly Equipment in good repair Remove combustibles 35 feet Minimum Flammable liquids, vapors and gases removed 50 feet Minimum Appropriate Shields Additional Special Precautions _____		
12. The location where the work is to be performed has been examined, necessary precautions taken and permission is granted for stated work. Name: Cornelius Berry Signed:  BERRY CORNELIUS E 1091 316743 2015.08.18 08:52:12 -0400 Contact Number 895-4600		
13. I am fully qualified to perform this operation, understand my responsibilities and my equipment meets all requirements outlined in AFI 91-203 and NFPA 51B. Operator or On-scene supervisor:  Signed:		
14. FINAL CHECK: Work area and all adjacent areas to which sparks and heat might spread, including floors above and below and opposite side of walls, were inspected at least 30 minutes or later after the work was completed and were found fire safe. Name: _____ Signed: _____		
1st Renewal		15. Expiration
Name: _____ Signed: _____		
2nd Renewal		16. Expiration
Name: _____ Signed: _____		

AF FORM 592 MAR 15 (SW)

APPENDIX C: Forms

ATTACHMENT: SET METER OUTAGE COORDINATION SHEET

Example

Date Prepared: 28 June 2016

Outage Coordination Sheet (Base Area)

☒ Electrical

☐ Water

☐ Gas

Date of Outage: 12 July 2016

Time/Duration: 1600-2000 (4 Hrs)

Office	Name	Signature	Date
Facility Manager(s) Note: My Squadron CC and tenants were briefed prior to outage.	Mark Garman	   	
Fire Prevention CEF/CEP	Mr. Berry/Mr. Davis		
Electrical Systems	Mr. Hallett		
Electrical Shop	Mr. Delgado/MSgt Campbell/Truesdell		
Power Production	Mr. Placke/MSgt Eastman		
Infrastructure Chief/CEOI	MSgt Martin		
Utilities Shop	Mr. Tucker		
Mechanical Chief	MSgt Johnson/TSgt Hart/TSgt Brown		
Heavy Repair Chief/CEOH	MSgt Field/Mr. Kendrick		
Communications/20 CS/SCOI briefed 20 CS/CC prior to outage	MSgt Fox/TSgt Beck/SSgt Ross		
Ops Deputy/CEOD	Mr. Brown		
Ops Chief/CEO	2Lt Kuster		
Commander/CC	Lt Col Carter		

This outage will affect the following buildings:

Building 118(Vehicle Maint Shop): POC - Mark Garman @ 895-9761

Project #: VLSB 07-0085

The purpose of the outage is to set a meter for Bldg 118.

Any questions regarding this Outage please contact POCs below.

Project Inspector - Tim Varner @ 895-9648

SDC POC - Kevin mason (ARC Inc) @ 843-685-7841

APPENDIX C: Forms

ATTACHMENT: REPAIR WATER LINE OUTAGE COORDINATION SHEET

Example

Date Prepared: 02 June 2016

Outage Coordination Sheet (Base Area)

☐ Electrical

☒ Water

☐ Gas

Date of Outage: 07 June 2016

Time/Duration: 0830 - 1000 (1.5 Hrs)

Office	Name	Signature	Date
Facility Manager(s) Note: My Squadron CC and tenants were briefed prior to outage.	TSgt Santiago		
	MSgt Brunnemer		
	Ami Alkonis		
			
Fire Prevention CEF/CEP	Mr. Berry/Mr. Davis		
Electrical Systems	Mr. Hallett		
Electrical Shop	Mr. Delgado/MSgt Campbell/Truesdell		
Power Production	Mr. Placke/MSgt Eastman		
Infrastructure Chief/CEOI	MSgt Martin		
Utilities Shop	Mr. Tucker		
Mechanical Chief	MSgt Johnson/TSgt Hart/TSgt Brown		
Heavy Repair Chief/CEOH	MSgt Field/Mr. Kendrick		
Communications/20 CS/SCOI briefed 20 CS/CC prior to outage	MSgt Fox/TSgt Beck/SSgt Ross		
Ops Deputy/CEOD	Mr. Brown		
Ops Chief/CEO	2Lt Kuster		
Commander/CC	Lt Col Carter		

This outage will affect the following buildings:

Building 1693(Hush House Office): POC - TSgt Santiago @ 895-1520
 Building 1695(Hush House Latrine): POC - TSgt Santiago @ 895-1520
 Building 1698(20 AMXS North EOR): POC - MSgt Brunnemer @ 895-8636
 Building 1712(20 AMXS Maint Hangar): POC - MSgt Brunnemer @ 895-8636
 Building 1720(20 AMXS Maint Dock Fuel Systems): POC - Ami Alkonis @ 895-1193

The purpose of the outage is to repair a broken water line at Bldg 1693.

Any questions regarding this Outage please contact POCs below.
 POC: SSgt Clayton Bautista @ 895-9667

APPENDIX C: Forms

ATTACHMENT: WATER BREAK OUTAGE COORDINATION

Example

Date Prepared: 27 June 2016

Outage Coordination Sheet (Base Area)

☐ Electrical ☒ Water ☐ Gas

Date of Outage: 19 July 2016

Time/Duration: 0800-1600 (1 Day)

Office	Name	Signature	Date
Facility Manager(s) Note: My Squadron CC and tenants were briefed prior to outage.	Ami Alkonis MSgt Brunnermer	see attached see attached	
Fire Prevention CEF/CEP	Mr. Berry/Mr. Davis		
Electrical Systems	Mr. Hallett MSGT EASTMAN	<i>[Signature]</i>	18 Jul 16
Electrical Shop	Mr. Delgado/MSgt Campbell/Truesdell	<i>[Signature]</i>	18 Jul 16
Power Production	Mr. Placke/MSgt Eastman	<i>[Signature]</i>	18 Jul 16
Infrastructure Chief/CEOI	MSgt Martin	<i>[Signature]</i>	18 Jul 16
Utilities Shop	Mr. Tucker	<i>[Signature]</i>	18 Jul 16
Mechanical Chief	MSgt Johnson/TSgt Hart/TSgt Brown	<i>[Signature]</i>	18 Jul 16
Heavy Repair Chief/CEOII	MSgt Field/Mr. Kendrick	<i>[Signature]</i>	18 Jul 16
Communications/20 CS/SCOI briefed 20 CS/CC prior to outage	N/A		
Ops Deputy/CEOD	Mr. Brown	<i>[Signature]</i>	18 Jul 16
Ops Chief/CEO	2Lt Kuster	<i>[Signature]</i>	18 Jul 16
Commander/CC	Lt Col Grover	<i>[Signature]</i>	18 Jul 16

This outage will affect the following buildings:

Building 1712: POC - MSgt Brunnermer @ 895-8636
 Building 1698: POC - MSgt Brunnermer @ 895-8636
 Building 1695: POC - Ami Alkonis @ 895-1193
 Building 1693: POC - Ami Alkonis @ 895-1193

///This is an URGENT Request///

Previous repair on line did not solve the issue, see attached documentation purpose of the outage is to assess a main water line behind Bldg 1712 where a sink hole formed.

Any questions regarding this Outage please contact POCs below.
 POC - TSgt Joki @ 895-9667

	APPENDIX C: Forms	
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**ATTACHMENT:
PRERECORDED MESSAGES FOR MASS**

Example

Note: If there is not an elevator in the building then the elevator reference shall be removed from the message.

MNS Voice Messages – Shaw AFB Standard 2017

****IN ORDER OF PRIORITY****

*****Female voice shall be used*****

- 1 – Severe weather warning. Severe weather has been detected in your area. Please be prepared to take shelter.
- 2 – This is an emergency. Please evacuate the building through secondary exits only. Do not use the main entrances.
- 3 – This is a bomb threat. A bomb threat alert has been called into local authorities. Please evacuate the building now.
- 4 – Armed intruder detected. Immediately take shelter where you are. Block doors and stay away from windows.
- 5 – This is a test of the facility’s mass notification system. This is only a test. If this had been an actual emergency, you would have received instructions on how to respond to the emergency.
- 6 – All clear, return to your workstation.
- 7 - Attention, Your attention please. The fire alarm in the building has been activated. Cease operations immediately. Proceed to the nearest exit. (IF AN ELEVATOR EXISTS IN THE FACILITY, ADD: “Do not use the elevator”).
- 8 – NOTE: THERE IS NO LONGER AN 8TH MESSAGE

*****Use ANSI Tone**

APPENDIX C: Forms

ATTACHMENT: DDC POINTS LIST FAN COIL

Digital Controller Points List								Available Controller Points	
Job Name:	Any Job - Review all tabs					Universal Inputs:			
Controller Type:						Analog Outputs:			
System / Equipment Designation:	Fan Coil Unit 1					Binary Outputs:			
Point Description	Analog Input	Binary Input	Analog Output	Binary Output	Alarm Point*	Non-DDC Point**	Other (specify)	Notes	
Discharge air temperature	1								
Space temperature	1								
Space humidity	1								
Supply fan start/stop & status				2					
Outside air humidity	1								
Air cooled condensing unit stages				4					
Clogged filter switch						1			
Hot water control valve			1						
Freezestat						1			
Outside & return air dampers			1						
Mixed air temperature	1								
Point Totals:	5	0	2	6	0	2	0		

APPENDIX C: Forms

ATTACHMENT: DDC POINTS LIST BOILER CHILLER

<u>Digital Controller Points List</u>													
												Available Controller Points	
Job Name:		Any Job - Review all tabs										Universal Inputs:	
Controller Type:												Analog Outputs:	
System / Equipment Designation:		Boiler / Chiller Plant										Binary Outputs:	
Point Description	Analog Input	Binary Input	Analog Output	Binary Output	Alarm Point*	Non-DDC Point**	Other (specify)	Notes					
Outside air temperature	1												
Hot water supply & return temperature	2				1								
Chilled water supply & return temperature	2				1								
Interface to boilers		1	2	2	1								
Interface to chillers		1	2	2	1								
Hot water pumps start/stop & status		1		1	1								
Chilled water pumps start/stop & status		1		1	1								
Hot water flow switches						2							
Chilled water flow switches						2							
Hot water three-way control valve			1										
Chilled water bypass control valve			1										
Hot water bypass control valve			1										
Hot water pressure	1				1								
Chilled water pressure	1				1								
Chiller isolation valves				2									
Combustion air damper						1							
System graphic							1						
Point Totals:	7	4	7	8	8	5	1						

APPENDIX C: Forms

ATTACHMENT: DDC POINTS LIST MAKE UP AIR

Digital Controller Points List								Available Controller Points
Job Name:	Any Job - Review all tabs					Universal Inputs:		
Controller Type:						Analog Outputs:		
System / Equipment Designation:	Make Up Air Unit MAU-1					Binary Outputs:		
Point Description	Analog Input	Binary Input	Analog Output	Binary Output	Alarm Point*	Non-DDC Point**	Other (specify)	Notes
Outside air temperature	1							
Outside air humidity	1				1			
Supply fan start/stop & status		1		1				
Outside air damper				1				
Hot water control valve				1				
Face/bypass dampers			1					
Freezestat						1		
Space temperature	1							
Clogged filter switch						1		
Point Totals:	3	1	1	3	1	2	0	

APPENDIX C: Forms

ATTACHMENT: DDC POINTS LIST MAKE UP AIR

<u>Digital Controller Points List</u>								Available Controller Points
Job Name:	Any Job - Review all tabs					Universal Inputs:		
Controller Type:						Analog Outputs:		
System / Equipment Designation:	VAV AHU					Binary Outputs:		
Point Description	Analog Input	Binary Input	Analog Output	Binary Output	Alarm Point*	Non-DDC Point**	Other (specify)	Notes
Outside air temperature	1							
Outside air Humidity	1				1			
Discharge air temperature	1				1			
Mixed air temperature	1							
Space temperature	1				1			
Building static pressure	1							
Supply fan start/stop & status		1		1				
Return fan start/stop & status		1		1				
Enthalpy controller		1						
Outside/return/exhaust air dampers			1					
Hot water control valve			1					
Supply fan VFD			1					
Return fan VFD			1					
Air cooled condensing unit stages				4				
Clogged filter switch						1		
Freezestat						1		
Supply air duct smoke detector						1		
External shutdown command from FAS		1						
System graphic							1	
Discharge air reset based on OA temp.							1	
Point Totals:	6	4	4	6	3	3	2	

APPENDIX C: Forms

ATTACHMENT: DDC POINTS LIST VAV AHU

<u>Digital Controller Points List</u>								
					Available Controller Points			
Job Name:		Any Job - Review all tabs			Universal Inputs:			
Controller Type:					Analog Outputs:			
System / Equipment Designation:		VAV AHU			Binary Outputs:			
Point Description	Analog Input	Binary Input	Analog Output	Binary Output	Alarm Point*	Non-DDC Point**	Other (specify)	Notes
Outside air temperature	1							
Outside air Humidity	1				1			
Discharge air temperature	1				1			
Mixed air temperature	1							
Space temperature	1				1			
Duct static pressure	1				1			
Building static pressure	1							
Supply fan start/stop & status		1		1				
Return fan start/stop & status		1		1				
Enthalpy controller		1						
Outside/return/exhaust air dampers			1					
Hot water control valve			1					
Supply fan VFD			1					
Return fan VFD			1					
Air cooled condensing unit stages				4				
Clogged filter switch						1		
Freezestat						1		
High limit static pressure switch						1		
Supply air duct smoke detector						1		
External shutdown command from FAS		1						
System graphic							1	
Discharge air reset based on OA temp.							1	
Point Totals:	7	4	4	6	4	4	2	

APPENDIX C: Forms

ATTACHMENT: DDC POINTS LIST EXHAUST FANS

Digital Controller Points List					Available Controller Points			
Job Name:	Any Job - Review all tabs				Universal Inputs:			
Controller Type:					Analog Outputs:			
System / Equipment Designation:	Exhaust Fans				Binary Outputs:			
Point Description	Analog Input	Binary Input	Analog Output	Binary Output	Alarm Point*	Non-DDC Point**	Other (specify)	Notes
EF-1 start/stop & status		1		1				
EF-2 start/stop & status		1		1				
EF-3 start/stop & status		1		1				
EF-4 start/stop & status		1		1				
EF-5 start/stop & status		1		1				
EF-6 start/stop & status		1		1				
EF-7 start/stop & status		1		1				
EF-8 start/stop & status		1		1				
EF-9 start/stop & status		1		1				
EF-10 start/stop & status		1		1				
EF-11 start/stop & status		1		1				
EF-12 start/stop & status		1		1				
EF-13 start/stop & status		1	1					
EF-14 start/stop & status		1	1					
EF-15 start/stop & status		1	1					
EF-16 start/stop & status		1	1					
EF-17 start/stop & status		1	1					
EF-18 start/stop & status		1	1					
EF-19 start/stop & status		1	1					
EF-20 start/stop & status		1	1					
Point Totals:	0	20	8	12	0	0	0	

APPENDIX C: Forms

ATTACHMENT: DDC POINTS LIST VRF INDOOR UNIT

<u>Digital Controller Points List</u>													
												Available Controller Points	
Job Name:		Any Job - Review all tabs										Universal Inputs:	
Controller Type:												Analog Outputs:	
System / Equipment Designation:		VRF Indoor Unit 1										Binary Outputs:	
Point Description	Analog Input	Binary Input	Analog Output	Binary Output	Alarm Point*	Non-DDC Point**	Other (specify)	Notes					
Discharge air temperature	1				1								
Space temperature	1				1								
Space humidity	1				1								
Supply fan start/stop & status		1		1	1								
Clogged filter switch		1											
Mixed air temperature	1												
Unit Alarm				1	1								
Malfunction code		1											
Point Totals:	4	3	0	2	5	0	0						

APPENDIX C: Forms

ATTACHMENT: DDC POINTS LIST VRF BRANCH CTRL

<u>Digital Controller Points List</u>													
												Available Controller Points	
Job Name:		Any Job - Review all tabs										Universal Inputs:	
Controller Type:												Analog Outputs:	
System / Equipment Designation:		VRF Branch Controller 1										Binary Outputs:	
Point Description	Analog Input	Binary Input	Analog Output	Binary Output	Alarm Point*	Non-DDC Point**	Other (specify)	Notes					
Zone Status		1											
Alarm		1			1								
Malfunction code		1											
		1											
Point Totals:	0	4	0	0	1	0	0						

APPENDIX C: Forms

ATTACHMENT: DDC POINTS LIST VRF OUTDOOR UNIT

<u>Digital Controller Points List</u>								Available Controller Points	
Job Name:	Any Job - Review all tabs					Universal Inputs:	8		
Controller Type:	ASIC/2-8040					Analog Outputs:	4		
System / Equipment Designation:	VRF Outdoor Unit 1					Binary Outputs:	8		
Point Description	Analog Input	Binary Input	Analog Output	Binary Output	Alarm Point*	Non-DDC Point**	Other (specify)	Notes	
System Start Stop (Control)				1					
System Start Stop (Monitor)		1							
Trip/Alarm				1	1				
Malfunction Code			1						
Operational mode (control)						1			
Operational mode (Status)	1								
Outside unit compressor Status		1							
Point Totals:	1	2	1	2	1	1	0		
Spare Inputs →	5		3	6	← Spare Outputs				
<u>Notes</u>									
1) _____									
2) _____									
3) _____									
4) _____									
5) _____									
6) _____									
7) _____									
8) _____									

APPENDIX C: Forms

ATTACHMENT: DDC POINTS LIST VRV SYSTEM

Digital Controller Points List								
Job Name:	Any Job - Review all tabs				Available Controller Points			
Controller Type:	ASIC/2-8040				Universal Inputs:	8		
System / Equipment Designation:	VRF Outdoor Unit 1				Analog Outputs:	4		
					Binary Outputs:	8		
Point Description	Analog Input	Binary Input	Analog Output	Binary Output	Alarm Point*	Non-DDC Point**	Other (specify)	Notes
System Start Stop (Control)	1							
System Start Stop (Monitor)	1							
Trip	1							
Malfunction Code		1		1				
Operational mode (control)						1		
Operational mode (Status)	1							
Air flow rates (control)								
Air flow rates (monitor)								
Room Temperatures								
Room Temperature Set point								
Room Humidity								
Room Humidity Set Point								
Room Temperature Adjustment								
Filter status								
Indoor fan status								
Point Totals:	4	1	0	1	0	1	0	
Spare Inputs	3		4	7	Spare Outputs			
								Notes
1)								
2)								
3)								
4)								
5)								
6)								
7)								
8)								

ATTACHMENT: INPUT OUTPUT SUMMARY

INPUT/ OUTPUT SUMMARY	START/STOP	SPEED/USE	ENABLE/DISABLE	CODING/LAN/CODED	DIG. MESSAGES	SETPOINT ADJUST	LEFT PRESS. SWITCH	CURRENT SWITCH	ON/OFF	OPEN/CLOSE CONTACT	ANALOG MESSAGE	AIRFLOW (CFM)	STATIC PRESSURE	GPM	ELECTRIC CURRENT	TEMPERATURE	HUMIDITY/DEW-POINT	POWER (AMPS/VOLTS/WATTS)	CO2 LEVEL (PPM)	PRESSURE MEASURE	EQUIPMENT FAILURE	HVAC UNIT	TIMERS/CLOCKS	TIME SCHEDULE	RUN TIME	OVERRIDE PROGRAM	DAY/NIGHT SETBACK	
BASIN KEY SYSTEM																												①
START/STOP (CONTROL)	X																						X		X	X		②
START/START (MONITORING)																												③
TRIP																				X								③ ⑥
WARNING CODE																				X								⑦ ⑧
AIR CONDITIONING MODE (SETTING)																												⑦ ⑩
AIR CONDITIONING MODE (MONITORING)																												⑧
AIR FLOW RATE (SETTING)																												⑧ ④
AIR FLOW RATE (MONITORING)																												⑨ ④
ROOM TEMPERATURE INDICATOR																X												⑨ ⑤
TEMPERATURE ADJUST						X																						⑨ ⑥
FILTER SEN																												⑨ ⑥
FILTER SEN RESET																												⑨ ⑥
REMOTE CONTROL MODE SETTING (START/STOP)	X																											⑩
REMOTE CONTROL MODE SETTING (A/C MODE)																												⑩
REMOTE CONTROL MODE SETTING (TEMP ADJUST)						X																						⑩
CENTRAL/LOCAL EQUIPMENT OPERATION																												⑩ ⑤
SYSTEM FORCED OFF																												⑩ ⑥
AIR DISTRIBUTION (SETTING)																												⑩ ⑤
AIR DISTRIBUTION (MONITORING)																												⑩ ⑤
FORCED THERMO OFF (SETTING)																												⑩ ⑥
FORCED THERMO OFF (MONITORING)																												⑩ ⑥
ENERGY EFFICIENCY (SETTING)																												⑩ ⑦
ENERGY EFFICIENCY (MONITORING)																												⑩ ⑦
THROTTLE OPERATOR STATUS																												⑩ ⑧
COMPRESSOR OPERATOR STATUS																												⑩
INDOOR R/A OPERATOR STATUS																												⑩
HEATER OPERATOR STATUS																												⑩ ⑤

- 1 SEE FLOOR PLANS FOR THE LOCATION OF ALL FAN COILS AND CONDENSING UNITS.
- 2 BACKET SERIAL INTERFACE PLUNTS FROM THE DRAIN SYSTEM.
- 3 DRAIN GENERATES TEMPERATURES IN CELSIUS THEREFORE A CONVERTER WILL BE REQUIRED BY A/C.
- 4 FAN SPEED
- 5 NOT USED
- 6 FAN ONLY - SHUT OFF OF A/C OR HEAT
- 7 SPACE TEMPERATURE RESET WITH NO CHANGES IN THE DISPLAY OF SPACE TEMPERATURE SET POINT
- 8 CALL FOR HEATING OR COOLING
- 9 FIRE ALARM TIE-IN
- 10 FOR EACH FAN COIL AND CONDENSING UNIT
- 11 SEE FLOOR PLANS FOR LOCATION. TEMPERATURE SENSOR/SENSOR SHALL BE PROVIDED FOR EACH FAN COIL.
- 12 TEMPERATURE SENSOR FOR MONITORING SPACE TEMPERATURE
- 13 FILTER DIFFERENTIAL PRESSURE SWITCH FOR (DYNAMIC ELECTRONIC) FILTER MODULE ASSOCIATED WITH EACH DRAIN FAN COIL
- 14 AN ALPHA NUMERIC CODE GENERATED BY THE DRAIN SYSTEM
- 15 COOLING/HEATING/STANDBY MODE

PRELIMINARY ONLY

APPENDIX C: Forms

Notes to Designers:

- Use this check list at least twice during each project: at Design Development stage and just before final documents are complete.
- Hand-in completed check list to Project Manager before final documents are issued.
- Help make this check list more effective and complete. Refer additions and revisions to QC/QC Manager.

DESIGN CHECKLIST – ARCHITECTURAL TEMPLATE

Done	N/A		ARCHITECTURAL - GENERAL:	Notes
		00.1	Cover sheet including project name, Contract Number, Identify submittal, e.g. Fast Track, and dated?	
		00.2	Index of drawings coordinated?	
		00.3	Are Issue Dates correct?	
		00.4	Title block complete? (i.e., project name, date, drawn by, checked by, Architect's Project Number, sheet name and sheet number?	
		00.5	NAVFAC numbers on Corrected Final Consolidated drawings?	
		00.6	Material symbols indicated?	
		00.7	Abbreviations indicated?	
		00.8	Architectural "Master Keynote Legend" indicated?	
		00.9	Seals with signatures on all sheets issued for corrected finals?	
		00.10	Have Owner review comments been responded to and coordinated with specs and drawings?	

Done	N/A		AE-100 Series FLOOR PLANS:	Notes
		100.1	Are sheet titles correct and coordinated with Index of Drawings?	
		100.2	Are graphic scales included?	
		100.3	Has north arrow been placed on all floor plan sheets?	
		100.4	Is there a Key Plan, if required?	
		100.5	Are plan key notes completed?	
		100.6	Are column grid and call outs completed?	
		100.7	Are all dimensions legible?	
		100.8	Are critical dimensions shown?	
		100.9	Do dimensions add up?	
		100.10	Are room or space number designations indicated for all rooms/spaces?	
		100.11	Are slab depressions, cutout, transitions and slopes shown?	
		100.12	Are floor drains indicated and shown in all wet areas?	
		100.13	Are material designations clear?	
		100.14	Are all partition types indicated on plan or enlarged plans?	
		100.15	Are building sections located?	
		100.16	Are all door numbers /types placed?	
		100.17	Contract or Owner-furnished equipment located?	
		100.18	Equipment clearances indicated?	
		100.19	Can large equipment items be placed/removed from within/from the building after it is constructed?	

APPENDIX C: Forms

Done	N/A		AE-100 Series FLOOR PLANS:	Notes
		100.20	Standpipes located? Enclosures shown and properly rated?	
		100.21	Fire extinguisher and hose cabinets/brackets located?	
		100.22	Are mechanical louvers located?	
		100.23	Are roof hatches and ladders located?	
		100.24	If match lines are used, are they consistent from plan to plan?	
		100.25	Are rain water downspouts and leaders placed?	
		100.26	Are concrete equipment pads dimensioned?	
		100.27	Have proper protection bollards been provided around transformer?	
		100.28	Have stair widths been coordinated with egress requirements?	
		100.29	Is stair direction designation indicated?	
		100.30	Are handrails and guardrails located?	
		100.31	Have large scale plans been referenced?	
		100.32	Has section been drawn through stair?	
		100.33	Are all door swings shown?	
		100.34	Have all recessed items been accommodated (i.e. FE cabinets, electrical panels, etc.)?	
		100.35	Verify recessed do not violate fire rating?	
		100.36	Are duct chases coordinated with actual requirements?	
		100.37	Are recessed drinking fountains indicated and provided for?	
		100.38	Have all Life Safety requirements been accommodated? (i.e., exit door swings, fire rated corridors, etc.)	
		100.39	Have all expansion joints been located, detailed and referenced?	
		100.40	Have all essential plan sections at columns been indicated?	
		100.41	Have all special hollow metal and aluminum glazed openings been scheduled?	
		100.42	Are adjacent walks indicated? (Verify with Civil drawings).	
		100.43	Are all window openings tagged and dimensioned?	
		100.44	Are interior elevations referenced?	
		100.45	Where overhead doors are used, have their clearances been coordinated?	
		100.46	Where vehicle access occurs, is there adequate wall and corner protection?	
		100.47	Are wall section references indicated?	
		100.48	Are building sections referenced?	

Done	N/A		AE-100 Series REFLECTED CEILING PLANS:	Notes
		100.49	Are sheet titles correct and coordinated with Index of Drawings?	
		100.50	Are graphic scales included?	
		100.51	Has north arrow been placed on all plan sheets?	
		100.52	Is there a Key Plan, if required?	
		100.53	Are plan key notes completed?	
		100.54	Is legend complete and coordinated with other disciplines?	
		100.55	Are column grid and call outs completed?	
		100.56	Have all fire-rated ceilings been provided to rooms such as stairs and storage rooms where necessary for fire rating?	

APPENDIX C: Forms

Done	N/A		AE-100 Series REFLECTED CEILING PLANS:	Notes
		100.57	Have acoustical ceilings been laid out to have a minimum of ½ tile width intersecting partitions?	
		100.58	Have all light fixtures been located? Have light fixtures been properly coordinated with proper type of ceiling?	
		100.59	Have all ceiling diffusers, grilles been located?	
		100.60	Have all miscellaneous items been located?	
		100.61	a. Fire Sprinklers	
		100.62	b. Smoke Detectors	
		100.63	c. Heat Detectors	
		100.64	d. Speakers	
		100.65	e. Ceiling Mounted Hangers e.g. projectors, TV's	
		100.66	f. Projection Equipment	
		100.67	g. Tele-Power Poles	
		100.68	h. Intrusion detection system components	
		100.69	Have access panels been located in non-accessible ceiling?	
		100.70	Have roof hatch openings been detailed to coordinate with type of ceiling used?	
		100.71	Have furred spaces been indicated, especially above cabinets?	
		100.72	Are all exposed decks indicated to be painted?	
		100.73	Are sprinkler head locations dimensioned in critical areas?	
		100.74	Are plaster and gypsum board ceilings indicated to be painted?	
		100.75	Are control joints indicated, detailed and referenced?	
		100.76	Are ceiling heights shown for all cases?	
		100.77	Is a typical ceiling height shown?	
		100.78	Are exit directional fixtures indicated?	
		100.79	Are ceiling details located and referenced?	
		100.80	Are all different types of ceiling materials indicated?	

Done	N/A		AE-100 Series ROOF PLANS:	Notes
		100.81	Are sheet titles correct and coordinated with Index of Drawings?	
		100.82	Are graphic scales included?	
		100.83	Has north arrow been placed on all plan sheets?	
		100.84	Is there a Key Plan, if required?	
		100.85	Are plan key notes completed?	
		100.86	Are column grid and call outs completed?	
		100.87	Roof sloped indicated? Minimum 1/2" per foot?	
		100.88	Roof slope consistent with framing plans?	
		100.89	Cants, crickets and saddles located if required?	
		100.90	Expansion joints located and details referenced?	
		100.91	Roof drains located?	
		100.92	Gutters and downspouts located and details referenced?	
		100.93	High/low roof transition details located and details referenced?	
		100.94	Overflow roof drains and scuppers located and details referenced?	
		100.95	Potential kitchen exhaust/grease discharge resolved?	
		100.96	Attic ventilators located and details referenced?	
		100.97	Hatches and scuttles located and details referenced?	

APPENDIX C: Forms

Done	N/A		AE-100 Series ROOF PLANS:	Notes
		100.98	Ventilation and hatch curbs located and details referenced?	
		100.99	Roof mounted mechanical equipment and penetrations located?	
		100.100	Curbs for roof-mounted equipment details referenced?	
		100.101	Pipe, conduit penetrations and supports details referenced?	
		100.102	Ladders located and details referenced?	
		100.103	Penthouses indicated and plan referenced?	
		100.104	Skylights located and details referenced?	

Done	N/A		AE-200 Series EXTERIOR ELEVATIONS:	Notes
		200.1	Are sheet titles correct and coordinated with Index of Drawings?	
		200.2	Are graphic scales included?	
		200.3	Are key notes completed?	
		200.4	Extent of differing finish materials and patterns delineated?	
		200.5	Are all louvers located, including head and sill heights?	
		200.6	Are unused portions of mechanical louvers sealed?	
		200.7	Column lines indicated?	
		200.8	Building sections referenced?	
		200.9	Details referenced?	
		200.10	Floor & roof elevations given, using top of slab or deck?	
		200.11	Vertical dimensions and elevations given?	
		200.12	Below grade construction noted, including bottom of footing?	
		200.13	Areas and basement wall openings indicated?	
		200.14	Handrails and guardrails indicated and details referenced?	
		200.15	Signs indicated and located? (Should be only those applied to building face.)	
		200.16	Ladders indicated?	
		200.17	Bumpers, corner guards indicated?	
		200.18	Roof slope shown?	
		200.19	Expansion and control joints shown and detailed?	
		200.20	Wall mounted fixtures such as lighting, siamese connections,	
		200.21	fire alarms, etc., located and coordinated with other disciplines?	
		200.22	Roof lines beyond parapet? (Only if above the parapet.)	
		200.23	Coping and flashing shown and detailed?	
		200.24	Fascia and trims at joint locations shown where required for uniform appearance?	
		200.25	Is extent of window types clear?	
		200.26	Are doors and door swings indicated?	
		200.27	Is visible mechanical and electrical equipment treatment resolved?	
		200.28	Are adequate details shown for exterior fenestration joints and false joints?	
		200.29	Is everything shown or indicated that will be visible	
		200.30	in the completed project?	
		200.31	Are existing and finish grade lines indicated?	

APPENDIX C: Forms

Done	N/A		AE-200 Series BUILDING SECTIONS:	Notes
		200.32	Are sheet titles correct and coordinated with Index of Drawings?	
		200.33	Are graphic scales included?	
		200.34	Are key notes completed?	
		200.35	Are room names and numbers given?	
		200.36	Are column grid and call outs completed?	
		200.37	Are vertical dimensions and elevations indicated?	
		200.38	Are structural elements including beams, bar joists and decks located and shown to scale?	
		200.39	Are ceilings indicated?	
		200.40	Are the height of interior partitions shown correctly?	
		200.41	Are partition types indicated?	
		200.42	Are wall hung or ceiling hung components other than typical HVAC and fire protection systems indicated?	
		200.43	Are fire rated or smoke rated vertical and horizontal assemblies indicated?	
		200.44	Are wall sections and details referenced?	
		200.45	Are special wall finishes indicated?	

Done	N/A		AE-400 Series LARGE SCALE PLANS:	Notes
		400.1	Are sheet titles correct and coordinated with Index of Drawings?	
		400.2	Are graphic scales included?	
		400.3	Are key notes completed?	
		400.4	Are back references completed?	
		400.5	Are all partition types indicated on plan or enlarged plans?	
		400.6	Are room or space number designations indicated for all rooms/spaces?	
		400.7	Are all door tags included?	
		400.8	Are all dimensions legible?	
		400.9	(Do not use dimensions less than 1/8".)	
		400.10	Do dimensions add up? (Always give an overall dimension to a string of dimensions. Tie dimensions to column grid lines where possible.)	
		400.11	Have all recessed items been accommodated (i.e. FE cabinets, electrical panels, etc.)?	
		400.12	Have all detail call outs been coordinated?	

Done	N/A		AE-400 Series LARGE SCALE TOILET ROOM PLANS, ELEVATIONS, AND SCHEDULE:	Notes
		400.13	Are sheet titles correct and coordinated with Index of Drawings?	
		400.14	Are graphic scales included?	
		400.15	Are key notes completed?	
		400.16	Are back references completed?	
		400.17	Are all partition types indicated?	
		400.18	Are room or space number designations indicated?	
		400.19	Are all door tags included?	
		400.20	Are all dimensions legible?	

APPENDIX C: Forms

Done	N/A	AE-400 Series LARGE SCALE TOILET ROOM PLANS, ELEVATIONS, AND SCHEDULE:	Notes
		400.21 (Do not use dimensions less than 1/8".)	
		400.22 Do dimensions add up? (Always give an overall dimension to a string of dimensions. Tie dimensions to column grid lines where possible.)	
		400.23 Dimension toilet compartments, and center lines of all fixtures in plan view.	
		400.24 Have all recessed accessories been accommodated?	
		400.25 Have all detail call outs been coordinated?	
		400.26 Are all toilet accessories scheduled, located and tagged in plan and elevations?	
		400.27 Have typical mounting location graphics been included?	
		400.28 Coordination with ADA checklist completed	
		400.29 Are floor drains and floor slopes indicated?	
		400.30 Are floor drains placed outside of traffic path?	

Done	N/A	AE-400 Series STAIR ENLARGED PLANS SECTIONS AND DETAILS:	Notes
		400.31 Are handrail wall and stair width clearances checked with egress requirements?	
		400.32 Have all required details been indicated for stair construction?	
		400.33 Are stair fire rated enclosure and edge joint details correct for fire rating and given conditions?	
		400.34 Typical stair tread including depth nosing, finish materials?	
		400.35 Landing with structure and guardrail?	
		400.36 Enclosure under stairs?	
		400.37 No recessed items can occur in stair enclosure perimeter such as junction boxes or fire extinguisher cabinet?	
		400.38 Have stair widths and overhead clearances been coordinated with egress requirements?	
		400.39 Is stair designation indicated? (i.e. UP or DOWN)	
		400.40 Stair numbered/named?	
		400.41 Is run and rise of flight shown?	
		400.42 Has maximum riser height been shown?	
		400.43 Has section been drawn through stair?	
		400.44 Are all door swings shown?	
		400.45 Handrail extensions indicated and dimensioned horizontally and vertically?	
		400.46 Guardrails detailed to 42' A.F.F. or stair nosings?	
		400.47 Handrails should be 1 1/2" diameter 34" A.F.F. or along stair nosings to top and 2-1/4" clear from walls. Are handrail brackets detailed?	
		400.48 Do brackets allow for continual use of handrails?	
		400.49 Stringers must be coordinated with structural drawings typically 1-1/2" or 3" wide channels.	
		400.50 Nosings, handrails, clearances, areas of rescue assistance?	
		400.51 Are material designations clear?	
		400.52 Furred spaces indicated?	
		400.53 Contract or Owner-furnished equipment located and identified?	

APPENDIX C: Forms

AE-400 Series STAIR ENLARGED PLANS SECTIONS AND DETAILS:				
Done	N/A			Notes
		400.54	Are clearances indicated for equipment?	
		400.55	Have expansion joints been located, detailed and details referenced?	
		400.56	Are applicable adjacent walks and grades indicated; coordinated with civil drawings?	
		400.57	Have all applicable windows and openings been coordinated with other drawings?	
		400.58	Are interior elevations designations shown?	

AE-500 Series ARCHITECTURAL - LARGE SCALE DETAILS GENERAL:				
Done	N/A			Notes
		500.1	Are sheet titles correct and coordinated with Index of Drawings?	
		500.2	Are graphic scales included?	
		500.3	Are back references completed?	
		500.4	Have details been dimensioned where required?	
		500.5	Are material designations clear and consistent?	
		500.6	Are thickness and types of gypsum board indicated?	
		500.7	Are thickness and types of insulation indicated?	
		500.8	Are metal studs drawn to scale and width and spacing indicated?	
		500.9	Is miscellaneous steel and structural steel drawn to scale?	
		500.10	Are miscellaneous steel shapes noted?	
		500.11	Are glazing framing members and glass type correct?	

AE-600 Series DOOR SCHEDULE and DETAILS				
Done	N/A			Notes
		600.1	Have all door and frame types been elevated?	
		600.2	Are all fire rated assemblies indicated? Fire ratings at exit components shall equal wall ratings.	
		600.3	Are acoustical doors indicated? Is assembly certified or gasketed?	
		600.4	Are security doors indicated?	
		600.5	Have oversized doors been identified e.g. at elevator Equipment rooms	
		600.6	Are louvers and glass lites indicated?	
		600.7	Are door and room numbers coordinated with floor plans?	
		600.8	Are hardware sets coordinated with project specifications?	
		600.9	Are door frames in gypsum board walls, placed at least 4" from intersecting walls?	
		600.10	Are all frame head and jamb conditions detailed?	
		600.11	Are all threshold conditions detailed? Are any doors undercut for mechanical	

APPENDIX C: Forms

Done	N/A		AE-600 Series DOOR and Hardware Specifications	Notes
		600.12	Are doors stops appropriate to location? Check wall mounted	
		600.13	Stops at wall guards, floor stops at traffic areas, and use	
		600.14	Overhead stops.	
		600.15	Wood door finishes	

Done	N/A		AE-600 Series WINDOW and LOUVER SCHEDULE and DETAILS	Notes
		600.16	Have all window and louver type elevations been drawn?	
		600.17	Are glazing requirements clear?	
		600.18	1. Safety glass	
		600.19	2. Spandrel	
		600.20	3. Insulated vision	
		600.21	4. Other	
		600.22	Are window frame depths derived from AT/FP and wind load forces?	
		600.23	Are all necessary details for jambs, heads and sills indicated?	
		600.24	Have all special hollow metal and aluminum glazed openings been scheduled and detailed?	
		600.25	Have masonry openings for windows and doors been coordinated with plan dimensions?	
		600.26	Has flashing been shown for sill and head conditions?	
		600.27	Are all sill flashings/end dams detailed, referenced and indicated?	
		600.28	Has aluminum glass door head framing been coordinated with automatic door operators?	
		600.29	Has aluminum glass door threshold been coordinated with walk off mats?	
		600.30	Have connections for transfer of forces from windows to building structure been coordinated with manufacturer?	

Done	N/A		AE-700 Series PARTITION TYPES	Notes
		700.1	Are sheet titles correct and coordinated with Index of Drawings?	
		700.2	Is graphic scale included, if required?	
		700.3	Are all partition types included?	
		700.4	Do STC rated walls reference GA file number?	
		700.5	Do fire rated walls reference U.L. designs?	
		700.6	Are terminations at floor or roof decks included or are they referenced?	
		700.7	Do security walls require expanded metal for this project?	
		700.8	Is all gypsum board required to be 5/8" and or Type 'X' by project requirements?	
		700.9	Is cement backer board required and used at ceramic tile walls in restrooms or wet walls and showers?	
		700.10	Do walls extend from true slab or access floors?	

APPENDIX C: Forms

ATTACHMENT: REVIEW AND CERTIFICATION FOR DOD MINIMUM ANTITERRORISM STANDARDS FOR BUILDINGS CHECKLIST

*Instructions: The information outlined in this document shall be used to provide the **minimum** requirement for development of DOD Minimum Antiterrorism Standards for Buildings submittals for all building projects. Additional and supplemental information may be used to further develop the review. Insert N/A after criteria, which may be "not applicable". Provide this checklist with certification signatures in the project Design Analysis at each submittal.*

Applicable Standards: UFC 4-010-01, 9 February 2012, Change 1, 1 October 2013
Chapter 1-2

Project Name: xxxxxxxxxx

Applicability: The DoD Minimum Antiterrorism Standards for Buildings apply to this project.

A. New Construction X
Chapter 1-8.1

- Primary Gathering X
- Billeting _____
- Inhabited _____
- Low Occupancy _____
- Expeditionary _____
- Temporary _____

B. Existing Building N/A
Chapter 1-8.2

Cost exceeds 50% of Replacement Cost _____
Cost less than 50% of Replacement Cost _____

- Primary Gathering _____
- Billeting _____
- Inhabited _____
- Low Occupancy _____
- Expeditionary _____
- Temporary _____

C. Building Addition N/A
Chapter 1-8.3

50% or more of the Gross Area _____
Less than 50% of the Gross Area _____

D. Leased Building N/A
Chapter 1-8.4

E. DoD Purchases of Existing Buildings N/A
Chapter 1-8.5

APPENDIX C: Forms

F. Non-DoD Tenant Buildings on DoD Installations N/A
Chapter 1-8.6

G. National Guard Building N/A
Chapter 1-6.6

H. Visitor Centers and Museums N/A
Chapter 1-8.8

I. Visitor Control Centers at Entry Control Facilities / Access Control Points N/A
Chapter 1-8.9

J. Expeditionary & Temporary Structures N/A
Chapter 1-8.10

- Have Appendix D requirements been incorporated? _____

K. Exempt N/A
Chapter 1-9

Site Planning:

1. Standard 1 – Standoff Distance
Appendix B-1.1 & Table B-1

- Controlled Perimeter or Parking and Roadways without Controlled Perimeter
 - Primary Gathering – Refer to Table varies per Wall Type X
 - Billeting – Refer to Table varies per Wall Type _____
 - Inhabited – Refer to Table varies per Wall Type _____
- Parking and Roadways within a Controlled Perimeter
 - Primary Gathering – Refer to Table varies per Wall Type X
 - Billeting – Refer to Table varies per Wall Type _____
 - Inhabited – Refer to Table varies per Wall Type _____
- Trash Containers
 - Primary Gathering – Refer to Table varies per Wall Type X
 - Billeting – Refer to Table varies per Wall Type _____
 - Inhabited – Refer to Table varies per Wall Type _____
- Parking of Emergency, Command, and Operations Support Vehicles
 - Is parking of vehicles required? YES
 - Have the conditions for parking vehicles been met? YES
- Parking of Vehicles Undergoing Maintenance
 - Is parking of vehicles required? YES
 - Have the conditions for parking vehicles been met? YES
- New Parking and Roadway projects
 - Does new parking and road location meet minimum standoff distance requirements from existing buildings? YES

APPENDIX C: Forms

2. Standard 2 – Unobstructed Space

Appendix B-1.2

- Are there any obstructions within standoff of the building that is 6 inches or greater in height? NO

Are packages within the standoff distance observable by building occupants? YES

Is Electrical and Mechanical Equipment 32 Feet or greater from the building? YES

- Equipment Enclosures within Standoff:
 - Are walls or screening devices more than two sides? YES
 - If "yes" has a four sided enclosure with a top been provided? NO

3. Standard 3 – Drive-Up/Drop-Off Areas

Appendix B-1.3

- Are drive-up or drop-off areas or drive-through lanes near building required? YES
 - If "yes" are the areas or lanes clearly defined and marked to prevent parking in those areas? YES
 - Are drive-up or drop-off areas, or drive-through lanes not located under inhabited portion of bldg? NO

4. Standard 4 – Access Roads

Appendix B-1.4

- Have access control measures been provided on access roads required for the operation of the building? YES

5. Standard 5 – Parking Beneath Buildings or on Rooftops

Appendix B-1.5 & UFC 4-023-03

- Is parking beneath the building or on roof top required? _____
 - If "yes" has access control Measures been provided? N/A Are floors beneath or roofs above inhabited areas designed to prevent progressive collapse? N/A

6. Appendix C – Recommended Additional Measures

Appendix C-1.1 thru C-1.10

- Have recommendations 1 through 10 been considered?
 - 1 – Vehicle Access Points? YES
 - 2 – High-speed Vehicle Approaches? YES
 - 3 – Vantage Points? YES
 - 4 – Drive-up / Drop Off? YES
 - 5 – Building Location? YES
 - 6 – Railroad Location? N/A
 - 7 – Access Control for Family Housing? N/A
 - 8 – Standoff for Family Housing? N/A
 - 9 – Minimize Secondary Debris? N/A
 - 10 – Building Separation? YES

APPENDIX C: Forms

Structural:

7. Standard 6 – Progressive Collapse Avoidance
Appendix B-2.1 & UFC 4-023-03

- Is building 3 or more stories? **NO**
(NOTE: Basements are considered a story if one or more walls are exposed.)
- If "yes" are walls, columns, and floors in accordance with UFC 4-023-03, Design of Buildings to Resist Progressive Collapse? **N/A**

8. Standard 7 – Structural Isolation
Appendix B-2.2

- Is new building addition structural system independent from the adjacent existing building? **N/A**
- Is inhabited portion of new building structurally independent from the uninhabited portion of the building? **N/A**

9. Standard 8 – Building Overhangs and Breezeways
Appendix B-2.3

- Does building have overhangs with inhabited spaces above them? **N/A**
 - If "yes" insure that there are no roadways or parking areas under the overhangs.
 - If "yes" insure that floors beneath inhabited areas are in accordance with UFC 4-023-03, Design of Buildings to Resist Progressive Collapse.
 - If "yes" insure that superstructure is in accordance with UFC 4-023-03, Design of Buildings to Resist Progressive Collapse.

10. Standard 9 – Exterior Masonry Walls
Appendix B-2.4

- Is masonry wall in new building reinforced with required minimum enforcement? **YES**
- Have mitigating measures been provided for masonry wall in existing building that provides an equivalent level of protection? **N/A**

11. Appendix C – Recommended Additional Measures
Appendix C-2.1

- Has recommendation 11 been considered?
 - 11 – Structural Redundancy? **YES**

12. Other Structural Requirements

- Have structural requirements related to windows been considered?
(See Architectural Standard 10)
 - Yes **YES**
 - No

APPENDIX C: Forms

Architectural:

13. Standard 10 – Windows and Skylights
Appendix B-3.1 & UFC 4-011-02

- Has required thickness of exterior glazing been determined using Tables B-2 & B-3? **YES**
- Do window frames, anchorages, and supporting elements meet required minimum level of protection for the following? **YES**
 - Frame Member Design
 - Glazing Frame Bite
 - Frame Connection to Wall
 - Supporting Structural Elements

14. Standard 11 – Building Entrance Layout
Appendix B-3.2

- Does building main entrance face away from the installation perimeter or other uncontrolled vantage point? **YES**
 - If "no" provide means to screen Lines of site.

15. Standard 12 – Exterior Doors
Appendix B-3.3

- Do all exterior doors from inhabited areas open outwards? **YES**
- Does glazing in doors meet Provisions of Standard 10 above? **YES**

16. Standard 13 – Mailrooms
Appendix B-3.4 & B-4.2

- Is mailroom located on the exterior perimeter of the building? **N/A**
- Is mailroom located as far away from heavily populated areas as possible? **N/A**
- Is mailroom sealed between its envelope and other portions of the building in which it is located? **N/A**
 - Does mailroom have a hard ceiling or does mailroom walls extend full height and are sealed to underside of structure above? _____
 - Does mailroom door have weather stripping on all four edges? _____

17. Standard 14 – Roof Access
Appendix B-3.5

- Are external roof access points controlled? **YES**

18. Standard 15 – Overhead Mounted Architectural Features
Appendix B-3.6

- Are overhead mounted features weighing 31 lbs. or more mounted to minimize falling and injuring building occupants? **YES**
- Are these items mounted to resist forces of 0.5 times the component weight in any

APPENDIX C: Forms

direction and 1.5 times the component weight in the downward direction? **YES**

19. Appendix C – Recommended Additional Measures
Appendix C-2.2 thru C-2.7

- Has recommendations 12 thru 17 been considered?
 - 12 – Internal Circulation? **YES**
 - 13 – Visitor Control? **YES**
 - 14 – Asset Location? **YES**
 - 15 – Room Layout? **YES**
 - 16 – External Hallways? **N/A**
 - 17 – Windows? **YES**

Mechanical and Electrical:

20. Standard 16 – Air Intakes
Appendix B-4.1

- Are all air intakes a minimum of 10 feet above the ground? **YES**

21. Standard 17 – Mailroom Ventilation
Appendix B-4.2 & DOD Security Engineering Design Manual

- Does mailroom have separate dedicated air ventilation system? **N/A**
- Is dedicated exhaust system to maintain slight negative air pressure provided? **N/A**
- Has outside air intakes and exhausts With low leakage isolation dampers been provided? **N/A**
- Has separate switches or methods of control to isolate mailroom been provided? **N/A**

22. Standard 18 – Emergency Air Distribution Shutoff
Appendix B-4.3

- Has Emergency shutoff switch in HVAC control system been provided? **YES**
- Is switch(es) easily accessible to building occupants? **YES**

23. Standard 19 – Equipment Bracing
Appendix B-4.5

- Are overhead mounted features weighing 31 lbs. or more located to minimize falling and injuring building occupants? **YES**
- Are these items mounted to resist forces of 0.5 times the component weight in any direction and 1.5 times the component weight in the downward direction? **YES**

24. Standard 20 – Under Building Access
Appendix B-4.6

- Are accesses to crawl spaces, utility tunnels, and other means of under building access controlled? **N/A**

	APPENDIX C: Forms	
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25. Standard 21 – Mass Notification
Appendix B-4.7 & UFC 4-021-01

- Has a mass notification system been provided in the new building? **YES**
- Has a mass notification system been provided in existing primary gathering, billeting, and high occupancy family housing buildings? **N/A**

Certification of Force Protection Requirements

Preparers of this document certify the accuracy and completeness of the Antiterrorism Force Protection features for this project in accordance with the attached completed form(s).

This Review and Certification for DoD Minimum Antiterrorism Standards for Buildings Checklist was completed on the following date:

	APPENDIX C: Forms	
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INTERIM or PRELIMINARY DESIGN

**Architect-Engineer
Certification of Antiterrorism Force Protection Requirements
(Note: Edit the team members if necessary)**

Preparers of this document certify the accuracy and completeness of the Antiterrorism Force Protection features of this project.

Civil Engineer of Record:

Signature	Date
-----------	------

Architect of Record:

Signature	Date
-----------	------

Structural Engineer of Record:

Signature	Date
-----------	------

Mechanical Engineer of Record:

Signature	Date
-----------	------

Electrical Engineer of Record:

Signature	Date
-----------	------

APPENDIX C: Forms

NOTE: Remaining portion of this exhibit is for use by the Louisville District Office

IN-HOUSE DESIGN ANTITERRORISM FORCE PROTECTION REVIEW INTERIM or PRELIMINARY DESIGN

The project specific **Antiterrorism Force Protection Checklist** has been completed and is attached.

The Antiterrorism Force Protection review, and related design analysis documentation have been checked and approved by the in-house design team.

Project Design Team Leader:

Signature _____ Date

Engineering Division Antiterrorism Force Protection Team:

Civil Team Member:

Signature _____ Date

Architectural Team Member:

Signature _____ Date

Structural Team Member:

Signature _____ Date

Mechanical Team Member:

Signature _____ Date

Electrical Team Member:

Signature _____ Date

APPENDIX C: Forms

IN-HOUSE DESIGN ANTITERRORISM FORCE PROTECTION REVIEW

DESIGN COMPLETE

The project specific **Antiterrorism Force Protection Checklist** has been completed and is attached. The construction contract plans, specifications, and related design analysis documentation have been checked and approved for accuracy and coordination.

Project Design Team Leader:

Signature _____ Date

District ATFP Team Approval:

Civil Team Member

Signature _____ Date

Architectural Team Member

Signature _____ Date

Structural Team Member

Signature _____ Date

Mechanical Team Member

Signature _____ Date

Electrical Team Member

Signature _____ Date

APPENDIX C: Forms

ATTACHMENT:

NON-NUCLEAR INTRUSION DETECTION SYSTEMS (IDS) EQUIPMENT APPROVAL



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, DC

21 Apr 15

MEMORANDUM FOR SEE DISTRIBUTION

FROM: HQ USAF/A4S
1030 AF Pentagon
Washington DC 20330-1030

SUBJECT: Non-Nuclear Intrusion Detection System (IDS) Equipment Approval

1. The IDS equipment listed below is approved for use when employed in the tested PL-1 Non-Nuclear through PL-4 applications and configurations. This letter consists of eight pages.

(* Indicates correction, change, and/or addition.)

PL-1 Non-Nuclear and Below

Command, Control Display Equipment (CCDE)

Will-Burt Annunciator (product formerly produced by Diebold)

Will-Burt (Diebold) Annunciator Predator Elite, with integrated access control

Annunciator Version 3.2.274p, subpatch p32274.1.15.

Annunciator Version 3.2.274p

Annunciator Version 3.0.252

Annunciator Version 3.0.246

LINX Predator Enrollment System Version 4.1.220

LINX Predator Enrollment System Version 4.0.203

LINX Versatile Interface Panel (VIP) Version 1.148

LINX Versatile Interface Panel (VIP) Version 1.64

LINX Versatile Interface Panel, Expandable (VIP-E) Version 7.284

LINX Versatile Interface Panel, Expandable (VIP-E) Version 7.145

WSD Reader Version 1.8V

Advantor Annunciator

Advantor Advantage Suite for Networks (ASN) Version 4.0

Advantor Advantage Suite for Networks (ASN) Version 5.0

Advantor Integrated Command, Control, and Access Control System Version 5.0

Advantor Integrated Command, Control, and Access Control System Version 5.0 Service Pack 6

* Advantor Integrated Command, Control, and Access Control System Version 6.0

APPENDIX C: Forms

Vindicator Annunciator

Vindicator Security Management and Reporting Terminal (SMART) Annunciator with Graphics Display:

Version 2.40 with Administrative Browser 4.0
Version 2.43, Build 11
Vindicator Command and Control (VCC) Version 1.0.1.5
Vindicator Access Control System (ACS) Version 2.3, Build 21
Transponder Firmware Version 2.28
TS 4000 Radio Frequency (R/F) Modem Interface
Vindicator SMART with Graphics Display Version 2.39 and SAW Version 3.9
Vindicator Command and Control Platform (VCCP) v5- Version 5.0
Vindicator Command and Control Platform (VCCP) v5- Version 6.0
Vindicator Command and Control Platform (VCCP) v5- Version 6.5 (Win 7, 32 bit only)

Vindicator Command & Control (VCC) GUI Version 5.1.1.4
Vindicator Badge Manager 2 (VBM 2) Version 2.0.7.0
Vindicator Badge Manager 2 (VBM 2) Version 2.0.7.1 (Win 7, 32 bit only)
Vindicator Security Archive Workstation (SAW 5) Version 5.1.0.6
Honeywell Vindicator Site Commander Version 1.2.0.1
V5 IDS Network Security Appliance – Intrusion Detection, Revision 3.2, Release 20:

UHS-8170
DES-8170T
AES-8170T

V5 ACS Network Security Appliance – Access Control Revision 3.2 Release 20:

UHS-1401
DES-1401T
AES-1407T

Vindicator UHS-Net Gateways:

UHS-8101 Version 2.33, Build 7
UHS-8102 Version 2.33, Build 6
UHS-8301 Version 2.33, Build 13
UHS-8400 Version 2.33, Build 13

Vindicator UHS-Net Transponder/Gateway Revision 3.3, Release 5:

UHS-1500
DES-1500T
AES-1500T

Vindicator UHS-Net Transponders Version 2.33, Build 13:

UHS-6842
UHS-6842F
DES-6842
DES-6842F

PC SMART PAC Software Package Version 5.1

Proteus5 & SmartSave 5 Software Programs Version 5.2

*Vindicator Command and Control Platform (VCCP) Windows 7 (64-bit)

Vindicator Command & Control 2-Version 1.2.1.4
V5 ACS Network Security Application-Version 3.2, Release 23
UHS-1500 UHS-Net Field Panel-Version 3.3, Release 7
Security Archive Workstation 2-Version 1.4.2.9

APPENDIX C: Forms

Vindicator Badge Manager 3-Version 2.0.26.7
Vindicator Site Commander-Version 1.3.0.7
Vindicator Area Commander-Version 1.1.0.6
Vindicator Premise Controller-Version 3.3, Release 7
Vindicator PC SMART PAK-Version 6.0.0.1
Vindicator Security Server-Version 1.0

Assessment Subsystems

Video Servers

- * Advantor Video Management System (VMS) Software (For use only with Advantor ASN 6.0)
Advantor VMS Version #va-advantorvms-3.3.22-1 (1/e15)
Advantor VMS Wall Version ds-vmx-3.3.1-3

Bosch Allegiant Matrix/Control System LTC 8600 and 8800

Broadware 4.80 / Cisco 5.1.1. Video Storage System (NOTE: Cisco renamed the 4.80 after purchasing Broadware.)

Video Image Control and Display System (VICADS) Version 4.0 Video Management System

- * Open Roads Consulting, Inc Video Image Control and Display System (VICADS) Version 4.1
Video Management system using Vindicator V5, Version 6 as the annunciator
- * Open Roads Consulting, Inc Video Image Control and Display System (VICADS) Version 4.1
Service Pack 1.6 Video Management system using Vindicator V5, Version 6.5 as the annunciator

Assessment Cameras

Bosch NWC-04-95-20P Internet Protocol (IP) Camera
Bosch NWC-04-95-20P (1/3 Format)
Bosch NBN-498-21P Internet Protocol (IP) Camera
Bosch Auto Dome VG 4-322-ECE1M
Bosch Auto Dome VG5-623-ECS
Bosch Auto Dome VG5-624-ECS
Bosch Auto Dome VG5-724-ECE2
Bosch Auto Dome 7000 Internet Protocol (IP) Camera with environmental housing
Bosch Dinion Internet Protocol (IP) 7000 Camera with environmental housing
Burle 300H Camera
Burle TC 351 Camera (1/2 inch format)
Cohu 4865 Camera (WS3) (2/3 inch format)
Cohu 48x Camera (KUMMSC) (2/3 inch format)
Cohu 4915/4912-3000 Camera (1/2 inch format)
IQ Eye 752 Internet Protocol (IP) Camera
Lumenera Le 165M-DN Internet Protocol (IP) Camera
Lumenera Le 165ME-DN Internet Protocol (IP) Camera with environmental housing
Lumenera Le 165MP-DN Internet Protocol (IP) Camera with environmental housing
Pelco ES31CBW35-2N Pan Tilt Zoom (PTZ) System

APPENDIX C: Forms

Pelco ES30C/ES31C Pan Tilt Zoom (PTZ) System (1/4 inch format) with/ without optional Wiper
 Pelco ES4136-2N Esprit ES system Pan Tilt Zoom (PTZ) System (1/4 inch format) with/ without optional Wiper
 Pelco MC3651H-2 Interior Camera (1/3 inch format)
 Pelco IXE20 IP Camera
 Pelco ES4036-5W Esprit Series, with and without wiper, standard and pressurized
 Pelco ES40E36-5W Esprit Series, with and without wiper, standard and pressurized
 Pelco ES40/41 Series Positioning System, Analog, PTZ, w/wo wiper Esprit SE Standard & Pressurized, model ES4036-5W
 Pelco ES40E/41E Series Positioning System, IP, PTZ, w/wo wiper Esprit SE Standard & Pressurized, Model ES40E36-5W
 Vivotek IP 7151

Interior Sensors

NOTE: Balanced Magnetic Switch (BMS) should not be used as a line of detection.

AN/GSS-20 Volumetric
 AN/GSS-9(V) SA 1955 BMS
 AN/GPS-15(V) Closed-Shelter Aircraft Sensor (C-SAS) (Volumetric)
 AN/GSS-36(V) Open-Shelter Aircraft Sensor (O-SAS) (Volumetric)
 Bosch DS 9370 PIR/MW (Volumetric)
 Bosch DS 939 PIR (Volumetric)
 Dortronics 1110 x D x CT, Magnetic Lock/BMS
 Eltec 862 Passive Infrared (PIR) Sensor (Wall)
 GE AP669 PIR (Volumetric)
 Protech Passive Infrared and Microwave Intruder Detectors (PIRAMID) SDI-76-G (Volumetric)
 Protech Passive Infrared and Microwave Intruder Detectors (PIRAMID) SDI-77-D (Volumetric)
 Protech SDI-76M-HS1-H Volumetric (Coverage 60'x 40', Two Sensors in Combination)
 Protech SDI-76MW Volumetric (Coverage 60'x 40', Two Sensors in Combination)
 Protech SDI-77XL2-EX, Explosion Proof Volumetric
 General Electric (Sentrol) Model 2700 Series BMS
 General Electric (Sentrol) Model 2807T Explosion Proof Balanced Magnetic Switch (BMS)
 General Electric (Sentrol) Model 2507AH-L Wide Gap BMS
 General Electric (Sentrol) Model 2800 Series BMS
 Magnasphere, High Security Sensor (HSS) Door Contact Switch, BMS, Version HSSL2S000
 Visonic CH-1000 (Wall)
 Visonic CH-1000/Xtalis ADPRO 18 WH PIR Combination (Ceiling) (Coverage 30'x 30')
 Banner Engineering Series Active Infrared (AIR), intrinsically safe, Model SMI30 (*Must be installed as an array of individually reporting sensor points, for use across openings in areas where explosive fumes may be present*)
 SightLogix SightSensor Video Motion Detection (VMD) using NS-90A Thermal Imager, for interior applications only.
 PL&E Communications AVT 234 (VMD) using Dinion analog infrared imagers, for interior applications only

AN/GSS-39(V) Interior Intrusion Detection System. Components include:

-- DR-301	-- DR-558	-- DR-851	-- HT-50B
-- HT-50DC	-- HT-100B	-- HT-100BC	-- SDI-76A

APPENDIX C: Forms

-- SDI-77C -- SD-80B -- SD-80EHB -- SD-150B
-- SD-150EHB -- SRN-2000H

Exterior Sensors

The following sensors are approved for use as a standalone line of detection:

EAG of Americas Infrared Intrusion Detection System 4/2/2 (IIDS4/2/2) Active Infrared Sensor
EAG of Americas Infrared Intrusion Detection System 4/4/2/2/2 w/ PSTC
EAG of Americas Intrusion Detection System 4/2 (IDS 4/2) Active Infrared Sensor
Microtrack buried line sensor (*NOTE: Not approved for use in Northern tier, or areas where snow and ice accumulations are normal, pending further testing*)
* Omnitrax buried line sensor
Perimitrax, Buried Cable Intrusion Detection Sensor
Protect (PIRAMID) / SDI-76-XL-MIL, PIR and Monostatic Microwave Sensor
Racon Single Stack; Barksdale Configuration - single stack, basket weave configuration with double stacked sensors at the corners
Racon Double Stack
Racon 16000-4 (Microwave) Sensor
Racon 14000-32 Microwave Sensor
Racon MPS-4100 (Microwave)
Racon MPS-14000-1 (Microwave)
* Senstar UltraWave Microwave Detection Sensor
Senstar Sentrax Short Ported Coaxial Cable Sensor (SPCS), large and small diameter cable, in the straight-line configuration
Birdseye Model IX Infrared Perimeter Detection System, up to 120m
DeTekion Defensor 100 Fence Sensor
DeTekion Vertical Taut Wire Sensor 400 (VTW-400), full fence or out-rigger configuration
ECSI Infrared Pulsed Intrusion Detection System (IPIDS), up to 80m with spring loaded mount bases and 100m with solid concrete bases
Fiber SenSys Fiber Defender FD200/300 series. The following models have been tested: 331, 332, 341, and 342. *Note: The 331 and 332 series is with "Sensitive" Lead-in cables whereas the 341 and 342 series is with the "Insensitive" Lead-in cables. Also, the last digit (1 or 2) indicates a single channel processor or dual channel processor. Additional note: The 33x series is normally utilized for TASS applications with the 34x series being utilized for all hardwired configurations.*
Fence Protection System 2-2R (FPS-2-2R)
Southwest Microwave Intrepid Micropoint. (*NOTE: Not approved for use in Northern tier, or areas where snow and ice accumulations are normal, pending further testing*)
Southwest (SW) Microwave 385 Monostatic Sensor, up to 100m
SW Microwave 310 Bi-static Sensor, up to 100m
Fiber Optics Intrusion Detection System (FO-IDS), Fiber Optic Sensor System (FOSS) Models 100 and 200
Fiber SenSys Fiber Defender 525 (*Note: Not approved for use in Northern tier, or areas where snow and ice accumulations are normal, pending further testing*)

APPENDIX C: Forms

The following sensors in combination are approved for use as a line of detection with fence climber enhancement detection:

Enhanced DTR-90 Vertical Taut Wire (VTW) Sensor, the DTR 90 "Y" VTW Sensor, or the VTW 400 Sensor installed at the top of the fence with any one of the following sensors installed on the fence:

Fiber SenSys Fiber Defender FD300 series. The following models have been tested: 331, 332, 341, and 342.

Fiber Optics Intrusion Detection System (FO-IDS), Fiber Optic Sensor System (FOSS) Models 100 and 200

Fence Protection System 2 (FPS-2)

Fence Protection System 2-2R (FPS-2-2R)

***Wide Area Detection/Approach Zone Sensors**

PSRS STS-350 (FLIR/ICx) Ground Based Radar used as an approach sensor out to 125 meters (crawlers) as described below:

ICX application software version 2.4.41.12

Firmware version 3.4.30 dated November 2, 2007.

PSRS STS-350 (FLIR/ICx) with control station application software version 2.4.41.12 or when integrated with Will Burt Annunciator Version 3.2.274p, subpatch p32274.1.15.

PL-2 and Below

In addition to all of the above components, the following equipment is approved for use in the protection of PL-2 and below assets:

Command, Control Display Equipment (CCDE): No Additional

Assessment Subsystems: No Additional

Interior Sensors: No Additional

Exterior Sensors: No Additional

PL-3 and Below

In addition to all of the above components, the following equipment is approved for use in the protection of PL-3 and below assets:

Command, Control Display Equipment (CCDE)

TASS 7.0 Annunciator (At deployed locations only)

TASS 6.0.1.A Annunciator (At deployed locations only)

Assessment Subsystems

* General Dynamics LRTI-w/CCTV

* FLIR ThermoVision 2000 Multi-Sensor System (a.k.a. SLRTI)

Surveillance Thermal Imager (WSTI) Sentry I and Sentry II

APPENDIX C: Forms

Short Range Thermal Imager; Fixed/Mounted (SRTI F/M)
DiOP Thermal Imager 180/60mm Thermal Upgrade Kit (TUK)

Interior Sensors: No Additional

Exterior Sensors: No Additional

PL-4

In addition to all of the above components, the following equipment is approved for use in the protection of PL-4 assets:

Command, Control Display Equipment (CCDE): No Additional

Assessment Subsystems: No Additional

Interior Sensors: No Additional

Exterior Sensors: No Additional

* Certified Air Force Test Sites:

Test Area C-3, Eglin AFB FL, and Cold Weather Test Site, Grand Forks AFB, ND are approved for conducting operational tests and evaluations on all IDS equipment.

2. A listing of equipment approved for use in PL-1 Nuclear applications is available in a separate letter maintained by the POC listed below.

3. This memorandum supersedes the 22 Sep 14 IDS approval memorandum. The POC is Mr. Warren Greene, AFSFC/SFXXR, DSN 945-7072.


ALLEN J. JAMERSON, Brig Gen, USAF
Director of Security Forces
DCS/Logistics, Installations & Mission Support

DISTRIBUTION:
AFDW/A7S
HQ USAFE/A7S
HQ AFMC/A7S
HQ PACAF/A7S
HQ AETC/A7S
HQ AFSPC/A7S
HQ AFSOC/A7S
HQ AFRC/A7S
HQ AMC/A7S
HQ ACC/A7S
HQ AFGSC/A7S
NGB/A7S

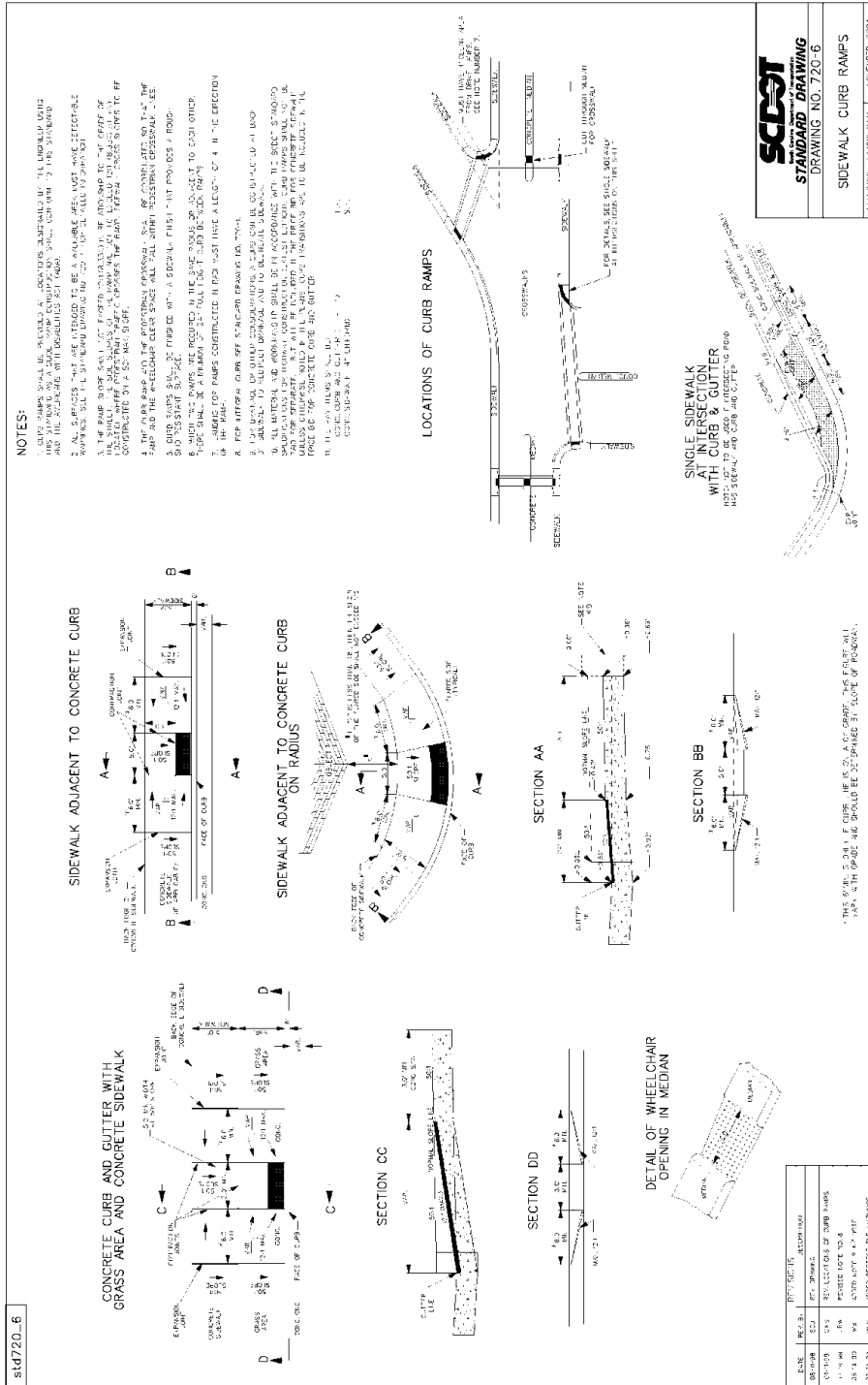
	APPENDIX C: Forms	
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**ATTACHMENT:
STORMWATER CONSTRUCTION MANAGEMENT SHAW AFB**

Stormwater Construction Management Shaw AFB

- ❖ All Projects greater than 5000 Square Feet – Comply with DoD Section 438 requirements outlined in Shaw AFB Construction Management Plan
 - Less than 1 acre
 - No DHEC permit required
 - Complete DHEC less than 1 acre notification form 2628
 - Mini-SWPPP for projects with description of project
 - Greater than 1 acre
 - Permit required
 - Complete NOI (DHEC Permit Application) – form 2617
 - Comprehensive SWPPP (C-SWPPP) and Plans
 - Submit check for \$125 payable to SCDHEC
 - Submit NOI, check & SWPPP to Shaw AFB MS4 Manager for Review
 - Submit permit package to Shaw AFB MS4 Manager
 - All construction sites must hire an independent SC Certified Stormwater Inspector to conduct WEEKLY site inspections
 - Shaw AFB MS4 will conduct monthly compliance inspections of construction sites
 - Weekly inspections must continue until the site is officially closed via Notice of Termination – form 2610
 - All DHEC permit application requirements on DHEC website

**ATTACHMENT:
SIDEWALK CURB AND GUTTER DETAILS**

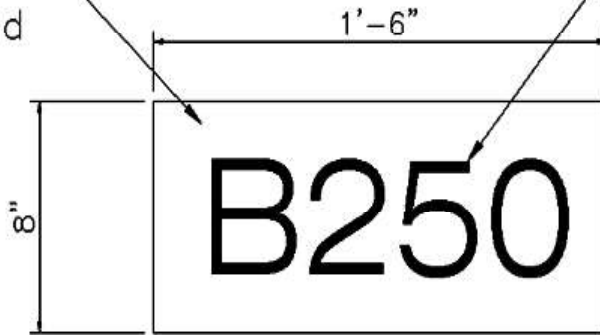


APPENDIX D: Standard Details

ATTACHMENT: BUILDING SIGNAGE

Sherwin Williams,
"Shaw Black"
background

Helvetica Medium
4" text

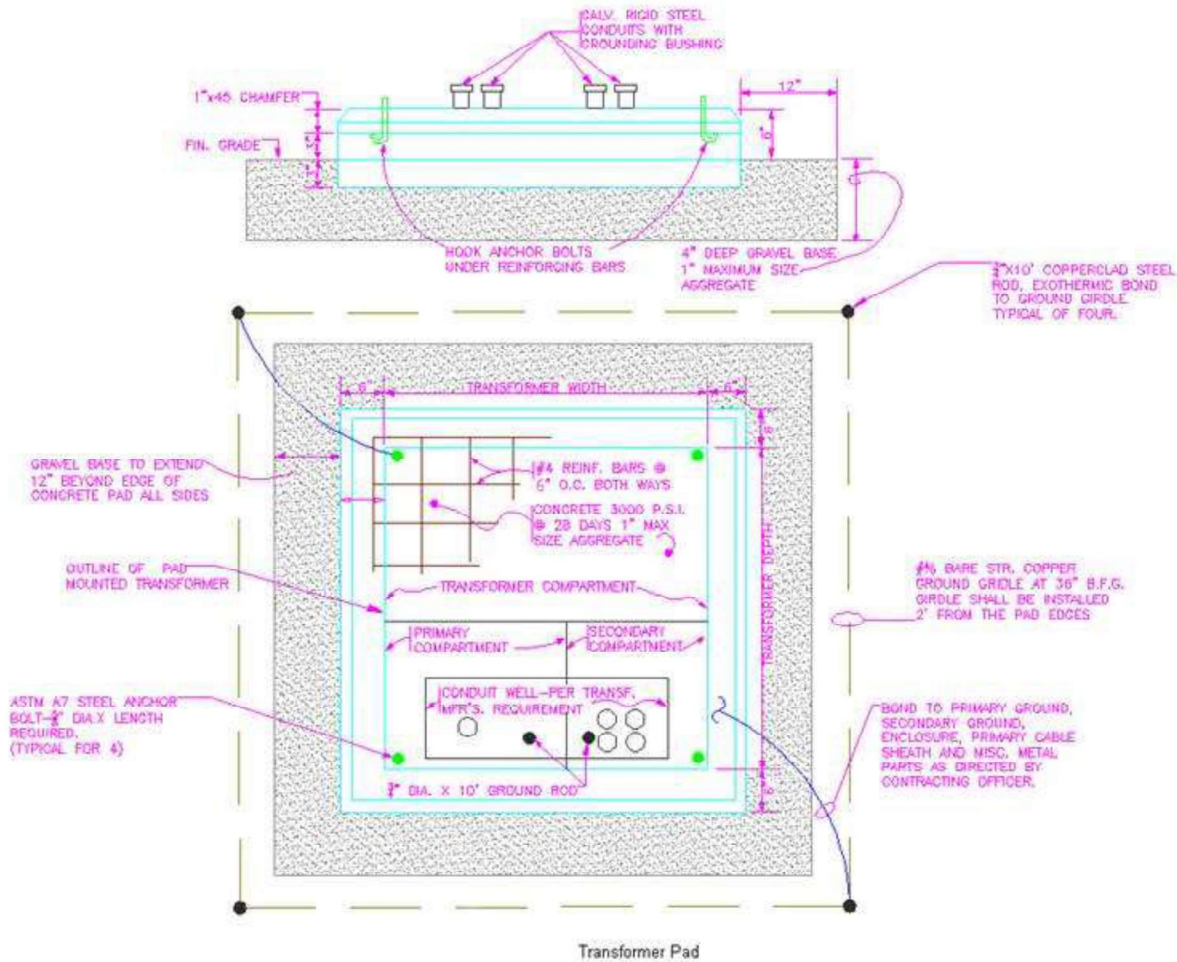


Note:

- Fire Department Connection (FDC) sign colors shall be red reflective background with white reflective letters

APPENDIX D: Standard Details

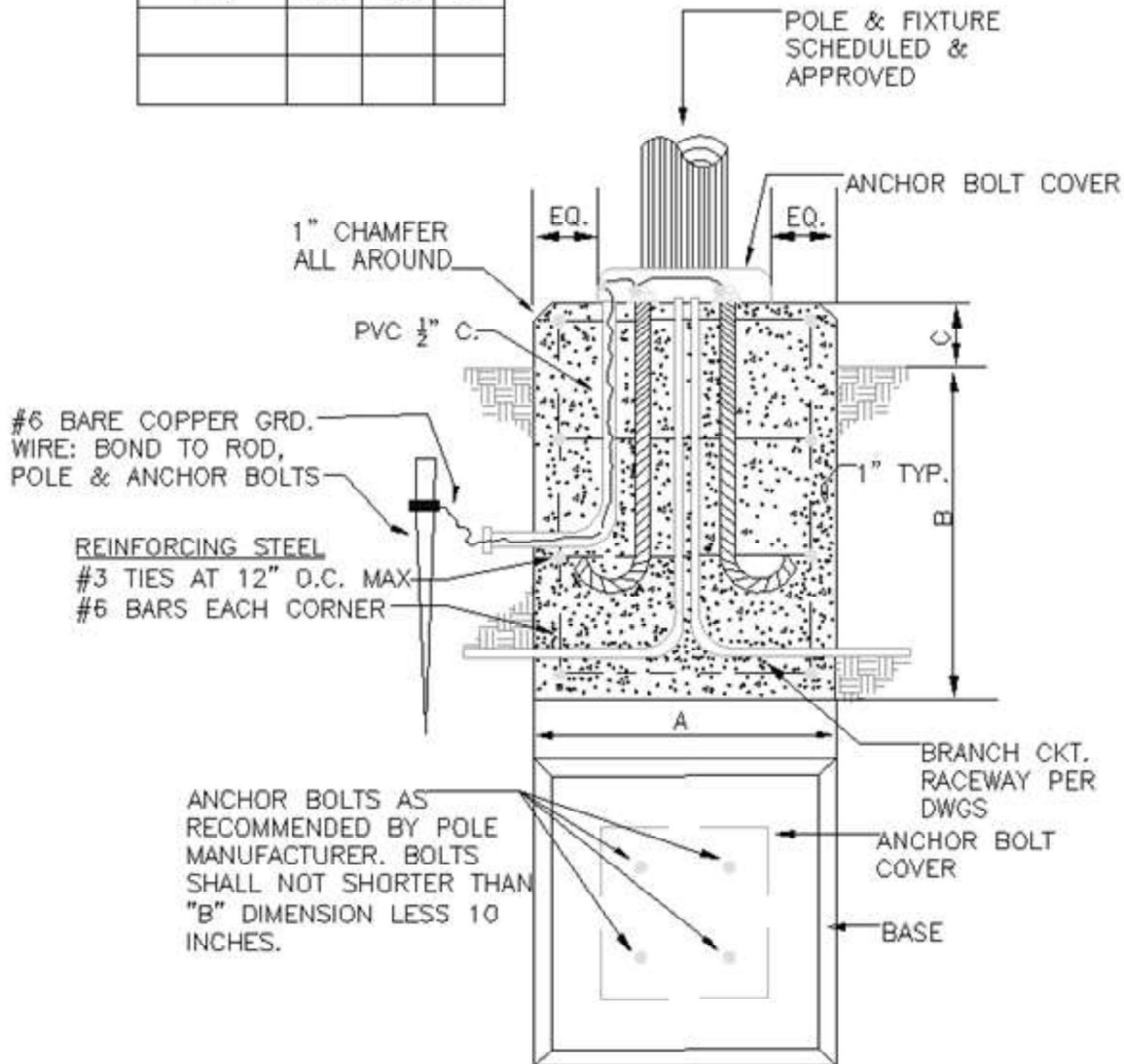
ATTACHMENT: TRANSFORMER PAD DETAIL



APPENDIX D: Standard Details

ATTACHMENT: LIGHT POLE BASE DETAIL

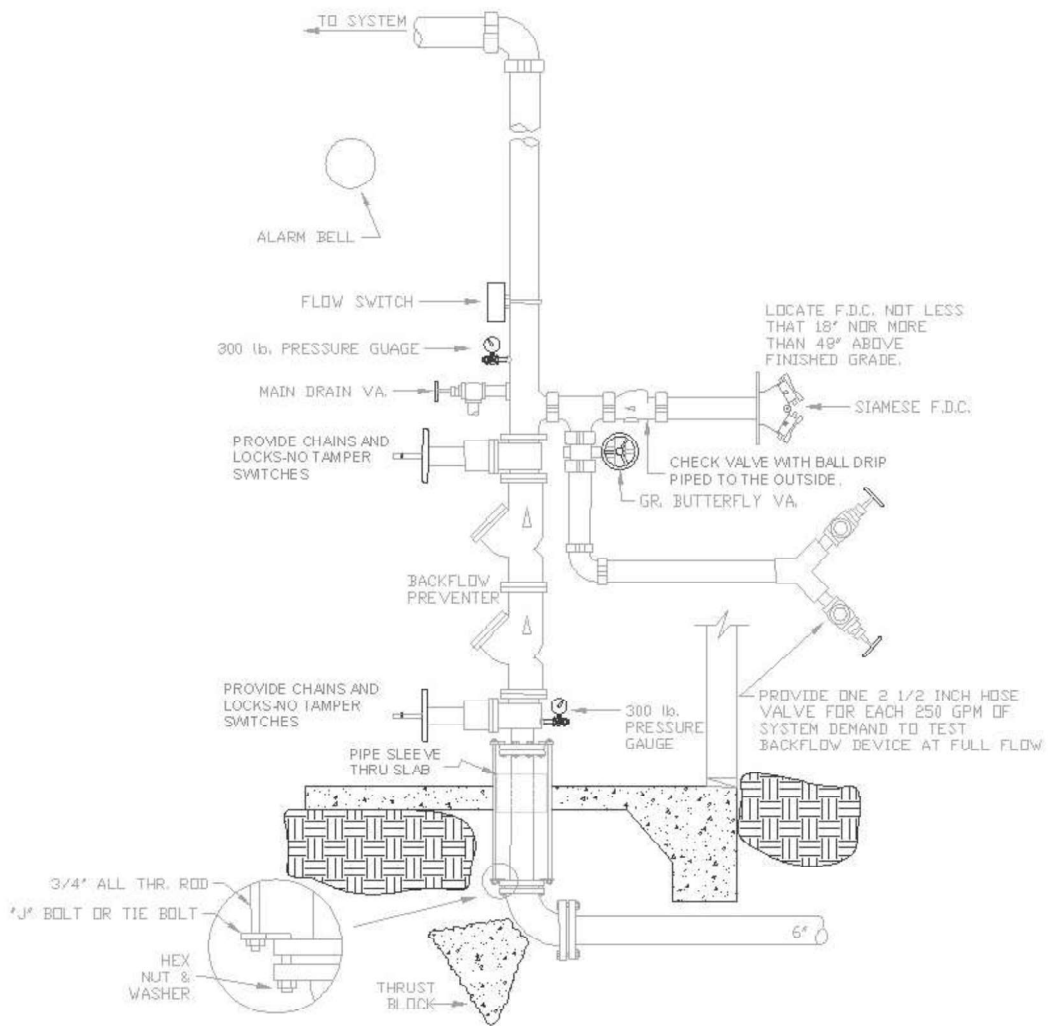
DIMENSIONS			
FIXTURE SYMBOL	A	B	C
SA	30"	45"	6"
SB	30"	45"	6"



Attachment 5 - Light Base Detail

APPENDIX D: Standard Details

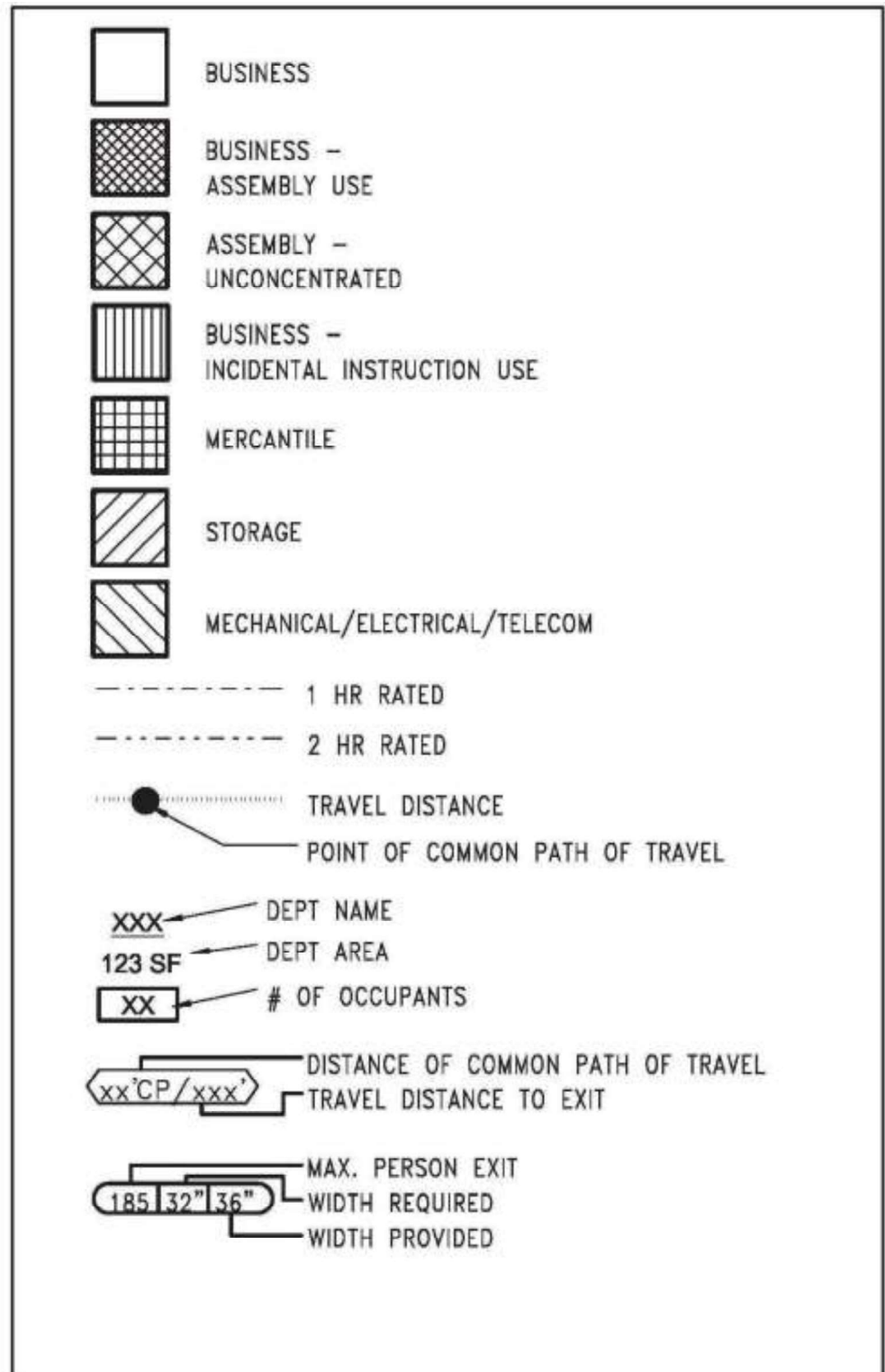
ATTACHMENT: FIRE SUPPRESSION RISER DETAIL



Fire Riser

APPENDIX D: Standard Details

ATTACHMENT: LIFE SAFETY LEGEND



APPENDIX D: Standard Details

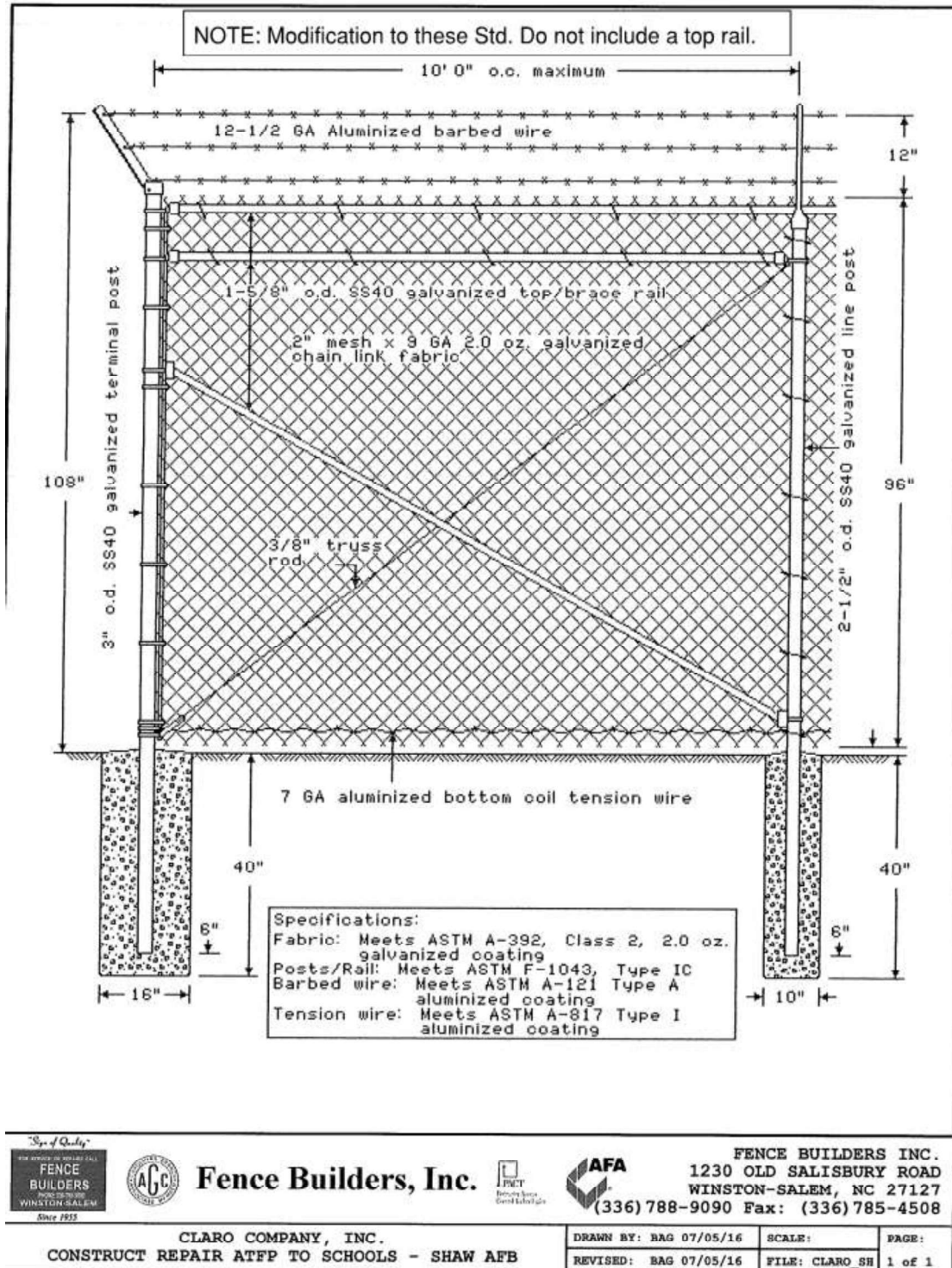
**ATTACHMENT:
TITLE BLOCK/SHEET SIZE**

20th CIVIL ENGINEER SQUADRON 10A CAMPUS STREET RAND AIR FORCE BASE, DAVIS DENSING, TEXAS TRANSPORT, PHONE: 1-801-981-4111, COMMERCIAL, TXC: 1-801-981-4011									
NAME: _____ GRADE: _____ COMPANY: _____ ADDRESS: _____ CITY: _____ STATE: _____ ZIP: _____				TITLE: _____ ORGANIZATION: _____ PROJECT: _____ DATE: _____					
SIGNATURE: _____ DATE: _____				REVIEW: _____ DATE: _____					

ATTACHMENT:

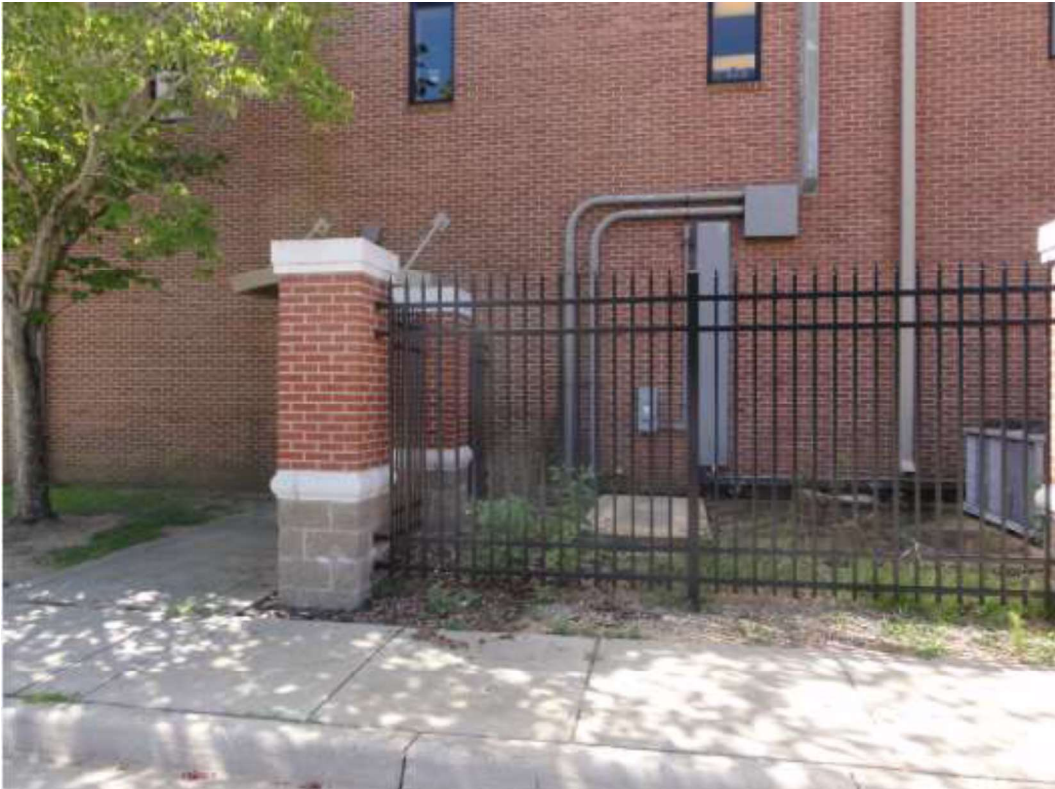
SECURITY FENCING

Note: use 6 ga hot dipped galvanized tie wires and hog rings



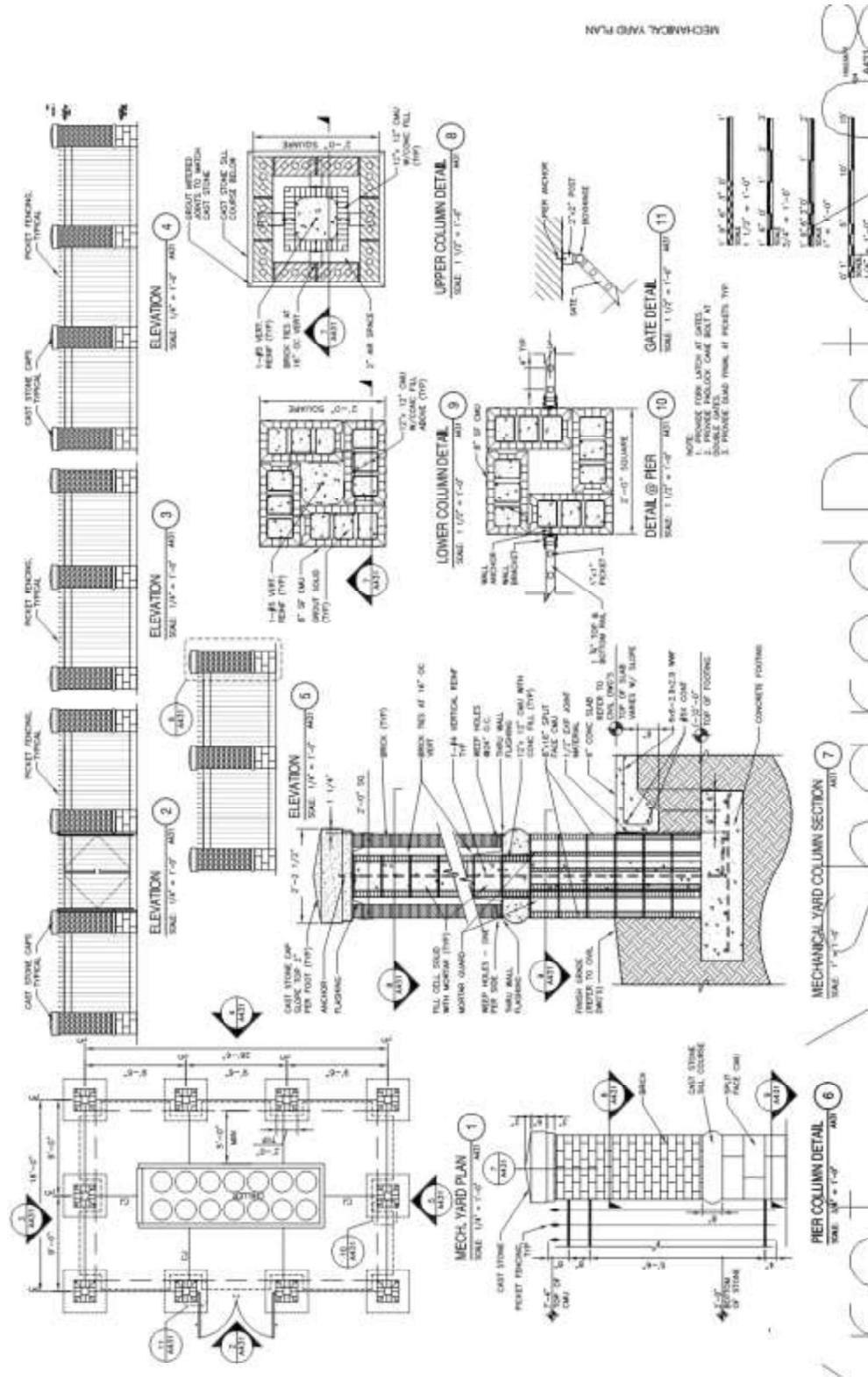
	APPENDIX D: Standard Details	
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**ATTACHMENT:
MECHANICAL SCREEN EXAMPLES**



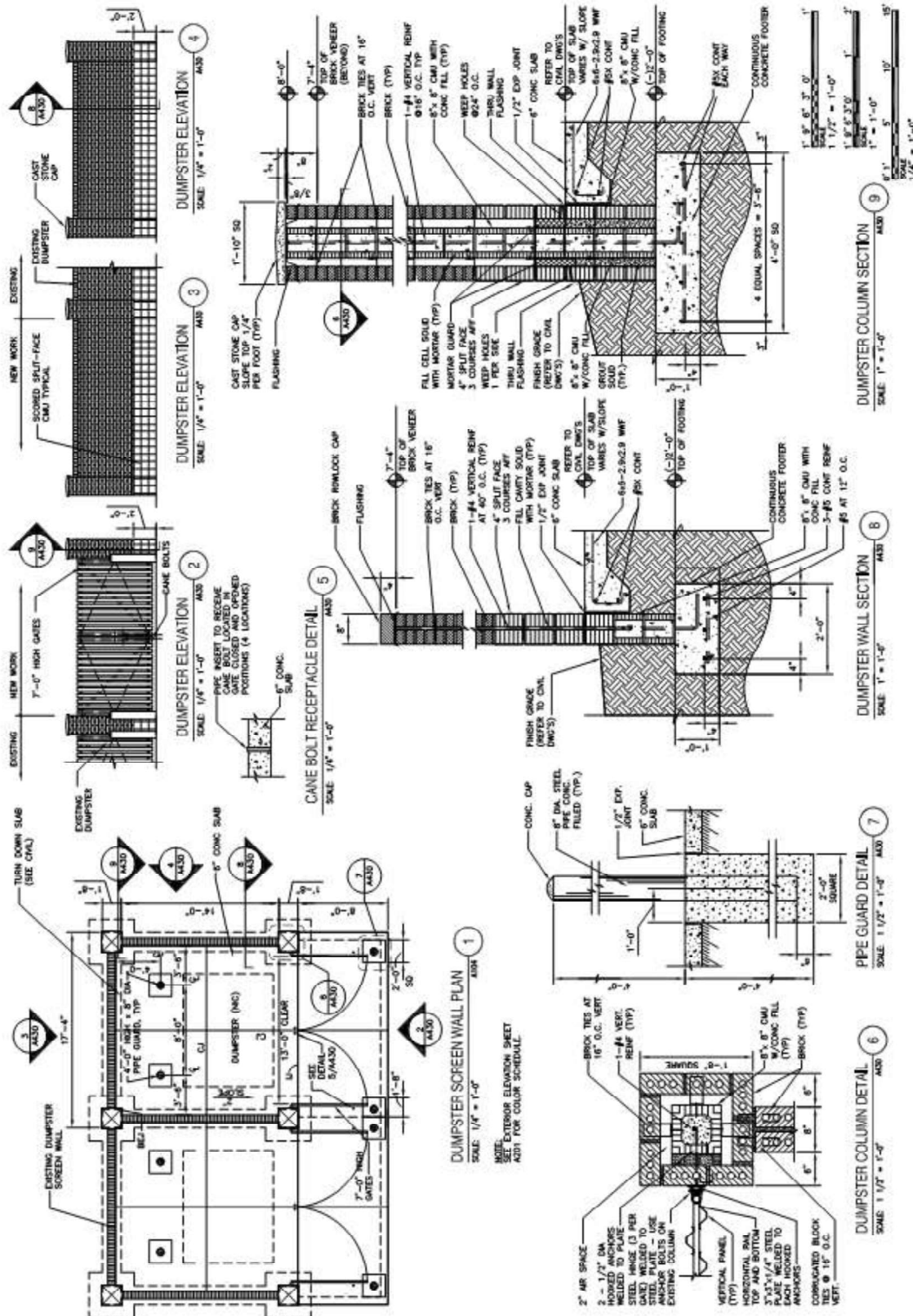
APPENDIX D: Standard Details

ATTACHMENT: ENCLOSURE DETAILS



APPENDIX D: Standard Details

ATTACHMENT: DUMPSTER ENCLOSURE DETAILS



	APPENDIX D: Standard Details	
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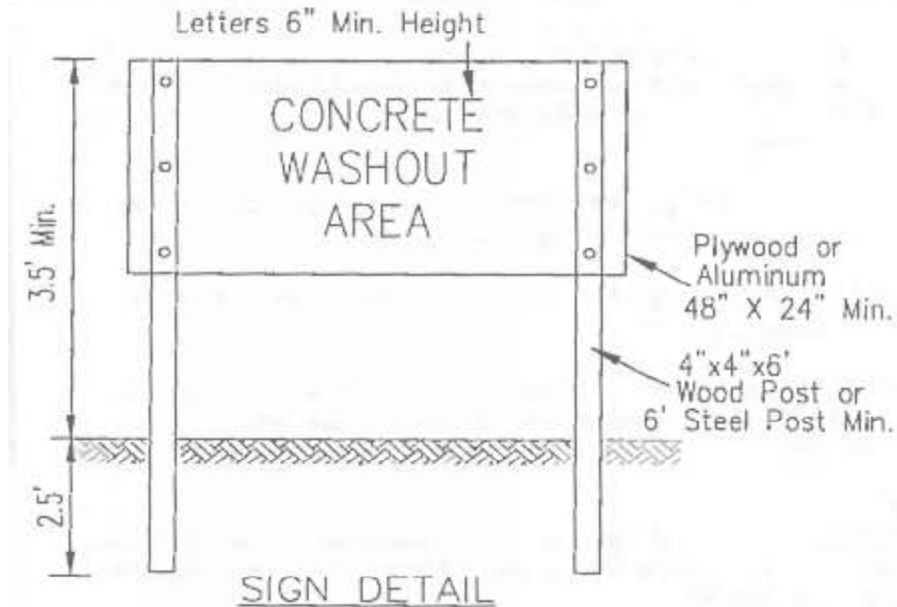
**ATTACHMENT:
ROOFING WARRANTY SIGN**



To be placed on an exterior Mechanical room door. Roof warranty signs shall be metal with engraved wording.

APPENDIX D: Standard Details

ATTACHMENT: TEMPORARY CONCRETE WASHOUT



	APPENDIX E:	
	Landscape and Plant Selection	

Landscape Design and Plant Selections

- Provide a design for low maintenance landscaping that is in compliance with UFC 4-010-01 Antiterrorism Standards.
- All planting beds shall include protective steel edging
- All landscaped areas shall be sprayed with a Base approved herbicide prior to landscaping to kill existing vegetation. This includes areas prepared with topsoil to receive sod or seeding. All planting bed and lawn areas shall be prepared by tilling, harrowing, fertilizing and raking all vegetation from the landscaped area. Remove existing vegetation from all landscaping beds. Landscaping fabric shall be used in all new plant beds for weed control.
- Use thick mulch over landscaping fabric. Mulch materials such as cedar chips, pine bark or pine straw shall be used.
- Use of landscape timbers, white rock, or lava rock for landscaping is not permitted.
- All facility construction projects shall include sod (Centipede) for grass replacement.
- Use of hydro seeding shall be in accordance with the Clemson Publication, "Southern Lawns: Best Management Practices for the Selection, Establishment and Maintenance of Southern Grasses". In no case shall Bahia grass be used.
- Sod to cover disturbed earth shall be included as part of the design.
- Irrigation systems shall NOT be included as part of the design, unless specifically requested. When irrigation systems are specifically requested they shall incorporate rain or moisture sensors.
- Use plants and trees suitable for local climate and as conforms to Shaw Air Force Base Approved Plant list (see APPENDIX C). Plant lists and design need to emphasize water efficient plants and shrubs.
- Use native plants for landscaping.
- Use flowering trees and shrubs as much as possible: Crepe Myrtle is not approved for use on Shaw Air Force Base.
- Specimen trees shall have bedding and watering bowls.
- Refrain from planting over buried utility lines or under overhead utility lines
- Use landscaping to shade buildings, block wind, and screen unsightly views, such as air conditioning equipment, tanks, and other external equipment.
- Project specifications shall include provisions that require the Contractor to water and care for trees and grass for the warranty period of the contract.

	APPENDIX E: Landscape and Plant Selection	
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LARGE TREES:

Armstrong Maple – <i>Acer Rubrum</i> ‘Armstrong’ 40’ to 50’ Narrow, upright grower Good for limited space Fall color: yellow-orange to red	
River Birch – <i>Betula Nigra</i> 50’ to 70’ Oval or pyramidal when young Older: rounded to irregular crown Often multi-trunked Scaly bark Fall color: yellow, short-lived	
Southern Magnolia - <i>Magnolia Grandiflora</i> 60’ to 80’ Pyramidal to oval growth habit Low branching and dense 30’ to 50’ wide Coarse texture Varieties available	

	APPENDIX E: Landscape and Plant Selection	
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Laurel Oak – <i>Quercus Laurifolia</i>	
65' to 80'	

Darlington Oak – <i>Quercus Hemisphaerica</i>	
50' to 60'	

Willow Oak - <i>Quercus Phellos</i>	

	APPENDIX E:	
	Landscape and Plant Selection	

Live Oak – *Quercus Virginiana*

65' to 85'

Wide spreading crown and flared at base of trunk

Acorns are ¾" to 1" long



Tilia Americana – *American Linden*

60' to 120'

Crown is domed, branches spreading

Also called Basswood



	APPENDIX E:	
	Landscape and Plant Selection	

Littleleaf Linden - *Tilia Cordata*

50' to 60', to 80' when old

Cold hardy

Regular pyramid or conical shape in youth

Dense and compact branching

Branches are upright and spreading

**Zelkova – *Zelkova Serrata***

50' to 80'

40' to 50' spread

Cold hardy

Low branched, vase shape in youth, ascending branches with age

Good shade tree, tolerant of heat, drought, wind and urban conditions

Similar to American Elm



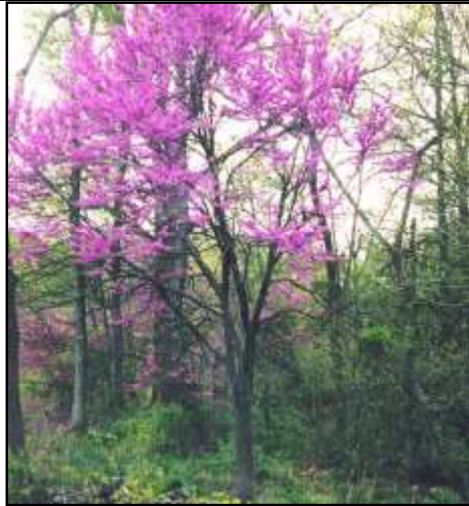
	APPENDIX E:	
	Landscape and Plant Selection	

MEDIUM TREES:

Acer Ginnala – Compact Amur maple	
9' to 20'	
Most cold hardy maple	
Sun to light shade	



Eastern Redbud - Cercis Canadensis	
20' to 30'	
Full sun to partial shade	



	APPENDIX E:	
	Landscape and Plant Selection	

White Fringetree - Chionanthus virginicus

15' to 30'

One of last to bloom



Flowering Dogwood – Cornus Florida

To 30'

Many varieties available



	APPENDIX E: Landscape and Plant Selection	
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American holly - Ilex opaca

30' to 40', sometimes to 60'

Usually found as understory tree

Male and female plants

Onboard Comment:

Certain hollies have been problematic in the past and are currently being removed.



Eastern Red Cedar - Juniperus virginiana

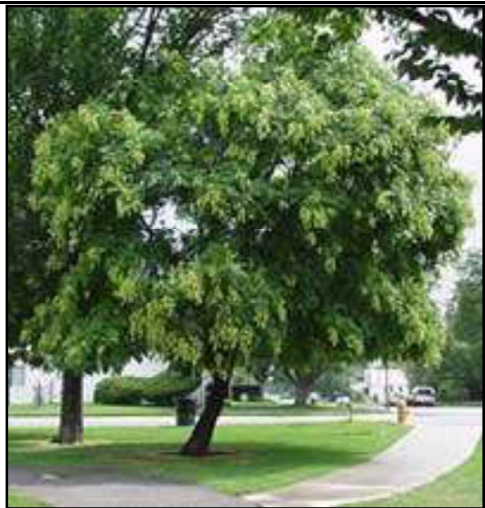
15' to 50'

Male and female plants



	APPENDIX E:	
	Landscape and Plant Selection	

Goldenrain Tree – Koelrueteria Paniculata 30' to 40' Likes full sun, hardy		
Saucer magnolia - Magnolia x. soulangiana 20' to 30' Full sun to partial shade Varieties available		



	APPENDIX E:	
	Landscape and Plant Selection	

Sweetbay – Magnolia Virginiana**20' to 30'****Full sun to part shade, tolerates shade****Likes wetter locations****Sargent Crabapple - Malus sargentii****6' to 8'****Prefers full sun****Dense, twiggy branching****Tolerant of range of soils****Cold hardy**

	APPENDIX E: Landscape and Plant Selection	
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Wax Myrtle – <i>Myrica Cerifera</i> To 25' Multi-trunk Will be more dense in full sun Tolerates wide variety of soils	
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Kwanzan Cherry – <i>Prunus serrulata</i> 'Kwanzan' 20' to 30' Prefers full sun Very showy Hardest of all cherry trees Onboard Comment: Cherry trees have been problematic in the past and are not desired.	
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	APPENDIX E:	
	Landscape and Plant Selection	

Yoshino Cherry – *Prunus x yedoensis*

30' to 40'

Very hardy

Washington, D.C. street tree

Onboard Comment:

Cherry trees have been problematic in the past and are not desired.



Chaste Tree - *Vitex agnus-castus*

10' to 20'

Sun to shade

Cold tolerant



	APPENDIX E: Landscape and Plant Selection	
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SMALL TREES AND LARGE SHRUBS:

Cleyera - Cleyera Japonica

**Best in shade, tolerates sun
Ht. 8' to 12'**

**Variegated variety available
Hardy**



Burford Chinese Holly - Ilex Cornuta Burfordi

**Full sun, partial sun
To 15' to 20''**

Heat tolerant, hardy, drought tolerant



	APPENDIX E:	
	Landscape and Plant Selection	

Yaupon Holly (tree form) – Ilex vomitoria

20' to 25'

Multiple stems form dense shrubby clumps

Male and female plants



Inkberry - Ilex glabra

To 6' to 8', as wide

Rounded habit

Clump forming

Male and female plants



	APPENDIX E: Landscape and Plant Selection	
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Anisetree – Illicium parviflorum
 10' to 15', pyramidal
 Cold hardy, pest and disease resistant
 Like full sun
 Varieties available:
 Willowwood: compact



Leatherleaf Viburnum – Viburnum Rhytidophyllum
 8' to 10', up to 15' when old
 Very cold hardy; can tolerate deep shade



English Laurel – Prunus Laurocerasus
 15' to 20', up to 40' when old

Also called Cherry Laurel

Varieties available:
 'Otto Luyken': half-dwarf, to 5'
 'Zabel': very cold hardy
 'Schipkaensis': 4' to 6',



	APPENDIX E:	
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Magnolia stellata 'Centennial' – Star magnolia

15' to 20'

Deciduous, medium size shrub

Dense, compact, twiggy



	APPENDIX E: Landscape and Plant Selection	
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SMALL SHRUBS:

Dwarf Abelia – Abelia x Grandiflora To 3' Semi-evergreen to evergreen Full sun to half shade Medium to fast growth (depending on var.) Varieties: 'Edward Goucher' 'Sherwoodii'	
Carissa Holly - Ilex Cornuta 'Carissa' To 3' to 4' Full sun, partial sun	
Japanese Holly - Ilex Crenata 2' to 4' Rounded habit Varieties: 'Helleri': dwarf, similar to boxwood 'Compacta': compact shrub	

	APPENDIX E: Landscape and Plant Selection	
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Dwarf Yaupon Holly - Ilex vomitoria 'nana' From 2' to 3' Full sun to full shade	
Juniper var. – Juniperus Var. Low-growing or spreading Slightly upswept Onboard Comment: Juniper shrubs are problematic because of maintenance and are not desired.	
Loropetalum – Loropetalum chinensis rubrum Sun to partial shade Varieties: 'Ruby': 3' to 5', smallest variety 'Burgundy': 6' to 10'	

	APPENDIX E: Landscape and Plant Selection	
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Pittosporum - Pittosporum tobira

6' to 8'

Sun or afternoon shade

Variegated varieties available



Indian Hawthorne – Raphiolepis indica

3' to 4'

Prefers full sun



Rosemary – Rosemarinus officinalis

To 5'

Upright or trailing varieties

Very hardy



	APPENDIX E:	
	Landscape and Plant Selection	

Andropogon gerardii – Big Bluestem	
From 3' to 6'	
Full sun to partial shade	
Very hardy, cold tolerant	
Makes tall hedge or screen	
Miscanthus sinensis – Maidengrass	

	APPENDIX E: Landscape and Plant Selection	
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Calamagrostis x acutiflora – Feather reed grass

To 3' to 5'

**Very vertical, clump forming
Sun and light shade**

Good variety: 'Karl Foerster'



Muhlenbergia capillaris - Pink Muhly Grass

From 3' to 4'

**Full sun, tolerates partial shade
Very hardy**



Yucca aloifolia – Spanish bayonet

Mounds to 3', stalk to 10'

Prefers full sun, tolerates partial sun



	APPENDIX E: Landscape and Plant Selection	
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Yucca filamentosa – Adam’s Needle Yucca Flower spike up to 12’ Prefers full sun, tolerates light shade	
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Pennisetum alopecuroides - Perennial Fountain Grass 1’ to 3’ Open, mound forming	
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Liriope muscarii – Big Blue lilyturf 12” to 18” Ground cover, evergreen clump	
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	APPENDIX E: Landscape and Plant Selection	
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Rhapidophyllum hystrix – Needle palm tree	
To 6', assumes shrub-like clump form Very cold hardy	



Sabal minor – Sabal palmetto tree	
To 3', to 12' if old	
One of most frost tolerant palms	
Also known as bush palmetto	



Sabal Palmetto – Sabal palmetto tree	
To 50' or higher	
Very cold hardy	
Also known as cabbage palm	



	APPENDIX E:	
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Serenoa repens – Saw palmetto tree

To 15' if old, usually 3' to 6'

Ground cover or understory, good in clumps

