



US Army Corps
of Engineers

Western Region

MATOC for Construction, Adapt/Build, or Design/Build of Tactical Equipment Maintenance Facility (TEMF)

Solicitation Number: W912HN-07-X-101B
Task Order: DSXX

FY11 THAAD BATTERY II TEMF FORT BLISS, TEXAS

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US ARMY ENGINEER DISTRICT, SAVANNAH
CORPS OF ENGINEERS
100 WEST OGLETHORPE AVENUE
SAVANNAH, GEORGIA 31401-3640

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1.0 PROJECT OBJECTIVES

The project objective is to design and construct facilities for the military that are consistent with the design and construction practices used for civilian sector projects that perform similar functions to the military projects. For example, a Company Operations Facility has the similar function as an office/warehouse in the civilian sector; therefore the design and construction practices for a company operations facility should be consistent with the design and construction of an office/warehouse building.

Comparison of Military Facilities to Civilian Facilities

Military Facility	Civilian Facility
Tactical Equipment Maintenance Facility (TEMF)	Heavy Equipment/Vehicle Maintenance Garage

It is the Army's objective that these buildings will have a 25-year useful design life before a possible re-use/re-purpose or renovation requirement, to include normal sustainment, restoration, modernization activities and a 50-year building replacement life. Therefore, the design and construction should provide an appropriate level of quality to ensure the continued use of the facility over that time period with the application of reasonable preventive maintenance and repairs that would be industry-acceptable to a major civilian sector project OWNER. The site infrastructure will have at least a 50-year life expectancy with industry-accepted maintenance and repair cycles.

The project site should be developed for efficiency and to convey a sense of unity or connectivity with the adjacent buildings and with the Installation as a whole.

Requirements stated in this contract are minimums. Innovative, creative, and life cycle cost effective solutions, which meet or exceed these requirements are encouraged. Further, the OFFEROR is encouraged to seek solutions that will expedite construction (panelization, pre-engineered, etc.) and shorten the schedule. **The intent of the Government is to emphasize the placement of funds into functional/operational requirements. Materials and methods should reflect this by choosing the lowest Type of Construction allowed by code for this occupancy/project allowing the funding to be reflected in the quality of interior/exterior finishes and systems selected.**

1.1. SECTION ORGANIZATION

This Section is organized under 6 major "paragraphs".

- (1) Paragraph 1 is intended to define the project objectives and to provide a comparison between the military facility(ies) and comparable "civilian" type buildings.
- (2) Paragraph 2 describes the scope of the project.
- (3) Paragraph 3 provides the functional, operational and facility specific design criteria for the specific facility type(s) included in this contract or task order.
- (4) Paragraph 4 lists applicable industry and government design criteria, generally applicable to all facility types, unless otherwise indicated in the Section. It is not intended to be all-inclusive. Other industry and government standards may also be used, where necessary to produce professional designs, unless they conflict with those listed.
- (5) Paragraph 5 contains Army Standard Design Criteria, generally applicable to all facility types, unless otherwise indicated in the Section.
- (6) Paragraph 6 contains installation and project specific criteria supplementing the other 5 paragraphs.

2.0 SCOPE

2.1. TACTICAL EQUIPMENT MAINTENANCE FACILITY (TEMF)

Provide Tactical Equipment Maintenance Facilities. This project type is to provide facilities for the purpose of maintaining and repairing vehicles, complete with equipment and parts storage and administrative offices. It is intended to be similar to heavy equipment or motor pool facilities in the private sector community. Assume 12 percent of personnel are female unless otherwise indicated.

The project will include TEMFs for 1 battalion(s). Specific sizing parameters for each battalion TEMF included in the project are as follows:

THAAD II BATTERY

TEMF size: Small

A 10-ton bridge crane is required in this TEMF.

Number of organizational vehicles to be accommodated: 78

Organizational vehicle hardstand: 19,161 square yards

Organizational storage building: 1,050 square feet

POL storage building: 180 square feet

Hazardous waste storage building: 180 square feet

Distribution company storage building, 8000 SF w/445 SY Secure Storage, NOT required

UAV maintenance and storage, 1800SF, NOT required

POL vehicle parking IS required

The maximum gross area for the primary Tactical Equipment Maintenance Facilities (excluding site storage buildings) in the project is limited to 18,000 SF.

2.2. SITE:

Provide all site design and construction within the TEMF limits of construction necessary to support the new building facilities. Supporting facilities include, but are not limited to, utilities, electric service, exterior and security lighting, fire protection and alarm systems, security fencing and gates, water, gas, sewer, oil water separators, storm drainage and site improvements. Provide accessibility for individuals with disabilities. Include Antiterrorism/Force Protection measures in the facility design in accordance with applicable criteria.

Maintain the construction site and haul route. Repair/replace damage to existing sidewalks, pavements, curb and gutter, utilities, and/or landscaping within the construction limit, adjacent to the construction site, and along the Contractor's haul route resulting from the Contractor's construction activities at no additional cost to the Government. Prior to construction activities, Contractor and Contracting Officer Representative shall perform an existing condition survey. At completion of the Task Order, Contractor and Contracting Officer representative shall perform a final condition survey to determine repair/replacement requirements.

Approximate area available for this (these) facility(ies) is shown on the drawings.

Provide all site improvements necessary to support the new building facilities. Refer to Paragraph 6.

Approximate area available 12.70 acres

2.3. GOVERNMENT-FURNISHED GOVERNMENT-INSTALLED EQUIPMENT (GFGI)

Coordinate with Government on GFGI item requirements and provide suitable structural support, brackets for projectors/VCRs/TVs, all utility connections and space with required clearances for all GFGI items. Fire extinguishers are GF/GI personal property, while fire extinguisher brackets and cabinets are Contractor furnished and installed CF/CI. All Computers and related hardware, copiers, faxes, printers, video projectors, VCRs and TVs are GFGI.

The following are also GFGI items: No additional requirements.

2.4. FURNITURE REQUIREMENTS

Provide furniture design for all spaces listed in Chapter 3 and including any existing furniture and equipment to be re-used. Coordinate with the user to define requirements for furniture systems, movable furniture, storage systems, equipment, any existing items to be reused, etc. Early coordination of furniture design is required for a complete and usable facility.

The procurement and installation of furniture is NOT included in this contract. Furniture will be provided and installed under a separate furniture vendor/installer contract. The general contractor shall accommodate that effort with allowance for entry of the furniture vendor/installer onto this project site at the appropriate time to permit completion of the furniture installation for a complete and usable facility to coincide with the Beneficial Occupancy Date (BOD) of this project. The furniture vendor/installer contract will include all electrical pre-wiring and the whips for final connection to the building electrical systems however; the general contractor shall make the final connections to the building electrical systems under this contract. Furthermore, the general contractor shall provide all Information/Technology (IT) wiring (i.e. LAN, phone, etc.) up to and including the face plate of all freestanding and/or systems furniture desk tops as applicable, the services to install the cable and face plates in the furniture, the coordination with the furniture vendor/installer to accomplish the installation at the appropriate time, and all the final IT connections to the building systems under this contract.

The Government reserves the right to change the method for procurement of and installation of furniture to Contractor Furnished/Contractor Installed (CF/CI). CF/CI furniture will require competitive open market procurement by the Contractor using the Furniture, Fixtures and Equipment (FF&E) package.

2.5. NOT USED

3.0 TACTICAL EQUIPMENT MAINTENANCE FACILITY (TEMF)

3.1. GENERAL

- (1) **Functional Areas.** The primary TEMF is composed of two main types of functional areas: Repair Bays (consisting of Repair areas and Maintenance areas), and the Core Area. Refer to the attached Floor Plans for recommended layout.
- (2) **Gross Building Area.** Gross areas of facilities shall be computed according to subparagraphs below. Maximum gross area limits indicated in Paragraph 2.0, SCOPE, may not be exceeded. A smaller overall gross area is permissible if all established net area program requirements are met.
 - (a) **Enclosed Spaces.** The gross area includes the total area of all floors, including basements, mezzanines, penthouses, usable attic or sloping spaces used to accommodate mechanical equipment or for storage with an average height of 6'-11" measured from the underside of the structural system and with the perimeter walls measuring a minimum of 4'-11" in height, and other enclosed spaces as determined by the effective outside dimensions of the building.
 - (b) **One-Half Spaces.** One half of the area will be included in the gross area for balconies and porches; exterior covered loading platforms or facilities, either depressed, ground level, or raised; covered but not enclosed passageways or walks; covered and uncovered but open stairs; and covered ramps.
 - (c) **Excluded Spaces.** Crawl spaces; exterior uncovered loading platforms or facilities, either depressed, ground level, or raised; exterior insulation applied to existing buildings; open courtyards; open paved terraces; roof overhangs and soffits for weather protection; uncovered ramps; uncovered stoops; and utility tunnels and raceways will be excluded from the gross area.
- (3) **Net Area.** Net area requirements for functional spaces are included in the drawings. If net area requirements are not indicated, the space shall be sized to accommodate the required function, comply with code requirements, comply with overall gross area limitations and other requirements of the RFP (for example, area requirements for corridors, stairs, and mechanical rooms will typically be left to the discretion of the Offeror).
- (4) **Deviations and Improvements.** It is the intent of this document to allow deviations and improvements to the design shown.
- (5) **Handicapped Access.** All TEMF buildings are to be handicapped accessible.
- (6) **Site Design and Functional Areas.** Site features include vehicular hardstand, utilities and site improvements.
- (7) **Adapt-Build Model.** An Adapt-Build Model for a TEMF, which contains a fully developed design, including a Building Information Model (BIM), 2-D CADD files, and specifications, can be downloaded from the following FTP site: <ftp://ftp.usace.army.mil/pub/sas/TEMF/>. This design is provided as a guide that exemplifies a technically suitable product and incorporates mandatory functional/operational requirements for a similar (although perhaps not an exact) facility to be constructed under this solicitation. It will be left to the offerors' discretion if, and how, they will use the sample design provided to satisfy the requirements of this Request for Proposal. This model is not intended to modify or over-ride specific requirements of this RFP and, under all circumstances, it will be incumbent upon the successful offeror to adhere to the site specific scope and functional/operational requirements specified within the RFP. Neither this statement of work, nor the adapt-build model, are intended to diminish the offeror's responsibilities under the clauses titled "Responsibility of the Contractor for Design," "Warranty of Design," and "Construction Role During Design." The successful offeror shall be the designer-of-record and shall be responsible for the final design and construction product, including but not limited to, adherence to the installation architectural theme, building code compliance and suitability of the engineering systems provided. The government assumes no liability for the model design provided and, to the extent it is used by an offeror, the offeror will be responsible for all aspects of the design as designer-of-record.

3.1.1. Repair Areas and Vehicle Corridor/Maintenance Areas

Repair areas and maintenance areas are garage areas used for service and repair of the full range of Army tactical equipment. They are single story ground floor spaces. A typical structural bay to accommodate both repair and maintenance areas is sized to measure 32' x 96'. Conceptually, this structural bay contains four 16' x 32' repair work areas, and a 32' wide vehicle corridor dividing them crosswise. The vehicle corridor also serves as a maintenance area. It accommodates 16' x 32' maintenance work areas down the length of the entire building .

Two contiguous work areas may be required to accommodate work on larger equipment, thus resulting in the need for work areas to be constructed in pairs. Repair and maintenance areas are to be free of intermediate support columns, i.e. columns are only permissible along exterior perimeter walls. This allows complete shop floor coverage by a single bridge crane for all contiguous maintenance and repair areas (each wing of the facility). TEMFs requiring four structural bays or less shall be constructed contiguously in a single wing of the facility.

(1) Repair Areas

(a) Function. Repair of vehicles as described above. Structural height shall be as required to allow minimum bridge crane hook cradle height of 20 feet (minimum of 25 feet for bays with 35-ton bridge cranes). Overhead coiling doors, 24'-0" wide x 14'-0" high, shall be provided at each end of each structural bay.

(b) Equipment. Repair Bays shall be served by a 10-ton or a 35-ton capacity traveling bridge crane with full structural bay coverage as indicated in the Architectural TEMF Features Matrix and as specified in Para. 2.1. Additional requirements are specified in the paragraph ARCHITECTURE.

(c) Provide one hose bibb and two compressed air outlets 3'-0" above the floor for each pair of repair areas.

(d) Welding/Machine Shop Area: Provide special purpose repair space to support machine shop equipment and power connectivity for portable welding equipment within one pair of repair areas, typically in repair bay farthest from the Core Area. This area will not be used exclusively for welding. It may be utilized as a repair area also and shall be equipped with all requirements for repair areas except items (e), and (j).

(e) Provide utilities for component washing and vehicle spot washing in the outermost work area of each wing of repair/maintenance areas. Provide a 5'-4" high concrete masonry wall separating the outermost bay from others to contain spray resulting from engine and component wash functions. Terminate partition to provide 6'-0" clear space at each end of the partition.

(f) In each pair of repair areas, provide electric power for user provided (GFGI) portable hydraulic lift.

(g) Provide continuous 6-inch wide trench drains with continuous grating along full width of bays at exterior doors; locate drains approximately 3'-0" inside face of exterior walls. In addition to the outside trench drains, a center trench drain running the full width of the bays is permissible to facilitate internal drainage of the facility. When a dedicated, partitioned welding area is provided, provide a solid cover to trench drain where it runs through the welding area.

(h) Each work area shall have access to NIPRNet -data connection points.

(i) Provide an outlet to a vehicle exhaust evacuation system for each repair area.

(j) Tire Changing Area: Provide capability for tire changing function where shown on the TEMF Standard Drawings. Tire changing equipment shall be GFGI."

(2) Vehicle Corridor/Maintenance Areas

(a) Function. Maintenance of vehicles as described above. Maintenance areas within core area shall be equipped for inspection, oil changing and lubrication. All requirements listed above, except items (d), (e), (f), and (j) apply to the maintenance areas.

(b) Maintenance Area within the High Bay Portion of Facility. Access to compressed air, water, vehicle exhaust, power and data in the maintenance areas within high bay portion of facility shall be via connections along the nearest wall.

(c) Maintenance Area within the Core Area. Maintenance areas within the core area shall be equipped for inspection, oil changing and lubrication. The minimum clear ceiling height shall be 14'-0" Above Finished Floor. Provide an outlet to a vehicle exhaust evacuation system for each pair of maintenance areas. Bridge crane access is not required for maintenance areas along central vehicle corridor in the core area.

(1) Maintenance Pit. Provide one 40-foot long x 3'-6" wide concrete maintenance pit in the central vehicle corridor portion maintenance area within the core with stair access. Due to inside clearance for some vehicles, the maximum 3'-6" width is critical for the pit and curbing. Pit shall have non-sparking, non-slip removable floor grating approximately 4'-4" below finish floor elevation, with concrete pit floor below sloping to sump. Provide sump pump, see Paragraph 3.1.8(4) Plumbing for additional information. Provide compressed air outlet at two places in the pit. When not in use, pit shall be provided with removable cover capable of supporting pedestrian traffic. Provide minimum 4-inch high steel angle curb surrounding pit opening. Pit cover panels to be light enough to be handled by a maximum of two personnel.

- (2) POL Hose Reels. Provide two POL dispensing points mounted to the wall of the maintenance area. They should be spaced along the length of the pit. Hose and reel assembly shall be heavy duty, designed for the applicable fluid or oil. Provide shutoff valve at reel. Provide distribution for grease, engine oil, gear oil, transmission fluid, and antifreeze.
- (3) Circulation Bays
- (a) Provide an 8' wide x 96' long structural bay between each wing of repair bays and the core area to facilitate pedestrian egress from the building and shall conform to OSHA requirements.
- (b) Equipment. Provide 4'-0" high x 8'-0" wide framed tack board (for 'safety board') mounted on wall along the circulation bay near the tool room. Provide one permanently installed emergency eyewash, hand held drench hose and shower station at each circulation bay that is adjacent to a core area and provide additional emergency eye wash, hand held drench hose and shower stations in other bays as required per OSHA standard 1910.151(c) and ANSI Z358.1. Provide one or more emergency eyewash, hand held drench hose and shower stations in Consolidated Bench Repair and in the Fluid Distribution Room when the equipment being serviced or solvents being used generate this requirement. Locate emergency wash stations in accordance with OSHA standard 1910.151(c) and ANSI Z358.1. Per OSHA 1910.151(c) emergency eyewash/shower units should be located such that a worker can reach one in 10 seconds. ANSI Z358.1 gives a guideline of 55 feet to meet this requirement.

3.1.2. Core Areas:

Core areas are arranged in one and two story configurations (refer to the attached floor plans for standard layouts). Internal walls within the core should be non-load bearing to the extent possible to allow future rearrangement of spaces.

- (1) Administration and Shop Control. Office space to accommodate foremen, production control, and clerical personnel. Provide one space per core; may be located on first or second floor but shall be accessible to the physically disabled. Provide counter and pass-through window between this room and the customer Waiting Area; size pass-through window to accommodate transfer of 30-inch by 30-inch items, and layout the area outside window so that two people can stand at the window and be out of the corridor traffic pattern. Provide viewing windows from administration and shop control space into the repair areas.
- (2) Training Room. The training room space is intended to facilitate the training mission for maintenance personnel. This space is to be divided into two training areas with an operable folding partition (movable wall) having a sound isolation of STC 45, minimum. Provision shall be made to accommodate up to 30 students for computer based training, including power and data connections for each student.
- (3) Consolidated Bench. Shop space for unit-level maintenance of electronics, optics, and other gear. Locate on first floor.
- (a) Equipment. Provide an overhead coiling door 10'-0" wide x 10'-0" high.
- (b) Furnishings/Fixtures. See Table 7 for furnishings. Provide capabilities shown in the features matrix for each work space.
- (c) Provide operable exterior windows. Provide at least one window with clear view and unobstructed line of sight out of the building to a minimum of 800 feet for testing weapon sights.
- (4) Tool Room. Designated space for the issue and secure storage of unit common tool kits, as well as supplemental tool kits and individual tools shared by shop personnel. Direct covered access from the tool room to the SATS containers (described below) on the exterior of the building is required. Provide lockable pair of personnel doors and pass-through opening with impact resistant counter and metal overhead lockable coiling shutter between Tool Room and Corridor.
- (a) Standard Automotive Tool Set (SATS). The SATS is a unit-owned (i.e. GF/GI) containerized tool system with the dimensions of 8' x 20' x 8' high. An exterior hardstand storage area adjacent to the Tool Room shall be provided for three SATS containers. Connectivity to building and installation network is required. SATS are accessed from the end. Provide wall mounted awning with minimum 14-foot clear height above hardstand for weather protected entry into SATS containers. The technical manual for SATS is TM 9-4910-783-13&P.
- (5) Tool Box Storage. Provide one Tool Box Storage Room for each wing of Repair Areas (if Repair Areas are located on both sides of a core, each side of core shall have a Tool Box Storage Room). Tool Box Storage is provided for personnel working inside the maintenance complex in the Repair Areas and the Consolidated Bench

for the storage of individually assigned or personal (Contractor) tools requiring security. Provide lockable personnel door with closer between Tool Box Storage and Circulation Bay.

(6) Combat Spares. Storage and issue of Prescribed Load List (PLL) and shop stock items kept in stock at all times because of demand or management decisions. Direct covered access from the Combat Spares room to the ASL-MS containers (described below) on the exterior of the building is required. Provide lockable pair of personnel doors so to accommodate 48" x 48" x 74" ASL-MS repair parts bins and shelving modules, and pass-through opening with impact resistant counter and overhead lockable coiling shutter between Combat Spares and Corridor.

(a) Authorized Stockage List - Mobility System (ASL-MS). Similar to the SATS, the ASL-MS is a unit-owned (i.e. GF/GI) 8' x 20' x 8' high container for repair parts. An exterior hardstand storage area adjacent to the Combat Spares room shall be provided for three ASL-MS containers. ASL-MS are accessed from the side. Provide sufficient aisles between ASL-MS for access. Provide wall mounted awning with minimum 14-foot clear height above hardstand for weather protected entry into ASL-MS containers. Provide lockable pair of personnel doors at building exterior to accommodate large bulk portable tools and equipment, and ASLMS repair parts modules. The technical manual for ASL-MS is TM 9-5411-236-13&P.

(7) Latrine, Shower and Locker Rooms

(a) Latrines. Provide separate latrines for men and women on each floor. Provide water closets, urinals, lavatories and drinking fountains in accordance with established layouts and referenced codes.

(b) Shower and Locker Rooms. Provide a Men's Shower and Locker Room and Women's Shower and Locker Room. Locate on first floor of each core, sized to accommodate the number of lockers and showers indicated. Shower and locker area shall be adjacent to and connect to the latrine area. Provide individual shower compartments (3'-0" x 3'-0") in the number indicated on the drawings. Provide a single tier steel locker for each non-administrational occupant of the building, minimum size 1'-0" wide x 1'-6" deep x 6'-0" high.

(8) Break, Training, and Conference (BTC). Locate this room on same floor as Admin and Shop Control.

(a) Furnishings. Provide kitchen, base and wall cabinets and 30-inch deep countertop minimum 10'-0" long.

(b) Equipment. Provide stainless steel two-compartment sink.

(c) Allow space and hookups for vending machines, refrigerator and microwave.

(d) Projection equipment hookups are to be provided in Medium, Large and X-Large BTC Room only. Due to small size of BTC Room in the Small TEMF, no projection equipment hookups will be provided in this area.

(9) Vaults. All vault walls, floors and ceilings shall be constructed in compliance with appropriate requirements referenced below. Provision for a user provided (GFGI) intrusion detection system including motion detectors, door alarm, and camera, is required.

(a) Weapons Storage Vault. Provide secure storage of weapons being repaired, especially vehicle-mounted weapons such as machine guns and firing port weapons. Weapons vault walls, floors and ceilings shall be constructed in compliance with AR 190-11, Physical Security of Arms, Ammunition, and Explosives. An option exists for use of prefabricated, modular vaults conforming to Fed. Spec. AA-V-2737 requirements. Provide a GSA-approved Class 5 Armory vault door with lock in accordance with Fed. Spec. AA-D-600D and a "Dutch door" style day gate. Provide an internal wire mesh partitioned space or provide space for GFGI lockable cabinets IAW installation requirements to accommodate armorer's tool kits, spare arms parts, machine gun barrels and major subassemblies. Coordinate arms rack anchor rings, common storage racks, etc with user.

(b) COMSEC Vault. Provide secure storage of communications/cryptology equipment. Room must have a minimum 8-foot dimension. Refer to Physical Security Standards of Appendix D of AR 380-40, Policy for Safeguarding and Controlling Communications Security (COMSEC) Material (FOUO).

(10) Nonsensitive Secure Storage. Nonsensitive Secure Storage shall be constructed to meet Secure Storage standards for Risk Level II per AR 190-51, Security of Unclassified Army Property.

(11) Telecommunications- Room-. Telecommunications rooms shall be provided for voice and data. There shall be a minimum of one room on each floor, located as near the center of the building as practicable, and stacked between floors. The telecommunications rooms shall be designed in accordance with the Technical Criteria for Installation Information Infrastructure Architecture I3A Criteria and ANSI/EIA/TIA-569-B. SIPRNET Room shall also be provided for future SIPRNet connectivity in accordance with the Technical Guide for the Integration of Secret Internet Protocol Router Network (SIPRNet).

- (12) Non-Assignable Spaces and Gross Area. The items below account for additional gross area within the core that is not specifically listed in the spaces above. These items may also vary in size contingent on site, climate, type and use.
- (a) Stairwells. Design in accordance with model and local building codes.
 - (b) Elevator. Provide one passenger elevator in each two-story building. Elevator machine room is also part of the gross area of the core.
 - (c) Common Circulation Corridors. All circulation corridors shall be a minimum of 6 feet wide.
 - (d) Waiting Area. Locate adjacent to Admin and Shop Control pass-through window off of corridor. Size Waiting Area for the seating of a minimum of four persons.
 - (e) Janitorial Spaces. Provide one janitorial space as shown on drawings with mop sink and heavy duty shelving. Expansion of the Janitorial Space to include a recycling function is optional.
 - (f) Mechanical Rooms. Utility space must be provided for heating and cooling equipment. Where feasible, vertically stack like utility spaces if located on two floors. Locate first floor mechanical rooms adjacent to exterior walls for external maintenance access and ventilation. See paragraph 3.1.7 Heating, Ventilation, and Air Conditioning (HVAC) Systems, for additional requirement. Walls and floor/ceiling assemblies enclosing mechanical room shall have a sound transmission class (STC) rating of not less than 50 (45 if field tested) for air-borne noise when tested in accordance with ASTM E 90, and an impact insulation class (IIC) rating of 50 (45 if field tested) when tested in accordance with ASTM E 492.
 - (g) Electrical Rooms. Locate first floor electrical rooms adjacent to exterior walls for external maintenance access and ventilation.
 - (h) Fluid Distribution Room. Provide a room to house the POL central distribution equipment and unused POL storage containers (typically 55-gallon drums) for five types of lubricants/fluids. Fluids shall be dispensed by automotive lubricant type air driven pump assemblies. Motor shall be heavy-duty compressed air driven reciprocating action. For antifreeze unit all parts shall be corrosion resistant. Locate near maintenance pit to minimize length of fluid distribution lines. Compliance with UFC 3-600-01, NFPA 30, and 29 CFR 1910.106 is mandatory. Provide secondary containment in compliance with applicable federal and state environmental regulations. Square footage for this space is part of the gross area for the core.

3.1.3. Site Functional Area

- (1) Dock. Provide one docking location for maintenance and electronic testing of specialized, permanently vehicle mounted, communications equipment. Provide equipment power connections and grounding points for vehicle degauss and individual personnel static discharge protection of equipment.
- (2) Organizational Vehicle Hardstand. This area consists of a rigid concrete paved area used for parking assigned vehicles (wheeled and heavy and tracked), commercial vehicles (Contractor support), trailers and generators. Organizational vehicle hardstand includes building aprons, parking spaces, and circulation lanes on site.
 - (a) Tactical/Military and Commercial Vehicle Parking. Maximize vehicle parking and traffic flow to best support the operation of the TEMF.
 - (b) POL Vehicle Parking Area. Parking for POL vehicles is considered separate from other organizational vehicle parking and shall be segregated from other vehicle parking areas.
 - (c) Dead Line Vehicle Parking. Parking for vehicles waiting for parts or for work to be performed. One dead line parking space for every pair of repair areas and shall be located in parking areas adjacent to repair bays that will service them.
 - (d) Building Aprons. Provide concrete pavement for aprons associated with each of the facilities located in the maintenance complex.
- (3) Site Storage
 - (a) Hazardous Waste Storage Building. Provide a building with solid walls and roof. It is used to temporarily store used lubricants, flammable solvents, dry sweep, etc. A unit is authorized 60 square feet for each 25 vehicles, or part thereof, which it maintains. A minimum of 120 square feet of hazardous waste storage space will be provided. The specific requirement for this project is specified in Para. 2.1. Provide secondary containment in compliance with applicable federal and state environmental regulations. Compliance with UFC 3-600-01, NFPA

30, and 29 CFR 1910.106 is mandatory. Maintain minimum separation distance from other buildings in accordance with the IBC in order to eliminate the need for automatic sprinkler protection. Pre-fabricated, fire-rated, self-contained, moveable steel safety storage buildings are permitted as an option. Minimum size of 120 SF per container, though multiple containers may add up to the total quantity required per satellite accumulation area.

(b) POL Storage Building. Provide a building for the storage of oil, lubricants, and flammable solvents for daily use. A unit is authorized 60 square feet for each 25 vehicles, or part thereof, which it maintains. A minimum of 120 square feet of oil storage space will be provided. The specific requirement for this project is specified in Para. 2.1. Provide an access apron at the entry of this building. Provide secondary containment in compliance with applicable federal and state environmental regulations. Compliance with UFC 3-600-01, NFPA 30, and 29 CFR 1910.106 is mandatory. Maintain minimum separation distance from other buildings in accordance with the IBC and local codes in order to eliminate the need for automatic sprinkler protection. Pre-fabricated, fire-rated, self-contained, moveable steel safety storage buildings are permitted as an option. Minimum size of 120 SF per container, though multiple containers may add up to the total quantity required per satellite accumulation area.

(c) Organizational Storage Building. This building is for storage of deployment equipment. The size of this facility is determined by the organizational structure and the number of organizational vehicles; specific to each project. Provide a 10' x 10' coiling door and a personnel door for each 700 SF of company supply area along one side of building. Provide internal wire or secure partitions between each 700 SF space. Floor area of building shall be as specified in the project scope of work. Building shall be approximately 25 feet deep. The floor system of this facility should be designed for fork-lift lifting.

(d) Distribution Company Storage Facility. Not required

(e) Secure Open Storage. Where a Distribution Company Storage Facility is provided, provide a 445 SY fenced area on concrete paving for exterior storage.

(f) UAV Maintenance and Storage Building. Not required

(g) Used Oil Storage Tank(s). Provide one 500-gallon above-ground used engine oil storage tank at the end of the Repair Areas. Tank shall be constructed of non-corrosive material. Provide secondary containment in compliance with applicable federal and state environmental regulations. Tank construction and location shall comply with IBC requirements. Recommended location is adjacent to the end repair area. Used oil, waste fuel, and used engine coolant storage tanks should be co-located, if possible.

(h) Used Engine Coolant (antifreeze) Storage Tank(s). Provide one 500-gallon above-ground used engine coolant storage tank at the end of the Repair Areas. Tank shall be constructed of non-corrosive material. Provide secondary containment in compliance with applicable federal and state environmental regulations. Tank construction and location shall comply with IBC requirements. Recommended location is adjacent to the end repair areas. Used oil, waste fuel, and used engine coolant storage tanks should be co-located, if possible.

(i) Out of Spec Waste Fuel Tank(s). Provide one 500-gallon above-ground Out-of-Spec Waste Fuel Tank at the end of Repair Areas. Tank shall be constructed of non-corrosive material. Provide secondary containment in compliance with applicable federal and state environmental regulations. Tank construction and location shall comply with IBC requirements. Recommended location is adjacent to the end repair area. Used oil, waste fuel, and used engine coolant storage tanks should be co-located, if possible.

(4) Entrance Drives. Provide primary and secondary entrance drives to connect organizational vehicle hardstand to existing roads and/or tank trails.

(5) Privately Owned Vehicle (POV) Parking. Provide POV parking at the rate of 56% of the total assigned personnel.

3.1.4. Site Design The following drawing should be used to associate relative adjacencies for site structures.

(1) Hardstand. All hardstand areas shall be rigid concrete pavement. Pavement design for organizational vehicle areas shall be designed to support the vehicles assigned to this facility and the heaviest vehicle at the installation. See appendix for Organizational Vehicle assigned to this facility. The parking layout and configuration shall be adjusted as necessary to for the site limits and space provided.

(2) Antiterrorism and Force Protection. Each project should be evaluated for security requirements in accordance with UFC 4-010-01. Minimum requirement is a security fence at the site perimeter consisting of 7-foot high chain link fabric plus a single outrigger with 3-strand barbed wire, designed in accordance with STD 872-90-03, FE-6, Chain-Link Security Fence Details. A zone cleared of trees and shrubs, 20 feet wide inside the fence and 10 feet wide outside the fence is required. The clear zone shall be gravel underlain by a synthetic fabric. The clear

zone shall be treated with herbicides to discourage vegetative growth. Manually operated vehicular gates, approximately 30 feet wide overall, shall be provided at each vehicle entrance/exit.

(3) Storm Water Management. Site storm water management may require controls on the peak flow that can be discharged. Installations are required to have a storm water pollution prevention plan. Implement the applicable portions of this plan using best management practices. Segregate drainage from areas likely to be contaminated (e.g., fueling area). Provide treatment for contaminated water prior to its discharge. Maintenance should not be performed outside the primary facility.

(4) Storm Drainage System. Construction and material specified for storm drainage installation shall be per the State's DOT requirements. All storm drainage lines constructed under organizational vehicle hardstand, entrance drives, and other surfaces subject to vehicular traffic shall be reinforced concrete pipe with watertight joints. See paragraph 6 for additional storm drainage system requirements.

(5) Oil/Water Separator. One or more oil/water separators are required to remove, oil, lubricants, floatables, and grit from contaminated water sources (e.g., repair and maintenance areas, POL fluids distribution, etc.). Oil/water separators shall be designed in accordance with local codes and standard industry practice for the specific waste stream to be treated. Minimize maintenance requirements and locate oil/water separators to minimize pipe runs, provide vehicular access, and built out of circulation areas.

(6) Used and Waste Oil, Antifreeze, Solvents, Cleaning Compounds, and Hazardous Materials Hazardous materials generated in the course of maintenance operations shall be classified in accordance with 40 CFR 261. Criteria for short term storage (less than 90 days) of hazardous materials is provided in 40 CFR 262. Long-term storage is not authorized for TEMF facilities. The installation Defense Resources Management Office has responsibility for long term storage. Long term storage of hazardous materials is governed by 40 CFR 264.

(7) Primary and Secondary drives. Provide a primary and secondary entrance drive into the organizational vehicle hardstand area. The primary and secondary entrance drives shall be 30 feet wide.

(8) Organizational Vehicle hardstand. Organizational vehicle pavement grades shall provide positive surface drainage with a 1 percent minimum slope in the direction of drainage. Maximum pavement slope shall be 2 percent.

(9) Circulation Lane. Organizational vehicle parking circulation lanes shall be 20 feet wide when lanes are located adjacent to TEMF aprons. Parking stalls within the hardstand are to be placed back-to-back with circulation lane widths of 30 feet for vehicles less than or equal to 18 feet long and 45 feet for vehicles more than 18 feet long.

(10) Tactical/Military Vehicle Parking. Tactical/Military Vehicle Parking spaces shall be spaced with side clearances of 3 feet and end clearances of 2 feet.

(11) POL Vehicle Parking (if applicable). POL vehicle parking shall be physically separated from organizational hardstand. POL parking shall be spaced a minimum of 10 feet between vehicles. POL parking area circulation lanes shall be 50 feet wide. Drainage from the POL parking area shall be isolated and shall not be allowed to enter underground storm or sanitary sewer systems without being impounded first and manually released. POL drainage impoundment shall be located 100 feet from any structure.

(12) Dead Line Vehicle Parking. Dead Line Vehicle Parking spaces shall be sized based on the largest vehicle for the assigned maintenance bay. Parking spaces shall be spaced with side clearances of 3 feet and end clearances of 2 feet.

(13) TEMF Aprons. TEMF aprons shall measure 45 feet wide on all four sides of the facility. Circulation lanes are not part of the 45-foot wide apron.

(14) Site Storage Building Aprons. Site storage building aprons shall measure 27 feet wide along the entire building length on the vehicular access side. Circulation lanes are not part of the 27-foot wide apron.

(15) Bollards at TEMF repair bays. Provide 12-inch diameter steel bollards filled with concrete at all TEMF repair bay openings where frequent vehicle access/egress increases the risk of damage by vehicle impact. Bollard footings shall be designed to withstand organizational vehicular impact.

(16) Mechanical and Electrical Equipment Yard. Provide 12-inch diameter by 5-foot high, concrete-filled, schedule 80 galvanized steel pipe bollards, 5 feet O.C. spacing, 5 feet from edge of the mechanical and Electrical Equipment Yard, painted safety yellow, around the perimeter of the equipment yards. Provide vehicular access and locate out of circulation areas. Bollard footings shall be designed to withstand organizational vehicular impact.

(17) Bollards at Out of Spec Waste Fuel, Used Oil and Used Engine Coolant (antifreeze) Storage Tank(s). Provide 12-inch diameter by 5-foot high, concrete-filled, schedule 80 galvanized steel pipe bollards, 5 feet O.C.

spacing, 5 feet from edge of containment wall, painted safety yellow, around the perimeter of above-ground tank areas. Bollard footings shall be designed to withstand organizational vehicular impact.

(18) Bollards at Site Storage Buildings. Provide 12-inch diameter by 5-foot high, concrete-filled, schedule 80 galvanized steel pipe bollards, 5 feet O.C. spacing, 5 feet from the edge of the building. Bollard spacing may be greater than 5' O.C. if portion of building being protected is not in a high volume traffic area. Bollard footings shall be designed to withstand organizational vehicular impact.

3.1.5. Architecture

(1) Exterior Materials. Select exterior materials to be attractive, economical, and durable and low maintenance. Masonry walls are recommended at the ground floor level.

(2) Floors. Provide concrete floors in maintenance and repair areas sloped in accordance with NFPA 30A and IBC/IPC. Provide a continuous trench drain located on the interior side of the overhead doors at repair areas and at centerline of central vehicle corridor, extending the length of maintenance areas.

(3) Natural Lighting. Repair and maintenance bays, storage and admin areas shall be illuminated using hybrid lighting systems which includes electric lighting with electronic daylight controls in combination with skylights with reflective tube that channels the light into the work area and a lens that diffuses the light, clerestory windows, and translucent wall panels above overhead doors. Open maintenance and storage sheds shall use hybrid lighting systems with a dome-shape skylights. Provide operable windows for natural lighting and ventilation in administration and shop control, training room, break/training/conference room, and consolidated bench repair shop. Preference will be given for designs providing vision panels in overhead doors.

(4) Partitions. Fixed walls are required to separate repair areas and maintenance areas from the core areas, along corridors, and surrounding fixed areas such as latrines, vaults, storage areas and shops. Shops and storage areas may be subdivided with metal mesh partitions. Admin., training and break room walls should be non-load bearing to the greatest extent possible (for example, gypsum board on steel studs) except around latrines.

(5) Sound Insulation. Provide sound insulation in all administration areas, training rooms, and bench repair areas to meet a minimum rating of STC 42 at walls and floor/ceiling assemblies, and a rating of STC 33 for doors. In addition to the sound insulation required, training areas shall meet a Noise Criteria (NC) 30 rating in accordance with ASHRAE Fundamentals Handbook.

(6) Repair Area Bay Doors. Provide overhead doors 24 feet wide by 14'-0" feet high in the exterior wall at each end of each structural bay. Provide doors of coiling, sectional, or telescoping design. Provide electrically operated doors with provision for manual chain operation. Provide manual 10-foot by 10-foot overhead doors for Consolidated Bench Repair Shop.

(a) Locking. Provide overhead doors that are operable from the interior only. Provide doors with a positive locking mechanism that will allow the door to remain open at engine exhaust position approximately 1 foot above the floor. Coordinate door locking requirements with the using service.

(b) Serviceability. Repair and maintenance bay doors shall be designed to meet heavy duty loads and high frequency of operation. Provide testing of deflection and operation of the doors prior to acceptance during construction. Doors shall be provided and installed by a commercial door company having not less than 5 years of experience in manufacturing, installing, and servicing the size and type of doors provided.

(c) Insulated Doors. Preference will be given to proposals that include insulated doors for thermal resistance and noise control.

(7) Personnel Doors. Provide exterior personnel doors in the ends of central vehicle corridor portion of maintenance areas and in the circulation bays as shown on the drawings. Provide steel doors with vision panels, except at storage, janitorial, and latrine areas. Minimum size for personnel doors is 3 feet wide by 7 feet high.

(8) Overhead Cranes. Crane shall be designed and constructed to CMAA 70 (Class C) or CMAA 74 (moderate requirements) for operation with hoist in accordance with ASME HST-1 or HST-4.

(a) The 10-ton crane shall have the following rated load speeds (plus or minus 15 percent):

1. Hoist - 20 fpm
2. Trolley - 65 fpm
3. Bridge - 125 fpm

(b) The 35-ton crane shall have the following rated load speeds (plus or minus 15 percent):

1. Hoist - 10 fpm
 2. Trolley - 60 fpm
 3. Bridge - 85 fpm
- (c) Hoist motor control system shall provide one speed in each direction.
- (d) Bridge and trolley main control systems shall provide one speed in each direction.
- (e) Provide runway stops at limits of crane bridge travel.

3.1.6. Fire Protection

3.1.6.1. Standards and Codes

All fire protection and life safety features shall be in accordance with UFC 3-600-01 and the criteria referenced therein. Tactical Equipment Maintenance Facilities shall be classified as mission essential and shall be provided with complete sprinkler protection.

3.1.6.2. Fire Protection and Life Safety Analysis

A fire protection and life safety design analysis shall be provided for all buildings in the project. The analysis shall be submitted with the interim design submittal. The analysis shall include classification of occupancy (both per the IBC and NFPA 101); type of construction; height and area limitations (include calculations for allowable area increases); life safety provisions (exit travel distances, common path distances, dead end distances, exit unit width required and provided); building separation or exposure protection; specific compliance with NFPA codes and the IBC; requirements for fire-rated walls, doors, fire dampers, etc.; analysis of automatic suppression systems and protected areas; water supplies; smoke control systems; fire alarm system, including connection to the base-wide system; fire detection system; standpipe systems; fire extinguishers; interior finish ratings; and other pertinent fire protection data. The submittal shall include a life safety floor plan for all buildings in the project showing occupant loading, occupancy classifications and construction type, egress travel distances, exit capacities, areas with sprinkler protection, fire extinguisher locations, ratings of fire-resistive assemblies, and other data necessary to exhibit compliance with life safety code requirements.

3.1.6.3. Sprinkler System

Provide complete sprinkler protection for Vehicle Maintenance, UAV Maintenance and Storage Buildings, Organizational Storage Buildings, and Distribution Company Storage Buildings. Wet pipe sprinkler systems shall be provided in areas that are heated and dry pipe sprinkler systems shall be provided in areas subject to freezing. All floors and all areas of the facilities shall be protected. The sprinkler system design shall be in accordance with UFC 3-600-01 and NFPA 13. The sprinkler hazard classifications shall be in accordance with UFC 3-600-01, NFPA 13, and other applicable criteria. Design densities, design areas and exterior hose streams shall be in accordance with UFC 3-600-01. The sprinkler systems shall be designed and all piping sized with computer generated hydraulic calculations. The exterior hose stream demand shall be included in the hydraulic calculations. A complete sprinkler system design, including sprinklers, branch lines, floor mains and risers, shall be shown on the drawings. The sprinkler system plans shall include node and pipe identification used in the hydraulic calculations. All sprinkler system drains, including main drains, test drains, and auxiliary drains, shall be routed to a 2' x 2' splash block at exterior grade.

3.1.6.4. Sprinkler Service Main and Riser

The sprinkler service main shall be a dedicated line from the distribution main. Sprinkler service and domestic service shall not be combined. The sprinkler service main shall be provided with an exterior post indicator valve with tamper switch reporting to the fire alarm control panel (FACP). The ground floor entry penetration shall be sleeved per NFPA 13 requirements for seismic protection. The sprinkler entry riser shall include a double check backflow preventer, a fire department connection, and a wall hydrant for testing of backflow preventer. The sprinkler system shall include an indicating control valve for each sprinkler system riser, a flow switch reporting to the FACP, and an exterior alarm bell. All control valves shall be OS&Y gate type and shall be provided with tamper switches connected to the FACP. Facilities with multiple floors shall be provided with floor control valves for each floor. The floor control valve assembly shall be in accordance with UFC 3-600-01, Figure 4-1.

3.1.6.5. Exterior Hose Stream

Exterior hose stream demand shall be in accordance with UFC 3-600-01. This shall be 250 gpm for light hazard and 500 gpm for ordinary hazard. Exterior hose stream demand shall be included in the sprinkler system hydraulic calculations.

3.1.6.6. Backflow Preventer

A double check backflow preventer shall be provided on the fire water main serving each building. This shall be located within the building. An exterior wall hydrant with dual hose connections with OS&Y valve shall be provided to allow testing of backflow preventer at design flow as required by NFPA 13.

3.1.6.7. Fire Department Connection

A fire department connection shall be provided for each building with sprinkler protection. These shall be located to be directly accessible to the fire department.

3.1.6.8. 3.1.6.4 Elevators

The fire protection features of elevators, hoist ways, machine rooms and lobbies shall be in accordance with UFC 3-600-01, ASME A17.1, NFPA 13 and NFPA 72.

3.1.6.9. System Components and Hardware

Materials for the sprinkler system, fire pump system, and hose standpipe system shall be in accordance with NFPA 13 and NFPA 20.

3.1.6.10. Protection of Piping Against Earthquake Damage

Sprinkler and fire pump piping systems shall be protected against damage from earthquakes. Seismic protection shall include flexible and rigid couplings, sway bracing, seismic separation assemblies where piping crosses building seismic separation joints, and other features as required by NFPA 13 for protection of piping against damage from earthquakes.

3.1.6.11. Fire Water Supply

Fire flow test data is provided in Appendix D.

3.1.6.12. Fire Pump

Refer to paragraph 3.1.9, Electrical and Communication Systems, for requirements.

3.1.6.13. Fire Detection and Alarm

A fire alarm and detection system shall be provided for this facility. It shall comply with the requirements of UFC 3-600-01 and NFPA 72. The system shall be addressable and fully compatible with and integrated with the local base wide central monitoring system.

3.1.6.14. Building Construction

Construction shall comply with requirements of UFC 3-600-01, the International Building Code and NFPA 101.

3.1.6.15. Fire Extinguishers Cabinets and Brackets

Fire Extinguisher cabinets and brackets shall be provided when fire extinguishers are required by UFC 3-600-01 and NFPA 101. Placement of cabinets and brackets shall be in accordance with NFPA 10. Semi-recessed cabinets shall be provided in finished areas and brackets shall be provided in non-finished areas (such as utility rooms, storage rooms, shops, and vehicle bays). Fire extinguishers shall not be provided in this contract.

3.1.6.16. Interior Wall and Ceiling Finishes

Interior wall and ceiling finishes and movable partitions shall conform to the requirements of UFC 3-600-01 and NFPA 101.

3.1.7. Heating, Ventilation, and Air Conditioning (HVAC) Systems

(1) Ventilation System. Ventilation Supply system for the repair and maintenance bays and the vehicle corridor shall be designed to provide 100% of outdoor air with no recirculation and sized for minimum of 1.5 cfm per square foot per ASHRAE 62.1. The ventilation air shall be tempered to 55 degrees (F). CO and NOx sensors shall be provided throughout the repair bays and vehicle corridor. If the sensors register concentrations above acceptable levels they shall initiate an alarm both locally and at the Building Automation System. The general system's fan shall be equipped with a VFD to adjust the exhaust airflow rate based on the operation of the vehicle exhaust systems. The repair and maintenance areas and vehicle corridor shall be maintained at negative pressure with respect to the air conditioned core area. UAV Maintenance and Storage Building shall be designed to provide 100% of outdoor air with no recirculation and sized for minimum of 1.5 cfm per square foot per ASHRAE 62.1. For the Organizational Storage, Distribution Company Storage, POL Building, mechanical and electrical rooms, the ventilation rate shall be such that the space is maintained at a maximum of 10 degrees (F) above ambient conditions. Air supplied into the air conditioned core area shall be cascaded into adjacent areas for pressurization and to prevent polluted air from entering this area.

(2) System Selection.

(a) Repair and maintenance bays, the vehicle corridor, the UAV Maintenance and Storage Building and Distribution Company Storage Building are to be heated to 55 degrees F. The repair and maintenance bays shall be heated by some form of radiant heating; over head gas infrared, in-floor hydronic, or some combination thereof. Other site storage buildings (see paragraph 3.2.f) are to be heated to 40 degrees F for freeze protection.

(b) Occupied spaces within the core shall be heated and cooled in accordance with Paragraph 5 of Section 01 10 00. Consider all viable alternative systems meeting the functional requirements of each of the areas of the facility. For the core spaces, consider packaged equipment, split systems or systems utilizing chilled/heating water from either a central plant or decentralized sources.

(c) Return air plenum systems are not allowed for Tactical Equipment Maintenance Facilities.

(d) Consider use of evaporative air pre-cooling in hot climates.

(e) Telecommunications Rooms and SIPRNet rooms will each be served by an independent and dedicated air-handling system. Air handling unit system(s) shall not be floor-space mounted within the actual space served. Rooms shall be maintained at 72 degrees F and 50 percent relative humidity year-round. Assume 616 Watts per hour for the equipment heat dissipation. Bollard spacing may be greater than 5' O.C. if portion of building being protected is not in a high volume traffic area. Contractor shall verify this load during the design stage.

(3) Building Exhaust Systems. Provide general exhaust in repair and maintenance areas and exhaust systems at maintenance area pit, welding area and weapons vault. Welding function is portable but welding exhaust shall be a part of the building construction. Exhaust fan shall be non-sparking. Maintenance area pit exhaust system will be ducted exhaust system with explosion proof fans. Welding exhaust shall be manually engaged during the welding activity. All other exhaust systems will operate continuously while the building is occupied. Exhaust duct openings shall be located so that they effectively remove vapor accumulations at floor level from all parts of the floor area. Exhaust systems shall be in accordance with NFPA 30 and 30A. Energy recovery from exhaust air shall be used in climate zones 3 through 8.

(4) Vehicle Exhaust Evacuation Systems. Vehicle exhaust evacuation system for wheeled and tracked vehicles shall be provided at each repair area and along the vehicle corridor allowing for capturing exhaust fumes from stationary vehicles and vehicles moving in and out of the building and along the vehicle corridor. Consider viable alternative systems meeting the functional requirements of each of the areas of the facility. Size and locate the exhaust lines as required to service vehicles and equipment within the repair areas. Lines shall not interfere with maintenance operations or obstruct equipment such as the traveling bridge crane. 50% duty cycle of the total available capacity of vehicle exhaust can be considered unless specified otherwise by the using service. The using service is responsible for providing the transition connectors (if required, depending on the type of exhaust system provided) between the vehicle exhaust and the vehicle exhaust system installed in the building. All system components must be compatible with the vehicle exhaust temperatures. Unless otherwise indicated by the user, design exhaust outlets for 1400 cfm and 700 degrees F. Exhaust evacuation systems in repair bays intended for repair of tracked vehicles shall be designed to withstand at least 1250 degrees F and shall have two exhaust

outlets evacuating 1400 cfm each which can be connected to tracked vehicle's exhaust grills. Ventilation in the maintenance and repair bays shall be as a minimum per ASHRAE 62.1. Additional makeup air may be needed compensate for the exhaust requirements.

(5) HVAC Controls. HVAC Controls shall be in accordance with paragraph 5.8.3. See Appendix for HVAC Controls for typical control system points schedules. These schedules identify as a minimum points to be monitored and controlled by the building automation system (BAS). See paragraph 6 for any additional installation specific points. Points schedule drawings convey a great deal of information critical to design, installation, and subsequent performance of the control system. It includes hardware input/output information, device ranges and settings, ANSI 709.1 communications protocol data, and information about data that is to be used at the operator workstation by Monitoring and Control software. These schedules are available as an excel spread sheet and as AutoCAD drawings on Engineering Knowledge Online (EKO) website <https://eko.usace.army.mil/fa/bas/>. Point schedule of system types not addressed in the appendix shall be developed by the Contractor, and shall be sufficiently detailed to a level consistent to a similar listed system in the appendix. It is recommended that all of the guidance and instruction documents be reviewed prior to using any of the info, as the documents provide necessary and critical information to the use of website drawings and other information.

3.1.8. Plumbing

(1) Trench Drains. Design trench drain for easy cleaning. Provide basket strainers to facilitate trash removal where trench drains discharge to piping systems. Convey waste to exterior oil/water separator prior to discharge to the sanitary sewer system. When a dedicated, partitioned welding area is provided, provide a solid cover to the trench drain where it runs through the welding area.

(2) Emergency Showers and Eye Washes. See Section 3.1.1 (3) (b) for eye wash, hand held drench hose and emergency shower requirements within the repair and maintenance areas and core area.

(3) Compressed Air. Provide the compressed air outlets with quick disconnect couplings in all repair and maintenance areas, along the vehicle corridor, at two places in the pit, and in the Consolidated Bench Repair area. Provide one compressed air outlet per bench in Consolidated Bench Repair area. Each drop shall include an isolation valve, filter and pressure regulator, condensate trap with drain cock. Provide air compressor with receiver, refrigerated air dryer, filtration and pressure regulation. The air compressor shall be installed building equipment. Size air compressor for 10 CFM per outlet in repair and maintenance areas and 5 cfm per outlet in the Consolidated Bench Repair area, with a 60 percent diversity (assume 60% of all drops in the facility will be in use at the same time), plus any additional compressed-air equipment in the facility. Unless otherwise indicated by the user requirements in paragraph 6, provide compressed air at 125 psi.

(4) Sump Pump. Provide sump pump in maintenance pit and elevator pit. Determine if maintenance pit sump pump shall be explosion proof type and provide explosion type, if required. Sump pump shall be submersible type and shall be capable of handling small amounts of oil and anti-freeze. Maintenance pit and elevator pit sumps shall discharge to an oil water separator.

3.1.9. Electrical and Telecommunications Systems

See Paragraph 6 for work to be performed by others (work indicated in paragraph 3 shall be a part of this contract unless otherwise indicated in paragraph 6), clarifications and additional requirements for the electric and telecommunications systems.

(1) Exterior Electrical Distribution System

(a) Parking Pad and Power Connections. Provide power connections to hardstand for existing equipment as required in Features Matrix.

(2) Exterior Lighting

(a) Exterior Lighting General. Exterior lighting systems inside the TEMF security fence shall be provided for sidewalks, roadways, service yards, facility aprons, open storage areas and parking areas. Exterior lighting shall consist of high intensity discharge (HID) light fixtures, mounted on poles located within the AT/FP fence line clear zone and elsewhere as required to attain illumination levels and uniformity. Poles located within the service yards, facility aprons and hardstand parking areas shall be located and protected to minimize damage from vehicles. Building-mounted light fixtures may be used around the building perimeter to supplement pole mounted light fixtures. Building mounted light fixtures used solely for building perimeter and doorway lighting may be fluorescent. Illumination levels shall be 5 foot-candles for areas adjacent to the primary facility and no less than 0.5 foot-candles

for parking areas. Exterior lighting shall be controlled by a photosensor or astronomical time clock that is capable of automatically turning off the exterior lighting when sufficient daylight is available or the lighting is not required.

(b) Perimeter Security Lighting. Protective lighting systems shall be provided in response to project specific requirements to deter trespassers and make them visible to guards. Levels of exterior lighting for protected areas shall conform to the requirements in the IESNA Lighting Handbook. Lighting circuits shall be controlled by a photosensor with manual override.

(3) Exterior Communication Services

(a) Parking Pad and Data Connections. None required

(4) Interior Electrical and Telecommunications

(a) Electrical

i. Power Service. In the electrical equipment room provide a space for 3-phase, 200 ampere breaker with additional 3-phase, 200 ampere power capacity for this breaker in the main switch board. Installation shall conform to NFPA 70, National Electrical Code.

ii. Nonlinear Loads. The effect of nonlinear loads such as computers and other electronic devices shall be considered and accommodated as necessary. These loads generate harmonics, which can overload conventionally sized conductors or equipment and thereby cause safety hazards and premature failures. Circuits serving such devices shall be equipped with a separate neutral conductor not shared with other circuits. Panelboards and any dry type transformers shall be rated accordingly.

iii. Lightning Protection System and Transient Voltage Surge Protection. Design shall be in accordance with NFPA 780 and other referenced criteria. Provide transient voltage surge protection. All tactical equipment maintenance facilities are classified as mission essential and continuity of facility services is required for lightning protection risk assessments.

(b) Receptacles. Power receptacles shall be provided per NFPA 70 and in conjunction with the proposed equipment and furniture layouts. Provide power connectivity to each workstation. Provide a duplex receptacle adjacent to each duplex voice/data and CATV outlet.

(c) Special Power Requirements. Electrical power outlets for special power shall be coordinated with workbench locations in shops and provided in the maintenance areas. Both low voltage and high frequency power may be required in some areas. See the TEMF Features Matrix. Coordinate with the User for the electrical characteristics of the equipment to be provided by the Government.

(d) Hazardous Locations. Hazardous locations shall be clearly defined on the drawings by the designer based on the intended use of the facility and applicable criteria. Receptacles, devices, equipment and wiring in hazardous locations shall be designed (UL listed for the application) and installed in accordance with the NFPA codes. When hazardous locations are determined to be up to 18 inches above the finished floor, receptacles and devices and conduit routing to them shall be installed above the hazardous area, where possible.

(e) Lighting. Lighting and lighting controls shall comply with the recommendations of the Illumination Engineering Society of North America (IESNA) and the requirements of ASHRAE 90.1.

i. Office, Training Room and Conference Room Lighting. Interior ambient illumination shall provide a generally glare free, high quality lighting environment conforming to IESNA RP-1-04. Training rooms and conference rooms shall have a dimmable circuit providing general lighting without glare on audio-video displays. Dimming ballasts shall be capable of dimming to 5 percent.

ii. Repair and Maintenance Areas. Illumination of the repair maintenance areas shall consist of T5, T5HO, T8 or solid state fluorescent light fixtures. The fixture layout shall be coordinated with the traveling bridge crane requirements.

iii. Maintenance Pit Lighting. Illumination in maintenance pits shall consist of T5, T5HO, T8 fluorescent linear or solid state light fixtures mounted in the pit area for general illumination. Task illumination shall be provided by no fewer than four pit-mounted incandescent, compact fluorescent, or metal halide adjustable, or solid state swing-arm task lights. In lieu of swing-arm task lights, no fewer than two receptacles with cord and plug incandescent, compact fluorescent or metal halide portable safety lights may be provided. Each cord shall be of adequate length to service no less than 60 percent of the pit area. All equipment shall be suitable for the hazardous classification of the pit.

iv. Illumination Levels. Maintained Illumination levels shall be in accordance with the Table 4 below. Maintained illumination levels in areas not included in Table 4 shall comply with the recommendations of the IESNA Lighting Handbook. Illumination levels in maintenance pits shall be calculated based on no contribution from the overhead ambient light fixtures.

TABLE 4 ILLUMINATION LEVELS	
FUNCTIONAL AREA	FOOT CANDLES
Administration and Shop Control	50
Warehouse, Storage, and Miscellaneous Rooms	20
Latrines, Showers, and Lockers	20
Break, Training, and Conference	30
Repair and Maintenance Areas	50
Weapons Storage and COMSEC Vaults	50
Maintenance Pit	15
Repair Shops (General Item, Compact Item, Special Environment, Battery, etc.)	50
Electrical/Mechanical Rooms	30

(f) Telecommunications System including Telecommunications and SIPRNET Minimum Room Sizes - Telecommunication Pathways, Outlets and Cabling. Telecommunications cabling shall be Category 6 for all voice and data connections unless length of run warrants need for multimode fiber optic cable. Provide number and type of connectors as defined by the User. Telecommunications outlets and conduits shall be provided in core areas and supply administration areas with a minimum of one outlet in each work area. Each Training Room shall have a voice outlet. Each Training Room shall have a data connection for each seat and for an instructor. Each repair area workstation shall have access to a data connection. In administration and shop control areas provide a voice and data outlet for every workstation. A data outlet shall be provided at each copier location. Provide a single jack outlet for wall mounted GFGI phones in mechanical, electrical, vaults, telecommunications room and corridors. For controlled access facilities, provide outlets for wall mounted GFGI phones at primary entrance. Additional outlet locations may be provided based on coordination with the facility User and where required for HVAC equipment or other equipment. Provide outlets per I3A technical criteria and Table 5 below. Provide Telecommunications and SIPRNET rooms minimum sizes as indicated in Table 5A below.

TABLE 5 OUTLET DENSITIES	
FUNCTIONAL AREA	AREA PER OUTLET (SF)
Administration and Shop Control	80
Latrines, Showers, and Lockers	0
Break, Training, and Conference	80
Repair and Maintenance Areas	500

Weapons Storage and COMSEC Vaults	80
Repair Shops (Consolidated bench repair, Battery, etc)	80

TEMF	Telecommunications Room		SIPRNET Room	
Floor	Width Feet (min)	Square Feet (min)	Width Feet (min)	Length Feet (min)
1st Small	8	150	6	6
1st Medium	8	150	6	6
2nd Medium	8	110	None	None
1st Large	8	150	6	6
2nd Large	8	110	None	None
1st EXLarge	8	150	6	6
2nd EXLarge	8	150	None	None

General Notes:
1. Width is a minimum inside edge of wall to inside edge of wall dimension inside the room. Length shall be greater than or equal to width.
2. The Telecomm room shall not be less than the minimum width and square feet indicated above and the SIPRNET rooms shall not be less than the minimum width not be less than the minimum width and length indicated above.
Telecommunications and SIPRNET rooms shall be rectangular in shape.

(g) Cable Television (CATV). A minimum of two CATV outlets shall be provided in the Break, Training, and Conference Room and Admin and Shop Control Room. The cable television system shall consist of cabling, pathways and outlets. All building CATV systems shall conform to applicable criteria to include I3A Technical Criteria and the UFC 3-580-01 Telecommunications Building Cabling Systems Planning Design.

(h) Audio/Visual Systems

i. Audio/Visual Systems. Provisions (consisting of a power receptacle and conduit for signal wiring) for a GFGI projector shall be provided in each Training Room.

ii. Paging Systems. A paging system shall be provided for the repair areas and maintenance areas with the microphone located in the administration and shop control area. The system shall be zoned for multiple bay operation and shall have input from the telephone system.

(i) Security Infrastructure. The security infrastructure shall be installed to support GFGI equipment including cameras, door alarms, and motion sensors.

i. Intrusion Detection and Security Systems. Provision for user provided ICIDS intrusion detection and security systems are required for secure and restricted areas including the arms vault, COMSEC vault and SIPRNet room. Provisions shall include dedicated power circuits, telecommunications connections, and raceways and signal wiring for user installed devices. System requirements shall be coordinated with the Installation Security Office.

ii. Access Control System. The access control system shall consist of proximity sensors throughout the facility with varying levels of security. System requirements shall be coordinated with the Installation Security Office.

(j) Mass Notification System (MNS). A mass notification system shall be provided as required by UFC 4-010-01.

(k) Grounding. Each maintenance building shall have a ground counterpoise around the building perimeter for grounding incoming service, building steel, lightning protection, telephone service, piping, and internal grounding requirements. Ground busbar shall be provided on walls of each repair area. A grounding point shall be provided in each repair area and each maintenance area. Each repair area and maintenance area is 16' x 32' in size. Grounding points shall be provided in vehicle and equipment parking areas on 40-foot centers (maximum) and coordinated parking layout. It will be acceptable to provide a minimum of one grounding point for every eight vehicles parked in a double row, and one grounding point for every four vehicles parked in a single row

configuration. Equipment parking grounding shall be in accordance with the recommendations of MIL-HNBK-419A, which is referenced in I3A. This includes, but is not limited to, the earth electrode subsystem should exhibit a resistance to earth of 10 ohms or less and multiple ground rods should be interconnected using 1/0 AWG bare copper cable. Install an interior #2 AWG bare tinned copper ground loop around the perimeter of the Fluid Distribution Room for dissipation of potential static charge. Bond ground loop to building structure and grounding riser. Provide thirty (30) #6 AWG bare copper pigtails complete with alligator clips on both ends for grounding of metallic barrels/dispensing equipment. Length of pigtails should be based on potential layout of equipment/drums and the location of ground ring. Additional grounding may be provided based on project requirements. Systems shall conform to NFPA 70 National Electrical Code, NFPA 780 Standard for the Installation of Lightning Protection Systems, local codes and the Technical Criteria for Installation Information Infrastructure Architecture (I3A).

(l) SIPRNET. The SIPRNET room shall be designed and constructed in accordance with the "Building SIPRNET Communication Room – New Construction Guidance", paragraph of the Technical Guide for Integration of SIPRNET (Secret Internet Protocol Router Network). The SIPRNET room design and construction shall be coordinated with local NEC and Physical Security Office. SIPRNET conduit and cable to SIPRNET Drops and the SIPRNET Drops will be provided in the future and is not to be provided as part of this scope of work. Connection to the main telecommunications room from the SIPRNET room shall be via a 2-inch trade size steel conduit. Provide six strands of single mode fiber optic cable from Telecommunications Room to the SIPRNET Room. Provide a communications signal ground bus bar connected to the main communications room signal bus bar via a properly sized ground wire (see MIL-HDBK-419-A, which is referenced in the Technical Guide for the Integration of SIPRNET). Provide one dedicated standard 20-amp duplex receptacle for future SIPRNET rack in addition to convenience receptacles in the SIPRNET room.

(m) Hydraulic Lift. In each pair of repair areas, provide electric power for User provided (GFGI) portable hydraulic lift. Coordinate electrical requirements with the User.

(n) Fire Detection and Alarm

i. A fire alarm and detection system shall be provided for this facility. It shall comply with the requirements of UFC 3-600-01 and NFPA 72. The system shall be addressable and fully compatible with and integrated with the local installation wide central monitoring system. Coordinate fire alarm system requirements with the Fire Department's Representative during design.

ii. All initiating devices shall be connected, Class A, Style 6, to signal line circuits (SLC). All alarm appliances shall be connected to notification appliance circuits (NAC), Class A. A looped conduit system shall be provided so that if the conduit and all conductors within are severed at any point, all NAC and SLC shall remain functional.

iii. Breakglass manual fire alarm stations shall not be used.

iv. Over-voltage and surge protection shall be provided at the input power of all panels.

3.1.10. Energy Conservation

3.1.10.1. Energy Performance. The building, including the building envelope, HVAC, ventilation and exhaust systems, service water heating, power, and lighting systems shall be designed to achieve a non-plug energy consumption that is at least 40% below the consumption of a baseline building meeting the minimum requirements of ANSI/ASHRAE/IESNA Standard 90.1 (see paragraph 5.9 Energy Conservation). (Note: Plug loads shall be included in building energy modeling but are subtracted in the final calculation of Energy Performance. See section "Design After Award" for additional guidance).

3.1.10.2. Required Energy Conservation Features. All items listed in the energy conservation features table shall be provided as a minimum. Additional energy conservation features may be required to meet the above energy performance. The contractor is responsible for determining and providing additional energy conservation features to meet the energy performance requirement.

Climate Zone 3B, Energy Conservation Features Table

Item	Component	Minimum Requirements
Roof	Insulation above deck	
	Metal building roof	R-13 + R-13
	Surface reflectance	0.65
Walls	Steel-framed	

	Metal building	R-13
Slabs	Unheated	NR
	Heated	R-10
Doors	Swinging	U-0.70
	Non-Swinging	U-0.25
Infiltration		0.5 ACH
Vertical Glazing	Window to Wall Ratio (WWR)	< 10%
	Thermal transmittance	U-0.45
	Solar heat gain coefficient (SHGC)	0.44 – N; 0.31 – S, E, W
	South Overhangs	NR
Skylights	Percent roof area	2%
	Thermal transmittance	U-0.69
	SHGC	0.19
Interior Lighting	Lighting Power Density	See Note 3
	Ballast	Electronic ballast
	Daylighting controls ⁴	Yes
	Automatic Lighting Shutoff	Occupancy sensors for all unoccupied spaces and where feasible for all occupied spaces
Ducts	Sealing	Seal class B
	Location	Interior only
	Insulation level ⁵	R-6
Service Water Heating	Gas storage	90% E _t

1. Not Used
2. NR means there is no requirement or recommendation for a component in this climate.
3. Lighting power densities in accordance with the following table:

Lighting Power Densities

Zone	Baseline	Minimum Requirements
Repair Bay	1.7 W/ft ² (18.3 W/m ²)	1.3 W/ft ² (14.0 W/m ²)
Vehicle Corridor	0.7 W/ft ² (7.5 W/m ²)	0.7 W/ft ² (7.5 W/m ²)
Showers	Use ASHRAE 90.1	0.6 W/ft ² (6.5 W/m ²)
Storage 1	Use ASHRAE 90.1	0.9 W/ft ² (9.7 W/m ²)
Consolidated Bench	1.9 W/ft ² (20.5 W/m ²)	1.3 W/ft ² (14.0 W/m ²)
Storage 2	Use ASHRAE 90.1	0.9 W/ft ² (9.7 W/m ²)
Office	Use ASHRAE 90.1	0.9 W/ft ² (9.7 W/m ²)

4. Daylighting should be included in the repair bays, vehicle corridor, and office.

5. The duct and pipe insulation values are from the ASHRAE Advanced Energy Design Guide for Small Offices.

System	Minimum Requirements	
	Fan Motor	Total Fan
Repair Bay	0.90	0.45
Vehicle Corridor	0.90	0.45
Showers	0.85	0.34
Storage 1	0.85	0.34
Consolidated Bench	0.90	0.45
Storage 2	0.85	0.34
Office	0.85	0.34
Fan Coil Units	0.85	0.34

3.1.10.3. Compliance Documentation

The required energy conservation features shown in the table above contributes to the achievement of the above energy performance and are life cycle cost effective for a TEMF. Use of the required energy conservation features does not eliminate the requirement for energy analysis calculations documenting compliance. The design-build contractor must document compliance with the above energy performance utilizing the methodology described in ASHRAE 90.1 Appendix G as discussed in section 01 33 16, Design After Award. The design analysis shall document each of the features selected to achieve the specified energy performance.

3.1.10.4. Schedules. The following load schedules must be used in all facility energy simulations for purposes of showing compliance with Paragraph 3.1.10.1.

Hr	Occupancy			Lighting			Plug Loads			Service Hot Water		
	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun
1	0	0	0	0.04	0.04	0.04	0.2	0.2	0.2	0.03	0.03	0.03
2	0	0	0	0.04	0.04	0.04	0.2	0.2	0.2	0.03	0.03	0.03
3	0	0	0	0.04	0.04	0.04	0.2	0.2	0.2	0.03	0.03	0.03
4	0	0	0	0.04	0.04	0.04	0.2	0.2	0.2	0.03	0.03	0.03
5	0	0	0	0.04	0.04	0.04	0.2	0.2	0.2	0.03	0.03	0.03
6	0	0	0	0.04	0.04	0.04	0.2	0.2	0.2	0.03	0.03	0.03
7	0	0	0	0.04	0.04	0.04	0.2	0.2	0.2	0.03	0.03	0.03
8	0.15	0	0	0.4	0.04	0.04	0.5	0.2	0.2	0.1	0.03	0.03
9	0.7	0	0	0.9	0.04	0.04	0.8	0.2	0.2	0.7	0.03	0.03
10	0.9	0	0	0.9	0.04	0.04	0.9	0.2	0.2	0.7	0.03	0.03
11	0.9	0	0	0.9	0.04	0.04	0.9	0.2	0.2	0.7	0.03	0.03
12	0.9	0	0	0.9	0.04	0.04	0.9	0.2	0.2	0.7	0.03	0.03
13	0.5	0	0	0.8	0.04	0.04	0.8	0.2	0.2	0.7	0.03	0.03
14	0.85	0	0	0.9	0.04	0.04	0.9	0.2	0.2	0.7	0.03	0.03
15	0.85	0	0	0.9	0.04	0.04	0.9	0.2	0.2	0.7	0.03	0.03
16	0.85	0	0	0.9	0.04	0.04	0.9	0.2	0.2	0.7	0.03	0.03
17	0.2	0	0	0.9	0.04	0.04	0.9	0.2	0.2	0.2	0.03	0.03
18	0	0	0	0.3	0.04	0.04	0.4	0.2	0.2	0.03	0.03	0.03
19	0	0	0	0.04	0.04	0.04	0.2	0.2	0.2	0.03	0.03	0.03
20	0	0	0	0.04	0.04	0.04	0.2	0.2	0.2	0.03	0.03	0.03

Hr	Occupancy			Lighting			Plug Loads			Service Hot Water		
21	0	0	0	0.04	0.04	0.04	0.2	0.2	0.2	0.03	0.03	0.03
22	0	0	0	0.04	0.04	0.04	0.2	0.2	0.2	0.03	0.03	0.03
23	0	0	0	0.04	0.04	0.04	0.2	0.2	0.2	0.03	0.03	0.03
24	0	0	0	0.04	0.04	0.04	0.2	0.2	0.2	0.03	0.03	0.03

3.1.11. Equipment and Furniture:

(a) Equipment and furniture are necessary to make TEMF ready for daily operations. Some items are provided as integral parts of the building construction. Most furniture and equipment must be provided by others. Table 6 shows typical contract provided equipment that is needed to make TEMF ready for operations.

TABLE 6 INSTALLED BUILDING EQUIPMENT		
Area	Equipment Class ¹	Equipment/Furniture Item
Repair Areas	CFCI	Exhaust System
	CFCI	Bridge Crane
	CFCI	Compressed Air
Maintenance Areas	CFCI	Bridge Crane
	CFCI	Maintenance Pit
	CFCI	Compressed Air
	CFCI	Dispensing/Disposal System
	CFCI	Emergency Eye Wash, hand wash and shower station
Administration and Shop Control	CFCI	Window/Reception Counter
	CFCI	Fire Extinguisher Cabinets
Consolidated Bench	CFCI	Compressed Air
Tool Room	CFCI	
Tool Box Storage	CFCI	Window/Reception Counter
Combat Spares	CFCI	Window/Reception Counter
Latrines, Showers & Lockers	CFCI	Lockers and Benches
Break, Training, Conference Room	CFCI	Counter with Sink
Weapons & COMSEC Vaults	CFCI	Vault Door
Site	CFCI	Oil/Water Separator

Note (1): CFCI is Contractor Furnished/Contractor Installed equipment. This equipment is always MCA funded and is part of the construction contract.

(b) Furniture Systems. The following criterion describes the furnishing requirements for all room types. Furnishings, other than installed building equipment, are to be Government-furnished and Government-installed

(GFGI) unless otherwise specified in this document. The following furnishings table is provided for coordination of room and office layouts to ensure suitability for their intended function.

Table 7: Room Size and Furnishings Chart

Table 7- Room Size and Furnishings Chart				
Room	Description	NSF	Comments	Furniture Required
Admin & Shop Control	Administration & Shop Control	Varies	OPEN-PLAN OFFICE	Systems furniture open plan office area with workstations, approx. 64 SF, with work surfaces, file drawers and overhead storage each for six staff members in Small TEMF, 16 staff members in Medium TEMF, 40 staff members in Large TEMF, and 57 staff members in Extra Large TEMF. Records section to have min. of 1 LF of 4 –drawer horizontal file cabinet for every 4 SF of room (250 SF room = min. 62.5 LF 4-drawer horizontal base files).
TRAINING ROOM	Training Room	1080	CLASSROOM	1 desk and chair for each 20 SF to accommodate min. 30 students.
BREAK ROOM/ CONF/ TRAIN	Break Room/ with adjacent Multi-purpose Space	Varies	STAFF BREAK AREA & CONFERENCE ROOM	Min. 10 LF base and wall cabinets with space for commercial grade refrigerator with ice maker. Provide seating and tables to accommodate approx. 40 percent of the building occupants.
ARMS VAULT	Class 5A Vault	300	CONSTRUCTED IN ACCORDANCE WITH AR 190-11, APP G.	1 desk to accommodate a computer, 1 task chair, 1 bookcase for manuals, one 4-drawer file cabinet, and 1 work bench.
COMSEC VAULT	Class 5V Vault	300	CONSTRUCTED IN ACCORDANCE WITH AR 380-5.	1 desk to accommodate a computer, 1 task chair, 1 bookcase for manuals, 4 lockable metal cabinets with shelves, two 4-drawer file cabinets, industrial shelving approximately 10'wx4'dx6'h each.
COMBAT SPARES	Spare Parts	Varies	STORAGE ROOM	1 desk to accommodate a computer, 1 task chair, one 4-drawer file cabinet, and 4 lockable metal cabinets with shelves.
TOOL ROOM	Tools and Tool Set Storage	Varies	STORAGE ROOM	1 desk to accommodate a computer, 1 task chair, one 4-drawer file cabinet, and 4 lockable metal cabinets with shelves.
SECURE STOR.	Secure Storage	300	CONSTRUCTED IN ACCORDANCE WITH RISK LEVEL II ANALYSIS OF AR 190-51.	4 lockable metal cabinets with shelves and industrial shelving approximately 10'wx2'dx6'h each - 1 for small TEMF, 2 for medium, 3 for large, and 4 for extra large.
CONSOLD. BENCH REPAIR	Consolidated Bench Repair	Varies	WORK AREA	Min. 16 SF of work bench space for each assigned repair technician – 6 for small TEMF, 20 for Medium, 36 for Large, and 71 for Extra Large.

3.2. FUNCTIONAL AND OPERATIONAL REQUIREMENTS

(a) Small TEMF. The nominal square footage (NSF) shown for each space below is used for programming purposes, and as a basis for computing the maximum allowable gross area of the facility. The floor plan provided should be used for building layout.

SMALL TEMF				

CORE ANALYSIS BY FUNCTIONAL AREA	NUMBER OF PERSONNEL			NSF
Administration & Shop Control	6			780
Training Room	0			1,080
Consolidated Bench	6			630
Combat Spares	0			200
Tool Room	0			200
Tool Box Storage	0			100
Latrine	0			1,000
Break, Training & Conference	0			250
Weapons Vault	0			300
COMSEC Vault	0			300
Secure Storage	0			300
Telecommunications Room (NIPRNet)	0			150
Telecommunications Room (SIPRNet)	0			150
Core Area (NSF)	12			5440
REPAIR AREA ANALYSIS BY FUNCTIONAL AREA				
	NUMBER OF PERSONNEL	NUMBER OF CIRCULATION AREAS	WORK AREAS (512 NSF)	NSF
Repair Areas				
Maintenance Areas	12		6	3,072
Welding Area			8	4,096
Total Work Areas			2	1,024
Circulation Area			16	8,192
Total Repair Area (NSF)		1		768
	12	1	16	8,960
SHOP TOTAL				
Non-Assignable & Utilities Factor				
SHOP TOTAL				
SHOP TOTAL (GSF)Non-Assignable & Utilities Factor	NUMBER OF PERSONNEL	NUMBER OF CIRCULATION AREAS	WORK AREAS (512 NSF)	
SHOP TOTAL (GSF)				1.25
	24	1	16	18,000
FLOOR PLAN AREA SHOWN				18,000

- (b) Not Used
- (c) Not Used
- (d) Not Used

(e) Architectural TEMF Features Matrix

ARCHITECTURAL TEMF FEATURES MATRIX	COLUMN-FREE SPACE	WIRE MESH ENCLOSURE	STUDWALL PARTITIONS	CONC/CMU IMPACT RESISTANT PARTITIONS	GYPSUM BOARD IMPACT RESISTANT PARTITIONS	WINDOWS TO REPAIR BAYS	WINDOWS TO EXTERIOR	VINYL COMPOSITION TILE	CONCRETE FLOOR HARDENER	CERAMIC TILE FLOOR	PAINTED WALLS	WALL CORNER GUARDS	FINISHED CEILING	MOISTURE RESISTANT CEILING	EXPOSED STRUCTURE OVERHEAD	CEILING HEIGHT 9 FT.	CEILING HEIGHT 12 FT.	10 TON CRANE-HOOK HEIGHT 20 FT (Note 4)	35 TON CRANE-HOOK HEIGHT 25 FT (Note 4)	OPERABLE WINDOW FOR TESTING SIGHTS	LOCKERS	OVERHEAD COILING DOORS - 10 FT. X 10 FT.	OVERHEAD COILING DOORS - 24 FT. X 14 FT IN.	BOLLARDS @ OH DOORS INSIDE/OUTSIDE	GSA CLASS 5 VAULT DOOR	MAINTENANCE PIT	ISSUE WINDOW WITH COUNTER & COILING DOOR	BUILT-IN STORAGE BINS
	FUNCTIONAL AREAS																											
ADMIN & SHOP CONTROL			1			•	•	•			•	•	•															
UNASSIGNED			1			•	•	•			•	•	•															
TOOL ROOM		3			•				•		•	•	•														•	•
TOOL BOX STORAGE		3			•				•		•	•	•														•	•
COMBAT SPARES		2			•				•		•	•	•														•	•
LATRINES, SHOWERS, LOCKERS					•					•	•	•	•									•						
TRAINING ROOM				•				•	•		•	•	•															
BREAK, TRAINING & CONF				•				•	•		•	•	•															
CONSOLIDATED BENCH REPAIR					•				•		•	•	•															
WEAPONS STORAGE VAULT		2			•				•		•	•	•					6									•	
COMSEC VAULT		2			•				•		•	•	•					6									•	
NONSENSITIVE SECURE STORAGE					•				•		•	•	•															
COMMUNICATION VEHICLE DOCK																												
CORRIDOR					•			5			•	•	•															
MECHANICAL ROOM					•				•		•	•	•															
ELECTRICAL ROOM					•				•		•	•	•															
COMMUNICATIONS ROOM					•				•		•	•	•															
SIPRNet ROOM									•		•	•	•															
FLUID DISTRIBUTION									•		•	•	•									9					•	
REPAIR AREAS	•								•		•	•	•		•												•	•
MAINTENANCE AREAS	•								•		•	•	•		8												•	
HARDSTAND																												
ORG STORAGE	•	•							•		•	•	•														•	
UAV MAINT. AND STORAGE BUILDING	•								•		•	•	•														•	
DISTRIBUTION COMPANY SUPPLY BLDG	•	•							•		•	•	•														•	
HAZ WASTE & POL STORAGE BUILDINGS	•	•							•		•	•	•														•	

Notes for Architectural TEMF Features Matrix

1. Lightweight, non-bearing partitions removable to rearrange space
2. Wire mesh partitions to subdivide where required
3. Wire mesh enclosed for tool storage to facilitate interaction of mechanics and tool room keeper, and for relocation flexibility.
4. Provide either a 10-ton or a 35-ton top running bridge crane for one wing of repair areas and maintenance areas as noted in para. 2.1.
5. VCT in corridor on 2nd Floor (except Small TEMF).

6. Provide top of Concrete Cap at 12'-0". Provide an additional dropped ceiling to protect weapons and COMSEC equipment under repair. Top of caps shall be secure from unauthorized access.
7. All Finishes are considered minimum finishes only.
8. The Maintenance Corridor through the Core Area shall have a minimum 14'-0" clear Ceiling Height.
9. Roll-up doors or double doors may be provided for exterior access to the Fluid Distribution Room based on User preference.

(g) Electrical TEMF Features Matrix

ELECTRICAL/ TELECOMMUNICATIONS TEMF FEATURES MATRIX	POWER	28V DC	120V SINGLE PH	208V SINGLE PH	208-230V 3 PH	208V-400 HZ	208V, 3PH, 50 HZ	FILTERED POWER	GROUND BUSBAR ON WALL	GROUNDING POINTS IN FLR OR HARDSTAND	COMMUNICATIONS	TELEPHONE	DATA CONNECTION	INTERCOM/PAGING/MASS NOTIFICATION	INTRUSION DETECTION SYSTEM	PANABLE ZOOM CAMERA	CATV	LIGHTING	FLUORESCENT	(HID) METAL HALIDE	EXPLOSION PROOF FLUORESCENT	(HID) HIGH PRESSURE SODIUM
	FUNCTIONAL AREAS																					
ADMIN & SHOP CONTROL			•									•	•	•			•		•			
UNASSIGNED			•									•	•	•			•		•			
TOOL ROOM			•		12							•	•	•					•			
TOOL BOX STORAGE			•									•	•	•					•			
COMBAT SPARES			11									•	•	•					•			
LATRINES, SHOWERS, LOCKERS			•											•					•			
TRAINING ROOM			•									•	•	•			•		•			
BREAK, TRAINING & CONF			•									•	•	•			•		•			
CONSOLIDATED BENCH REPAIR		•	•					•	•			•	•	•					•			
WEAPONS STORAGE VAULT			•									•	•	•	•				•			
COMSEC VAULT			•						•			•	•	•	•				•			
NONSENSITIVE SECURE STORAGE			•									•	•	•					•			
COMMUNICATION VEHICLE DOCK			•		5				•			•	•	•					•		•	
CORRIDOR			•									•		•					•			
MECHANICAL ROOM			•									•	•						•			
ELECTRICAL ROOM			•									•	•						•			
COMMUNICATIONS ROOM			•						•			•	•						•			
SIPRNet ROOM			•						•			•			•				•			
FLUID DISTRIBUTION			•									•	•	•					•			
REPAIR AREAS	1	•	•	10	•		4	•	•			•	•			7			•			
MAINTENANCE AREAS		•	•	•	•		4	•	•			•	•			7			•		8	
HARDSTAND					2,6	3				•		•										
ORGANIZATIONAL STORAGE			•									9							•			
UAV MAINT & STORAGE BLDG		•	•						•			•	•						•			
HAZ WASTE & POL STORAGE BUILDINGS			•																•			
DISTRIBUTION COMPANY STORAGE BLDG			•									9							•			

Notes for Electrical TEMF Features Matrix

1. Provide power connections for hook-up of user procured (GFGI) portable steam cleaner for cleaning of engines and engine components in a pair of repair areas. Coordinate power requirements with the User.
2. MILVANS (100A), TOE vans (50A), Hospital (100A, 208V, 3-PH, 5-Wire).
3. LCSS Vans (to be discontinued in future), Patriot Missile Units.
4. For Engineers shop.
5. Communications Vans (100A).
6. Hospital units require 120/208V, 3-PH, 5-Wire connection

7. Provide power and conduit and wiring system(s) for user provided panable zoom camera system; monitored in Admin and Shop Control.

8. Lighting classification for pit lighting shall be determined during the design.

9. Provide 1-4" conduit with a 6 pair copper cable to the Distribution Company

Storage and Organizational Storage Buildings from the main communications room in the TEMF. Conduit and cable routing may be to the nearest telecommunications maintenance hole before routing cable back to the TEMF main communications room. Provide Protected Entrance Terminal (PET) with one 110 type block mounted on a 4 ft by 8 ft backboard mounted vertically. Backboard treatment shall be in accordance with I3A. Provide one wall mounted telephone outlet inside the building. Ground PET in accordance with 250.50 and 800.100 of NFPA 70 National Electrical Code.

10. Provide 208V single phase power in all Repair Areas and with weather proof connection for tire changing machine where shown on the TEMF Standard Drawings.

11. ASLMS Containers

a) The ASLMS Container is provided with the following:

1) Each ASLMS container comes with a set of two – 150 foot cables with each end plug identical. MS part number for the plug used on cable is MS3456W16-10P.

2) Electrical circuit is 20 ampere, 120 volt, single phase.

b) Provide the following power provisions for each ASLMS container:

1) Two dedicated 20 ampere, 120 volt, single phase circuits with a special receptacle for each circuit. MS part number for special receptacle to be provided is MS3451W16-10S.

12. SATS Containers

a) The SATS Container is provided with the following:

1) Integrated 10 KW generator (208V, 3 phase 60 Hz)

2) A wall mounted 100 Amp, 208 volt, 3-phase, 60 Hz AC conforming to MIL-C-22992, Class L, Style P comprised of a MS90558 C 44 4 shell, with an MS14055 insert having insert arrangement 44-12, along with a MS90564 44 C weather-tight cover.

3) Signal entry panel (SEP) with the following connections: RS 232 Male/Female small and large, RJ 11 (phone), RJ 45 (LAN), 10 Base 2 (BNC), and 10 Base T (Ethernet).

b) Provide the following power and data provisions for each SATS container:

1) A branch circuit sized to the full load capacity of the 10kw generator to a weatherproof wall mounted 100 amp disconnect switch located within the cable's reach.

2) A pre-manufacturer cable, stock number 5995-01-435-8697. This cable is 50 foot long with a plug for the SATS receptacle at one end and terminal connections on the other end. Connect the cable's terminal ends to the disconnect switch. Provide a means to hang the cable.

3) A weatherproof RJ 45 (phone) and RJ 45 (LAN) outlet with the conduit and cables (Category 6) to the Communication Room and connect per I3A requirements. Provide 50 feet of exterior cable with appropriate connectors on each end for each outlet. Provide a means to hang the cables.

3.3. References

(1) 40 CFR 261, Identification and Listing of Hazardous Waste

(2) 40 CFR 262, Standards Applicable to Generators of Hazardous Waste

(3) 40 CFR 264, Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

(4) American Society of Mechanical Engineers (AMSE)

ASME HST-1, Performance Standard for Electric Chain Hoists

ASME HST-4, Performance Standard for Overhead Electric Wire Rope Hoists

(5) ANSI Z358.1, American National Standard for Emergency Eyewash and Shower Equipment

(6) Not used.

(7) AR 190-11, Physical Security of Arms, Ammunition, and Explosives (FOUO)

(8) AR 190-51, Security of Unclassified Army Property (Sensitive and Nonsensitive)

(9) AR 380-5, Department of the Army Information Security Program

(10) Crane Manufacturers Association of America (CMAA)

CMAA 70, Top Running and Bridge and Gantry Type Multiple Girder Electric Overhead Traveling Cranes, No. 70

CMAA 74, Top Running and Under Running Single Girder Electric Overhead Cranes

Utilizing Under Running Trolley Hoist, No. 74

(11) Fed Spec AA-V-2737, Modular Vault Systems

(12) TM 5-853-1, Security Engineering Project Development (FOUO)

(13) UFC 3-550-3, Design: Electrical Power Supply and Distribution

(14) AR 380-40, Policy for Safeguarding and Controlling Communications Security (COMSEC) Material (FOUO).

(15) USACE STD 872-90-03, FE6 Chain-Link Security Fence Details

4.0 APPLICABLE CRITERIA

Unless a specific document version or date is indicated, use criteria from the most current references as of the date of issue of the contract or task order, including any applicable addenda, unless otherwise stated in the task order. In the event of conflict between References and/or Applicable Military Criteria, apply the most stringent requirement, unless otherwise specifically noted in the contract or task order.

4.1. INDUSTRY CRITERIA

Applicable design and construction criteria references are listed in Table 1 below. This list is not intended to include all criteria that may apply or to restrict design and construction to only those references listed. See also Paragraph 3 for additional facility-specific applicable criteria.

Table 1: Industry Criteria

Air Conditioning and Refrigeration Institute (ARI)	
ARI 310/380	Packaged Terminal Air-Conditioners and Heat Pumps
ARI 440	Room Fan-Coil and Unit Ventilator
ANSI/ARI 430-99	Central Station Air Handling Units
ARI 445	Room Air-Induction Units
ARI 880	Air Terminals
Air Movement and Control Association (AMCA)	
AMCA 210	Laboratory Methods of Testing Fans for Rating
American Architectural Manufacturers Association (AAMA)	
AAMA 605	Voluntary Specification Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels
AAMA 607.1	Voluntary Guide Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum
AAMA 1503	Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors, and Glazed Wall Sections
American Association of State Highway and Transportation Officials (AASHTO)	
	Roadside Design Guide [guardrails, roadside safety devices]
	Standard Specifications for Transportation Materials and Methods of Sampling and Testing [Road Construction Materials]

	Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals
	Guide for Design of Pavement Structures, Volumes 1 and 2 [pavement design guide]
	A Policy of Geometric Design of Highways and Streets
American Bearing Manufacturers Association (AFBMA)	
AFBMA Std. 9	Load Ratings and Fatigue Life for Ball Bearings
AFBMA Std. 11	Load Ratings and Fatigue Life for Roller Bearings
American Boiler Manufacturers Association (ABMA)	
ABMA ISEI	Industry Standards and Engineering Information
American Concrete Institute	
ACI 302.2R	Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials
ACI 318	Building Code Requirements for Structural Concrete
ACI SP-66	ACI Detailing Manual
ACI 530	Building Code Requirements for Masonry Structures
ADA Standards for Accessible Design	
See US Access Board	ADA and ABA Accessibility Guidelines for Buildings and Facilities, Chapters 3-10.
American Institute of Steel Construction (AISC)	
	Manual of Steel Construction – 13 th Edition (or latest version)
American Iron and Steel Institute	
AISI S100	North American Specification for the Design of Cold-Formed Steel Structural Members
American National Standards Institute 11 (ANSI)	

ANSI Z21.10.1	Gas Water Heaters Vol. 1, Storage water Heaters with Input Ratings of 75,000 Btu per Hour or less
ANSI Z124.3	American National Standard for Plastic Lavatories
ANSI Z124.6	Plastic Sinks
ANSI Z21.45	Flexible Connectors of Other Than All-Metal Construction for Gas Appliances
ANSI/IEEE C2-2007	National Electrical Safety Code
ANSI/AF&PA NDS-2001	National Design Specification for Wood Construction
American Society of Civil Engineers (ASCE)	
ASCE 7	Minimum Design Loads for Buildings and Other Structures
ASCE 37	Design and Construction of Sanitary and Storm Sewers, Manuals and Reports on Engineering Practice [sanitary sewer and storm drain design criteria]
ASCE/SEI 31-03	Seismic Evaluation of Existing Buildings [Existing Building Alteration/Renovation]
ASCE/SEI 41-06	Seismic Rehabilitation of Existing Buildings [Existing Building Alteration/Renovation]
American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)	
ASHRAE 90.1	ANSI/ASHRAE/IESNA 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings
ASHRAE Guideline 0	The Commissioning Process
ASHRAE Guideline 1.1	The HVAC Commissioning Process
ASHRAE Handbooks	Fundamentals, HVAC Applications, Systems and Equipment, Refrigeration (Applicable, except as otherwise specified)
ASHRAE Standard 15	Safety Standard for Refrigeration Systems
ASHRAE Standard 62.1	Ventilation for Acceptable Indoor Air Quality
ASHRAE Standard 55	Thermal Environmental Conditions for Human Occupancy (Design portion is applicable, except where precluded by other project requirements.)

American Society of Mechanical Engineers International (ASME)	
ASME BPVC SEC VII	Boiler and Pressure Vessel Code: Section VII Recommended Guidelines for the Care of Power Boilers
ASME A17.1	Safety Code for Elevators and Escalators
ASME B 31 (Series)	Piping Codes
American Water Works Association (AWWA)	
	Standards [standards for water line materials and construction]
American Welding Society	
	Welding Handbook
	Welding Codes and Specifications (as applicable to application, see International Building Code for example)
Architectural Woodwork Institute (AWI)	
Version 1.2	AWI Quality Standards 7th Edition
Associated Air Balance Council (AABC)	
AABC MN-1	National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems
	AABC Associated Air Balance Council Testing and Balance Procedures
ASTM International	
ASTM C1060-90(1997)	Standard Practice for Thermographic Inspection of Insulation Installations in Envelope Cavities of Frame Buildings
ASTM E 779 (2003)	Standard Test Method for Determining Air Leakage Rate by Fan Pressurization
ASTM E1827-96(2002)	Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door
Builders Hardware Manufacturers Association (BHMA)	
ANSI/BHMA	American National Standards for Builders Hardware

Building Industry Consulting Service International	
	Telecommunications Distribution Methods Manual (TDMM)
	Customer-Owned Outside Plant Design Manual (CO-OSP)
Code of Federal Regulations (CFR)	
49 CFR 192	Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards
10 CFR 430	Energy Conservation Program for Consumer Products
Consumer Electronics Association	
CEA 709.1B	Control Network Protocol Specification
CEA 709.3	Free-Topology Twisted-Pair Channel Specification
CEA 852	Tunneling Component Network Protocols Over Internet Protocol Channels
Electronic Industries Association (EIA)	
ANSI/EIA/TIA 568	Structured Cabling Series
ANSI/EIA/TIA 569	Commercial Building Standard for Telecommunications Pathways and Spaces (includes ADDENDA)
ANSI/TIA/EIA-606	Administrative Standard for the Telecommunications Infrastructure of Commercial Buildings
J-STD EIA/TIA 607	Commercial Building Grounding and Bonding Requirements for Telecommunications
Federal Highway Administration (FHWA)	
	Manual on Uniform Traffic Control Devices for Streets and Highways [signage and pavement markings for streets and highways]
FHWA-NHI-01-021	Hydraulic Engineering Circular No. 22, Second Edition, URBAN DRAINAGE DESIGN MANUAL
Illuminating Engineering Society of North America (IESNA)	
IESNA RP-1	Office Lighting

IESNA RP-8	Roadway Lighting
IESNA Lighting Handbook	Reference and Application
Institute of Electrical and Electronics Engineers Inc. (IEEE)	
	Standard for Use of the International System of Units (SI): the Modern Metric System
Standard 1100	Recommended Practice for Powering and Grounding Sensitive Electronic Equipment
International Code Council (ICC)	
IBC	<p>International Building Code</p> <p>Note: All references in the International Building Code to the International Electrical Code shall be considered to be references to NFPA 70.</p> <p>All references in the International Building Code to the International Fuel Gas Code shall be considered to be references to NFPA 54 and NFPA 58.</p> <p>All references in the International Building Code to the International Fire Code and Chapter 9 shall be considered to be references to Unified Facilities Criteria (UFC) 3-600-01.</p>
IMC	<p>International Mechanical Code –</p> <p>Note: For all references to “HEATING AND COOLING LOAD CALCULATIONS”, follow ASHRAE 90.1</p> <p>Note: For all references to “VENTILATION”, follow ASHRAE 62.1</p>
IRC	International Residential Code
IPC	International Plumbing Code
IEC	Energy Conservation Code (IEC) –Applicable only to the extent specifically referenced herein. Refer to Paragraph 5, ENERGY CONSERVATION requirements.
IGC	International Gas Code - not applicable. Follow NFPA 54, National Fuel Gas Code and NFPA 58, Liquefied Petroleum Gas Code.
International Organization for Standardization (ISO)	
ISO 6781:1983	Qualitative detection of thermal irregularities in building envelopes –

	infrared method
LonMark International (LonMark)	
LonMark Interoperability Guidelines	(available at www.lonmark.org), including: Application Layer Guidelines, Layer 1-6 Guidelines, and External Interface File (XIF) Reference Guide
LonMark Resource Files	(available at www.lonmark.org), including Standard Network Variable Type (SNVT) definitions
Metal Building Manufacturers Association (MBMA)	
	Metal Building Systems Manual
Midwest Insulation Contractors Association (MICA)	
	National Commercial and Industrial Insulation Standards Manual
National Association of Corrosion Engineers International (NACE)	
NACE RP0169	Control of External Corrosion on Underground or Submerged Metallic Piping Systems
NACE RP0185	Extruded, Polyolefin Resin Coating Systems with Adhesives for Underground or Submerged Pipe
NACE RP0285	Corrosion Control of Underground Storage Tank Systems by Cathodic Protection
NACE RP0286	Electrical Isolation of Cathodically Protected Pipelines
National Electrical Manufacturers Association (NEMA)	
National Environmental Balancing Bureau (NEBB)	
	Procedural Standards Procedural Standards for Testing Adjusting Balancing of Environmental Systems
National Fire Protection Association (NFPA)	
NFPA 10	Standard for Portable Fire Extinguishers
NFPA 13	Installation of Sprinkler Systems
NFPA 13R	Residential Occupancies up to and Including Four Stories in Height Sprinkler Systems

NFPA 14	Standard for the Installation of Standpipes and Hose Systems
NFPA 20	Installation of Centrifugal Fire Pumps
NFPA 24 NFPA 25	Standard for the Installation of Private Fire Service Mains and Their Appurtenances [underground fire protection system design] Inspection, Testing And Maintenance Of Water-Based Fire Protection Systems
NFPA 30	Flammable and Combustible Liquids Code
NFPA 30A	Motor Fuel Dispensing Facilities and Repair Garages
NFPA 31	Installation of Oil Burning Equipment
NFPA 54	National Fuel Gas Code
NFPA 58	Liquefied Petroleum Gas Code
NFPA 70	National Electrical Code
NFPA 72	National Fire Alarm Code
NFPA 76	Fire Protection of Telecommunications Facilities
NFPA 80	Standard for Fire Doors and Fire Windows
NFPA 90a	Installation of Air Conditioning and Ventilating Systems
NFPA 96	Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations
NFPA 101	Life Safety Code
NFPA 780	Standard for the Installation of Lightning Protection Systems
National Roofing Contractor's Association (NRCA)	
	Roofing and Waterproofing Manual
National Sanitation Foundation, International	
NSF/ANSI Std. 2, 3, 4, 5, 6, 7, 8, 12, 13, 18, 20, 21, 25, 29, 35, 36, 37, 51, 52, 59,	Food Equipment Standards

169	
ANSI/UL Std. 73, 197, 471, 621, 763	Food Equipment Standards
CSA Std. C22.2 No. 109, 120, 195	Food Equipment Standards
Occupational Safety and Health Administration (OSHA)	
Title 29, Part 1926	OSHA Construction Industry Standards, Title 29, Code of Federal Regulations, Part 1926, Safety and Health Regulations for Construction
Plumbing and Drainage Institute (PDI)	
PDI G 101	Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data
PDI WH201	Water Hammer Arrestors
Precast Concrete Institute	
PCI Design Handbook	Precast and Prestressed Concrete
Sheet Metal and Air Conditioning Contractor's National Association (SMACNA)	
SMACNA HVAC Duct Construction Standards	HVAC Duct Construction Standards - Metal and Flexible
SMACNA Architectural Manual	Architectural Sheet Metal Manual
SMACNA HVAC TAB	HVAC Systems - Testing, Adjusting and Balancing
State/Local Regulations	
	State Department of Transportation Standard Specifications for Highway and Bridge Construction
	Sedimentation and Erosion Control Design Requirements
	Environmental Control Requirements
	Storm Water Management Requirements
Steel Door Institute (SDI)	

ANSI A250.8/SDI 100	Standard Steel Doors and Frames
Steel Deck Institute	
	SDI Diaphragm Design Manual
Steel Joist Institute	
	Catalog of Standard Specifications and Load Tables for Steel Joists and Joist Girders
Underwriters Laboratories (UL)	
UL 96A	Installation Requirements for Lightning Protection Systems
UL 300	Standard for Safety for Fire Testing of Fire Extinguishing Systems for Protection of Restaurant Cooking Areas
UNITED STATES ACCESS BOARD: U.S. ARCHITECTURAL AND TRANSPORTATION BARRIERS COMPLIANCE BOARD	
ADA and ABA Accessibility Guidelines for Buildings and Facilities	<p>ABA Accessibility Standard for DoD Facilities</p> <p>Derived from the ADA and ABA Accessibility Guidelines: Specifically includes: ABA Chapters 1 and 2 and Chapters 3 through 10.</p> <p>Use this reference in lieu of IBC Chapter 11.</p> <p>Excluded are:</p> <p>(a) Facilities, or portions of facilities, on a military installation that are designed and constructed for use exclusively by able-bodied military personnel (See Paragraph 3 for any reference to this exclusion).</p> <p>(b) Reserve and National Guard facilities, or portions of such facilities, owned by or under the control of the Department of Defense, that are designed and constructed for use exclusively by able-bodied military personnel. (See paragraph 3 for any reference to this exclusion).</p>
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES	
	FDA National Food Code
U.S. GREEN BUILDING COUNCIL (USGBC)	
LEED-NC	Green Building Rating System for New Construction & Major Renovations
	Application Guide for Multiple Buildings and On-Campus Building Projects

4.2. MILITARY CRITERIA

The project shall conform to the following criteria. Certain design impacts and features due to these criteria are noted for the benefit of the offeror. However, all requirements of the referenced criteria will be applicable, whether noted or not, unless otherwise specified herein.

- 4.2.1. Energy Policy Act of 2005 (Public Law 109-58) (applies only to the extent specifically implemented in the contract, which may or may not directly cite or reference EPACT)
- 4.2.2. Executive Order 12770: Metric Usage In Federal Government
- (a) Metric design and construction is required except when it increases construction cost. Offeror to determine most cost efficient system of measurement to be used for the project.
- 4.2.3. TB MED 530: Occupational and Environmental Health Food Sanitation
- 4.2.4. Unified Facilities Criteria (UFC) 3-410-01FA: Heating, Ventilating, and Air Conditioning - applicable only to the extent specified in paragraph 5, herein.
- 4.2.5. Deleted.
- 4.2.6. UFC 3-600-01 Design: Fire Protection Engineering for Facilities. Use the latest edition of the IBC in coordination with this UFC. Use Chapters 3, 6, 7, 33 and UFC 3-600-01. If any conflict occurs between these Chapters and UFC 3-600-01, the requirements of UFC 3-600-01 take precedence. Use UFC 3-600-01 in lieu of IBC Chapters 4, 8,9,10.
- 4.2.7. UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings
- 4.2.8. UFC 4-023-03 Design of Buildings to Resist Progressive Collapse (Use most recent version, regardless of references thereto in other publications)
- (a) Note the option to use tie force method or alternate path design for Occupancy Category II.
- 4.2.9. UFC 4-021-01 Design and O&M: Mass Notification Systems
- 4.2.10. Technical Criteria for Installation Information Infrastructure Architecture (I3A)
- (a) Email: DetrickSECI3Aguide@conus.army.mil
- 4.2.11. U.S. Army Information Systems Engineering Command (USAISEC) TG for the Integration of SECRET Internet Protocol (IP) Router Network (SIPRNET). See Paragraph 3 for applicability to specific facility type. May not apply to every facility. This is mandatory criteria for those facilities with SIPRNET.

5.0 GENERAL TECHNICAL REQUIREMENTS

This paragraph contains technical requirements with general applicability to Army facilities. See also Paragraph 3 for facility type-specific operational, functional and technical requirements. Residential or similar grade finishes and materials are not acceptable for inclusion in these buildings, unless otherwise specifically allowed.

5.1. SITE PLANNING AND DESIGN

5.1.1. STANDARDS AND CODES: The site planning and design shall conform to APPLICABLE CRITERIA and to paragraph 6, PROJECT SPECIFIC REQUIREMENTS.

5.1.2. SITE PLANNING OBJECTIVES: Group buildings in configurations that create a sense of community and promote pedestrian use. See paragraph 3 for additional site planning requirements relating to building functions.

5.1.2.1. Provide enclosures and or visual screening devices for Outdoor Utility such as dumpsters, emergency generators, transformers, heating, ventilation, and air conditioning units from streetscape and courtyard views to limit visual impact. Enclosures shall be compatible with the building they serve and accessible by vehicle. The location of dumpsters can have a significant visual impact and should be addressed as part of an overall building design and incorporated in site planning.

5.1.2.2. Where included in the project, dumpster pads shall be concrete (minimum of 8 inches thick on 4 inch base course, unless site conditions dictate more conservative requirements) and directly accessible by way of a paved service drive or parking lot with adequate overhead clearance for collection vehicles. Provide space at dumpster areas for recycling receptacles. Coordinate with Installation on recycling receptacle types, sizes and access requirements and provide space at dumpster areas to accommodate them.

5.1.2.3. Vehicular Circulation. Apply design vehicle templates provided by the American Association of State Highway and Transportation Officials (AASHTO) to the site design. The passenger car class includes passenger cars and light trucks, such as vans and pick-ups. The passenger car template is equivalent to the non-organizational – privately owned vehicle (POV). The truck class template includes single-unit trucks, recreation vehicles, buses, truck tractor-semi-trailer combinations, and trucks or truck tractors with semi-trailers in combination with full trailers. Provide vehicle clearances required to meet traffic safety for emergency vehicles, service vehicles, and moving vans. Provide required traffic control signage Site entrances and site drive aisles shall maximize spacing between drives, incorporate right-angle turns, and limit points of conflict between traffic. Design Services Drives to restrict access to unauthorized vehicles by removable bollards, gates, or other barriers to meet Anti-Terrorism/Force Protection (ATFP) requirements. Orient service drives to building entrances other than the primary pedestrian entry at the front of the building.

5.1.2.4. Provide Emergency Vehicle Access around the facility and shall be in accordance with AT/FP requirements. Maintain a 33-foot clear zone buffer for emergency vehicles, designed to prevent other vehicles from entering the AT/FP standoff to the building.

5.1.2.5. Clear and grub all trees and vegetation necessary for construction; but, save as many trees as possible. Protect trees to be saved during the construction process from equipment.

5.1.2.6. Stormwater Management. Employ design and construction strategies (Best Management Practices) that reduce stormwater runoff, reduce discharges of polluted water offsite and maintain or restore predevelopment hydrology with respect to temperature, rate, volume and duration of flow to the maximum extent practicable. See paragraph 6, PROJECT SPECIFIC requirements for additional information.

5.1.3. EXTERIOR SIGNAGE: Provide exterior signage in accordance with Appendix H, Exterior Signage. Provide exterior NO SMOKING signage that conveys building and grounds smoking policy.

5.1.4. EXISTING UTILITIES: Base utilities maps and capacities for this site are included as part of this RFP. See paragraph 6 for more detailed information.

5.2. SITE ENGINEERING

5.2.1. STANDARDS AND CODES: The site engineering shall conform to APPLICABLE CRITERIA.

5.2.2. SOILS:

5.2.2.1. A report has been prepared to characterize the subsurface conditions at the project site and is **appended to these specifications**. The report provides a general overview of the soil and geologic conditions with detailed descriptions at discrete boring locations. The Contractor's team shall include a licensed geotechnical engineer to interpret the report and develop earthwork and foundation recommendations and design parameters in which to base the contractor's design. If any additional subsurface investigation or laboratory analysis is required to better characterize the site or develop the final design, the Contractor shall perform it under the direction of a licensed geotechnical engineer. There will be no separate payment for the cost of additional tests. If differences between the Contractor's additional subsurface investigation and the government provided soils report or the reasonably expected conditions require material revisions in the design, an equitable adjustment may be made, in accordance with the provisions of the Differing Site Conditions clause. The basis for the adjustment would be the design and construction appropriate for the conditions described in the Government furnished report or the reasonably expected conditions, in comparison with any changes required by material differences in the actual conditions encountered, in accordance with the terms of contract clause Differing Site Conditions.

5.2.2.2. The contractor's licensed geotechnical engineer shall prepare a final geotechnical evaluation report, to be submitted along with the first foundation design submittal, as described in Section 01 33 16, *Design After Award*.

5.2.3. VEHICLE PAVEMENTS: (as applicable to the project)

5.2.3.1. Design procedures and materials shall conform to one of the following: 1) the USACE Pavement Transportation Computer Assisted Structural Engineering (PCASE) program, 2) American Association of State Highway and Transportation Officials (AASHTO) or, 3) the applicable state Department of Transportation standards in which the project is located. See paragraph 5.2.2.2 and Section 01 33 16 for required information for the Contractor's geotechnical evaluation report. The minimum flexible pavement section shall consist of 2 inches of asphalt and 6 inches of base or as required by the pavement design, whichever is greater, unless specifically identified by the Government to be a gravel road. Design roads and parking areas for a life expectancy of 25 years with normal maintenance. Parking area for tactical vehicles (as applicable to the project) shall be Portland Cement Concrete (PCC) rigid pavement design. For concrete pavements, submit joint layout plan for review and concurrence. Design pavements for military tracked vehicles (as applicable to the project) IAW USACE PCASE. Traffic estimates for each roadway area will be as shown on the drawings or listed in Section 01 10 00 Paragraph 6.4.4. Pavement markings and traffic signage shall comply with the Installation requirements and with the Manual on Uniform Traffic Control Devices.

5.2.3.2. Parking Requirements.

- (a) All handicap POV parking lots (where applicable in the facility specific requirements) shall meet the ADA and ABA Accessibility Guidelines for accessible parking spaces.
- (b) Design POV parking spaces for the type of vehicles anticipated, but shall be a minimum of 9 ft by 18 ft for POVs, except for two wheel vehicles.

5.2.3.3. Sidewalks. Design the network of walks throughout the complex (where applicable) to facilitate pedestrian traffic among facilities, and minimize the need to use vehicles. Incorporate sidewalks to enhance the appearance of the site development, while creating a sense of entry at the primary patron entrances to the buildings. Minimum sidewalk requirements are in Paragraph 3, where applicable and/or paragraph 6 and/or site plans, where applicable..

5.2.4. CATHODIC PROTECTION: Provide cathodic protection systems for all underground metallic systems and metallic fittings/portions of non-metallic, underground systems, both inside and outside the building 5 foot line that are subject to corrosion. Coordinate final solutions with the installation to insure an approach that is consistent with installation cathodic protection programs.

5.2.5. UTILITIES: See paragraph 6.4.6 for specific information on ownership of utilities and utility requirements. Meter all utilities (gas, water, and electric, as applicable) to each facility. For Government owned utilities, install meters that are wireless data transmission capable as well as have a continuous manual reading option. All meters will be capable of at least hourly data logging and transmission and provide consumption data for gas, water, and

electricity. Gas and electric meters will also provide demand readings based on consumption over a maximum of any 15 minute period. Configure all meters to transmit at least daily even if no receiver for the data is currently available at the time of project acceptance. For privatized utilities, coordinate with the privatization utility(ies) for the proper meter base and meter installation.

5.2.6. PERMITS: The CONTRACTOR shall be responsible for obtaining all permits (local, state and federal) required for design and construction of all site features and utilities.

5.2.7. IRRIGATION. Landscape irrigation systems, if provided, shall comply with the following:

5.2.7.1. Irrigation Potable Water Use Reduction. Reduce irrigation potable water use by 100 percent using LEED credit WE1.1 baseline (no potable water used for irrigation), except where precluded by other project requirements.

5.2.8. EPA WaterSense Products and Contractors. Except where precluded by other project requirements, use EPA WaterSense labeled products and irrigation contractors that are certified through a WaterSense labeled program where available.

5.3. ARCHITECTURE AND INTERIOR DESIGN:

This element will be evaluated per APPLICABLE CRITERIA under the quality focus.

5.3.1. STANDARDS AND CODES: The architecture and interior design shall conform to APPLICABLE CRITERIA.

5.3.2. GENERAL: Overall architectural goal is to provide a functional, quality, visually appealing facility that is a source of pride for the installation and delivered within the available budget and schedule.

5.3.3. COMPUTATION OF AREAS: See APPENDIX Q for how to compute gross and net areas of the facility(ies).

5.3.4. BUILDING EXTERIOR: Design buildings to enhance or compliment the visual environment of the Installation. Where appropriate, reflect a human scale to the facility. Building entrance should be architecturally defined and easily seen. When practical, exterior materials, roof forms, and detailing shall be compatible with the surrounding development and adjacent buildings on the Installation and follow locally established architectural themes. Use durable materials that are easy to maintain. Exterior colors shall conform to the Installation requirements. See paragraph 6.

5.3.4.1. Building Numbers: Permanently attach exterior signage on two faces of each building indicating the assigned building number or address. Building number signage details and locations shall conform to Appendix H, Exterior Signage.

5.3.5. BUILDING INTERIOR

5.3.5.1. Space Configuration: Arrange spaces in an efficient and functional manner in accordance with area adjacency matrices.

5.3.5.2. Surfaces: Appearance retention is the top priority for building and furniture related finishes. Provide low maintenance, easily cleaned room finishes that are commercially standard for the facility occupancy specified, unless noted otherwise.

5.3.5.3. Color: The color, texture and pattern selections for the finishes of the building shall provide an aesthetically pleasing, comfortable, easily maintainable and functional environment for the occupants. Coordinate the building colors and finishes for a cohesive design. Select colors appropriate for the building type. Use color, texture and pattern to path or way find through the building. Trendy colors that will become dated shall be limited to non-permanent finishes such as carpet and paint. Select finishes with regards to aesthetics, maintenance, durability, life safety and image. Limit the number of similar colors for each material. Use medium range colors for ceramic and porcelain tile grout to help hide soiling. Plastic laminate and solid surface materials shall have patterns that are mottled, flecked or speckled. Coordinate finish colors of fire extinguisher cabinets, receptacle bodies and plates, fire alarms / warning lights, emergency lighting, and other miscellaneous items with the building interior. Match color of equipment items on ceilings (speakers, smoke detectors, grills, etc.) the ceiling color.

5.3.5.4. Circulation: Circulation schemes must support easy way finding within the building.

5.3.5.5. Signage: Provide interior signage for overall way finding and life safety requirements. A comprehensive interior plan shall be from one manufacturer. Include the following sign types: (1) Lobby Directory, (2) Directional Signs; (3) Room Identification Signs; (4) Building Service Signs; (5) Regulatory Signs; (6) Official and Unofficial Signs (7) Visual Communication Boards (8) NO SMOKING signage that conveys building smoking policy. Use of emblems or logos may also be incorporated into the signage plan.

5.3.5.6. Window Treatment: Provide interior window treatments with adjustable control in all exterior window locations for control of day light coming in windows or privacy at night. Maintain uniformity of treatment color and material to the maximum extent possible within a building.

5.3.6. COMPREHENSIVE INTERIOR DESIGN

5.3.6.1. Comprehensive Interior Design includes the integration of a Structural Interior Design (SID) and a Furniture, Fixtures and Equipment (FF&E) design and package. SID requires the design, selection and coordination of interior finish materials that are integral to or attached to the building structure. Completion of a SID involves the selection and specification of applied finishes for the building's interior features including, but not limited to, walls, floors, ceilings, trims, doors, windows, window treatments, built-in furnishings and installed equipment, lighting, and signage. The SID package includes finish schedules, finish samples and any supporting interior elevations, details or plans necessary to communicate the building finish design and build out. The SID also provides basic space planning for the anticipated FF&E requirements in conjunction with the functional layout of the building and design issues such as life safety, privacy, acoustics, lighting, ventilation, and accessibility. See Section 01 33 16 for SID design procedures.

5.3.6.2. The FF&E design and package includes the design, selection, color coordination and of the required furnishing items necessary to meet the functional, operational, sustainability, and aesthetic needs of the facility coordinated with the interior finish materials in the SID. The FF&E package includes the specification, procurement documentation, placement plans, ordering and finish information on all freestanding furnishings and accessories, and a cost estimate. Coordinate the selection of furniture style, function and configuration with the defined requirements. Examples of FF&E items include, but are not limited to workstations, seating, files, tables, beds, wardrobes, draperies and accessories as well as marker boards, tack boards, and presentation screens. Criteria for furniture selection include function and ergonomics, maintenance, durability, sustainability, comfort and cost. See Section 01 33 16 for FFE design procedures.

5.4. STRUCTURAL DESIGN

5.4.1. STANDARDS AND CODES: The structural design shall conform to APPLICABLE CRITERIA.

5.4.2. GENERAL: The structural system must be compatible with the intended functions and components that allows for future flexibility and reconfigurations of the interior space. Do not locate columns, for instance, in rooms requiring visibility, circulation or open space, including, but not limited to entries, hallways, common areas, classrooms, etc. Select an economical structural system based upon facility size, projected load requirements and local availability of materials and labor. Base the structural design on accurate, site specific geotechnical information and anticipated loads for the building types and geographical location. Consider climate conditions, high humidity, industrial atmosphere, saltwater exposure, or other adverse conditions when selecting the type of cement and admixtures used in concrete, the concrete cover on reinforcing steel, the coatings on structural members, expansion joints, the level of corrosion protection, and the structural systems. Analyze, design and detail each building as a complete structural system. Design structural elements to preclude damage to finishes, partitions and other frangible, non-structural elements to prevent impaired operability of moveable components; and to prevent cladding leakage and roof ponding. Limit deflections of structural members to the allowable of the applicable material standard, e.g., ACI, AISC, Brick Industry Association, etc. When modular units or other pre-fabricated construction is used or combined with stick-built construction, fully coordinate and integrate the overall structural design between the two different or interfacing construction types. If the state that the project is located in requires separate, specific licensing for structural engineers (for instance, such as in Florida, California and others), then the structural engineer designer of record must be registered in that state.

5.4.3. LOADS: See paragraph 3 for facility specific (if applicable) and paragraph 6 for site and project specific structural loading criteria. Unless otherwise specified in paragraph 6, use Exposure Category C for wind. If not

specified, use Category C unless the Designer of Record can satisfactorily justify another Exposure Category in its design analysis based on the facility Master Plan. Submit such exceptions for approval as early as possible and prior to the Interim Design Submittal in Section "Design After Award". Design the ancillary building items, e.g. doors, window jambs and connections, overhead architectural features, systems and equipment bracing, ducting, piping, etc. for gravity, seismic, lateral loads and for the requirements of UFC 4-010-01, DOD Minimum Antiterrorism Standards for Buildings. Ensure and document that the design of glazed items includes, but is not limited to, the following items under the design loads prescribed in UFC 4-010-01:

- (a) Supporting members of glazed elements, e.g. window jamb, sill, header
- (b) Connections of glazed element to supporting members, e.g. window to header
- (c) Connections of supporting members to each other, e.g. header to jamb
- (d) Connections of supporting members to structural system, e.g. jamb to foundation.

5.4.4. TERMITE TREATMENT: (Except Alaska) Provide termite prevention treatment in accordance with Installation and local building code requirements, using licensed chemicals and licensed applicator firm.

5.5. THERMAL PERFORMANCE

5.5.1. STANDARDS AND CODES: Building construction and thermal insulation for mechanical systems shall conform to APPLICABLE CRITERIA.

5.5.2. BUILDING ENVELOPE SEALING PERFORMANCE REQUIREMENT. Design and construct the building envelope for office buildings, office portions of mixed office and open space (e.g., company operations facilities), dining, barracks and instructional/training facilities with a continuous air barrier to control air leakage into, or out of, the conditioned space. Clearly identify all air barrier components of each envelope assembly on construction documents and detail the joints, interconnections and penetrations of the air barrier components. Clearly identify the boundary limits of the building air barriers, and of the zone or zones to be tested for building air tightness on the drawings. Pending the publication of the 2010 version of ASHRAE 90.1, the use of painted interior walls is not an acceptable air barrier method.

5.5.2.1. Trace a continuous plane of air-tightness throughout the building envelope and make flexible and seal all moving joints.

5.5.2.2. The air barrier material(s) must have an air permeance not to exceed 0.004 cfm / sf at 0.3" wg (0.02 L/s.m² @ 75 Pa) when tested in accordance with ASTM E 2178

5.5.2.3. Join and seal the air barrier material of each assembly in a flexible manner to the air barrier material of adjacent assemblies, allowing for the relative movement of these assemblies and components.

5.5.2.4. Support the air barrier so as to withstand the maximum positive and negative air pressure to be placed on the building without displacement, or damage, and transfer the load to the structure.

5.5.2.5. Seal all penetrations of the air barrier. If any unavoidable penetrations of the air barrier by electrical boxes, plumbing fixture boxes, and other assemblies are not airtight, make them airtight by sealing the assembly and the interface between the assembly and the air barrier or by extending the air barrier over the assembly.

5.5.2.6. The air barrier must be durable to last the anticipated service life of the assembly.

5.5.2.7. Do not install lighting fixtures with ventilation holes through the air barrier

5.5.2.8. Provide a motorized damper in the closed position and connected to the fire alarm system to open on call and fail in the open position for any fixed open louvers such as at elevator shafts.

5.5.2.9. Damper and control to close all ventilation or make-up air intakes and exhausts, atrium smoke exhausts and intakes, etc when leakage can occur during inactive periods.

5.5.2.10. Compartmentalize garages under buildings by providing air-tight vestibules at building access points.

5.5.2.11. Compartmentalize spaces under negative pressure such as boiler rooms and provide make-up air for combustion.

5.5.2.12. Performance Criteria and Substantiation: Submit the qualifications and experience of the testing entity for approval. Demonstrate performance of the continuous air barrier for the opaque building envelope by the following tests:

(a) Test the completed building and demonstrate that the air leakage rate of the building envelope does not exceed 0.25cfm/ft² at a pressure differential of 0.3" w.g.(75 Pa) in accordance with ASTM's E 779 (2003) or E-1827-96 (2002). Accomplish tests using either pressurization or depressurization or both. Divide the volume of air leakage in cfm @ 0.3" w.g. (L/s @ 75 Pa) by the area of the pressure boundary of the building, including roof or ceiling, walls and floor to produce the air leakage rate in cfm/ft² @ 0.3" w.g. (L/s.m² @ 75 Pa). Do not test the building until verifying that the continuous air barrier is in place and installed without failures in accordance with installation instructions so that repairs to the continuous air barrier, if needed to comply with the required air leakage rate, can be done in a timely manner.

(b) Test the completed building using Infrared Thermography testing. Use infrared cameras with a resolution of 0.1deg C or better. Perform testing on the building envelope in accordance with ISO 6781:1983 and ASTM C1060-90(1997). Determine air leakage pathways using ASTM E 1186-03 Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems, and perform corrective work as necessary to achieve the whole building air leakage rate specified in (a) above.

(c) Notify the Government at least three working days prior to the tests to provide the Government the opportunity to witness the tests. Provide the Government written test results confirming the results of all tests.

5.6. PLUMBING

5.6.1. STANDARDS AND CODES: The plumbing system shall conform to APPLICABLE CRITERIA.

5.6.2. PRECAUTIONS FOR EXPANSIVE SOILS: Where expansive soils are present, include design features for underslab piping systems and underground piping serving chillers, cooling towers, etc, to control forces resulting from soil heave. Some possible solutions include, but are not necessarily limited to, features such as flexible expansion joints, slip joints, horizontal offsets with ball joints, or multiple bell and spigot gasketed fittings. For structurally supported slabs, suspend piping from the structure with adequate space provided below the pipe for the anticipated soil movement.

5.6.3. HOT WATER SYSTEMS: For Hot Water heating and supply, provide a minimum temp of 140 Deg F in the storage tank and a maximum of 110 Deg F at the fixture, unless specific appliances or equipment specifically require higher temperature water supply.

5.6.4. SIZING HOT WATER SYSTEMS: Unless otherwise specified or directed in paragraph 3, design in accordance with ASHRAE Handbook Series (appropriate Chapters), ASHRAE Standard 90.1, and the energy conservation requirements of the contract. Size and place equipment so that it is easily accessible and removable for repair or replacement.

5.6.5. JANITOR CLOSETS: In janitor spaces/room/closets, provide at minimum, a service sink with heavy duty shelf and wall hung mop and broom rack(s).

5.6.6. FLOOR DRAINS: As a minimum, provide floor drains in mechanical rooms and areas, janitor spaces/rooms/closets and any other area that requires drainage from fixtures or equipment, drain downs, condensate, as necessary.

5.6.7. URINALS: Urinals shall be vitreous china, wall-mounted, wall outlet, non-water using, with integral drain line connection, and with sealed replaceable cartridge or integral liquid seal trap. Either type shall use a biodegradable liquid to provide the seal and maintain a sanitary and odor-free environment. Install, test and maintain in accordance with manufacturer's recommendations. Slope the sanitary sewer branch line for non-water use urinals a minimum of 1/4 inch per foot. Do not use copper tube or pipe for drain lines that connect to the urinal. Manufacturer shall provide an operating manual and on-site training to installation operations personnel for the proper care and maintenance of the urinal. For complexes, non-water using urinals are not required for barracks type spaces.

5.6.8. BUILDING WATER USE REDUCTION. Reduce building potable water use in each building 30 percent using IPC fixture performance requirements baseline.

5.6.9. Do not use engineered vent or Sovent® type drainage systems.

5.6.10. Where the seasonal design temperature of the cold water entering a building is below the seasonal design dew point of the indoor ambient air, and where condensate drip will cause damage or create a hazard, insulate plumbing piping with a vapor barrier type of insulation to prevent condensation. Do not locate water or drainage piping over electrical wiring or equipment unless adequate protection against water (including condensation) damage is provided. Insulation alone is not adequate protection against condensation. Follow ASHRAE Fundamentals Chapter 23, Insulation for Mechanical Systems, IMC paragraph 1107 and International Energy Conservation Code for pipe insulation requirements.

5.7. ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

5.7.1. STANDARDS AND CODES: The electrical systems for all facilities shall conform to APPLICABLE CRITERIA.

5.7.2. MATERIALS AND EQUIPMENT: Materials, equipment and devices shall, as a minimum, meet the requirements of Underwriters Laboratories (UL) where UL standards are established for those items. Wiring for branch circuits shall be copper. Motors larger than one-half horsepower shall be three phase. All electrical systems shall be pre-wired and fully operational unless otherwise indicated. Wall mounted electrical devices (power receptacles, communication outlets and CATV outlets) shall have matching colors, mounting heights and faceplates.

5.7.3. POWER SERVICE: Primary service from the base electrical distribution system to the pad-mounted transformer and secondary service from the transformer to the building service electrical equipment room shall be underground. See paragraph 6 for additional site electrical requirements.

5.7.3.1. Spare Capacity: Provide 10% space for future circuit breakers in all panelboards serving residential areas of buildings and 15% spaces in all other panelboards.

5.7.4. TELECOMMUNICATION SERVICE: Connect the project's facilities to the Installation telecommunications (voice and data) system through the outside plant (OSP) telecommunications underground infrastructure cabling system per the I3A Criteria. Connect to the OSP cabling system from each facility main cross connect located in the telecommunications room.

5.7.5. LIGHTING: Comply with the recommendations of the Illumination Engineering Society of North America (IESNA), the National Energy Policy Act and Energy Star requirements for lighting products..

5.7.5.1. Interior Lighting:

(a) Reflective Surfaces: Coordinate interior architectural space surfaces and colors with the lighting systems to provide the most energy-efficient workable combinations.

(b) High Efficiency Fluorescent Lighting: Utilize NEMA premium electronic ballasts and energy efficient fluorescent lamps with a Correlated Color Temperature (CCT) of 4100K. Linear fluorescent and compact fluorescent fixtures shall have a Color Rendering Index of (CRI) of 87 or higher. Fluorescent lamps shall be the low mercury type qualifying as non-hazardous waste upon disposal. Do not use surface mounted fixtures on acoustical tile ceilings. Provide an un-switched fixture with emergency ballast shall be provided at each entrance to the building.

(c) Solid State Lighting: Fixtures shall provide lighting with a minimum Correlated Color Temperature (CCT) of 4100K and shall have a Color Rendering Index of (CRI) of 75 or higher. Verify performance of the light producing solid state components by a test report in compliance with the requirements of IESNA LM 80. Verify performance of the solid state light fixtures by a test report in compliance with the requirements of IESNA LM 79. Provide lab results by a NVLAP certified laboratory. The light producing solid state components and drivers shall have a life expectancy of 50,000 operating hours while maintaining at least 70% of original illumination level. Provide a complete five year warranty for fixtures.

- (d) Metal Halide Lighting (where applicable): Metal Halide lamp fixtures in the range of 150-500 Watts shall be pulse start type and have a minimum efficiency rating of 88%.
- (e) Lighting Controls: ANSI/ASHRAE/IESNA 90.1 has specific lighting controls requirements. Provide a high level of lighting system control by individual occupants or by specific groups in multi-occupant spaces (classrooms, conference rooms) to promote the productivity, comfort and well being of the building occupants. In office spaces, the preferred lighting should be a 30 FC ambient lighting level with occupancy sensor controlled task lighting in the work spaces to provide a composite lighting level of 50 FC on the working surfaces. Consider incorporating daylighting techniques for the benefit of reducing lighting energy requirements while improving the quality of the indoor spaces. If daylight strategies are used, additional coordination is required with the architect and mechanical engineer. Additionally, incorporate electric lighting controls to take advantage of the potential energy savings.
- (f) Exterior Lighting: See paragraph 6.9 for site specific information, if any, on exterior lighting systems. Minimize light pollution and light trespass by not over lighting and use cut-off type exterior luminaries.

5.7.6. TELECOMMUNICATION SYSTEM: Building telecommunications cabling systems (BCS) and OSP telecommunications cabling system shall conform to APPLICABLE CRITERIA, including but not limited to I3A Technical Criteria. An acceptable BCS encompasses, but is not limited to, copper and fiber optic (FO) entrance cable, termination equipment, copper and fiber backbone cable, copper and fiber horizontal distribution cable, workstation outlets, racks, cable management, patch panels, cable tray, cable ladder, conduits, grounding, and labeling.. Items included under OSP infrastructure encompass, but are not limited to, manhole and duct infrastructure, copper cable, fiber optic cable, cross connects, terminations, cable vaults, and copper and FO entrance cable.

5.7.6.1. Design, install, label and test all telecommunications systems in accordance with the I3A Criteria and ANSI/TIA/EIA 568, 569, and 606 standards. A Building Industry Consulting Services International (BICSI) Registered Communications Distribution Designer (RCDD) with at least 2 yrs related experience shall develop and stamp telecommunications design, and prepare the test plan. See paragraph 5.8.2.5 for design of environmental systems for Telecommunications Rooms.

5.7.6.2. The installers assigned to the installation of the telecommunications system or any of its components shall be regularly and professionally engaged in the business of the application, installation and testing of the specified telecommunications systems and equipment. Key personnel; i.e., supervisors and lead installers assigned to the installation of this system or any of its components shall be BICSI Registered Cabling Installers, Technician Level. Submit documentation of current BICSI certification for each of the key personnel. In lieu of BICSI certification, supervisors and installers shall have a minimum of 5 years experience in the installation of the specified copper and fiber optic cable and components. They shall have factory or factory approved certification from each equipment manufacturer indicating that they are qualified to install and test the provided products.

5.7.6.3. Perform a comprehensive end to end test of all circuits to include all copper and fiber optic cables upon completion of the BCS and prior to acceptance of the facility. Provide adequate advanced notification to the COR to allow COR and Installation personnel attendance The BCS circuits include but are not limited to all copper and fiber optic(FO) entrance cables, termination equipment, copper and fiber backbone cable, copper and fiber horizontal distribution cable, and workstation outlets. Test in accordance with ANSI/EIA/TIA 568 standards. Use test instrumentation that meets or exceeds the standard. Submit the official test report to include test procedures, parameters tested, values, discrepancies and corrective actions in electronic format. Test and accomplish all necessary corrective actions to ensure that the government receives a fully operational, standards based, code compliant telecommunications system.

5.7.7. LIGHTNING PROTECTION SYSTEM: Provide a lightning protection system where recommended by the Lightning Risk Assessment of NFPA 780, Annex L.

5.8. HEATING, VENTILATING, AND AIR CONDITIONING

5.8.1. STANDARDS AND CODES: The HVAC system shall conform to APPLICABLE CRITERIA.

5.8.2. DESIGN CONDITIONS.

5.8.2.1. Outdoor and indoor design conditions shall be in accordance with UFC 3-410-01FA. Outdoor air and exhaust ventilation requirements for indoor air quality shall be in accordance with ASHRAE 62.1. All Buildings with

minimum LEED Silver requirement (or better) will earn LEED Credit EQ 7.1, Thermal Comfort-Design., except where precluded by other project requirements. Where the contract specifies indoor design temperature, airflow, humidity conditions, etc., use those parameters.

5.8.2.2. High Humidity Areas: Design HVAC systems in geographical areas meeting the definition for high humidity in UFC 3-410-01FA to comply with the special criteria therein for humid areas.

5.8.2.3. Cooling equipment may be oversized by up to 15 percent to account for recovery from night setback. Heating equipment may be oversized by up to 30 percent to account for recovery from night setback. Design single zone systems and multi-zone systems to maintain an indoor design condition of 50% relative humidity for cooling only. For heating only where the indoor relative humidity is expected to fall below 20% for extended periods, add humidification to increase the indoor relative humidity to 30%. Provide ventilation air from a separate dedicated air handling unit (DOAU) for facilities using multiple single zone fan-coil type HVAC systems. Do not condition outside air through fan coil units. Avoid the use of direct expansion cooling coils in air handling units with constant running fans that handle outside air.

5.8.2.4. Locate all equipment so that service, adjustment and replacement of controls or internal components are readily accessible for easy maintenance.

5.8.2.5. Environmental Requirements for Telecommunications Rooms,(including SIPRNET ROOMS, where applicable for specific facility type). Comply with ANSI/EIA/TIA 569 and the I3A.

5.8.2.6. Fire dampers: dynamic type with a dynamic rating suitable for the maximum air velocity and pressure differential to which the damper is subjected. Test each fire damper with the air handling and distribution system running.

5.8.3. BUILDING AUTOMATION SYSTEM. Provide a Building Automation System consisting of a building control network, and integrate the building control network into the UMCS as specified.

The building control network shall be a single complete non-proprietary Direct Digital Control (DDC) system for control of the heating, ventilating and air conditioning (HVAC) systems as specified herein. The building control network shall be an Open implementation of LONWORKS® technology using ANSI/EIA 709.1B as the only communications protocol and use only LonMark Standard Network Variable Types (SNVTs), as defined in the LonMark® Resource Files, for communication between DDC Hardware devices to allow multi-vendor interoperability.

5.8.3.1. The building automation system shall be open in that it is designed and installed such that the Government or its agents are able to perform repair, replacement, upgrades, and expansions of the system without further dependence on the original Contractor. This includes, but is not limited to the following:

- (a) Install hardware such that individual control equipment can be replaced by similar control equipment from other equipment manufacturers with no loss of system functionality.
- (b) Necessary documentation (including rights to documentation and data), configuration information, configuration tools, programs, drivers, and other software shall be licensed to and otherwise remain with the Government such that the Government or its agents are able to perform repair, replacement, upgrades, and expansions of the system without subsequent or future dependence on the Contractor.

5.8.3.2. All DDC Hardware shall:

- (a) Be connected to a TP/FT-10 ANSI/EIA 709.3 control network.
- (b) Communicate over the control network via ANSI/EIA 709.1B exclusively.
- (c) Communicate with other DDC hardware using only SNVTs
- (d) Conform to the LonMark® Interoperability Guidelines.
- (e) Be locally powered; link power (over the control network) is not acceptable.
- (f) Be fully configurable via standard or user-defined configuration parameter types (SCPT or UCPT), standard network variable type (SNVT) network configuration inputs (*nci*), or hardware settings on the controller itself to support the application. All settings and parameters used by the application shall be configurable via standard or

user-defined configuration parameter types (SCPT or UCPT), standard network variable type (SNVT) network configuration inputs (*nci*), or hardware settings on the controller itself

(g) Provide input and output SNVTs required to support monitoring and control (including but not limited to scheduling, alarming, trending and overrides) of the application. Required SNVTs include but are not limited to: SNVT outputs for all hardware I/O, SNVT outputs for all setpoints and SNVT inputs for override of setpoints.

(h) To the greatest extent practical, not rely on the control network to perform the application..

5.8.3.3. Controllers shall be Application Specific Controllers whenever an ASC suitable for the application exists. When an ASC suitable for the application does not exist use programmable controllers or multiple application specific controllers.

5.8.3.4. Application Specific Controllers shall be LonMark Certified whenever a LonMark Certified ASC suitable for the application exists. For example, VAV controllers must be LonMark certified.

5.8.3.5. Application Specific Controllers (ASCs) shall be configurable via an LNS plug-in whenever t an ASC with an LNS plug-in suitable for the application exists.

5.8.3.6. Each scheduled system shall accept a network variable of type SNVT_occupancy and shall use this network variable to determine the occupancy mode. If the system has not received a value to this network variable for more than 60 minutes it shall default to a configured occupancy schedule.

5.8.3.7. Gateways may be used provided that each gateway communicates with and performs protocol translation for control hardware controlling one and only one package unit.

5.8.3.8. Not Used

5.8.3.9. Perform all necessary actions needed to fully integrate the building control system. These actions include but are not limited to:

- Configure M&C Software functionality including: graphical pages for System Graphic Displays including overrides, alarm handling, scheduling, trends for critical values needing long-term or permanent monitoring via trends, and demand limiting.
- Install IP routers or ANSI/CEA-852 routers as needed to connect the building control network to the UMCS IP network. Routers shall be capable of configuration via DHCP and use of an ANSI/CEA-852 configuration server but shall not rely on these services for configuration. All communication between the UMCS and building networks shall be via the ANSI/CEA-709.1B protocol over the IP network in accordance with ANSI/CEA-852.

5.8.3.10. Provide the following to the Government for review prior to acceptance of the system:

- The latest version of all software and user manuals required to program, configure and operate the system.
- Points Schedule drawing that shows every DDC Hardware device. The Points Schedule shall contain the following information as a minimum:
 - Device address and NodeID.
 - Input and Output SNVTs including SNVT Name, Type and Description.
 - Hardware I/O, including Type (AI, AO, BI, BO) and Description.
 - Alarm information including alarm limits and SNVT information.
 - Supervisory control information including SNVTs for trending and overrides.
 - Configuration parameters (for devices without LNS plug-ins) Example Points Schedules are available at <https://eko.usace.army.mil/fa/besc/>
- Riser diagram of the network showing all network cabling and hardware. Label hardware with ANSI.CEA-709.1 addresses, IP addresses, and network names.
- Control System Schematic diagram and Sequence of Operation for each HVAC system.
- Operation and Maintenance Instructions including procedures for system start-up, operation and shut-down, a routine maintenance checklist, and a qualified service organization list.
- LONWORKS® Network Services (LNS®) database for the completed system.
- Quality Control (QC) checklist (below) completed by the Contractor's Chief Quality Control (QC) Representative

Table 5-1: QC Checklist

5.8.3.11. Perform a Performance Verification Test (PVT) under Government supervision prior to system acceptance. During the PVT demonstrate that the system performs as specified, including but not limited to demonstrating that the system is Open and correctly performs the Sequences of Operation.

5.8.3.12. Provide a 1 year unconditional warranty on the installed system and on all service call work. The warranty shall include labor and material necessary to restore the equipment involved in the initial service call to a fully operable condition.

5.8.3.13. Provide training at the project site on the installed building system. Upon completion of this training each student, using appropriate documentation, should be able to start the system, operate the system, recover the system after a failure, perform routine maintenance and describe the specific hardware, architecture and operation of the system.

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5.8.4. TESTING, ADJUSTING AND BALANCING. Test and balance air and hydronic systems, using a firm certified for testing and balancing by the Associated Air Balance Council (AABC), National Environmental Balancing Bureau (NEBB), or the Testing Adjusting, and Balancing Bureau (TABB). The prime contractor shall hire the TAB firm directly, not through a subcontractor. Perform TAB in accordance with the requirements of the standard under which the TAB Firm's qualifications are approved, i.e., AABC MN-1, NEBB TABES, or SMACNA HVACTAB unless otherwise specified herein. All recommendations and suggested practices contained in the TAB Standard shall be considered mandatory. Use the provisions of the TAB Standard, including checklists, report forms, etc., as nearly as practicable to satisfy the Contract requirements. Use the TAB Standard for all aspects of TAB, including qualifications for the TAB Firm and Specialist and calibration of TAB instruments. Where the instrument manufacturer calibration recommendations are more stringent than those listed in the TAB Standard, adhere to the manufacturer's recommendations. All quality assurance provisions of the TAB Standard such as performance guarantees shall be part of this contract. For systems or system components not covered in the TAB Standard, the TAB Specialist shall develop TAB procedures. Where new procedures, requirements, etc., applicable to the Contract requirements have been published or adopted by the body responsible for the TAB Standard used (AABC, NEBB, or TABB), the requirements and recommendations contained in these procedures and requirements are mandatory.

5.8.5. COMMISSIONING: Commission all HVAC systems and equipment, including controls, and all systems requiring commissioning for LEED Enhanced commissioning, in accordance with ASHRAE Guideline 1.1, ASHRAE Guideline 0 and LEED. Do not use the sampling techniques discussed in ASHRAE Guideline 1.1 and in ASHRAE Guideline 0. Commission 100% of the HVAC controls and equipment. Hire the Commissioning Authority (CA), certified as a CA by AABC, NEBB, or TABB, as described in Guideline 1.1. The CA will be an independent subcontractor and not an employee of the Contractor nor an employee or subcontractor of any other subcontractor on this project, including the design professionals (i.e., the DOR or their firm(s)). The CA will communicate and report directly to the Government in execution of commissioning activities. The Contracting Officer's Representative will act as the Owner's representative in performance of duties spelled out under OWNER in Annex F of ASHRAE Guideline 0. All buildings with Minimum LEED Silver (or better) requirement will earn LEED Credit EA3 Enhanced Commissioning.

5.9. ENERGY CONSERVATION

5.9.1. The building including the building envelope, HVAC systems, service water heating, power, and lighting systems shall meet the Mandatory Provisions and the Prescriptive Path requirements of ASHRAE 90.1. Substantiation requirements are defined in Section 01 33 16, Design After Award.

5.9.2. Design all building systems and elements to meet the minimum requirements of ANSI/ASHRAE/IESNA 90.1. Design the buildings, including the building envelope, HVAC systems, service water heating, power, and lighting systems to achieve an energy consumption that is at least 40% below the consumption of a baseline building meeting the minimum requirements of ANSI/ASHRAE/IESNA Standard 90.1. Energy calculation methodologies and substantiation requirements are defined in Section 01 33 16, Design After Award.

5.9.3. Purchase Energy Star products, except use FEMP designated products where FEMP is applicable to the type product. The term "Energy Star product" means a product that is rated for energy efficiency under an Energy Star program. The term "FEMP designated product" means a product that is designated under the Federal Energy Management Program of the Department of Energy as being among the highest 25 percent of equivalent products

for energy efficiency. When selecting integral sized electric motors, choose NEMA PREMIUM type motors that conform to NEMA MG 1, minimum Class F insulation system. Motors with efficiencies lower than the NEMA PREMIUM standard may only be used in unique applications that require a high constant torque speed ratio (e.g., inverter duty or vector duty type motors that conform to NEMA MG 1, Part 30 or Part 31).

5.9.4. Solar Hot Water Heating. Provide at least 30% of the domestic hot water requirements through solar heating methodologies, unless the results of a Life Cycle Cost Analysis (LCCA) developed utilizing the Building Life Cycle Cost Program (BLCC) which demonstrates that the solar hot water system is not life cycle cost effective in comparison with other hot water heating systems. The type of system will be established during the contract or task order competition and award phase, including submission of an LCCA for government evaluation to justify non-selection of solar hot water heating. The LCCA uses a study period of 25 years and the Appendix K utility cost information. The LCCA shall include life cycle cost comparisons to a baseline system to provide domestic hot water without solar components, analyzing at least two different methodologies for providing solar hot water to compare against the baseline system.

5.9.5. Process Water Conservation. When potable water is used to improve a building's energy efficiency, employ lifecycle cost effective water conservation measures, except where precluded by other project requirements.

5.9.6. Renewable Energy Features. The Government's goal is to implement on-site renewable energy generation for Government use when lifecycle cost effective. See Paragraph 6, PROJECT SPECIFIC REQUIREMENTS for renewable energy requirements for this project.

5.10. FIRE PROTECTION

5.10.1. STANDARDS AND CODES Provide the fire protection system conforming to APPLICABLE CRITERIA.

5.10.2. Inspect and test all fire suppression equipment and systems, fire pumps, fire alarm and detection systems and mass notification systems in accordance with the applicable NFPA standards. The fire protection engineer of record shall witness final tests. The fire protection engineer of record shall certify that the equipment and systems are fully operational and meet the contract requirements. Two weeks prior to each final test, the contractor shall notify, in writing, the installation fire department and the installation public work representative of the test and invite them to witness the test.

5.10.3. Fire Extinguisher Cabinets: Provide fire extinguisher cabinets and locations for hanging portable fire extinguishers in accordance with NFPA 10 Standard for Portable Fire Extinguishers. The Government will furnish and install portable fire extinguishers, which are personal property, not real property installed equipment.

5.10.4. Fire alarm and detection system: Required fire alarm and detection systems shall be the addressable type. Fire alarm initiating devices, such as smoke detectors, heat detectors and manual pull stations shall be addressable. When the system is in alarm condition, the system shall annunciate the type and location of each alarm initiating device. Sprinkler water flow alarms shall be zoned by building and by floor. Supervisory alarm initiating devices, such as valve supervisory switches, fire pump running alarm, low-air pressure on dry sprinkler system, etc. shall be zoned by type and by room location.

5.10.5. Roof Access: Paragraph 2-9 of UFC 3-600-01 Fire Protection for Facilities will be modified in the next update to that UFC. Pending revision, comply with roof access and stairway requirements in accordance with the International Building Code. Where roof access is required by the IBC or other criteria, comply with UFC 4-010-01, Anti-Terrorist Force Protection, Standard 14. "Roof Access".

5.10.6. Fire Protection Engineer Qualifications: In accordance with UFC 3-600-01, FIRE PROTECTION ENGINEERING FOR FACILITIES, the fire protection engineer of record shall be a registered professional engineer (P.E.) who has passed the fire protection engineering written examination administered by the National Council of Examiners for Engineering and Surveys (NCEES), or a registered P.E. in a related engineering discipline with a minimum of 5 years experience, dedicated to fire protection engineering that can be verified with documentation.

5.11. SUSTAINABLE DESIGN

5.11.1. STANDARDS AND CODES: Sustainable design shall conform to APPLICABLE CRITERIA. See paragraph 6, PROJECT-SPECIFIC REQUIREMENTS for which version of LEED applies to this project. The LEED-NC

Application Guide for Multiple Buildings and On-Campus Building Projects (AGMBC) applies to all projects. Averaging may be used for LEED compliance as permitted by the AGMBC but is restricted to only those buildings included in this project. Each building must individually comply with the requirements of paragraphs ENERGY CONSERVATION and BUILDING WATER USE REDUCTION.

5.11.2. LEED RATING, REGISTRATION, VALIDATION AND CERTIFICATION: See Paragraph PROJECT-SPECIFIC REQUIREMENTS for project minimum LEED rating/achievement level, for facilities that are exempt from the minimum LEED rating, for LEED registration and LEED certification requirements and for other project-specific information and requirements.

5.11.2.1. Innovation and Design Credits. LEED Innovation and Design (ID) credits are acceptable only if they are supported by formal written approval by GBCI (either published in USGBC Innovation and Design Credit Catalog or accompanied by a formal ruling from GBCI). LEED ID credits that require any Owner actions or commitments are acceptable only when Owner commitment is indicated in paragraph PROJECT-SPECIFIC REQUIREMENTS or Appendix LEED Project Credit Guidance

5.11.3. OPTIMIZE ENERGY PERFORMANCE. : Project must earn, as a minimum, the points associated with compliance with paragraph ENERGY CONSERVATION. LEED documentation differs from documentation requirements for paragraph ENERGY CONSERVATION and both must be provided. For LEED-NC v2.2 projects you may substitute ASHRAE 90.1 2007 Appendix G in its entirety for ASHRAE 90.1 2004 in accordance with USGBC Credit Interpretation Ruling dated 4/23/2008.

5.11.4. COMMISSIONING. See paragraph 5.8.5 COMMISSIONING for commissioning requirements. USACE templates for the required Basis of Design document and Commissioning Plan documents are available at <http://en.sas.usace.army.mil> (click on Engineering Criteria) and may be used at Contractor's option.

5.11.5. DAYLIGHTING. Except where precluded by other project requirements, do the following in at least 75 percent of all spaces occupied for critical visual tasks: achieve a 2 percent glazing factor (calculated in accordance with LEED credit EQ8.1) OR earn LEED Daylighting credit, provide appropriate glare control and provide either automatic dimming controls or occupant-accessible manual lighting controls.

5.11.6. LOW-EMITTING MATERIALS. Except where precluded by other project requirements, use materials with low pollutant emissions, including but not limited to composite wood products, adhesives, sealants, interior paints and finishes, carpet systems and furnishings,

5.11.7. CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT. Except where precluded by other project requirements, earn LEED credit EQ 3.1 Construction IAQ Management Plan, During Construction and credit EQ 3.2 Construction IAQ Management Plan, Before Occupancy.

5.11.8. RECYCLED CONTENT. In addition to complying with section RECYCLED/RECOVERED MATERIALS, earn LEED credit MR4.1, Recycled Content, 10 percent except where precluded by other project requirements.

5.11.9. BIOBASED AND ENVIRONMENTALLY PREFERABLE PRODUCTS. Except where precluded by other project requirements, use materials with biobased content, materials with rapidly renewable content, FSC certified wood products and products that have a lesser or reduced effect on human health and the environment over their lifecycle to the maximum extent practicable.

5.11.10. FEDERAL BIOBASED PRODUCTS PREFERRED PROCUREMENT PROGRAM (FB4P). The Farm Security and Rural Investment Act (FSRIA) of 2002 required the U.S. Department of Agriculture (USDA) to create procurement preferences for biobased products that are applicable to all federal procurement (to designate products for biobased content). For all designated products that are used in this project, meet USDA biobased content rules for them except use of a designated product with USDA biobased content is not required if the biobased product (a) is not available within a reasonable time, (b) fails to meet performance standard or (c) is available only at an unreasonable price. For biobased content product designations, see <http://www.biopreferred.gov/ProposedAndFinalItemDesignations.aspx>.

5.12. CONSTRUCTION AND DEMOLITION (C&D) WASTE MANAGEMENT: Achievement of 50% diversion, by weight, of all non-hazardous C&D waste debris is required. Reuse of excess soils, recycling of vegetation, alternative daily cover, and wood to energy are not considered diversion in this context, however the Contractor

must tracked and report it. A waste management plan and waste diversion reports are required, as detailed in Section 01 57 20.00 10, ENVIRONMENTAL PROTECTION.

5.13. SECURITY (ANTI-TERRORISM STANDARDS): Unless otherwise specified in Project Specific Requirements, only the minimum protective measures as specified by the current Department of Defense Minimum Antiterrorism Standards for Buildings, UFC 4-010-01, are required for this project. The element of those standards that has the most significant impact on project planning is providing protection against explosives effects. That protection can either be achieved using conventional construction (including specific window requirements) in conjunction with establishing relatively large standoff distances to parking, roadways, and installation perimeters or through building hardening, which will allow lesser standoff distances. Even with the latter, the minimum standoff distances cannot be encroached upon. These setbacks will establish the maximum buildable area. All standards in Appendix B of UFC 4-010-01 must be followed and as many of the recommendations in Appendix C that can reasonably be accommodated should be included. The facility requirements listed in these specifications assume that the minimum standoff distances can be met, permitting conventional construction. Lesser standoff distances (with specific minimums) are not desired, however can be provided, but will require structural hardening for the building. See Project Specific Requirements for project specific siting constraints. The following list highlights the major points but the detailed requirements as presented in Appendix B of UFC 4-010-01 must be followed.

- (a) Standoff distance from roads, parking and installation perimeter; and/or structural blast mitigation
- (b) Blast resistant windows and skylights, including glazing, frames, anchors, and supports
- (c) Progressive collapse resistance for all facilities 3 stories or higher. Unless determined otherwise by the Installation and noted in paragraphs 3 or 6, the building shall be considered to have areas of uncontrolled public access when designing for progressive collapse.
- (d) Mass notification system (shall also conform to UFC 4-021-01, Mass Notification Systems)
- (e) For facilities with mailrooms (see paragraph 3 for applicability) – mailrooms have separate HVAC systems and are sealed from rest of building

6.0 PROJECT SPECIFIC REQUIREMENTS FORT BLISS, TX

6.1. GENERAL

The requirements of this paragraph augment the requirements indicated in Paragraphs 3 through 5.

6.2. APPROVED DEVIATIONS

The following are approved deviations from the requirements stated in Paragraphs 3 through 5 that only apply to this project.

6.2.1. Irrigation Potable Water Use Reduction . The requirement for 100% reduction in potable water usage for irrigation in Paragraph 5.2.7.1 is waived. Instead, the requirement is to reduce irrigation potable water use 50 percent using LEED credit WE1.1 baseline, except where precluded by other project requirements.

6.3. SITE PLANNING AND DESIGN

6.3.1 General

6.3.1.1. Site Preparation Plan, design, and construct all functional and technical site requirements listed in this project, including erosion control measures, underground conduit, piping, utility service lines and connections (electrical, communications, cable, water, sewer, stormwater, gas, mechanical), etc. within the project limits. The project limits are shown on the drawings. Base the site design upon conceptual site layouts provided in Appendix J.

6.3.1.2. Confine construction limits to the construction site boundaries for the specific facility location for the project.

6.3.1.3. Do not waste excess soil within the project limits without the written approval of the Government.

6.3.1.4. The Government may modify desired building placement within the site area to ensure adequate spacing between buildings and to ensure access is maintained. The Government will provide coordinates for two corners of the approved building location in order for the Contractor's surveyor to stake the site and building location.

6.3.2. Site Structures and Amenities

Provide the following site structures and amenities.:

Dumpster Pad and Enclosure: Design and provide enclosure for dumpsters and recycling bins as required for facility size. Provide 6'-0" high rock wall enclosure. See Appendix J for requirements. Dumpster screening should be compatible with the building they serve and incorporates the concepts defined in the architectural theme in paragraph 6.5..

POV Parking and Access Drives. Design and construct POV parking areas and access drives as outlined in Paragraph 5 and paragraph 6.5 .

Provide fencing and enclosures in accordance with Appendix J.

See Appendices AA and GG for additional requirements for Site Structures and Amenities.

6.3.3. Site Functional Requirements:

6.3.3.1. Stormwater Management (SWM) Systems.

(a) During construction of the facility the Contractor is responsible for SWPPP of the entire construction site limits. Coordinate the laydown spaces, haul roads and fabrication areas within the SWPPP.

(b) Storm Drainage – Design and install Storm Drainage. In areas where underground storm drainage piping exists, coordinate location and size for connection of roof drain leaders to the a storm water system with the Government prior to finalizing building design, but in any event, no later than 45 days prior to beginning building

construction. Coordinate the storm water drainage system plan with the Government prior to finalizing building design. Construct the permanent storm water drainage system concurrently with the construction of the facility and will require coordination with the Installation.

(c) Most of the storm water runoff from the Main Cantonment Area drains via channels and lift stations to the Fort Bliss sump to the north of Fred Wilson Road and east of the Union Pacific Railroad. From the Fort Bliss Sump outlet, storm water drains to a series of basins including Pershing Dam Basin and connects to the river through the City of El Paso's municipal separate storm sewer system (MS4). Fort Bliss Sump and Pershing Dam Basin are the operational responsibility of the City and are located on Fort Bliss Property under long term leases. There are other smaller interconnections with the City of El Paso's MS4 at the post boundary, mainly via curb and gutter flows from access roads to the post.

(d) Storm water drainage from Biggs AAF flight line area is collected via a system of catch-basins and conduits which ultimately flow into a retention pond located east of taxiway G. Prior to the current construction of new Biggs AAF facilities, storm water conveyance within the remaining Biggs Army Airfield area was handled by swales and sheet flow. These flows would then collect in low areas and evaporate and infiltrate over time.

(e) Prior to current development of the East Biggs Area, drainage was via sheet flow through natural topography where storm water would infiltrate and evaporate. The existing Biggs AAF area and the East Biggs Area are being developed using on-site storm water retention basins as there are no natural drainages or adjacent urban drainage infrastructure sufficient to receive the increased post development runoff. Consistent with City of El Paso design requirements, the design criteria used by the Land Development Engineer for the new Biggs AAF and East Biggs infrastructure is the 10 year event for storm water conveyance and 25 year event for storm water retention.

(f) Fort Bliss maintains a TCEQ Multi-Sector General Storm Water Permit (TXR050000) for industrial activities at the post and a Phase II Small (MS4) General Permit (TXR040000) for operation of the installation urban MS4.

(g) Graded Slope and Fills: The angle for graded slopes and fills shall be no greater than the angle that can be retained by vegetative cover or other adequate erosion control devices or structures generally not to exceed 3:1 slope. In any event, plant slopes left exposed will, within 21 calendar days of completion of any phase of grading, or otherwise provide with temporary or permanent ground cover, devices, or structures sufficient to restrain erosion. Demonstrate the angle for graded slopes and fills to be stable. Stable is the condition where the soil remains in its original configuration, with or without mechanical constraints.

(h) Ground Cover: Whenever land-disturbing activity is undertaken on a tract, the entity conducting the land-disturbing activity shall install plant or otherwise provide a permanent ground cover per Fort Bliss seeding specification or Blue Grama, 11.25 Kg/ha of Pure Live Seed, unhulled, for erosion control.

(i) Final Inspection. When all construction on the project is complete, the Erosion and Sediment Control Inspector will evaluate the site and all permanent erosion control features, permanent ground cover and off-site impacts to other properties. If found to be in compliance, a close-out letter will be issued.

(j) Design Storm. Provide erosion and sedimentation control measures, structures, and devices to provide protection from the calculated maximum peak rate of runoff from the twenty-five (25) year storm.

(k) Grade. Provide newly constructed open channels and storm drainage ponds with side slopes no steeper than three horizontal to one vertical if a vegetative cover is used for stabilization unless soil conditions permit a steeper slope or where the slopes are stabilized by using mechanical devices, structural devices, or other acceptable ditch lines. In any event, the angle for side slopes shall be sufficient to restrain accelerated erosion. Typically the storm drainage ponds shall have a 3-strand barb wire fence, except if approved otherwise by the DPW.

(l) Acceptable Management Measures. Measures applied alone or in combination to satisfy the intent of this section are acceptable if there are no objectionable secondary consequences. The Installation recognizes that the management of storm water runoff to minimize or control downstream channel and bank erosion is a developing technology.

6.3.3.2. Erosion and Sediment Control

The Texas Pollutant Discharge Elimination System (TPDES) oversees the Stormwater Sediment and Erosion Control Management Plan for the post. Comply with requirement general permit number TXR150000. Provide and maintain the SWPPP over the life of the project. Qualifying construction activities (greater than 1 acre) in the Texas

portion of the installation are conducted under the TCEQ Construction General Permit (TXR150000) or, in New Mexico, under the EPA Region VI Construction General Permit (FRL-8690-8; EPA-HQ-OW-2008-0238). Construction site operators on Fort Bliss meeting the definition in the permits of primary or secondary operator must comply with the appropriate state construction general permit. Depending on the execution mechanism of the project, the construction site operator may be all, or a combination of the Directorate of Public Works, US Army Corps of Engineers, the Land Development Engineer, Land Development Infrastructure Contractor, Design Build contractor or other entities meeting the definition.

6.3.3.3. Vehicular Circulation.

NOT USED

6.4. SITE ENGINEERING

6.4.1. The existing site survey for the project is included as Appendix JJ.. After award, conduct a site survey to establish survey control points and a coordinate system, based on UTM, 13N, WGS83. Identify horizontal and vertical data used. Bring any discrepancies which are found in the existing surveys to the attention of the Contracting Officer.

6.4.2. Existing Geotechnical conditions: See Appendix A for a preliminary geotechnical report.

6.4.2.1. Geotechnical borings, a boring location map, and the raw data on the subsurface conditions described in 5.2.2 are furnished as part of the RFP in Appendix A.

6.4.3. Fire Flow Tests. See Appendix D for Results of Fire Flow Tests to use for Basis of Design for Fire Flow and Domestic Water Supply Registration. In areas under development or planned development, see Appendix D for fire flow data to be used for the basis of proposal preparation and for design in lieu of actual fire flow tests.

6.4.4. Pavement Engineering and Traffic Estimates:

NOT USED

6.4.5. Traffic Signage and Pavement Markings

NOT USED

6.4.6. Base Utility Information (See Appendix J.)

6.4.7. Cut and Fill

NOT USED

6.4.8. Borrow Material

NOT USED

6.4.9. Haul Routes and Staging Areas

6.4.9.1. A Map with available haul routes, construction water distribution point, construction entrance gate, common staging areas, landfill, and borrow areas (if applicable) is included in Appendix J. Disposal areas are off site and are the Contractor's responsibility.

6.4.10. Clearing and Grubbing:

Site grading will include clearing and grubbing for access drives, parking lots, and any site development

6.4.11. Landscaping:

6.4.11.1. Landscaping. Design and install landscaping in accordance with Appendix AA. Install landscaping perimeters required for ATFP

6.4.12. Turf:

NOT USED

6.5. ARCHITECTURE

6.5.1. General: To the maximum extent possible within the contract cost limitation, the buildings shall conform to the look and feel of the architectural style and shall use the same colors as adjacent facilities as expressed herein. The Government will evaluate the extent to which the proposal is compatible with the architectural theme expressed in the RFP during the contract or task order competition. The first priority in order of importance is that the design provides comparable building mass, size, height, and configuration compared to the architectural theme expressed herein. The second priority is that design is providing compatible exterior skin based upon façade, architectural character (period or style), exterior detailing, matching nearby and installation material/color pallets, as described herein.

6.5.2. Design

6.5.2.1. Appendix F is provided "For Information Only", to establish the desired site and architectural themes for the area. Appendix F identifies the desired project look and feel based on the Installation's Architectural Theme from existing and proposed adjacent building forms; i.e. building exterior skin, roof lines, delineation of entrances, proportions of fenestration in relation to elevations, shade and shadow effects, materials, textures, exterior color schemes, and organizational layout.

6.5.2.2. The design should address the installation's identified preferences. Implement these preferences considering the following:

- (a) Achievable within the Contract Cost Limitation
- (b) Meets Milestones within Maximum Performance Duration.
- (c) Achieves Full Scope identified in this Solicitation.
- (d) Best Life-Cycle Cost Design
- (e) Meets the Specified Sustainable Design and LEED requirements.
- (f) Complies with Energy Conservation Requirements Specified in this RFP.

6.5.2.3. Priority #1. Visual Compatibility: Facility Massing (Size, Height, Spacing, Architectural Theme, etc.) Exterior Aesthetic Considerations: The buildings massing, exterior functional aesthetics, and character shall create a comprehensive and harmonious blend of design features that are sympathetic to the style and context of the Installation. The Installation's intent for this area is:

[Not Supplied - PS_Architecture : THEME_DESCRIPTION] Site and Architectural conceptual drawings that meet this objective are shown in Appendix J.

6.5.2.4. Priority #2. Architectural Compatibility: Exterior Design Elements (Materials, Style, Construction Details, etc.) Roofs, Exterior Skin, and Windows & Door Fenestrations should promote a visually appealing compatibility with the desired character while not sacrificing the integrity and technical competency of building systems.

6.5.2.5. See Appendix F for exterior colors that apply to Architectural character . The manufacturers and materials referenced are intended to establish color only, and are not intended to limit manufacturers and material selections.

6.5.2.6. Additional architectural requirements:

- (a) Install fall protection anchor points on all roofs with a slope greater than 2:12
- (b) Architectural Design Objectives
 - a. 1. Exterior Walls: If a stucco look is desired in the Theme, use more durable materials such as EIFS or stucco-like finish on prefabricated metal panels or concrete panels. If EIFS is used, use a heavy duty reinforcing

mesh around all doors and window openings, and extend a minimum 8'0" above finished floor elevation on all exterior walls. The heavy duty reinforcing mesh used on the EIFS shall have a minimum combined weight of 20 ounces per square yard and this standard can be met by using multiple layers. Use high impact mesh on all other surfaces.

2. Roof:

- a. Fully adhered, single ply Hypalon 45 mil / TPO 60 mil with a white color finish is required for flat roof systems. Minimum slope for flat roof system shall be 1/4 inch in 12 inches
- b. Roof Mounted Equipment: Unless specifically required in Section 3 of the Scope of Work or the standard design provided herein, do not provide roof-mounted equipment. If roof-mounted equipment is provided, use modified bitumen roofing system.
- c. Roof access from building exterior is prohibited.
- d. Submit a Sample Warranty Certificate and Maintenance Guidelines for government review and concurrence prior to submission of final warranty. Provide a manufacturer's standard 20 year warranty. Warrant for 100 mph wind speed.

3. Trim and Flashing

Gutters, downspouts, and fascias shall be factory pre-finished metal and shall comply with SMACNA Architectural Sheet Metal Manual. Provide for bird habitat mitigation.

4. Bird Habitat Mitigation

Provide details necessary to eliminate the congregating and/or nesting of birds at, on, or in the facility.

5. Connect boot wash drains to underground drainage.

6. Exterior Doors and Frames

- a. Main Entrance Doors: Main Entrance Doors: Aluminum storefront doors and frames with Architectural Class 1 anodized finish, fully glazed, with medium or wide stile are preferred for entry into lobbies or corridors.
- b. Exterior Non-Main Entrance Doors: Exterior doors and frames opening to spaces other than corridors or lobbies shall be insulated hollow metal.
- c. Side Entrance / Exit Doors: Exterior doors and frames opening to corridors shall be insulated hollow metal and comply with ANSI A250.8/SDI 100. Fire-rated openings shall comply with NFPA 80, and the requirements of the labeling authority. Door and frame installation shall comply with applicable codes and UFC 4-010-01 requirements.

7. Exterior Doors Finish and Hardware

- a. Hardware General: All hardware in the facility shall be consistent and shall conform to ANSI/BMHA. Standards for Grade 1. Hardware finishes shall conform to ANSI/BHMA A156.18. Provide ANSI 626 (Satin Chromium plated on Brass or Bronze) or 630 (Stainless Steel). Disassembly of knob or lockset is not allowed in order to remove interchangeable core from lockset.
- b. Key locksets for mechanical rooms, electrical closets, and Telecommunications Rooms to the existing Post Engineer Key System without key removable cores.
- c. Auxiliary Hardware: ANSI/BHMA A156.16. Provide wall or floor stops for all exterior doors that do not have overhead holder/stops. Provide other hardware as necessary for a complete installation.

8. Exterior Windows:

Unless specifically required by the standard design, provide fixed windows. If the standard design requires operable windows, furnish windows with fiberglass or aluminum insect screens removable from the inside, secured with interior metal clips.

9. Exterior Louvers:

Design exterior louvers to exclude wind-driven rain, with bird screens and to withstand wind loads in accordance with the applicable codes. Wall louvers shall bear the AMCA certified ratings program seal for air performance and water penetration in accordance with AMCA 500-D and AMCA 511. Louver finish shall be factory applied color.

10. Roof Hatches:

Roof access hatches shall be a minimum of 16 square feet in opening area, with no dimension smaller than 4'-0". Equip roof hatches with Post Engineer Master Lock on operating hardware.

11. Exterior Signage

See Appendix H for Exterior Signage requirements

12. Additional Requirements

See Appendix AA for additional architectural design requirements.

6.5.3. Programmable Electronic Key Card Access Systems: Not Required.

6.5.4. INTERIOR DESIGN

6.5.4.1. Interior building signage requirements: Furnish paper and software for creating text and symbols for computers for Owner production of paper inserts after project completion. Coordinate with user and installation facilities engineer (DPW). Provide Room Number and Room Function signage for all rooms, except apartment modules.

6.5.4.2. Interior Design Considerations:

(a) Interior Partitions and Walls.

(b) Interior Glass and Glazing: Coordinate the arrangement of fenestrations with the proposed furniture layout.

(c) Floors:

Provide durable and low maintenance materials

Carpet is not an allowable floor finish in corridors.

(d) Metal Support Systems

Non-load bearing metal studs and furring shall comply with ASTM C 645; stud gauge shall be as required by height and loading. Metal framing and furring system shall be capable of carrying a transverse load of 5psf without exceeding either allowable stress or a deflection of L/240, but shall not be less than 20 gauge. Provide galvanized finish.

(e) Gypsum Board

Comply with ASTM C 36. Minimum panel thickness shall be 5/8 inch. Provide moisture resistant panels (glass-mat panels are preferred) at locations subject to moisture. Glass-mat gypsum panels or water-resistant "greenboard" gypsum drywall shall be used as substrate for ceramic tile wall applications except at showers where cementitious backer board shall be used. Gypsum Board systems are to be constructed using Joint treatment per ASTM C 475, screws per ASTM C 646, and drywall installation per the requirements of ASTM C 840.

(f) Interior Doors and Frames

Provide hollow metal, flush solid core wood, or hollow core wood doors as specified below. All door frames shall be hollow metal.

1. Wood Doors: Provide flush solid core wood doors conforming to WDMA I.S.-1A. Stile edges shall be non-finger jointed hardwood compatible with face veneer. Provide Architectural Woodwork Institute (AWI) Grade A hardwood face veneer for transparent finished doors; provide AWI Sound Grade hardwood face veneer for painted doors. (Transparent finished doors are preferred.)

2. Wood Doors – Provide hollow core, Type II flush doors conforming to WDMA I.S 1-A. Provide Architectural Woodwork Institute (AWI) Grade A hardwood face veneer for transparent finished doors; provide AWI Sound Grade hardwood face veneer for painted doors. (Transparent finished doors are preferred.)

3. Hollow Metal Doors: Comply with ANSI A250.8/SDI 100. Doors shall be minimum Level 2, physical performance Level B, Model 2; factory primed.

4. Hollow Metal Frames: Comply with ANSI A250.8/SDI 100. Frames shall be minimum Level 2, 16 gauge, with continuously welded corners and seamless face joints; factory primed.

(g) Interior Door Finish Hardware:

1. Hardware General: All hardware in the facility shall be consistent and shall conform to ANSI/BMHA standards for Grade 1. All requirements for hardware keying shall be coordinated with the Contracting Officer. Hardware finish shall conform to ANSI/BHMA A156.18. Provide ANSI 626 (Satin Chromium plated on Brass or Bronze) or 630 (Stainless Steel.)

2. Key locksets for mechanical rooms, electrical closets, telecommunications rooms (TR), and crawl spaces to the existing Post Engineer Key System, consisting of a lever with a dead bolt cylinder above passage lockset, AR-1 keyway, without key removable cores.

3. Auxiliary Hardware: ANSI/BHMA A156.16. Provide other hardware as necessary for a complete installation.

4. Locksets: Provide cylinders and cores with seven-pin tumblers for locks. Cylinders shall be products of one manufacturer, and cores shall be products of one manufacturer. Mortise cylinders, and knobs of bored locksets shall have interchangeable cores that are removable by special control keys. Stamp each interchangeable core with a key control symbol in a concealed place on the core. Cylinders shall be fully compatible with products of the Best Lock Corporation, Arrow Lock Corporation, or Falcon Lock. Submit a core code sheet with the cores. Provide cores master keyed in one system for this project. Disassembly of knob or lockset is not allowed in order to remove interchangeable core from lockset. For interior locksets, use bored type vs. mortise lockset, to the maximum extent possible. The bored type lock will have a metal plate to prevent jimmying of lockset.

(h) Specialties And Furnishings:

1. Window Treatments: Provide aluminum horizontal mini-blinds or roller tube window shades (MechoEuroveil or equal) at all exterior glazing, except where noted otherwise. Provide roller tube window shades at clerestory windows or other difficult to access windows.

(i) Thermal Insulation: Do not install insulation directly on top of suspended acoustical panel ceiling systems.

(j) Elevators: Provide a State of Texas (or State of New Mexico, as applicable) licensed elevator inspector to inspect the elevator, test all new elevators, as applicable to the project, and to certify in writing that the installation meets all requirements.

(k) Provide 4 eye-bolts in each Arms Room / Vault, one in each corner. Eye bolts are to be drop forged steel, hot dip galvanized with a 1" diameter shank and a 2" diameter eye. Place bolt centered 6" above finished floor. Place each bolt 24" to the left of each room corner. Bolt shall be anchored so as to provide a minimum of 3.5 kips pull out strength. Place bolt to allow 1" of exposed shank between eye and surface of wall.

6.6. STRUCTURAL DESIGN

6.6.1. Site Specific Loading Requirements:

6.6.1.1. The basic wind speed, in miles per hour, for the determination of the wind loads shall be 100 mph 3-second-gust wind speed.

6.6.1.2. Use ground snow load of 5psf.

6.6.1.3. Use frost penetration of zero inches.

6.6.1.4. Use the following seismic acceleration parameters for mapped Maximum Considered Earthquake spectral response at short periods and at 1-second period, respectively: Ss: 31 (%g) and S1: 10 (%g).

6.6.2. Equipment Pads: Elevate floor or on-grade mounted equipment on minimum 4 inch thick concrete pads to prevent accumulation of water and metal corrosion.

6.7. THERMAL PERFORMANCE

There are no additional requirements other than those previously stated/referenced.

6.8. PLUMBING

- 6.8.1. Piping Materials: Use Type K copper for water supply under slab. Use CPVC and Type L (or above) copper for water supply above slabs. Use plastic pipe (schedule 40 PVC) for drainage and venting including under concrete slabs or inside buildings. Do not use exposed PVC for exposed vent piping above roof. Type M copper is not allowed.
- 6.8.2. Cross Connection Control: See the Fort Bliss Cross Connection Control Manual, located in Appendix E, for specific requirements for cross connection control and backflow prevention.
- 6.8.3. Provide gas plumbing for GF Clothes dryers (provided by others).
- 6.8.4. Do not use electric water heaters, except that small on-demand applications may be used.
- 6.8.5. Natural Gas Supply: Furnish standard gas pressures from building regulator of 8-15 ounces, 2 psi or 5 psi.
- 6.8.6. Gas Regulator Venting: Vent all gas regulators in building to the outside
- 6.8.7. Exterior Water Piping Freeze Protection: Design seasonally (not used in winter) utilized water supply piping for complete drain down including interior or below grade isolation valve. Insulate exposed water piping that is utilized year round and heat trace and protect with pipe jacketing to ensure that the piping will not freeze.
- 6.8.8. Fixture Faucet Mixing Valves: Provide single handle type mixing faucet valves with seals and seats combined into one replaceable cartridge; the cartridge shall be designed to be interchangeable between lavatories, bathtubs, kitchen and bar sinks, etc. or provide replaceable seals and seats that are removable either as a seat insert or as a part of a replaceable valve unit. Approved manufacturers are Delta, Kohler, Price Pfister, Crane.
- 6.8.9. Use automatic infrared metered-flow faucets at lavatory sinks in public areas.
- 6.8.10. Provide monitoring panel with Oil-Water Separators. Submit design for Government concurrence. Post a sign at entry locations to drain systems including oil-water separators (OWS), as specified in Appendix Y.
- 6.8.11. Provide cast iron valve boxes and covers. Water meter vaults shall have covers weighing 20 lbs or less or shall have a closeable opening in the cover directly above the meter to allow reading of the meter. Distance from top of cover to top of water meter consumption reading (dial) shall be less than 18 inches.

6.9. SITE ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

- 6.9.1. Exterior Lighting: Exterior site and area lighting, including lighting for parking areas, roadways, walkways, and ball courts shall be high pressure sodium, except compact fluorescent lighting shall be acceptable for walkway lighting. Photo control devices for exterior lighting shall conform to ANSI C136.10 and shall have an adjustable operation range of approximately 0.5 to 5.0 footcandles.
- 6.9.2. Utility Metering: Provide Watt Node Plus LON Electric Power meter or equal. Provide pulse meter for gas and water. Provide a legibly and indelibly printed multiplier on the face of the meter. Wiring for UMCS system shall be compatible with Fort Bliss system. Install communications wiring in a 1" conduit from the Mechanical Room to the Pulse Kit on the Gas Meter for use by the UMCS system. Install communications wiring in a 1" conduit from the Mechanical Room to the Electric Meter for use by the UMCS system. Install communications wiring in a 1" conduit from the Mechanical Room to the Pulse Kit on the Water Meter for use by the UMCS system
- 6.9.3. Exterior Communications: Install communications infrastructure as required by the drawings in Appendix J. Cable TV is to be included in the Site Communication duct bank. Coordinate with Fort Bliss DOIM / NEC Plans Office.
- 6.9.4. Corrosion Control: Obtain the services of a "corrosion expert" to design, supervise, inspect, and test the installation and performance of the cathodic protection system. "Corrosion expert" refers to a person, who by

thorough knowledge of the physical sciences and the principles of engineering and mathematics, acquired by professional education and related practical experience, is qualified to engage in the practice of corrosion control of buried or submerged metallic surfaces. Such a person must be accredited or certified by the National Association of Corrosion Engineers (NACE) as a NACE Accredited Corrosion Specialist or a NACE certified Cathodic Protection (CP) Specialist or be a registered professional engineer who has certification or licensing that includes education and experience in corrosion control of buried or submerged metallic piping and tank systems, if such certification or licensing includes 5 years experience in corrosion control on underground metallic surfaces of the type under this contract. The corrosion expert shall obtain soil resistivity data, acknowledging the type of pipeline coatings to be used and reporting to the Contractor the type of cathodic protection required. Use sacrificial anode type cathodic protection.

6.10. FACILITY ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

6.10.1. Facility Telecommunications systems:

6.10.1.1. Telephone and Local Area Network (LAN):

- (a) All equipment racks shall have both vertical and horizontal cable management.
- (b) Line all walls in the telecommunications rooms with 4' X 8' X 3/4" plywood, painted flat white. All plywood shall be fire-rated and the fire-retardant stamp are shall remain unpainted and open to view. Provide a ladder type cable tray around the perimeter of the telecommunications room and from the perimeter ladder tray to the 19" communications rack. Mount the ladder cable tray 7-1/2 feet above finished floor. Install all horizontal cabling into the TR in this cable tray routing them around the room and into the 19" rack.
- (c) Terminate the incoming fiber optic cable on a 19" twelve port single mode fiber optic patch panel with SC type connectors.
- (d) No construction deviations in the communications system from the accepted design will be permitted without prior Government review and concurrence.
- (e) Submit a detailed test plan for all the cable plant installation for government review and concurrence. Include information on the test equipment and its calibration documentation.
- (f) Feed all electrical circuits within a TR from an electrical panel installed within that room.
- (g) Provide a 1" conduit from the electrical panel in the TR to outside of the building for future commercial cable television power. Provide a 2" conduit (adjacent to the 1" conduit) from the TR to outside of the building for future commercial cable television service entrance.
- (h) Terminate Single-Mode and Multi-Mode Fiber Optic cables on separate patch panels.
- (i) Terminate voice and data cables on separate patch panels located in the same equipment rack. Install voice patch panels in the copper equipment rack or cabinet.
- (j) All raised flooring shall have a cable tray management system in compliance with UFC 3-580-01 under the floor for communications cabling. Submit a cable management plan showing cable routing and cable management system installation for review and concurrence prior to commencement of work.
- (k) Install the horizontal cabling conduit from the outlet box, extending to the cable tray. The use of J-hooks is not permitted without prior written approval.
- (l) Terminate exterior communications drops for testing purposes and cover with a blank weatherproof faceplate.
- (m) Use green insulation on all bonding jumpers, regardless of size.
- (n) Floor mount communications and power drops to be used by modular furniture including those for modular furniture near a wall. Submit a communications and power plan showing locations of communications and power drops superimposed over modular furniture plan with the interim and final design packages.
- (o) Manholes shall be splayed type communications MH's with preinstalled terminators and internal grounding.
- (p) Provide lockable, waterproof CMH covers. Submit for approval prior to use in accordance with Fort Bliss Force Protection Standards.
- (q) Use the following color scheme for Telecommunications wiring and voice/data jacks:
NIPRNET – Green

SIPRNET – Red

TACNET – Yellow

Voice - Gray

- 6.10.2. Cable TV (CATV): Provide and install a pre-wired CATV system throughout the designated spaces. CATV system shall include but not limit to cables, conduits, pull boxes, and CATV jacks. Route all CATV signals conduits and cables back to the telecommunication room.
- 6.10.3. Closed Circuit TV (CCTV): Provide and install a conduit system to support CCTV throughout the designated spaces. Conduit system shall include but not limit to conduits, pull boxes, and pull wires. Route all conduits for CCTV signals back to the designated monitoring room. As part of the Interim Design Review, present the proposed Floor Plan to representatives of Fort Bliss and 1AD Security personnel to identify specific locations of security cameras, location of monitoring room, conduit routing, and system details.
- 6.10.4. Intrusion Detection (IDS): Provide and install conduit for IDS in the designated areas. The devices (motion sensors, contact switches, duress buttons, keypads and security panels) are provided by others. Provide conduit and a junction box for each device. Route all device conduits to a j-box in a designated wall space (for a security panel) near the entrance of the room. Provide and install a 1" conduit with a Category 6 cable routed from the j-box to the nearest communications room. Terminate and certify the cable inside the j-box on an RJ-45 Female Jack and inside the communications room on a patch panel. Provide a dedicated 120V single-phase circuit for IDS.
- 6.10.5. General: Ground and bond all inside plant cable pathways (e.g. cable trays, cable ladders, and conduits) to the Main Telecommunication Room (TR) ground bar (TMGB). Bond individual sections of all metallic cable tray and ladder systems to each other and to the raceway (e.g. EMT) in which they support.
- 6.10.6. Landscape/Irrigation Controls – Provide power and outlet to accommodate the irrigation controller for each building. Make space available for the irrigation controller in the mechanical room or where designated by the Government.
- 6.10.7. Provide a weathertight through-roof conduit from Comm Room to roof for installation of communication cable and Government installed roof-mounted antenna.
- 6.10.8. Outside electrical panels: all electrical panels located in exterior areas shall be dustproof.
- 6.10.9. Control exterior security lighting by a switch and photocell.
- 6.10.10. Arms Rooms / Vaults: Provide a tamper-proof light fixture on separate switch outside the entrance to each Arms Room / Vault. Position the switch so that unauthorized personnel may not have access.
- 6.10.11. Where SIPRNET is required, the USAISEC-FDED SIPRNET Team will determine and engineer the SIPRNET.
- 6.11. HEATING, VENTILATING, AND AIR CONDITIONING
- 6.11.1. General: The existing UMCS is LonWorks Open.
- 6.11.2. System Selection: Current local utility rates for gas, electric, water and sewer are contained in Appendix K. These are rates paid by Fort Bliss to the local utility providers and are for use in LEED energy cost calculations. Provide CO2 sensors in return air stream to minimize the amount of outside air required to satisfy ASHRAE 62.1 requirements for building Indoor Air Quality. Provide one CO2 sensor per HVAC zone. Installation infrastructure has insufficient capacity to support use of electric HVAC systems. Provide gas-fired and/or renewable energy sources for heating.
- 6.11.3. Communication Rooms: Air condition communications equipment rooms to space comfort conditions as per applicable criteria by separate year round direct expansion cooling systems.

- 6.11.4. Mechanical Room Ventilation: Automatically ventilate mechanical, fire protection, electrical, and storage spaces to limit space temperatures to 10 degrees F above design outdoor air temperature.
- 6.11.5. Equipment Coordination: For Variable Air Volume (VAV) systems, limit size of any individual VAV box to approximately 2500 cfm to promote better zoning and fit of equipment to space available. Coordinate all mechanical systems and equipment with space available to prevent conflict with other building systems.
- 6.11.6. UMCS Base-wide System and Building Control Interface: A base-wide UMCS/EMCS system has been installed as part of a separate contract. Provide a 3/4" conduit with CAT VI cable from the EMCS router to the nearest comm room for connection to the building LAN. Integration to the base-wide system shall be done under separate contract and is not part of this scope of work. The building shall be capable of running stand alone until such time it is integrated into the base-wide system. Energy saving controls are desired such as schedule start/stop, optimized start/stop, occupancy sensors, etc. Locate AC control panels and routers in the Mechanical Room.
- 6.11.7. Existing IP Network: Existing IP network consist of Gig-backbone: 10/100MB to the user, 1GB between the end user building and ADN, and a 10GB core backbone.
- 6.11.8. Network Media: Existing network media consist of single-mode fiber optic.
- 6.11.9. Head-end hardware/Software location: Location of head-end UMCS hardware/software will be in Bldg. 777.
- 6.11.10. Water Quality Analysis and Treatment: Water quality for Fort Bliss and surrounding area is 'hard'. Treatment will be required for use as make-up water in HVAC equipment. Water Quality Analysis reports are inserted as Appendix DD. Additional water analysis data from water treatment contractor (POC: Gary Hamilton, Delta Water Laboratories, 915-892-8227) are as follows:
- Chlorides: 70 ppm
 - P Alkalinity: 0 ppm
 - M Alkalinity: 100 ppm (Total alkalinity)
 - Total Hardness: 130 ppm (CaCO₃)
 - ph: 7.89
 - Silica: 4 to 7 ppm (Can go as high as 11 ppm)
 - Iron: 0.01- 0.5 Reactive
 - Total Dissolved Solids: 475 to 680 ppm
- Coordinate with water treatment contractor to confirm above data and current water treatment methods to obtain the required quantity and types of chemicals to be initially introduced into the closed loop heating and chilled water systems. Material Safety Data Sheets for current Ft. Bliss DPW chemical treatment method for hydronic water systems (Boiler heating hot water and chilled water) are contained in Appendix EE (Corrshield NT402).
- 6.11.11. Coordinate locations of emergency shut-off switches, central control area, and switch features with Fort Bliss DPW during design.
- 6.11.12. Evaporative cooling - Where evaporative cooling is provided, the preference for user occupied areas is that control be provided by temperature sensors instead of thermostats. The intent is to provide control of the space while not allowing occupant adjustment or intervention by adjustment of the space temperature set point. Provide ability for adjustment and maintenance of sensors by authorized personnel. Water softening is required where evaporative cooling is provided. Provide drain lines to drain to a specific location and not drain directly onto the roof.

6.11.13. HVAC Controls: Admin/Classrooms/Labs/Dining Facilities are to have a three-hour override switch on the thermostat.

6.11.14. HVAC Controls in Apartment Areas: The preference is that thermostatic control in each living unit be adjustable in allowing 2 deg F adjustment either side of design setpoints for heating and cooling. The UMCS system shall control the +/- 2 Deg F range limits and shall not be adjustable by the area occupant.

6.11.15. HVAC system preferences and requirements are:

(a) For air-conditioned core and related areas (central core work rooms, offices, conference rooms, laboratories, electronics repair shops, etc.): the preference is for heating, ventilating and air-conditioning systems that provide appropriate zoning and number of zones to allow comfort in spaces with varying occupancy (by time of day, etc.), exterior exposures, and internal loads due to equipment, door usage, etc. The expectation is for more rather than less zones to create an optimum balance of initial cost versus occupant comfort for peak human efficiency based upon temperature setpoints and thermal comfort requirements of this RFP. System complexity: provide integrated HVAC air handling system or systems that are only complex enough to meet all energy, quality and system longevity requirements and other goals of this RFP; this may entail economizers, will require proper air filtration provisions, etc.; additionally systems shall be fully accessible for maintenance and shall be easily and completely replaceable via removal through mechanical room doors, etc. HVAC system cooling shall occur within the HVAC air handling system(s) and be provided by electric refrigerated means, such as electric direct expansion, chilled water or other refrigerated cooling system..

(b) Mechanical and Fire Protection Room Heating and Ventilation; It is preferred that main mechanical and/or fire protection equipment spaces be heated with gas or hydronic unit heaters.

(c) Arms Vaults: Provide a ceiling fan and unit heater only. Arms Vault is not to be served by the building central HVAC system.

6.11.16. Piping Materials: Do not use Type M copper.

6.11.17. Equipment Placement: Place air handling equipment within the building spaces (i.e. equipment rooms, etc.) which are sound isolated, within exterior on-grade equipment yards which are enclosed with screen walls. Or, if placed on roof, provide equipment with screening to prevent viewing of the equipment from a point 6 feet above any ground level at a distance of up to 300 feet from the building exterior wall in any direction. Organize vents, stacks, grilles, and placement of mechanical or electrical service fixtures into locations which do not provide visually negative design impacts. Avoid catwalks, especially when up and down travel is required to service multiple equipment pieces (coordinate with Architectural designer). Enclose mechanical and electrical equipment (transformers, chillers, boilers, etc.) installed at grade with screen walls. Screen wall finishes and appearance are subject to Government review and approval.

6.12. ENERGY CONSERVATION

6.12.1. Inclusion of Renewable Energy Features. The following renewable energy features have been determined lifecycle cost effective, are included in the project budget and shall be provided:

No additional requirements.

6.13. FIRE PROTECTION

6.13.1. The Fire Alarm Control Panel shall be fully compatible with the existing Monaco system presently in use at Fort Bliss. See Section 6.13.8 below for additional requirements.

6.13.2. HVAC Equipment Restart: After a fire alarm shut-down is cleared at fire alarm panel, affected mechanical equipment shall automatically restart.

6.13.3. Sprinkler Freeze Protection: Provide temperature sensor and alarm to notify fire department of possible freezing conditions for wet pipe sprinkler systems in spaces where heat may not be available due to being unoccupied or heating system may have failed.

6.13.4. Riser Location: Install fire risers in dedicated space or mechanical room with external access for fire department.

- 6.13.5. Provide and install a Fire Department Connection near the street curb, PIV, and fire hydrant. Coordinate exact location of Fire Department Connection with LDE and Fort Bliss Fire Department.
- 6.13.6. Fire Sprinkler Backflow Prevention: Backflow prevention shall be in accordance with the Fort Bliss Cross-Connection Control Manual. This requirement may be more stringent than the requirement in UFC 3-600-01.
- 6.13.7. Fire Alarm System:
- 6.13.7.1. The RF Transceiver shall be compatible with the Fire Department receiving system, operating on an RF frequency.
- 6.13.7.2. The RF transceiver shall be a Monaco BT-XM or approved equal operating on a frequency of 165.0625 MHZ.
- 6.13.7.3. The Fire alarm receiving system is a Monaco D-21 system.
- 6.13.7.4. The information sent to the Fire Department receiving system shall be zone by zone information.
- 6.13.7.5. All tamper devices shall be sent to the D-21 system as a supervisory tamper.
- 6.13.7.6. All initiating devices shall be connected, Style D, to signal line circuits (SLC), Style 6.
- 6.13.7.7. All alarm appliances shall be connected to notification appliance circuits (NAC), Style Z.
- 6.13.7.8. Provide photoelectric smoke detectors with 2.5% obscuration, pigtailed for permanent connections, continuous power indicator light, test button, and metal base.
- 6.13.7.9. RF transceiver shall be equipped with a directional antenna.
- 6.13.7.10. Fire alarm pull boxes shall be of metal construction, dual-action, and key operable.”
- 6.13.8. Provide keyed alike fire alarm panels, keys C415A, 17021, & PK625; C415 for MNS panels. PK625 on manual pull stations. Sample keys are available from Fort Bliss Fire Department upon request..
- 6.13.9. Not Used.
- 6.13.10. Do not use glass or lockable doors in fire extinguisher cabinets.
- 6.13.11. Mass Notification System. Mount a speaker system on the exterior of the building that will cover a 16' wide area around the perimeter of the buildings.
- 6.13.11.1. Connect the MNS to the Fort Bliss Fire Alarm System utilizing the Monaco BT-XM All equipment must be compatible with the existing Monaco D21 Central Receiving Unit utilized by the Fort Bliss Fire Department.
- 6.13.11.2. Program the following 8 pre-recorded messages into the system:
- (a) MESSAGE #1. Label message “Fire”. Five seconds of siren are played, followed by the message:
- “Attention, attention. A fire emergency has been reported. Please leave the building using the nearest exit or exit stairway. "Do not use the elevators if installed within this facility”.
- (b) MESSAGE #2. Label message “Severe Weather.” Five seconds of 100-kHz steady tone are played, followed by the message:
- “This is the Fort Bliss Installation Operations Center. The National Weather Service has issued a severe weather alert for this area. Turn on your radios or televisions for the latest update and take required action. Again, this is the Fort Bliss Installation Operations Center. The National Weather Service has issued a severe weather alert for this area. Turn on your radios or televisions for the latest update and take required action.

(c) MESSAGE #3. Label message "Bomb" A horn sound is played for 5 seconds, followed by the message:

"Attention, attention. This building has received a bomb threat. All personnel are to evacuate immediately using the nearest exit and to report to our designated re-assembly area for accountability and additional instruction. Again, this building has received a bomb threat. All personnel are to evacuate immediately using the nearest exit and to report to our designated re-assembly area for accountability and for additional instruction.

(d) MESSAGE # 4. Label message "Shelter In Place" Three 1-kHz tones (one second each) are played, followed by the message:

"Attention, attention. All personnel "shelter in place". Turn off fans, heating, ventilation and air condition systems. Close all doors and windows and remain indoors until the "All Clear" announcement is given."

(e) MESSAGE #5. Label message "FPCON C" Three seconds of HI/LOW tones, followed by the message:

"Attention, attention. Fort Bliss is now at FPCON Charlie. Implement FPCON Alpha, Bravo and Charlie security plans immediately. Again, Fort Bliss is now at FPCON Charlie. Implement FPCON Alpha, Bravo and Charlie security plans immediately and stand by for additional information from the Fort Bliss Installation Operation Center.

(f) MESSAGE # 6. Label message "FPCON D" Three seconds of HI/LOW tones, followed by the message:

"Attention, attention. Fort Bliss is now at FPCON Delta. Implement all FPCON security plans, Alpha through Delta immediately. Again, Fort Bliss is now at FPCON Delta. Implement all FPCON security plans, Alpha through Delta immediately and stand by for additional information from the Fort Bliss Installation Operation Center.

(g) MESSAGE #7. Label message "All Clear". Five seconds of chime sound are played, followed by the message:

"The emergency has now ended. Please resume normal operations. Thank you for your cooperation."

(h) MESSAGE #8. Label message "Test" A 1-kHz tone is sounded for 2 seconds, followed by the message:

"May I have your attention, please? This is the Fort Bliss Installation Operations Center conducting a test of the mass notification system. Repeat, this is only a test."

6.14. SUSTAINABLE DESIGN

6.14.1. LEED Rating Tool Version. Execute the project using LEED-NC Version 3.

6.14.2. The minimum requirement for this project is to achieve LEED Silver level. Each non-exempt facility (building plus sitework) must achieve this level. In addition to any facilities indicated as exempt in paragraph 3, the following facilities are exempt from the minimum LEED achievement requirement: Organizational storage, HAZMAT, and oil storage buildings are exempt..

6.14.3. Credit Validation: The project is the site work and building(s) portion of a multiple contractor Combined Project. LEED registration, compiling of documentation at LEED OnLine and use of the LEED Letter Templates is required Registration and payment of registration fees will be by the Government. Administration/team management of the online project will be . Administration/team management of the online project will be by the Contractor per Appendix LEED Requirements for Multiple Contractor Combined Projects. Validation of credits will be accomplished by the Government. LEED certification of the project by the Contractor is not required. The Government may choose to seek LEED certification of the project, in which case the Government will pay certification fees and coordinate with GBCI and the Contractor will furnish audit data as requested at no additional cost.

6.14.4. Commissioning: See Appendix M for Owner's Project Requirements document(s).

6.14.5. LEED Credits Coordination. The following information is provided relative to Sustainable Sites and other credits.

MR Credit 2 Construction Waste Management.

The Installation does not have an on-post recycling facility available for Contractor's use.

Regional Priority Credits (Version 3 only)

The project zip code is 79906.

See LEED Multiple Contractor Responsibilities Table(s) for additional information.

6.14.6. LEED Credit Preferences, Guidance and Resources. See Appendix L LEED Project Credit Guidance for supplemental information relating to individual credits.

6.14.7. Multiple Contractor Combined Project. When site work and building(s) are accomplished by separate contractors, it is a Multiple Contractor Combined Project for purposes of LEED scoring and documentation. This project is part of a Multiple Contractor Combined Project that includes site work and building(s) accomplished by separate contractors. See Appendix LEED Requirements for Multiple Contractor Combined Projects and Appendix LEED Multiple Contractor Responsibilities Table(s) for special requirements for this project.

6.14.8. Additional Information

No additional information/requirements.

6.15. ENVIRONMENTAL

6.15.1. Do not use Asbestos containing materials in the new construction.

6.15.2. The impacts of the Fort Bliss Expansion have been adequately addressed in the Fort Bliss, Texas and New Mexico Mission and Master Plan Programmatic Environmental Impact Statement (MMPEIS). The environmental documents that apply to this task order are the City of El Paso Rule Regulation #9 (available at http://www.epwu.org/PDF/rules_regs.pdf), as well as the following documents included in Appendix E: Potable Regulatory Policy (Policy Letter #16, Cross connection control manual for Fort Bliss, Installation environmental Noise Management Plan, Installation hazardous waste management plan, and the Cost Schedule for Hazmat disposal. Comply with all Federal, State, and Local environmental requirements.

6.16. PERMITS

6.16.1. Obtain digging permit from Fort Bliss DPW, unless any government installed utilities have not been turned over to Fort Bliss. In this case, coordinate with USACE prior to any digging.

6.16.2. See Appendix FF for Fort Bliss Access Control Policy

6.16.1 Obtain digging permit from Ft. Bliss DPW unless any Government-installed utilities have not been turned over to Ft. Bliss. In this case, coordinate with USACE prior to any digging.

6.16.2 See Appendix FF for Fort Bliss Access Control Policy.

6.17. DEMOLITION

6.17.1 See Appendix E.

6.18. ADDITIONAL FACILITIES

See Appendix KK for supplemental requirements for the facilities listed.

**SECTION 01 33 00.DSXX
SUBMITTAL PROCEDURES
(DESIGN-BUILD TASK ORDERS)**

1.0 GENERAL

1.13. GOVERNMENT APPROVED OR CONCURRED WITH SUBMITTALS

1.14. INFORMATION ONLY SUBMITTALS

1.0 GENERAL

1.1.1. This section contains requirements specifically applicable to this task order. The requirements of Base ID/IQ contract Section 01 33 30 apply to this task order, except as otherwise specified herein.

1.13. GOVERNMENT APPROVED OR CONCURRED WITH SUBMITTALS

Upon completion of review of submittals requiring Government approval or concurrence, the Government will stamp and date the submittals as approved or concurred. The Government will retain four (4) copies of the submittal and return one (1) copy(ies) of the submittal.

1.14. INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the Contracting Officer is not required on information only submittals. The Government reserves the right to require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe. The Government will retain five (5) copies of information only submittals.

End of Section 01 33 00.DSXX

**SECTION 01 33 16
DESIGN AFTER AWARD**

1.0 GENERAL INFORMATION

1.1. INTRODUCTION

1.2. DESIGNER OF RECORD

2.0 PRODUCTS (Not Applicable)

3.0 EXECUTION

3.1. PRE-WORK ACTIVITIES & CONFERENCES

3.1.1. Design Quality Control Plan

3.1.2. Post Award Conference

3.1.3. Partnering & Project Progress Processes

3.1.4. Initial Design Conference

3.1.5. Pre-Construction Conference

3.2. STAGES OF DESIGN SUBMITTALS AND OVER THE SHOULDER PROGRESS REVIEWS

3.2.1. Site/Utilities

3.2.2. Interim Design Submittals

3.2.3. Over-the-Shoulder Progress Reviews

3.2.4. Final Design Submissions

3.2.5. Design Complete Submittals

3.2.6. Holiday Periods for Government Review or Actions

3.2.7. Late Submittals and Reviews

3.3. DESIGN CONFIGURATION MANAGEMENT

3.3.1. Procedures

3.3.2. Tracking Design Review Comments

3.3.3. Design and Code Checklists

3.4. INTERIM DESIGN REVIEWS AND CONFERENCES

3.4.1. General

3.4.2. Procedures

3.4.3. Conference Documentation

- 3.5. INTERIM DESIGN REQUIREMENTS
 - 3.5.1. Drawings
 - 3.5.2. Design Analyses
 - 3.5.3. Geotechnical Investigations and Reports
 - 3.5.4. LEED Documentation
 - 3.5.5. Energy Conservation
 - 3.5.6. Specifications
 - 3.5.7. Building Rendering
 - 3.5.8. Interim Building Design Contents
- 3.6. FINAL DESIGN REVIEWS AND CONFERENCES
- 3.7. FINAL DESIGN REQUIREMENTS
 - 3.7.1. Drawings
 - 3.7.2. Design Analysis
 - 3.7.3. Specifications
 - 3.7.4. Submittal Register
 - 3.7.5. Preparation of DD Form 1354 (Transfer of Real Property)
 - 3.7.6. Acceptance and Release for Construction
- 3.8. DESIGN COMPLETE CONSTRUCTION DOCUMENT REQUIREMENTS
- 3.9. SUBMITTAL DISTRIBUTION, MEDIA AND QUANTITIES
 - 3.9.1. Submittal Distribution and Quantities
 - 3.9.2. Web based Design Submittals
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1.0 GENERAL INFORMATION

1.1. INTRODUCTION

1.1.1. The information contained in this section applies to the design required after award. After award, the Contractor will develop the accepted proposal into the completed design, as described herein.

1.1.2. The Contractor may elect to fast track the design and construction that is, proceed with construction of parts of the sitework and facilities prior to completion of the overall design. To facilitate fast tracking, the Contractor may elect to divide the design into no more than six (6) design packages per major facility type and no more than three (3) design packages for site and associated work. Designate how it will package the design, consistent with its overall plan for permitting (where applicable) and construction of the project. See Sections 01 33 00 SUBMITTAL PROCEDURES and 01 32 01.00 10 PROJECT SCHEDULE for requirements for identifying and scheduling the design packaging plan in the submittal register and project schedule. See also Sections 01 10 00 STATEMENT OF WORK and 01 57 20.00 10 ENVIRONMENTAL PROTECTION for any specified permit requirements. If early procurement of long-lead item construction materials or installed equipment, prior to completion of the associated design package, is necessary to facilitate the project schedule, also identify those long-lead items and how it will assure design integrity of the associated design package to meet the contract requirements (The Contract consists of the Solicitation requirements and the accepted proposal). Once the Government is satisfied that the long-lead items meet the contract requirements, the Contracting Officer will allow the Contractor to procure the items at its own risk.

1.1.3. The Contractor may proceed with the construction work included in a separate design package after the Government has reviewed the final (100%) design submission for that package, review comments have been addressed and resolved to the Government's satisfaction and the Contracting Officer (or the Administrative Contracting Officer) has agreed that the design package may be released for construction.

1.1.4. **INTEGRATED DESIGN.** To the maximum extent permitted for this project, use a collaborative, integrated design process for all stages of project delivery with comprehensive performance goals for siting, energy, water, materials and indoor environmental quality and ensures incorporation of these goals. Consider all stages of the building lifecycle, including deconstruction.

1.2. DESIGNER OF RECORD

Identify, for approval, the Designer of Record ("DOR") that will be responsible for each area of design. One DOR may be responsible for more than one area. Listed, Professional Registered, DOR(s) shall account for all areas of design disciplines shall be accounted for by a listed. The DOR's shall stamp, sign, and date each design drawing and other design deliverables under their responsible discipline at each design submittal stage (see contract clause Registration of Designers). If the deliverables are not ready for release for construction, identify them as "preliminary" or "not for release for construction" or by using some other appropriate designation. The DOR(s) shall also be responsible for maintaining the integrity of the design and for compliance with the contract requirements through construction and documentation of the as-built condition by coordination, review and approval of extensions of design, material, equipment and other construction submittals, review and approval or disapproval of requested deviations to the accepted design or to the contract, coordination with the Government of the above activities, and by performing other typical professional designer responsibilities.

2.0 PRODUCTS (Not Applicable)

3.0 EXECUTION

3.1. PRE-WORK ACTIVITIES & CONFERENCES

3.1.1. Design Quality Control Plan

Submit for Government acceptance, a Design Quality Control Plan in accordance with Section 01 45 04.00 10 CONTRACTOR QUALITY CONTROL before design may proceed.

3.1.2. Post Award Conference

3.1.2.1. The government will conduct a post award contract administration conference at the project site, as soon as possible after contract award. This will be coordinated with issuance of the contract notice to proceed (NTP). The Contractor and major sub-contractor representatives shall participate. All designers need not attend this first meeting. Government representatives will include COE project delivery team members, facility users, facility command representatives, and installation representatives. The Government will provide an agenda, meeting goals, meeting place, and meeting time to participants prior to the meeting.

3.1.2.2. The post award conference shall include determination and introduction of contact persons, their authorities, contract administration requirements, discussion of expected project progress processes, and coordination of subsequent meetings for quality control (see Section 01 45 04.00 10 CONTRACTOR QUALITY CONTROL), Partnering (see below and SCR: Partnering), and the initial design conference (see below).

3.1.2.3. The government will introduce COE project delivery team members, facility users, facility command representatives, and installation representatives. The DB Contractor shall introduce major subcontractors, and other needed staff. Expectations and duties of each person shall be defined for all participants. A meeting roster shall be developed and distributed by the government with complete contact information including name, office, project role, phone, mailing and physical address, and email address.

3.1.3. Partnering & Project Progress Processes

3.1.3.1. The initial Partnering conference may be scheduled and conducted at any time with or following the post award conference. The Government proposes to form a partnership with the DB Contractor to develop a cohesive building team. This partnership will involve the COE project delivery team members, facility users, facility command representatives, installation representatives, Designers of Record, major subcontractors, contractor quality control staff, and contractor construction management staff. This partnership will strive to develop a cooperative management team drawing on the strengths of each team member in an effort to achieve a quality project within budget and on schedule. This partnership will be bilateral in membership and participation will be totally voluntary. All costs, excluding labor and travel expenses, shall be shared equally between the Government and the Contractor. The Contractor and Government shall be responsible for their own labor and travel costs. Normally, partnering meetings will be held at or in the vicinity of the project installation.

3.1.3.2. As part of the partnering process, the Government and Contractor shall develop, establish, and agree to comprehensive design development processes including conduct of conferences, expectations of design development at conferences, fast-tracking, design acceptance, Structural Interior Design (SID)/ Furniture, Fixtures & Equipment (FF&E) design approval, project closeout, etc. The government will explain contract requirements and the DB Contractor shall review their proposed project schedule and suggest ways to streamline processes.

3.1.4. Initial Design Conference

The initial design conference may be scheduled and conducted at the project installation any time after the post award conference, although it is recommended that the partnering process be initiated with or before the initial design conference. Any design work conducted after award and prior to this conference should be limited to site and is discouraged for other items. All Designers of Record shall participate in the conference. The purpose of the meeting is to introduce everyone and to make sure any needs the contractor has are assigned and due dates established as well as who will get the information. See also Attachment F, BUILDING INFORMATION MODELING REQUIREMENTS for discussion concerning the BIM Implementation Plan demonstration at this meeting. The DB Contractor shall conduct the initial design conference.

3.1.5. Pre-Construction Conference

Before starting construction activities, the Contractor and Government will jointly conduct a pre-construction administrative conference to discuss any outstanding requirements and to review local installation requirements for start of construction. It is possible there will be multiple Pre-Construction Conferences based on the content of the design packages selected by the Contractor. The Government will provide minutes of this meeting to all participants.

3.2. STAGES OF DESIGN SUBMITTALS AND OVER THE SHOULDER PROGRESS REVIEWS

The stages of design submittals described below define Government expectations with respect to process and content. The Contractor shall determine how to best plan and execute the design and review process for this project, within the parameters listed below. As a minimum, the Government expects to see at least one interim design submittal, at least one final design submittal before construction of a design package may proceed and at least one Design Complete submittal that documents the accepted design. The Contractor may sub-divide the design into separate packages for each stage of design and may proceed with construction of a package after the Government accepts the final design for that package. See discussion on waivers to submission of one or more intermediate design packages where the parties partner during the design process. See also Attachment F, BUILDING INFORMATION MODELING REQUIREMENTS for discussion concerning BIM and the various stages of design submittals and over-the-shoulder progress reviews.

3.2.1. Site/Utilities

To facilitate fast-track design-construction activities the contractor may submit a final (100%) site and utility design as the first design submittal or it may elect to submit interim and final site and utility design submittals as explained below. Following review, resolution, and incorporation of all Government comments, and submittal of a satisfactory set of site/utility design documents, after completing all other pre-construction requirements in this contract and after the pre-construction meeting, the Government will allow the Contractor to proceed with site development activities, including demolition where applicable, within the parameters set forth in the accepted design submittal. For the first site and utility design submission, whether an interim or final, the submittal review, comment, and resolution times from this specification apply, except that the Contractor shall allow the Government a 14 calendar day review period, exclusive of mailing time. No on-site construction activities shall begin prior to written Government clearance to proceed.

3.2.2. Interim Design Submittals

The Contractor may submit either a single interim design for review, representing a complete package with all design disciplines, or split the interim design into smaller, individual design packages as it deems necessary for fast-track construction purposes. As required in Section 01 32 01.00 10 PROJECT SCHEDULE, the Contractor shall schedule its design and construction packaging plan to meet the contract completion period. This submission is the Government's primary opportunity to review the design for conformance to the solicitation and to the accepted contract proposal and to the Building Codes at a point where required revisions may be still made, while minimizing lost design effort to keep the design on track with the contract requirements. The requirements for the interim design review submittals and review conferences are described hereinafter. This is not necessarily a hold point for the design process; the Contractor may designate the interim design submittal(s) as a snapshot and proceed with design development at its own risk. See below for a waiver, where the parties establish an effective over-the-shoulder progress review procedure through the partnering process that would eliminate the need for or expedite a formal intermediate design review on one or more individual design packages.

3.2.3. Over-the-Shoulder Progress Reviews

To facilitate a streamlined design-build process, the Government and the Contractor may agree to one-on-one reviewer or small group reviews, electronically, on-line (if available within the Contractor's standard design practices) or at the Contractor's design offices or other agreed location, when practicable to the parties. The Government and Contractor will coordinate such reviews to minimize or eliminate disruptions to the design process. Any data required for these reviews shall normally be provided in electronic format, rather than in hard copy. If the Government and Contractor establish and implement an effective, mutually agreeable partnering procedure for regular (e.g., weekly) over-the-shoulder review procedures that allow the Government reviewers the opportunity to keep fully informed of the progress, contents, design intent, design documentation, etc. of the design package, the Government will agree to waive or to expedite the formal intermediate design review period for that package. The Contractor shall still be required to submit the required intermediate design documentation, however the parties may agree to how that material will be provided, in lieu of a formal consolidated submission of the package. It should be noted that Government funding is extremely limited for non-local travel by design reviewers, so the maximum use of virtual teaming methods must be used. Some possible examples include electronic file sharing, interactive software with on-line or telephonic conferencing, televideo conferencing, etc. The Government must still perform its Code and Contract conformance reviews, so the Contractor is encouraged to partner with the reviewers to find ways to facilitate this process and to facilitate meeting or bettering the design-build schedule. The Contractor shall maintain a fully functional configuration management system as described herein to track design revisions, regardless of whether or not there is a need for a formal intermediate design review. The formal intermediate

review procedures shall form the contractual basis for the official schedule, in the event that the partnering process determines that the formal intermediate review process to be best suited for efficient project execution. However, the Government pledges to support and promote the partnering process to work with the Contractor to find ways to better the design schedule.

3.2.4. Final Design Submissions

This submittal is required for each design package prior to Government acceptance of that design package for construction. The requirements for the final design submittal review conferences and the Government's acceptance for start of construction are described herein after.

3.2.5. Design Complete Submittals

After the final design submission and review conference for a design package, revise the design package to incorporate the comments generated and resolved in the final review conferences, perform and document a back-check review and submit the final, design complete documents, which shall represent released for construction documents. The requirements for the design complete submittals are described hereinafter.

3.2.6. Holiday Periods for Government Review or Actions

Do not schedule meetings, Government reviews or responses during the last two weeks of December or other designated Government Holidays (including Friday after Thanksgiving). Exclude such dates and periods from any durations specified herein for Government actions.

3.2.7. Late Submittals and Reviews

If the Contractor cannot meet its scheduled submittal date for a design package, it must revise the proposed submittal date and notify the government in writing, at least one (1) week prior to the submittal, in order to accommodate the Government reviewers' other scheduled activities. If a design submittal is over one (1) day late in accordance with the latest revised design schedule, or if notification of a proposed design schedule change is less than seven (7) days from the anticipated design submission receipt date, the Government review period may be extended up to seven (7) days due to reviewers' schedule conflicts. If the Government is late in meeting its review commitment and the delay increases the Contractor's cost or delays completion of the project, the Suspension of Work and Defaults clauses provide the respective remedy or relief for the delay.

3.3. DESIGN CONFIGURATION MANAGEMENT

3.3.1. Procedures

Develop and maintain effective, acceptable design configuration management (DCM) procedures to control and track all revisions to the design documents after the Interim Design Submission through submission of the As-Built documents. During the design process, this will facilitate and help streamline the design and review schedule. After the final design is accepted, this process provides control of and documents revisions to the accepted design (See Special Contract Requirement: Deviating From the Accepted Design). The system shall include appropriate authorities and concurrences to authorize revisions, including documentation as to why the revision must be made. The DCM data shall be available to the Government reviewers at all times. The Contractor may use its own internal system with interactive Government concurrences, where necessary or may use the Government's "DrChecks Design Review and Checking System" (see below and Attachment C).

3.3.2. Tracking Design Review Comments

Although the Contractor may use its own internal system for overall design configuration management, the Government and the Contractor shall use the DrChecks Design Review and Checking System to initiate, respond to, resolve and track Government design compliance review comments. This system may be useful for other data which needs to be interactive or otherwise available for shared use and retrieval. See Attachment C for details on how to establish an account and set-up the DrChecks system for use on the project.

3.3.3. Design and Code Checklists

Develop and complete various discipline-specific checklists to be used during the design and quality control of each submittal. Submit these completed checklists with each design submittal, as applicable, as part of the project documentation. See Section 01 45 04.00 10 Contractor Quality Control, Attachment D for a Sample Fire Protection and Life Safety Code review checklist and Attachment E for LEED SUBMITTALS.

3.4. INTERIM DESIGN REVIEWS AND CONFERENCES

3.4.1. General

At least one interim design submittal, review and review conference is required for each design package (except that, per paragraph 3.2.1, the Contractor may skip the interim design submission and proceed directly to final design on the sitework and utilities package). The DB Contractor may include additional interim design conferences or over-the-shoulder reviews, as needed, to assure continued government concurrence with the design work. Include the interim submittal review periods and conferences in the project schedule and indicate what part of the design work is at what percentage of completion. The required interim design conferences shall be held when interim design requirements are reached as described below. See also Paragraph: **Over-the-Shoulder Progress Reviews** for a waiver to the formal interim design review.

3.4.2. Procedures

After receipt of an Interim Design submission, allow the Government fourteen (14) calendar days after receipt of the submission to review and comment on the interim design submittal. For smaller design packages, especially those that involve only one or a few separate design disciplines, the parties may agree on a shorter review period or alternative review methods (e.g., over-the-shoulder or electronic file sharing), through the partnering process. For each interim design review submittal, the COR will furnish, to the Contractor, a single consolidated, validated listing of all comments from the various design sections and from other concerned agencies involved in the review process using the DrChecks Design Review and Checking System. The review will be for conformance with the technical requirements of the solicitation and the Contractor's RFP proposal. If the Contractor disagrees technically with any comment or comments and does not intend to comply with the comment, he/she must clearly outline, with ample justification, the reasons for noncompliance within five (5) days after receipt of these comments in order that the comment can be resolved. Furnish disposition of all comments, in writing, through DrChecks. The Contractor is cautioned that if it believes the action required by any comment exceeds the requirements of this contract, that it should take no action and notify the COR in writing immediately. The Interim Review conference will be held for each design submittal at the installation. Bring the personnel that developed the design submittal to the review conference. The conference will take place the week after the receipt of the comments by the Contractor. For smaller fast-track packages that involve only a few reviewers, the parties may agree to alternative conferencing methods, such as teleconferencing, or televideo, where available, as determined through Partnering.

3.4.3. Conference Documentation

3.4.3.1. In order to facilitate and accelerate the Government code and contract conformance reviews, identify, track resolution of and maintain all comments and action items generated during the design process and make this available to the designers and reviewers prior to the Interim and subsequent design reviews.

3.4.3.2. The DB Contractor shall prepare meeting minutes and enter final resolution of all comments into DrChecks. Copies of comments, annotated with comment action agreed on, will be made available to all parties before the conference adjourns. Unresolved problems will be resolved by immediate follow-on action at the end of conferences. Incorporate valid comments. The Government reserves the right to reject design document submittals if comments are significant. Participants shall determine if any comments are critical enough to require further design development prior to government concurrence. Participants shall also determine how to proceed in order to obtain government concurrence with the design work presented.

3.5. INTERIM DESIGN REQUIREMENTS

Interim design deliverables shall include drawings, specifications, and design analysis for the part of design that the Contractor considers ready for review.

3.5.1. Drawings

Include comments from any previous design conferences incorporated into the documents to provide an interim design for the "part" submitted.

3.5.2. Design Analyses

3.5.2.1. The designers of record shall prepare and present design analyses with calculations necessary to substantiate and support all design documents submitted. Address design substantiation required by the applicable codes and references and pay particular attention to the following listed items:

3.5.2.2. For parts including sitework, include site specific civil calculations.

3.5.2.3. For parts including structural work, include structural calculations.

- (a) Identify all loads to be used for design.
- (b) Describe the method of providing lateral stability for the structural system to meet seismic and wind load requirements. Include sufficient calculations to verify the adequacy of the method.
- (c) Provide calculations for all principal roof, floor, and foundation members and bracing and secondary members.
- (d) Provide complete seismic analyses for all building structural, mechanical, electrical, architectural, and building features as dictated by the seismic zone for which the facility is being constructed.
- (e) Computer generated calculations must identify the program name, source, and version. 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, element/members, materials/properties, and all loadings, induced settlements/deflections, etc., and a list of load combinations. Include an output listing for maximum/minimum stresses/forces and deflections for each element and the reactions for each loading case and combination.
- (f) See also the Security (Anti-Terrorism) requirements below for members subject to Anti-Terrorist Force Protection (ATFP) and Progressive Collapse requirements.
- (g) Fully coordinate and integrate the overall structural design between two different or interfacing construction types, such as modular and stick-built or multistory, stacked modular construction. Provide substantiation of structural, consolidation/settlement analysis, etc., as applicable, through the interfaces.

3.5.2.4. For Security (Anti-Terrorism): Provide a design narrative and calculations where applicable, demonstrating compliance with each of the 22 standards in UFC 4-010-01, which includes Design of Buildings to Resist Progressive Collapse (use the most recent version of UFC 4-023-03, regardless of references to any specific version in UFC 4-010-01). Where sufficient standoff distance is not being provided, show calculations for blast resistance of the structural system and building envelope. Show complete calculations for members subjected to ATFP loads, e.g., support members of glazed items (jamb, headers, sills) connections of windows to support members and connections of support members to the rest of the structure. For 3 story and higher buildings, provide calculations to demonstrate compliance with progressive collapse requirements.

3.5.2.5. For parts including architectural work, include building floor area analysis.

3.5.2.6. For parts including mechanical work, include HVAC analysis and calculations. Include complete design calculations for mechanical systems. Include computations for sizing equipment, compressed air systems, air duct design, and U-factors for ceilings, roofs and exterior walls and floors. Contractor shall employ commercially available energy analysis techniques to determine the energy performance of all passive systems and features. Use of hourly energy load computer simulation is required (see paragraph 3.5.5.2 for list of acceptable software). Based on the results of calculations, provide a complete list of the materials and equipment proposed with the manufacturer's published cataloged product installation specifications and roughing-in data.

3.5.2.7. For parts including life safety, include building code analysis and sprinkler and other suppression systems. Notwithstanding the requirements of the Codes, address the following:

- (a) A registered fire protection engineer (FPE) must perform all fire protection analyses. Provide the fire protection engineer's qualifications. See Section 01 10 00, paragraph 5 for qualifications.

- (b) Provide all references used in the design including Government design documents and industry standards used to generate the fire protection analysis.
- (c) Provide classification of each building in accordance with fire zone, building floor areas and height and number of stories.
- (d) Provide discussion and description of required fire protection requirements including extinguishing equipment, detection equipment, alarm equipment and water supply. Alarm and detection equipment shall interface to requirements of Electronic Systems.
- (e) Provide hydraulic calculations based on water flow test for each sprinkler system to insure that flow and pressure requirements can be met with current water supply. Include copies of Contractor's water flow testing done to certify the available water source.

3.5.2.8. For parts including plumbing systems:

- (a) List all references used in the design.
- (b) Provide justification and brief description of the types of plumbing fixtures, piping materials and equipment proposed for use.
- (c) Detail calculations for systems such as sizing of domestic hot water heater and piping; natural gas piping; LP gas piping and tanks, fuel oil piping and tanks, etc., as applicable.
- (d) When the geotechnical report indicates expansive soils are present, indicate in the first piping design submittal how piping systems will be protected against damage or backfall/backflow due to soil heave (from penetration of slab to the 5 foot building line).

3.5.2.9. For elevator systems:

- (a) List all criteria codes, documents and design conditions used.
- (b) List any required permits and registrations for construction of items of special mechanical systems and equipment.

3.5.2.10. For parts including electrical work, include lighting calculations to determine maintained foot-candle levels, electrical load analysis and calculations, electrical short circuit and protective device coordination analysis and calculations and arc fault calculations.

3.5.2.11. For parts including telecommunications voice/data (including SIPRNET, where applicable), include analysis for determining the number and placement of outlets

3.5.2.12. For Cathodic Protection Systems, provide the following stamped report by the licensed corrosion engineer or NACE specialist with the first design submission. The designer must be qualified to engage in the practice of corrosion control of buried or submerged metallic surfaces. He/she must be accredited or certified by the National Association of Corrosion Engineers (NACE) as a NACE Accredited Corrosion Specialist or a NACE certified Cathodic Protection Specialist, or must be a registered professional engineer with a minimum of five years experience in corrosion control and cathodic protection. Clearly describe structures, systems or components in soil or water to be protected. Describe methods proposed for protection of each.

3.5.3. Geotechnical Investigations and Reports:

3.5.3.1. The contractor's licensed geotechnical engineer shall prepare a final geotechnical evaluation report, to be submitted along with the first foundation design submittal. Make this information available as early as possible during the over-the-shoulder progress review process. Summarize the subsurface conditions and provide recommendations for the design of appropriate utilities, foundations, floor slabs, retaining walls, embankments, and pavements. Include compaction requirements for fill and backfill under buildings, sidewalks, other structures and open areas. Recommend foundation systems to be used, allowable bearing pressures for footings, lateral load resistance capacities for foundation systems, elevations for footings, grade beams, slabs, etc. Provide an assessment of post-construction settlement potential including total and differential. Provide recommendations regarding lateral earth pressures (active, at-rest, passive) to be used in the design of retaining walls. Include the recommended spectral accelerations and Site Class for seismic design along with an evaluation of any seismic hazards and recommendations for mitigation, if required. Include calculations to support the recommendations for bearing capacity, settlement, and pavement sections. Include supporting documentation for all recommended

design parameters such as Site Class, shear strength, earth pressure coefficients, friction factors, subgrade modulus, California Bearing Ratio (CBR), etc. Provide earthwork recommendations, expected frost penetration, expected groundwater levels, recommendations for dewatering and groundwater control and the possible presence of any surface or subsurface features that may affect the construction of the project such as sinkholes, boulders, shallow rock, old fill, old structures, soft areas, or unusual soil conditions. Include pH tests, salinity tests, resistivity measurements, etc., required to design corrosion control and grounding systems. Include the raw field data. Arrange a meeting with the Government subsequent to completion and evaluation of the site specific geotechnical exploration to outline any differences encountered that are inconsistent with the Government provided preliminary soils information. Clearly outline differences which require changes in the foundation type, or pavement and earthwork requirements from that possible and contemplated using the Government furnished preliminary soils investigation, which result in a change to the design or construction. Any equitable adjustment is subject to the provisions of the contract's Differing Site Conditions Clause.

3.5.3.2. Vehicle Pavements: The Contractor's geotechnical report shall contain flexible and rigid pavement designs, as applicable for the project, including design CBR and modulus of subgrade reaction and the required compaction effort for subgrades and pavement layers. Provide Information on the types of base course materials available in the area and design strengths.

3.5.3.3. The Contractor and the professional geotechnical engineer consultant shall certify in writing that the design of the project has been developed consistent with the Contractor's final geotechnical report. The certification shall be stamped by the consulting professional geotechnical engineer and shall be submitted with the first design submission. If revisions are made to the initial design submission, a new certification shall be provided with the final design submission.

3.5.4. LEED Documentation:

Assign a LEED Accredited Professional, responsible to track LEED planning, performance and documentation for each LEED credit through construction closeout. Incorporate LEED credits in the plans, specifications and design analyses. Develop LEED supporting documentation as a separable portion of the Design Analysis and provide with each required design submittal. Include the LEED Project checklist for each non-exempt facility (one checklist may be provided for multiple facilities in accordance with the LEED-NC Application Guide for Multiple Buildings and On-Campus Building Projects and the LEED SUBMITTALS (Attachment E, herein) with each submittal. Final design submittal for each portion of the work must include all required design documentation relating to that portion of work (example - all site credit design documents with final site design). Submittal requirements are as indicated in Attachment E, LEED SUBMITTALS. Submit all documentation indicated on Attachment E as due at final design at final design submittal (for fast-track projects with multiple final design submittals, this shall be at the last scheduled final design submittal). All project documentation related to LEED shall conform to USGBC requirements for both content and format, including audit requirements and be separate from other design analyses. Maintain and update the LEED documentation throughout project progress to construction closeout and shall compile product data, receipts, calculations and other data necessary to substantiate and support all credits claimed. The Government may audit any or all individual credits. Audit documentation is not required to be submitted unless requested. These requirements apply to all projects. If the project requires the Contractor to obtain USGBC certification, the Contractor shall also be responsible for obtaining USGBC certification and shall provide written evidence of certification with the construction closeout LEED documentation submittal. Install the USGBC building plaque at the location indicated by the Government upon receipt. If Contractor obtains USGBC interim design review, submit the USGBC review to the Government within 30 days of receipt for information only.

3.5.4.1. LEED Documentation for Technology Solution Set. If the Solicitation provides a Prescriptive Technology Solution Set, use of the Technology Solution set has no effect on LEED documentation requirements. Provide all required LEED documentation, including energy analysis, in accordance with LEED requirements when using the Technology Solution Set.

3.5.5. Energy Conservation:

3.5.5.1. Refer to Section 01 10 00, Paragraph 5. Interim and Final Design submittals shall demonstrate that each building including the building envelope, HVAC systems, service water heating, power, and lighting systems meet the Mandatory Provisions and the Prescriptive Path requirements of ASHRAE 90.1. Use Compliance Documentation forms available from ASHRAE and included in the ASHRAE 90.1 User's Manual for this purpose. The Architectural Section of the Design Analysis shall include completed forms titled "Building Envelope

Compliance Documentation Parts I and II". The Heating Ventilating and Air Conditioning (HVAC) Section of the Design Analysis shall include a completed form titled "HVAC Simplified Approach Option - Part I" if this approach is allowed by the Standard. Otherwise, the HVAC Section of the Design Analysis shall include completed forms titled "HVAC Mandatory Provisions - Part II" and "HVAC Prescriptive Requirements - Part III". The Plumbing Section of the Design Analysis shall include a completed form titled "Service Water Heating Compliance Documentation". The Electrical Section of the Design Analysis shall include an explanatory statement on how the requirements of ASHRAE 90.1-2004 Chapter 8 Power were met. The Electrical Section of the Design Analysis shall also include a completed form titled "Lighting Compliance Documentation".

3.5.5.2. Interim and Final Design submittals which address energy consuming systems, (heating, cooling, service hot water, lighting, power, etc.) must also include calculations in a separate Energy Conservation Section of the Design Analysis which demonstrate and document (a) the baseline energy consumption for the facility or facilities under contract, that would meet the requirements of ANSI/ASHRAE/IESNA Standard 90.1 and (b) the energy consumption of the facility or facilities under contract utilizing the materials and methods required by this construction contract. Use the USGBC Energy and Atmosphere (EA) Credit 1 compliance template / form or an equivalently detailed form for documenting compliance with the energy reduction requirements. This template / form is titled PERFORMANCE RATING METHOD and is available when the project is registered for LEED. The calculation methodology used for this documentation and analysis shall follow the guidelines set forth in Appendix G of ASHRAE 90.1, with two exceptions: a) receptacle and process loads may be omitted from the calculation; and b) the definition of the terms in the formula for Percentage Improvement found in paragraph G1.2 are modified as follows: Baseline Building Performance shall mean the annual energy consumption calculated for a building design intended for use as a baseline for rating above standard design meeting the minimum requirements of the energy standard, and Proposed Building Performance shall mean annual energy consumption calculated for the proposed building design intended for construction. This calculation shall address all energy consuming systems in a single integrated methodology. Include laboratory fume hoods and kitchen ventilation loads in the energy calculation. They are not considered process loads. Individual calculations for heating, cooling, power, lighting, power, etc. systems will not be acceptable. The following building simulation software is acceptable for use in calculating building energy consumption: Hourly Analysis Program (HAP) by Carrier Corp., TRACE 700 by Trane Corp., DOE-2 by US Department of Energy, EnergyPlus by DOD/DOE.

3.5.6. Specifications

Specifications may be any one of the major, well known master guide specification sources (use only one source) such as MASTERSPEC from the American Institute of Architects, SPECTEXT from Construction Specification Institute or Unified Facility Guide Specifications (UFGS using MASTERFORMAT 2004 numbering system), etc. (including specifications from these sources). Manufacturers' product specifications, utilizing CSI's Manu-Spec, three part format may be used in conjunction with the selected specifications. The designers of record shall edit and expand the appropriate Specifications to insure that all project design requirements, current code requirements, and regulatory requirements are met. Specifications shall clearly identify, where appropriate, specific products chosen to meet the contract requirements (i.e., manufacturers' brand names and model numbers or similar product information).

3.5.7. Building Rendering

Present and provide a draft color computer, artist, or hand drawn rendering with the conceptual design submittal of the building exterior. Perspective renderings shall include a slightly overhead view of the entire building to encompass elevations and the roof configuration of the building. After Government review and acceptance, provide a final rendering, including the following:

Three (3) 18" x 24" color prints, framed and matted behind glass with project title underneath the print.

One (1) Image file (high resolution) in JPG format on CD for those in the submittal distribution list.

3.5.8. Interim Building Design Contents

The following list represents what the Government considers should be included in the overall completed design for a facility or project. It is not intended to limit the contractor from providing different or additional information as needed to support the design presented, including the require design analyses discussed above. As the Contractor develops individual design packages and submits them for Interim review, include as much of the applicable

information for an individual design package as is developed at the Interim design level for review purposes. These pieces shall be developed as the design progresses toward the design complete stage.

3.5.8.1. Lawn and Landscaping Irrigation System

3.5.8.2. Landscape, Planting and Turfing

3.5.8.3. Architectural

- (a) Design Narrative
- (b) Architectural Floor Plans, Typical Wall and Roof Sections, Elevations
- (c) Finish schedule
- (d) All required equipment
- (e) Special graphics requirements
- (f) Door and Window Schedules
- (g) Hardware sets using BHMA designations
- (h) Composite floor plan showing all pre-wired workstations
- (i) Structural Interior Design (SID) package: See ATTACHMENT A for specific requirements
- (j) Furniture, Fixtures & Equipment (FF&E) design package: See ATTACHMENT B for specific requirements

3.5.8.4. Structural Systems. Include:

- (a) Drawings showing principal members for roof and floor framing plans as applicable
- (b) Foundation plan showing main foundation elements where applicable
- (c) Typical sections for roof, floor, and foundation conditions

3.5.8.5. Plumbing Systems

- (a) Show locations and general arrangement of plumbing fixtures and major equipment
- (b) Plan and isometric riser diagrams of all areas including hot water, cold water, waste and vent piping. Include natural gas (and meter as required), (natural gas and meter as required), (LP gas), (fuel oil) and other specialty systems as applicable.
- (c) Include equipment and fixture connection schedules with descriptions, capacities, locations, connection sizes and other information as required

3.5.8.6. HVAC Systems

- (a) Mechanical Floor Plans: The floor plans shall show all principle architectural features of the building which will affect the mechanical design. The floor plans shall also show the following:
 - (1) Room designations.
 - (2) Mechanical legend and applicable notes.
 - (3) Location and size of all ductwork and piping.
 - (4) Location and capacity of all terminal units (i.e., registers, diffusers, grilles, hydronic baseboards).
 - (5) Pre-Fabricated Paint Spray Booth (where applicable to project scope)
 - (6) Paint Preparation Area (where applicable to project scope)
 - (7) Exhaust fans and specialized exhaust systems.
 - (8) Thermostat location.
 - (9) Location of heating/cooling plant (i.e., boiler, chiller, cooling tower, etc).
 - (10) Location of all air handling equipment.

- (11) Air balancing information.
- (12) Flue size and location.
- (13) Piping diagram for forced hot water system (if used).
- (b) Equipment Schedule: Provide complete equipment schedules. Include:
 - (1) Capacity
 - (2) Electrical characteristics
 - (3) Efficiency (if applicable)
 - (4) Manufacturer's name
 - (5) Optional features to be provided
 - (6) Physical size
 - (7) Minimum maintenance clearances
- (a) Details: Provide construction details, sections, elevations, etc., only where required for clarification of methods and materials of design.
- (b) HVAC Controls: Submit complete HVAC controls equipment schedules, sequences of operation, wiring and logic diagrams, Input/Output Tables, equipment schedules, and all associated information. See the Statement of Work for additional specific requirements.

3.5.8.7. Fire Protection and Life Safety.

- (a) Provide plan for each floor of each building that presents a compendium of the total fire protection features being incorporated into the design. Include the following types of information:
 - (1) The location and rating of any fire-resistive construction such as occupancy separations, area separations, exterior walls, shaft enclosures, corridors, stair enclosures, exit passageways, etc.
 - (2) The location and coverage of any fire detection systems
 - (3) The location and coverage of any fire suppression systems (sprinkler risers, standpipes, etc.)
 - (4) The location of any other major fire protection equipment
 - (5) Indicate any hazardous areas and their classification
 - (6) Schedule describing the internal systems with the following information: fire hazard and occupancy classifications, building construction type, GPM/square foot sprinkler density, area of operation and other as required
- (b) Working plans and all other materials submitted shall meet NFPA 13 requirements, with respect to required minimum level of detail.

3.5.8.8. Elevators. Provide:

- (a) Description of the proposed control system
- (b) Description, approximate capacity and location of any special mechanical equipment for elevators.

3.5.8.9. Electrical Systems.

- (a) Electrical Floor Plan(s): Show all principle architectural features of the building which will affect the electrical design. Show the following:
 - (1) Room designations.
 - (2) Electrical legend and applicable notes.
 - (3) Lighting fixtures, properly identified.
 - (4) Switches for control of lighting.
 - (5) Receptacles.

- (6) Location and designation of panelboards. Clearly indicate type of mounting required (flush or surface) and reflect accordingly in specifications.
- (7) Service entrance (conduit and main disconnect).
- (8) Location, designation and rating of motors and/or equipment which requires electrical service. Show method of termination and/or connection to motors and/or equipment. Show necessary junction boxes, disconnects, controllers (approximate only), conduit stubs, and receptacles required to serve the motor and/or equipment.
- (b) Building Riser Diagram(s) (from pad-mounted transformer to unit load center panelboard): Indicate the types and sizes of electrical equipment and wiring. Include grounding and metering requirements.
- (c) Load Center Panelboard Schedule(s): Indicate the following information:
 - (1) Panelboard Characteristics (Panel Designation, Voltage, Phase, Wires, Main Breaker Rating and Mounting.
 - (2) Branch Circuit Designations.
 - (3) Load Designations.
 - (4) Circuit Breaker Characteristics. (Number of Poles, Trip Rating, AIC Rating)
 - (5) Branch Circuit Connected Loads (AMPS).
 - (6) Special Features
- (d) Lighting Fixture Schedule(s): Indicate the following information:
 - (1) Fixture Designation.
 - (2) General Fixture Description.
 - (3) Number and Type of Lamp(s).
 - (4) Type of Mounting.
 - (5) Special Features.
- (e) Details: Provide construction details, sections, elevations, etc. only where required for clarification of methods and materials of design.

3.5.8.10. Electronic Systems including the following responsibilities:

- (a) Fire Detection and Alarm System. Design shall include layout drawings for all devices and a riser diagram showing the control panel, annunciator panel, all zones, radio transmitter and interfaces to other systems (HVAC, sprinkler, etc.)
- (b) Fire Suppression System Control. Specify all components of the Fire Suppression (FS) System in the FS section of the specifications. Clearly describe how the system will operate and interact with other systems such as the fire alarm system. Include a riser diagram on the drawings showing principal components and interconnections with other systems. Include FS system components on drawing legend. Designate all components shown on floor plans "FS system components" (as opposed to "Fire Alarm components"). Show location of FS control panels, HVAC control devices, sensors, and 120V power panel connections on floor plans. Indicate zoning of areas by numbers (1, 2, 3) and detectors sub-zoned for cross zoning by letter designations (A and B). Differentiate between ceiling mounted and under floor detectors with distinct symbols and indicate sub-zone of each.
- (c) Public Address System
- (d) Special Grounding Systems. Completely reflect all design requirements in the specifications and drawings. Specifications shall require field tests (in the construction phase), witnessed by the Government, to determine the effectiveness of the grounding system. Include drawings showing existing construction, if any.
- (e) Cathodic Protection.
- (f) Intrusion Detection, Card Access System
- (g) Central Control and Monitoring System
- (h) Mass Notification System
- (i) Electrical Power Distribution Systems

3.5.8.11. Separate detailed Telecommunications drawings for Information Systems including the following responsibilities:

- (a) Telecommunications Cabling
- (b) Supporting Infrastructure
- (a) Outside Plant (OSP) Cabling - Campus or Site Plans - Exterior Pathways and Inter-Building Backbones
 - (a) Include a layout of the voice/data outlets (including voice only wall & pay phones) on telecommunication floor plan drawing, location of SIPRNET data outlets (where applicable), and a legend and symbol definition to indicate height above finished floor. Show size of conduit and cable type and size on Riser Diagram. Do not show conduit runs between backboard and outlets on the floor plans. Show underground distribution conduit and cable with sizing from point of presence to entrance facility of building.
 - (b) Layout of complete building per floor - Serving Zone Boundaries, Backbone Systems, and Horizontal Pathways including Serving Zones Drawings - Drop Locations and Cable ID's
 - (c) Communication Equipment Rooms - Plan Views - Tech and AMEP/Elevations - Racks and Walls. Elevations with a detailed look at all telecomm rooms. Indicate technology layout (racks, ladder-racks, etc.), mechanical/electrical layout, rack elevation and backboard elevation. They may also be an enlargement of a congested area of T1 or T2 series drawing.

3.6. FINAL DESIGN REVIEWS AND CONFERENCES

A final design review and review conference will be held upon completion of final design at the project installation, or – where equipment is available - by video teleconference or a combination thereof, for any design package to receive Government acceptance to allow release of the design package for construction. For smaller separate design packages, the parties may agree on alternative reviews and conferences (e.g., conference calls and electronic file sharing, etc.) through the Partnering process. Include the final design conference in the project schedule and shall indicate what part of the design work is at 100% completion. The final design conference will be held after the Government has had seven (7) calendar days after receipt of the submission to review the final design package and supporting data. For smaller packages, especially those involving only one or a few design disciplines the parties may agree on a shorter period.

3.7. FINAL DESIGN REQUIREMENTS

Final design deliverables for a design package shall consist of 100% complete drawings, specifications, submittal register and design analyses for Government review and acceptance. The 100% design submission shall consist of drawings, specifications, updated design analyses and any permits required by the contract for each package submitted. In order to expedite the final design review, prior to the conference, ensure that the design configuration management data and all review comment resolutions are up-to-date. Include the 100% SID and 100% FF&E binders for government approval. The Contractor shall have performed independent technical reviews (ITR's) and back-checks of previous comment resolutions, as required by Section 01 45 04.00 10 CONTRACTOR QUALITY CONTROL, including providing documentation thereof. Use DrChecks or other acceptable comment tracking system during the ITR and submit the results with each final design package

3.7.1. Drawings

3.7.1.1. Submit drawings complete with all contract requirements incorporated into the documents to provide a 100% design for each package submitted.

3.7.1.2. Prepare all drawings with the Computer-Aided Design and Drafting (CADD)/Computer-Aided Design (CAD) system, organized and easily referenced electronically, presenting complete construction information.

3.7.1.3. Drawings shall be complete. The Contractor is encouraged to utilize graphics, views, notes, and details which make the drawings easier to review or to construct but is also encouraged to keep such materials to those that are necessary.

3.7.1.4. Provide detail drawings that illustrate conformance with the contract. Include room finish schedules, corresponding color/finish/special items schedules, and exterior finish schedules that agree with the submitted SID binders.

3.7.1.5. The design documents shall be in compliance with the latest version of the A/E/C CAD Standard, available at <https://cadbim.usace.army.mil/CAD>. Use the approved vertical Corps of Engineers title blocks and borders on all drawings with the appropriate firm name included within the title block area.

3.7.1.6. CAD System and Building Information Modeling (BIM) (NOTE: If this is a Single Award or Multiple Award, Indefinite Delivery/Indefinite Quantity Contract, this information will be provided for each task order.)

All CAD files shall be fully compatible with AutoCAD 2000 or higher. Save all design CAD files as AutoCAD 2000 or higher files. All submitted BIM Models and associated Facility Data shall be fully compatible with Bentley BIM file format and the USACE Bentley BIM v8 Workspace.

(a) CAD Data Final File Format: During the design development capture geo-referenced coordinates of all changes made to the existing site (facility footprint, utility line installations and alterations, roads, parking areas, etc) as a result of this contract. There is no mandatory methodology for how the geo-referenced coordinates will be captured, however, Engineering and Construction Bulletin No. 2006-15, Subject: Standardizing Computer Aided Design (CAD) and Geographic Information Systems (GIS) Deliverables for all Military Design and Construction Projects identifies the format for final as-built drawings and data sets to be delivered to the government. Close-out requirements at the as-built stage; require final geo-referenced GIS Database of the new facility along with all exterior modifications. The Government will incorporate this data set into the Installation's GIS Masterplan or Enterprise GIS System. See also, Section 01 78 02.00 10 Closeout Submittals.

(b) Electronic Drawing Files: In addition to the native CAD design files, provide separate electronic drawing files (in editable CAD format and Adobe Acrobat PDF version 7.0 or higher) for each project drawing.

(c) Each file (both CAD and PDF) shall represent one complete drawing from the drawing set, including the date, submittal phase, and border. Each drawing file shall be completely independent of any data in any other file, including fonts and shapes not included with the basic CAD software program utilized. Fonts that are not included as part of the default CAD software package installation or recognized as an allowable font by the A/E/C CAD Standard are not acceptable in delivered CAD files. All displayed graphic elements on all levels of the drawing files shall be part of the project drawing image. The drawing files shall not contain any graphic element that is not part of the drawing image.

(d) Deliver BIM Model and associated Facility Data files in their native format. At a minimum, BIM files shall address major architecture design elements, major structural components, mechanical systems and electrical/communication distribution and elements as defined in Attachment F. See Attachment F for additional BIM requirements.

(e) Drawing Index: Provide an index of drawings sheet in CAD as part of the drawing set, and an electronic list in Microsoft Excel of all drawings on the CD. Include the electronic file name, the sheet reference number, the sheet number, and the sheet title, containing the data for each drawing.

(f) Hard Copies: Plot submitted hard copy drawings directly from the "electronic drawing files" and copy for quantities and sizes indicated in the distribution list at the end of this specification section. The Designers of Record shall stamp, sign and date original hard copy sheets as Released For Construction, and provide copies for distribution from this set.

3.7.2. Design Analyses

3.7.2.1. The designers of record shall update, finalize and present design analyses with calculations necessary to substantiate and support all design documents submitted.

3.7.2.2. The responsible DOR shall stamp, sign and date the design analysis. Identify the software used where, applicable (name, version, vendor). Generally, provide design analyses, individually, in an original (file copy) and one copy for the assigned government reviewer.

3.7.2.3. All disciplines review the LEED design analysis in conjunction with their discipline-specific design analysis; include a copy of the separable LEED design analysis in all design analysis submittals.

3.7.2.4. Do not combine multi-disciplined volumes of design-analysis, unless multiple copies are provided to facilitate multiple reviewers (one copy per each separate design analysis included in a volume).

3.7.3. Specifications

Specifications shall be 100% complete and in final form.

3.7.4. Submittal Register

Prepare and update the Submittal Register and submit it with the 100% design specifications (see Specification Section 01 33 00, SUBMITTAL PROCEDURES) with each design package. Include the required submittals for each specification section in a design package in the submittal register.

3.7.5. Preparation of DD Form 1354 (Transfer of Real Property)

This form itemizes the types, quantities and costs of various equipment and systems that comprise the project, for the purpose of transferring the new construction project from the Corps Construction Division to the Installation's inventory of real property. The Government will furnish the DB Contractor's design manager a DD Form 1354 checklist to use to produce a draft Form 1354. Submit the completed checklist and prepared draft Form DD 1354 with the 100% design in the Design Analysis. The Corps will use these documents to complete the final DD 1354 upon completion of construction.

3.7.6. Acceptance and Release for Construction

3.7.6.1. At the conclusion of the Final Design Review (after resolutions to the comments have been agreed upon between DOR and Government reviewers), the Contracting Officer or the ACO will accept the Final Design Submission for the design package in writing and allow construction to start for that design package. The Government may withhold acceptance until all major corrections have been made or if the final design submission requires so many corrections, even though minor, that it isn't considered acceptably complete.

3.7.6.2. Government review and acceptance of design submittals is for contract conformance only and shall not relieve the Contractor from responsibility to fully adhere to the requirements of the contract, including the Contractor's accepted contract proposal, or limit the Contractor's responsibility of design as prescribed under Special Contract Requirement: "Responsibility of the Contractor for Design" or limit the Government's rights under the terms of the contract. The Government reserves the right to rescind inadvertent acceptance of design submittals containing contract deviations not separately and expressly identified in the submittal for Government consideration and approval.

3.8. DESIGN COMPLETE CONSTRUCTION DOCUMENT REQUIREMENTS

After the Final Design Submission and Review Conference and after Government acceptance of the Final Design submission, revise the design documents for the design package to incorporate the comments generated and resolved in the final review conference, perform and document a back-check review and submit the final, design complete documents. Label the final design complete documents "FOR CONSTRUCTION" or use similar language. In addition to the final drawings and specifications, the following deliverables are required for distribution and field use. The deliverable includes all documentation and supporting design analysis in final form, as well as the final review comments, disposition and the back-check. As part of the quality assurance process, the Government may perform a back-check of the released for construction documentation. Promptly correct any errors or omissions found during the Government back-check. The Government may withhold retainage from progress payments for work or materials associated with a final design package until this submittal has been received and the Government determines that it is complete.

3.9. SUBMITTAL DISTRIBUTION, MEDIA AND QUANTITIES

3.9.1. Submittal Distribution and Quantities

General: The documents which the Contractor shall submit to the Government for each submittal are listed and generally described in preceding paragraphs in this Section. Provide copies of each design submittal and design substantiation as follows (NOTE: If this is a Single Award or Multiple Award, Indefinite Delivery/Indefinite Quantity Contract, this information will be provided for each task order):

Activity and Address	Drawing Size (Full Size) Full size Full Sets/ *Partial Sets	Design Analyses & Specs Full Sets/ *Partial Sets	Drawing Size (Half Size) 1/2 size Full Sets/ *Partial Sets	Non-BIM Data CD-ROM or DVD as Necessary (PDF & .dwg)	Furniture Submittal (Per Attachment B)	Structural Interior Design Submittal	BIM Data DVD (Per Attachment F)
Commander, U.S.Army Engineer District Ft. Worth	1/0	8/0	8/0	8	1	2	1
Commander, U.S.Army Engineer District, Center of Standardization Savannah	0/0	1/0	1/0	3	N/A	0	1
Installation	0/0	8/0	15/0	29	2	2	1
U.S.Army Corps of Engineers Construction Area Office	0/0	4/0	4/0	4	1	2	1
Information Systems Engineering Command (ISEC)	0/0	0/1	0/0	1	N/A	N/A	1
Other Offices	0/0	4/0	4/0	7	N/A	2	0

***NOTE: For partial sets of drawings, specifications and design analyses, see paragraph 3.9.3.3, below.**

****NOTE: When specified below in 3.9.2, furnish Installation copies of Drawings as paper copies, in lieu of the option to provide secure web-based submittals.**

3.9.2. Web based Design Submittals

Except for full or half-sized drawings for Installation personnel, as designated in the Table above, Web based design submittals will be acceptable as an alternative to the paper copies listed in the Table above, provided a single hard-copy PDF based record set is provided to the Contracting Officer for record purposes. Where the contract requires the Contractor to submit documents to permitting authorities, still provide those authorities paper copies (or in an alternate format where required by the authority). Web based design submittal information shall be provided with adequate security and availability to allow unlimited access those specifically authorized to Government reviewers while preventing unauthorized access or modification. File sizes must be of manageable size for reviewers to quickly download or open on their computers. As a minimum, drawings shall be full scale on American National Standards Institute (ANSI) D sheets (34" x 22"). In addition to the optional website, provide the BIM data submission on DVD to each activity and address noted above in paragraph 3.9.1 for each BIM submission required in Attachment F.

3.9.3. Mailing of Design Submittals

3.9.3.1. Mail all design submittals to the Government during design and construction, using an overnight mailing service. The Government will furnish the Contractor addresses where each copy shall be mailed to after award of the contract (or individual task order if this is an indefinite delivery/indefinite quantity, task order contract). Mail the submittals to twenty (20) different addresses. Assemble drawing sheets, specs, design analyses, etc. into individual sets; do not combine duplicate pages from individual sets so that the government has to assemble a set.

3.9.3.2. Each design submittal shall have a transmittal letter accompanying it indicating the date, design percentage, type of submittal, list of items submitted, transmittal number and point of contact with telephone number.

3.9.3.3. Provide partial sets of drawings, specifications, design analyses, etc., as designated in the Table in paragraph 3.9.1, to those reviewers who only need to review their applicable portions of the design, such as the various utilities. The details of which office receives what portion of the design documentation will be worked out after award.

3.10. AS-BUILT DOCUMENTS

Provide as-built drawings and specifications in accordance with Section 01 78 02.00 10, CLOSEOUT SUBMITTALS. Update LEED design phase documentation during construction as needed to reflect construction changes and advancing project completion status (example - Commissioning Plan updates during construction phase) and include updated LEED documentation in construction closeout submittal.

ATTACHMENT A STRUCTURAL INTERIOR DESIGN (SID) REQUIREMENTS

1.0 GENERAL INFORMATION

Structural Interior Design includes all building related elements and components generally part of the building itself, such as wall finishes, ceilings finishes, floor coverings, marker/bulletin boards, blinds, signage and built in casework. Develop the SID in conjunction with the furniture footprint.

2.0 STRUCTURAL INTERIOR DESIGN (SID) REQUIREMENTS FOR THE INTERIM AND FINAL DESIGN SUBMITTALS

2.1. FORMAT AND SCHEDULE

Prepare and submit for approval an interior and exterior building finishes scheme for an interim design submittal. The DOR shall meet with and discuss the finish schemes with the appropriate Government officials prior to preparation of the schemes to be presented. Present original sets of the schemes to reviewers at an interim design conference.

At the conclusion of the interim phase, after resolutions to the comments have been agreed upon between DOR and Government reviewers, the Contractor may proceed to final design with the interior finishes scheme presented.

The SID information and samples are to be submitted in 8 ½" x 11" format using three ring binders with pockets on the inside of the cover. When there are numerous pages with thick samples, use more than one binder. Large D-ring binders are preferred to O-ring binders. Use page protectors that are strong enough to keep pages from tearing out. Anchor large or heavy samples with mechanical fasteners, Velcro, or double-faced foam tape rather than rubber cement or glue. Fold out items must have a maximum spread of 25 ½". Provide cover and spine inserts sheets identifying the document as "Structural Interior Design" package. Include the project title and location, project number, Contractor/A/E name and phone number(s), submittal stage and date.

Design submittal requirements include, but are not limited to:

2.1.1. Narrative of the Structural Interior Design Objectives

The SID shall include a narrative that discusses the building related finishes. Include topics that relate to base standards, life safety, sustainable design issues, aesthetics, durability and maintainability, discuss the development and features as they relate to the occupants requirements and the building design.

2.1.2. Interior Color Boards

Identify and key each item on the color boards to the contract documents to provide a clear indication of how and where each item will be used. Arrange finish samples to the maximum extent possible by room type in order to illustrate room color coordination. Label all samples on the color boards with the manufacturer's name, patterns and colors name and number. Key or code samples to match key code system used on contract drawings.

Material and finish samples shall indicate true pattern, color and texture. Provide photographs or colored photocopies of materials or fabrics to show large overall patterns in conjunction with actual samples to show the actual colors. Finish samples must be large enough to show a complete pattern or design where practical.

Color boards shall include but not be limited to original color samples of the following:

All walls finishes and ceiling finishes, including corner guards, acrylic wainscoting and wall guards/chair rail finishes

All tile information, including tile grout color and tile patterns.

- All flooring finishes, including patterns.
- All door, door frame finishes and door hardware finishes
- All signage, wall base, toilet partitions, locker finishes and operable/folding partitions and trim

- All millwork materials and finishes (cabinets, counter tops, etc.)
- All window frame finishes and window treatments (sills, blinds, etc.)

Color board samples shall reflect all actual finish textures, patterns and colors required as specified. Patterned samples shall be of sufficient size to adequately show pattern and its repeat if a repeat occurs.

2.1.3. Exterior Color Boards

Prepare exterior finishes color boards in similar format as the interior finishes color boards, for presentation to the reviewers during an interim design conference. Provide original color samples of all exterior finishes including but not limited to the following:

- All Roof Finishes
- All Brick and Cast Stone Samples
- All Exterior Insulation and Finish Samples
- All Glass Color Samples
- All Exterior Metals Finishes
- All Window & Door Frame Finishes
- All Specialty Item Finishes, including trim

Identify each item on the exterior finishes color boards and key to the building elevations to provide a clear indication of how and where each item will be used.

2.2. STRUCTURAL INTERIOR DESIGN DOCUMENTS

2.2.1. General

Structural interior design related drawings must indicate the placement of extents of SID material, finishes and colors and must be sufficiently detailed to define all interior work. The following is a list of minimum requirements:

2.2.2. Finish Color Schedule

Provide finish color schedule(s) in the contract documents. Provide a finish code, material type, manufacturer, series, and color designations. Key the finish code to the color board samples and drawings.

2.2.3. Interior Finish Plans

Indicate wall and floor patterns and color placement, material transitions and extents of interior finishes.

2.2.4. Furniture Footprint Plans

Provide furniture footprint plans showing the outline of all freestanding and systems furniture for coordination of all other disciplines.

2.2.5. Interior Signage

Include interior signage plans or schedules showing location and quantities of all interior signage. Key each interior sign to a quantitative list indicating size, quantity of each type and signage text.

2.2.6. Interior Elevations, Sections and Details

Indicate material, color and finish placement.

**ATTACHMENT B
FURNITURE, FIXTURES & EQUIPMENT (FF&E) REQUIREMENTS**

1.0 FF&E REQUIREMENTS FOR THE INTERIM AND FINAL DESIGN SUBMITTALS

1.1. FORMAT AND SCHEDULE

Prepare and submit for approval a comprehensive FF&E scheme for an interim design submittal. The Contractor's interior designer, not a furniture dealer, shall develop the design. FF&E is the selection, layout, specification and documentation of furniture includes but is not limited to workstations, seating, tables, storage and shelving, filing, trash receptacles, clocks, framed artwork, artificial plants, and other accessories. Contract documentation is required to facilitate pricing, procurement and installation. The FF&E package is based on the furniture footprint developed in the Structural Interior Design (SID) portion of the interior design. Develop the FF&E package concurrently with the building design to ensure that there is coordination between the electrical outlets, switches, J-boxes, communication outlets and connections, and lighting as appropriate. In addition, coordinate layout with other building features such as architectural elements, thermostats, location of TV's, GF/GI equipment (for example computers, printers, copiers, shredders, faxes), etc. Locate furniture in front of windows only if the top of the item falls below the window and unless otherwise noted, do not attach furniture including furniture systems to the building. If project has SIPRNET and/or NIPRNET, coordinate furniture layout with SIPRNET and NIPRNET separation requirements. Verify that access required by DOIM for SIPRNET box and conduit is provided. The DOR shall interview appropriate Government personnel to determine FF&E requirements for furniture and furnishings prior to preparation of the scheme to be presented. Determine FFE items and quantities by, but not limited to: (1) the number of personnel to occupy the building, (2) job functions and related furniture/office equipment to support the job function, (3) room functions, (4) rank and grade. Present original sets of the scheme to reviewers at an interim design conference upon completion of the interim architectural submittal or three months prior to the submittal of the final FF&E package (whichever comes first).

Design may proceed to final with the FF&E scheme presented at the conclusion of the interim phase, after resolutions to the comments have been agreed upon between DOR and Government reviewers.

Provide six copies of the electronic versions of all documents upon completion of the final architectural submittal or ten months prior to the contract completion date (whichever comes first), to ensure adequate time for furniture acquisition. Provide unbound, electronic drawings in CAD and BIM. Provide all files needed to view complete drawings. Submit all text documents in Microsoft Word or Excel..

Submit four copies of the final and complete FF&E information and samples in 8 ½" x 11" format using three ring binders with pockets on the inside of the cover upon completion of the final architectural submittal or ten months prior to the contract completion date (whichever comes first). Use more than one binder when there are numerous pages with thick samples. Large D-ring binders are preferred to O-ring binders. Use page protectors that are strong enough to keep pages from tearing out for upholstery and finish boards. Anchor large or heavy samples with mechanical fasteners, Velcro, or double-faced foam tape rather than rubber cement or glue. Fold out items must have a maximum spread of 25 ½". Provide cover and spine inserts sheets identifying the document as "Furniture, Fixtures & Equipment" package and include the project title and location, project number, Contractor/A/E name and phone number(s), submittal stage and date.

Provide electronic copies of all documents upon completion of the final architectural submittal or ten months prior to the contract completion date (whichever comes first), to ensure adequate time for furniture acquisition. Provide six compact disks with all drawings files needed to view the complete drawings unbound and in the latest version AutoCAD. Provide six additional compact disks of all text documents in Microsoft Word or Excel.

Design submittal requirements include, but are not limited to:

1.1.1. Narrative of Interior Design Objectives

Provide a narrative description of the furniture, to include functional, safety and ergonomic considerations, durability, sustainability, aesthetics, and compatibility with the building design.

1.1.2. Furniture Order Form

Prepare one Furnishings Order Form for each item specified in the design. This form identifies all information required to order each individual item. In addition to the project name and location, project number, and submittal phase, the order form must include:

- (a) Furniture item illustration and code
- (b) Furniture item name
- (c) Job name, location, and date
- (d) General Services Administration (GSA) FSC Group, part, and section
- (e) Manufacturer, Product name and Product model number or National Stock Number (NSN)
- (f) Finish name and number (code to finish samples)
- (g) Fabric name and number, minimum Wyzenbeek Abrasion Test double rubs (code to fabric samples)
- (h) Dimensions
- (i) Item location by room number and room name
- (j) Quantity per room
- (k) Total quantity
- (l) Special instructions for procurement ordering and/or installation (if applicable)
- (m) Written Product Description: include a non-proprietary paragraph listing the salient features of the item to include but not limited to:
 - (1) required features and characteristics
 - (2) ergonomic requirements
 - (3) functional requirements
 - (4) testing requirements
 - (5) furniture style
 - (6) construction materials
 - (7) minimum warranty

The following is an example for "m" features and characteristics, ergonomic requirements and functional requirements:

Chair Description:

- (1) Mid-Back Ergonomic Task Chair
- (2) Pneumatic Gaslift; Five Star Base
- (3) Mesh Back; Upholstered Seat
- (4) Height and Width Adjustable Task Arms:
 - a. Arm Height: 6" - 11" (+-1/2")
 - b. Arm Width: 2" - 4" adjustment
- (5) Height Adjustable Lumbar Support
- (6) Adjustable Seat Height 16"-21" (+- 1")
- (7) Sliding Seat Depth Adjustment 15"-18" (+-1")
- (8) Standard Hard Casters (for carpeted areas)
- (9) Overall Measurements:
 - a. Overall width: 25" - 27"
 - b. Overall depth: 25" - 28"

- (10) Must have a minimum of the following adjustments (In addition to the above):
- a. 360 Degree Swivel
 - b. Knee-Tilt with Tilt Tension
 - c. Back angle
 - d. Forward Tilt
 - e. Forward Tilt and Upright Tilt Lock

For projects with systems furniture, also provide a written description of the following minimum requirements:

- (1) Type furniture systems (panel, stacking panels, spine wall, desk based system, or a combination)
- (2) Minimum noise reduction coefficient (NRC)
- (3) Minimum sound transfer coefficient (STC)
- (4) Minimum flame spread and smoke development
- (5) UL testing for task lighting and electrical system
- (6) Panel widths and heights and their locations (this may be done on the drawings) Worksurface types and sizes (this may be done on the drawings)
- (7) Worksurface edge type
- (8) Varying panel/cover finish materials and locations (locations may be shown on the drawings)
- (9) Storage requirements
- (10) Keyboard requirements
- (11) Lock and keying requirements
- (12) Accessory components (examples: tack boards, marker boards, paper management)
- (13) Electrical and communication raceway requirement; type, capacity and location (base, bellline, below and/or above bellline)
- (14) Locations of communication cables (base, bellline, below and/or above bellline, top channel)
- (15) Types of electrical outlets
- (16) Types of communication jacks; provided and installed by others
- (17) Locations of electrical outlets and communication jacks (this may be done on the drawings)
- (18) Type of cable (examples: Cat. 5, Cat. 6, fiber optic; UTP or STP, etc.) system needs to support; provided and installed by others

1.1.3. Alternate Manufacturer List

Provide a table consisting of major furniture items that lists the manufacturers products specified on the Order Form and two alternate manufacturers. Major furniture items include, but are not limited to, casegoods, furniture systems, seating, and tables. Organize matrix by item code and item name. Supply alternates that are available on GSA Schedule and meet the requirements of the Furniture Order Form. One of the two alternates must be from UNICOR if possible. Provide manufacturer name address, telephone number, product series and product name for each alternate manufacturer.

1.1.4. FF&E Procurement List

Provide a table that lists all FF&E furniture, mission unique equipment and building Contractor Furnished/Contractor Installed (CF/CI) items. Give each item a code and name and designate whether item will be procured as part of the FF&E furniture, mission unique equipment or the building construction contract. Use the item code to key all FF&E documents including location plans, color boards, data sheets, cost estimate, etc.

1.1.5. Points of Contact (POCs)

Provide a comprehensive list of POCs needed to implement the FF&E package. This would include but not be limited to appropriate project team members, using activity contacts, interior design representatives, construction contractors and installers involved in the project. In addition to name, address, phone, fax and email, include each contact's job function. Divide the FF&E package into different sections based on this listing, applies to order forms and cost estimates.

1.1.6. Color Boards

Provide color boards for all finishes and fabrics for all FF&E items. Finishes to be included but not limited to paint, laminate, wood finish, fabric, etc.

1.1.7. Itemized Furniture Cost Estimate

Provide an itemized cost estimate of furnishings keyed to the plans and specifications of products included in the package. This cost estimate should be based on GSA price schedules. The cost estimate must include separate line items for general contingency, installation, electrical hook-up for systems furniture or other furniture requiring hardwiring by a licensed electrician, freight charges and any other related costs. Installation and freight quotes from vendors should be use in lieu of a percentage allowance when available. Include a written statement that the pricing is based on GSA schedules. An estimate developed by a furniture dealership may be provided as support information for the estimate, but must be separate from the contractor provided estimate.

1.2. INTERIOR DESIGN DOCUMENTS

1.2.1. Overall Furniture and Area Plans

Provide floor Plans showing locations and quantities of all freestanding, and workstation furniture proposed for each floor of the building. Key each room to a large scale Furniture Placement Plan showing the furniture configuration, of all furniture. Provide enlarged area plans with a key plan identifying the area in which the building is located. Key all the items on the drawings by furniture item code. Do not provide manufacturer specific information such as product names and numbers on drawings, Drawings shall be non-proprietary. This is typical for FFE on all plans, including those mentioned below.

1.2.2. Workstation Plans

Show each typical workstation configuration in plan view, elevations or isometric view. Drawings shall illustrate panels and all major components for each typical workstation configuration. Identify workstations using the same numbering system as shown on the project drawings. Key components to a legend on each sheet which identifies and describes the components along with dimensions. Provide the plan, elevations and isometric of each typical workstation together on the same drawing sheet.

1.2.3. Panel Plans

Show panel locations and critical dimensions from finished face of walls, columns, panels including clearances and aisle widths. Key panel assemblies to a legend which shall include width, height, configuration of frames, panel fabric and finishes (if there are different selections existing within a project), powered or non-powered panel and wall mount locations.

1.2.4. Desk Plans

Provide typical free standing desk configurations in plan view, elevation or isometric view and identify components to clearly represent each desk configuration.

1.2.5. Reflected Ceiling Plans

Provide typical plans showing ceiling finishes and heights, lighting fixtures, heating ventilation and air conditioning supply and return, and sprinkler head placement for coordination of furniture.

1.2.6. Electrical and Telecommunication Plans

Show power provisions including type and locations of feeder components, activated outlets and other electrical components. Show locations and quantities of outlets for workstations. Clearly identify different outlets, i.e. electrical, LAN and telecommunication receptacles indicating each type proposed. Show wiring configuration, (circuiting, switching, internal and external connections) and provide as applicable.

1.2.7. Artwork Placement Plans

Provide an Artwork Placement Plan to show location of artwork, assign an artwork item code to each piece of artwork. As an alternative, artwork can be located on the Furniture Plans. Provide a schedule that identifies each piece by room name and number. Provide installation instructions; include mounting height.

1.2.8. Window Drapery Plans

Provide Interior Window Drapery Plans. Key each drapery treatment to a schedule showing color, pattern, material, drapery size and type, draw direction, location and quantities.

1.3. FURNITURE SELECTION

1.3.1. Select furniture from the GSA Schedules. Specify furniture available open market when an item is not available on the GSA Schedules. Provide justification for items not available on the GSA Schedules.

1.3.2. To the greatest extent possible when specifying furniture work within a manufacturer's family of furniture for selections, example: Steelcase, Turnstone, Brayton International, Metro, and Vecta are all Steelcase companies. Each alternate should also be specified from a manufacturer's family of furniture, example: first set of alternates would be specified from Knoll's family of furniture and the second from Herman Miller family of furniture. It may be necessary to make some selections from other than a manufacturer's family of furniture if costs are not reasonable for particular items, some items are not available or appropriate for the facility or the items are not on GSA Schedule. If this occurs, consider specifying product from an open line that is accessible by numerous dealerships. Select office furniture including case goods, tables, storage, seating, etc. that is compatible in style, finish and color. Select furniture that complies with ANSI/BIFMA and from manufacturer's standard product line as shown in the most recent published price list and/or amendment and not custom product.

1.4. CONSTRUCTION

1.4.1. Provide knee space at workstations and tables that is not obstructed by panels/legs that interfere with knee space of seated person and specify modesty panels at walls to be of a height or be hinged to allow access to building wall electrical outlets and communication jacks. Provide desks, storage and tables with leveling devices to compensate for uneven floors.

1.4.2. Specify workstations and storage of steel construction. Provide worksurface tops constructed to prevent warpage. Provide user friendly features such as radius edges. Do not use sharp edges and exposed connections and ensure the underside of desks, tables and worksurfaces are completely and smoothly finished. Provide abutting worksurfaces that mate closely and are of equal heights when used in side-by-side configurations in order to provide a continuous and level worksurface.

1.4.3. Drawers shall stay securely closed when in the closed position and protect wires from damage during drawer operation. Include a safety catch to prevent accidental removal when fully open

1.4.4. Unless otherwise noted, provide lockable desks and workstations, filing cabinets and storage. Key all locks within a one person office the same; key all one person offices within a building differently. If an office or open office area has more than one workstation, key all the workstations differently, but key all locks within an individual workstation the same. Use tempered glass glazing when glazing is required. Use light-emitting diode (LED)/solid state lighting where task lighting is required in furniture.

1.5. FINISHES AND UPHOLSTERY

1.5.1. Specify neutral colors for casegoods, furniture systems, storage and tables. Specify desk worksurfaces and table tops that are not too light or too dark in color and have a pattern to help hide soiling. Accent colors are

allowed in break and lounge areas. Keep placement of furniture systems panel fabric accent colors to a minimum. All finishes shall be cleanable with ordinary household cleaning solutions.

1.5.2. Use manufacturer's standard fabrics; including textile manufacturers fabrics that have been graded into the furniture manufactures fabric grades and are available through their GSA Schedule. Customers Own Material (COM) can be used in headquarter buildings in command suites with executive furniture. Coordinate specific locations with Corps of Engineers Interior Designer.

1.5.3. Specify seating upholstery that meets Wyzenbeek Abrasion Test, 55,000 minimum rubs. Specify a soil retardant finish for woven fabrics if Crypton or vinyl upholstery is not provided for seating in dining areas. Use manufacturer's standard fabrics. This includes textile manufacturers fabrics that have been graded into the furniture manufactures fabric grades and are available through their GSA Schedule. Specify upholstery and finish colors and patterns that help hide soiling. Specify finishes that can be cleaned with ordinary household cleaning solutions.

1.6. ACCESSORIES

1.6.1. Specify all accessories required for completely finished furniture installation. Provide filing cabinets and storage for office supplies. Provide tack surfaces at workstations with overhead storage. Provide tackable surfaces at workstations with overhead storage.

1.6.2. Not Used.

1.6.3. Workstations are to be equipped with stable keyboard trays that have height adjustability, tilting capability, including negative tilt, have a mouse pad at same height as the keyboard tray that can accommodate both left and right handed users, and retractable under worksurface.

1.7. MISSION UNIQUE EQUIPMENT

Funding for FF&E furniture items and mission unique equipment (MUE) items are from two different sources. Separate the designs and procurement documentation for FFE items and MUE. MUE includes, but is not limited to, items such as industrial shelving, workbenches, appliances, fitness equipment, IT equipment and supporting carts. The User will purchase and install mission unique equipment items, unless otherwise noted. Identify locations of known MUE items such as industrial shelving, workbenches, appliances, etc. for space planning purposes.

1.8. SUSTAINABILITY

1.8.1. For all designs provided regardless of facility type, make every effort to implement all aspects of sustainability to the greatest extent possible for all the selections made in the FF&E package. This includes but is not limited to the selection of products that consider: **Material Chemistry and Safety of Inputs** (What chemicals are used in the construction of the selections?); **Recyclability** (Do the selections contain recycled content?); **Disassembly** (Can the selections be disassembled at the end of their useful life to recycle their materials?).

1.8.2. Make selections to the greatest extent possible of products that possess current McDonough Braungart Design Chemistry ([MBDC](#)) certification or other "third-party" certified Cradle to Cradle program, Forest Stewardship Council (FSC) certification, GREENGAURD certification or similar "third-party" certified products consisting of low-emitting materials.

1.9. FURNITURE SYSTEMS

1.9.1. General.

Where appropriate, design furniture systems in open office areas. Coordinate style and color of furniture systems with other storage, seating, etc. in open office areas. Minimize the number of workstation typicals and the parts and pieces required for the design to assist in future reconfiguration and inventorying.

1.9.2. Connector Systems.

Specify a connector system that allows removal of a single panel or spine wall within a typical workstation configuration without requiring disassembly of the workstation or removal of adjacent panels. Specify connector

system with tight connections and continuous visual seals. When Acoustical panels are used, provide connector system with continuous acoustical seals. Specify concealed clips, screws, and other construction elements, where possible.

1.9.3. Panels and Spine Walls

Specify panels and spine walls with hinged or removable covers that permit easy access to the raceway when required but are securely mounted and cannot be accidentally dislodged under normal conditions. Panels shall be capable of structurally supporting more than 1 fully loaded component per panel per side. Raceways are to be an integral part of the panel and must be able to support lay-in cabling and have a large capacity for electrical and IT. Do not thread cables through the frame.

1.9.4. Electrical And Information/Technology (IT)

Design furniture with electrical systems that meets requirements of UL 1286 when powered panels are required and UL approved task lights that meet requirements of NFPA 70. Dependent on user requirements and Section 01 10 00, paragraph 3 requirements, it is recommended that workstation electrical and IT wiring entry come from the building walls to eliminate the use of power poles and access at the floor. Design electrical and IT systems that are easily accessed in the spine wall and panels without having to move return panels and components. Electrical and IT management will be easily accessible by removable wall covers which can be removed while workstation components are still attached. Specify connector system that has continuation of electrical and IT wiring within workstations and workstation to workstation.

1.9.5. Pedestals

Specify pedestals that are interchangeable from left to right, and right to left, and retain pedestal locking system capability.

1.10. EXECUTIVE FURNITURE

1.10.1. Design for executive furniture in command areas, coordinate specific locations with Corps of Engineers Interior Designer. Use upgraded furniture, upholsteries and finishes in command suites. This includes but is not limited to wood casegoods, seating and tables. Select executive furniture casegoods from a single manufacturer and style line, to include workstations, credenzas, filing, and storage, etc.

1.10.2. Specify furniture with wood veneer finish (except worksurfaces) with mitered solid wood edge of same wood type. Provide worksurface plastic laminate that closely matches adjacent wood veneer. Other executive office furniture such as seating, tables, executive conference room furniture, etc. shall be compatible in style, finish and color with executive furniture casegoods.

1.11. SEATING

1.11.1. General

Specify appropriate chair casters and glides for the floor finish where the seating is located. Universal casters that are appropriate for both hard surface flooring and carpet are preferred. All seating shall support up to a minimum of 250 lbs.

1.11.2. Desk and Guest Seating

Select ergonomic desk chairs with casters, non-upholstered adjustable arms, waterfall front, swivel, tilt, variable back lock, adjustable back height or adjustable lumbar support, pneumatic seat height adjustment, and padded, contoured upholstered seat and back. Desk and guest chair backs may be other than upholstered such as mesh fabric if it is ergonomically designed, forms to back and is comfortable. Depending on scale of desk chair provide seat pan forward and back adjustment to increase or decrease depth of seat pan. All desk chairs shall have an adjustable seat height range of 4 1/2", range to include 16 1/2"-20". Select guest chairs that are compatible in style, finish and color with the desk chairs.

1.11.3. Conference Room Seating

At tables, select ergonomic conference seating with casters, non-upholstered arms, waterfall front, swivel, tilt, pneumatic seat height adjustment, and padded, contoured seat and back, unless otherwise noted. Select arm height and/or design that allows seating to be moved up closely to the table top. Conference chair backs may be other than upholstered such as mesh fabric if it is ergonomically designed, forms to back and is comfortable. Perimeter conference chairs shall be compatible in style, finish and color with conference seating at the tables.

1.11.4. Lounge, Waiting and Reception Area Seating

Select seating with arms and cushioned, upholstered seat and back. In heavy use areas, arms shall be easily cleaned such as non-upholstered arms or upholstered arms with wood arm caps unless otherwise noted.

1.11.5. Break Room Seating

Select stackable seating that is easily cleaned. Seating shall be appropriate for table and counter heights as applicable with non-upholstered arms if arms are required. Chairs shall have metal legs and composite materials for seats.

1.11.6. Lounge, Waiting and Reception Furniture.

Design for end and coffee tables with plastic laminate tops that are compatible in style finish and color with the seating.

1.12. FILING AND STORAGE.

Select storage and shelving units that meet customer's functional load requirements for stored items. Specify counterweights for filing cabinets when required by the manufacturer for stability. File drawers shall allow only one drawer to be opened at a time. Provide heavy duty storage and shelving if information is not available.

1.13. TRAINING TABLES.

Don't use plastic laminate self edge. Training tables shall be reconfigurable, moveable and storable; lighter weight folding with dollies or casters as necessary. Specify dollies if required.

1.14. FURNITURE WARRANTIES.

Specify manufacturer's performance guarantees or warranties that include parts, labor and transportation as follows:

- Furniture System, unless otherwise noted – 10 year minimum
- Furniture System Task Lights – 2 year minimum, excluding bulbs
- Furniture System Fabric – 3 year minimum
- Desks - 10 year minimum
- Seating, unless otherwise noted - 10 year minimum
- Seating Mechanisms and Pneumatic Cylinders - 10 years
- Fabric - 3 years minimum
- Filing and Storage - 10 year minimum
- Tables, unless otherwise noted - 10 year minimum
- Table Mechanisms – 5 year
- Table Ganging Device - 1 year
- Items not listed above - 1 year minimum

ATTACHMENT C TRACKING COMMENTS IN DRCHECKS

1.0 General

The Government and DB Contractor shall set up the project in Dr Checks. Throughout the design process, the parties shall enter, track, and back-check comments using the DrChecks system. Government reviewers enter design review comments into DrChecks. Designers of Record shall annotate comments timely and specifically to indicate exactly what action will be taken or why the action is not required. Comments considered critical by the conference participants shall be flagged as such.

2.0 DrChecks Review Comments

The Contractor and the Government shall monitor DrChecks to assure all comments are annotated and agreed to by the designers and reviewers prior to the next submittal. The DrChecks comments and responses shall be printed and included in the design analysis for record.

2.1. Conference participants (reviewers) will expect coordination between Design Analysis calculations and the submitted design. Reviewers will also focus on the design submittal's satisfaction of the contract requirements.

2.2. The Designers of Record shall answer each comment in DrChecks with a formal response prior to the next submittal, clearly indicating what action will be taken and what drawing/spec will change. Designers of Record are encouraged to directly contact reviewers to discuss and agree to the formal comment responses rather than relying only on DrChecks and review meetings to discuss comments. With the next design conference, reviewers will back-check answers to the comments against the submittal, in addition to reviewing additional design work.

2.3. Comments that, in the DB Contractor's opinion, require effort outside the scope of the contract shall be clearly indicated as such in DrChecks. The DB Contractor shall not proceed with work outside the contract until a modification to the contract is properly executed, if one is necessary.

3.0 DrChecks Initial Account Set-Up

To initialize an office's use of DrChecks, choose a contact person within the office to call the DrChecks Help Desk at 800-428-HELP, M-F, 8AM-5PM, Central time. This POC will be given an office password to distribute to others in the office. Individuals can then go to the hyperlink at <http://www.projnet.org> and register as a first time user. Upon registration, each user will be given a personal password to the DrChecks system.

3.1. Once the office and individuals are registered, the COE's project manager or lead reviewer will assign the individuals and/or offices to the specific project for review. At this point, persons assigned can make comments, annotate comments, and close comments, depending on their particular assignment.

4.0 DrChecks Reviewer Role

The Contractor is the technical reviewer and the Government is the compliance reviewer of the DB designers design documents. Each reviewer enters their own comments into the Dr Checks system. To enter comments:

4.1. Log into DrChecks.

4.2. Click on the appropriate project.

4.3. Click on the appropriate review conference. An Add comment screen will appear.

4.4. Select or fill out the appropriate sections (particularly comment discipline and type of document for sorting) of the comment form and enter the comment in the space provided.

4.5. Click the Add Comment button. The comment will be added to the database and a fresh screen will appear for the next comment you have.

4.6. Once comments are all entered, exit DrChecks by choosing “My Account” and then Logout.

5.0 DrChecks Comment Evaluation

The role of the designers of record is to evaluate and respond to the comments entered by the Government reviewers and by the DB Contractor. To respond to comments:

5.1. Log into DrChecks.

5.2. Click on the appropriate project.

5.3. Under “Evaluate” click on the number under “Pending”.

5.4. Locate the comments that require your evaluation. (Note: If you know the comment number you can use the Quick Pick window on your home page in DrChecks; enter the number and click on go.)

5.5. Select the appropriate evaluation (concur, non-concur, for information only, or check and resolve) and add the response.

5.6. Click on the Add button. The evaluation will be added to the database and a fresh screen will appear with the next comment.

5.7. Once evaluations are all entered, exit DrChecks by choosing “My Account” and then Logout.

6.0 DrChecks Back-check

At the following design conference, participants will back-check comment annotations against newly presented documents to verify that the designers' responses are acceptable and completed. The Contractor and Government reviewers shall either enter additional back-check comments, as necessary or close those that are resolved as a result of the design conferences:

6.1. Log into DrChecks.

6.2. Click on the appropriate project.

6.3. Under “My Backcheck” click on the number under “Pending”.

6.4. If you agree with the designer's response select “Close Comment” and add a closing response if desired.

6.5. If you do not agree with the designer's response or the submittal does not reflect the response given, select “Issue Open”, enter additional information.

6.6. Click on the Add button. The back-check will be added to the database and a fresh screen will appear with the next comment.

6.7. Once back-checks are all entered, exit DrChecks by choosing “My Account” and then Logout. The design is completed and final when there are no pending comments to be evaluated and there are no pending or open comments under back-check.

**ATTACHMENT D
SAMPLE FIRE PROTECTION AND LIFE SAFETY CODE REVIEW**

Instructions: Use the information outlined in this document to provide the minimum requirement for development of Fire Protection and Life Safety Code submittals for all building projects. Additional and supplemental information may be used to further develop the code review. Insert N/A after criteria, which may be "not applicable".

1.0 SAMPLE FIRE PROTECTION AND LIFE SAFETY CODE REVIEW

- 1.1. Project Name (insert name and location)
- 1.2. Applicable Codes and Standards
 - 1.2.1. Unified Facilities Criteria (UFC): 3-600-01, Design: Fire Protection Engineering For Facilities
 - 1.2.2. International Building Code (IBC) for fire resistance requirements, allowable floor area, building height limitations and building separation distance requirements, except as modified by UFC 3-600-01.
 - 1.2.3. National Fire Protection Association (NFPA) 101 Life Safety Code (latest edition), for building egress and life safety and applicable criteria in UFC 3-600-01.
 - 1.2.4. ADA and ABA Accessibility Guidelines. For Buildings and Facilities See Section 01 10 00, Paragraph 3 for facility specific criteria.
- 1.3. Occupancy Classification
IBC chapters 3 and 4
- 1.4. Construction Type
IBC chapter 6
- 1.5. Area Limitations
IBC chapter 5, table 503
- 1.6. Allowable Floor Areas
IBC section 503, 505
- 1.7. Allowable area increases
IBC section 506, 507
- 1.8. Maximum Height of Buildings
IBC section 504
- 1.9. Fire-resistive substitution
- 1.10. Occupancy Separations
IBC table 302.3.2
- 1.11. Fire Resistive Requirements
 - 1.11.1. Exterior Walls - [] hour rating, IBC table 601, 602
 - 1.11.2. Interior Bearing walls - [] hour rating
 - 1.11.3. Structural frame - [] hour rating
 - 1.11.4. Permanent partitions - [] hour rating

- 1.11.5. Shaft enclosures - [] hour rating
- 1.11.6. Floors & Floor-Ceilings - [] hour rating
- 1.11.7. Roofs and Roof Ceilings - [] hour rating
- 1.12. Automatic Sprinklers and others used to determine the need for automatic Extinguishing Equipment, Extinguishing Systems, Foam Systems, Standpipe
 - 1.12.1. UFC 3-600-01, chapters 4 and 6 systems, wet chemical systems, etc. State which systems are required and to what criteria they will be designed.
 - 1.12.2. UFC 3-600-01, Appendix B Occupancy Classification. Note the classification for each room. This may be accomplished by classifying the entire building and noting exceptions for rooms that differ (E.g. The entire building is Light Hazard except boiler room and storage rooms which are [], etc.)
 - 1.12.3. UFC 3-600-01, Chapter 3 Sprinkler Design Density, Sprinkler Design Area, Water Demand for Hose Streams (supply pressure and source requirements).
 - 1.12.4. UFC 3-600-01, Chapter 4 Coverage per sprinkler head. Extended coverage sprinkler heads are not permitted.
 - 1.12.5. Available Water Supply. Provide the results of the water flow tests showing the available water supply static pressure and residual pressure at flow. Based on this data and the estimated flow and pressure required for the sprinkler system, determine the need for a fire pump.
 - 1.12.6. NFPA 13, Para. 8.16.4.6.1. Provide backflow preventer valves as required by the local municipality, authority, or water purveyor. Provide a test valve located downstream of the backflow preventer for flow testing the backflow preventer at full system demand flow. Route the discharge to an appropriate location outside the building.
- 1.13. Kitchen Cooking Exhaust Equipment
Describe when kitchen cooking exhaust equipment is provided for the project. Type of extinguishing systems for the equipment should be provided. per NFPA 96. Show all interlocks with manual release switches, fuel shutoff valves, electrical shunt trips, exhaust fans, and building alarms.
- 1.14. Portable Fire Extinguishers, fire classification and travel distance. per NFPA 10
- 1.15. Enclosure Protection and Penetration Requirements. - Opening Protectives and Through Penetrations
 - 1.15.1. IBC Section 712, 715 and Table 715.3. Mechanical rooms, exit stairways, storage rooms, janitor [] hour rating. IBC Table 302.1.1
 - 1.15.2. Fire Blocks, Draft Stops, Through Penetrations and Opening Protectives
- 1.16. Fire Dampers. Describe where fire dampers and smoke dampers are to be used (IBC Section 716 and NFPA 90A). State whether isolation smoke dampers are required at the air handler.
- 1.17. Detection Alarm and Communication. UFC 3-600-01, (Chapter 5); NFPA 101 para. 3.4 (chapters 12-42); NFPA 72
- 1.18. Mass Notification. Describe building/facility mass notification system (UFC 4-021-01) type and type of base-wide mass notification/communication system. State whether the visible notification appliances will be combined with the fire alarm system or kept separate. (Note: Navy has taken position to combine visible notification appliances with fire alarm).
- 1.19. Interior Finishes (classification). NFPA 101.10.2.3 and NFPA 101.7.1.4
- 1.20. Means of Egress

- 1.20.1. Separation of Means of Egress, NFPA 101 chapters 7 and 12-42; NFPA101.7.1.3
- 1.20.2. Occupant Load, NFPA101.7.3.1 and chapters 12-42.
- 1.20.3. Egress Capacity (stairs, corridors, ramps and doors) NFPA101.7.3.3
- 1.20.4. Number of Means of Egress, NFPA101.7.4 and chapters 12-42.
- 1.20.5. Dead end limits and Common Path of Travel, NFPA 101.7.5.1.6 and chapters 12-42.
- 1.20.6. Accessible Means of Egress (for accessible buildings), NFPA101.7.5.4
- 1.20.7. Measurement of Travel Distance to Exits, NFPA101.7.6 and chapters 12-42.
- 1.20.8. Discharge from Exits, NFPA101.7.7.2
- 1.20.9. Illumination of Means of Egress, NFPA101.7.8
- 1.20.10. Emergency Lighting, NFPA101.7.9
- 1.20.11. Marking of Means of Egress, NFPA101.7.10
- 1.21. Elevators, UFC 3-600-01, Chapter 6; IBC and ASME A17.1 - 2000,(Safety Code for Elevators and Escalators)
- 1.22. Accessibility Requirements, ADA and ABA Accessibility Guidelines for Buildings and Facilities
- 1.23. Certification of Fire Protection and Life Safety Code Requirements. (Note: Edit the Fire team membership if necessary). Preparers of this document certify the accuracy and completeness of the Fire Protection and Life Safety features for this project in accordance with the attached completed form(s).
- 1.24. Designer of Record. Certification of Fire protection and Life Safety Code Requirements. (Note: Edit the Fire team members if necessary). Preparers of this document certify the accuracy and completeness of the Fire Protection and Life Safety features of this project.

Fire Protection Engineer of Record:

Signature and Stamp

Date

OR

Architect of Record:

Signature and Stamp

Date

Mechanical Engineer of Record:

Signature and Stamp

Date

Electrical Engineer of Record:

Signature/Date

**ATTACHMENT E
LEED SUBMITTALS**

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	LEED-NC v3 Submittals (OCT09)	Provide for Credit Audit Only	REQUIRED DOCUMENTATION	Date Submitted (to be filled in by Contractor)	Government Reviewer's Use
PAR		FEATURE	DUE AT		DATE	REV
GENERAL						
		GENERAL - All calculations shall be in accordance with LEED 2009 Reference Guide.				
		GENERAL: Obtain excel version of this spreadsheet at http://en.sas.usace.army.mil/enWeb , "Engineering Criteria".				
		GENERAL - For all credits, narrative/comments may be added to describe special circumstances or considerations regarding the project's credit approach.				
		GENERAL - Include all required LEED drawings indicated below in contract drawings with applicable discipline drawings, labeled For Reference Only.				
		NOTE: Each submittal indicated with "****" differs from LEED certified project submittals by either having a different due date or being an added submittal not required by GBCI.				
		NOTE: Projects seeking LEED certification need only submit to GBCI whatever documentation is acceptable to GBCI (for example, licensed professional certifications). This checklist identifies what must be submitted to the Government for internal review purposes. Government review of LEED documentation in no way supercedes or modifies the requirements and rulings of GBCI for purposes of compliance with project requirement to obtain LEED certification.				
		GENERAL - Audit documentation may include but is not limited to what is indicated in this table.				
			Closeout	List of all Final Design submittals revised after final design to reflect actual closeout conditions. Revised Final Design submittals. - OR - Statement confirming that no changes have been made since final design that effect final design submittal documents.		Proj Engr (PE)
CATEGORY 1 - SUSTAINABLE SITES						
SSPR1		Construction Activity Pollution Prevention (PREREQUISITE)	**Final Design	List of drawings and specifications that address the erosion control, particulate/dust control and sedimentation control measures to be implemented.		CIV
			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			**Final Design	Narrative that indicates which compliance path was used (NPDES or Local standards) and describes the measures to be implemented on the project. If a local standard was followed, provide specific information to demonstrate that the local standard is equal to or more stringent than the NPDES program.		CIV
SS1		Site Selection	Final Design	Statement confirming that project does not meet any of the prohibited criteria.		CIV
			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	X LEED Site plan drawing that shows all proposed development, line depicting boundary of all bodies of water and/or wetlands within 100 feet of project boundary and a line depicting 5' elevation above 100 year flood line that falls within project boundary. Not required if neither condition applies.		CIV
SS2		Development Density & Community Connectivity	Final Design	Option 1: LEED Site vicinity plan showing project site and surrounding development. Show density boundary or note drawing scale.		CIV
			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Option 1: Table indicating, for project site and all surrounding sites within density radius (keyed to site vicinity plan), site area and building area. Project development density calculation. Density radius calculation. Development density calculation within density radius.		CIV
			Final Design	Option 2: LEED Site vicinity plan showing project site, the 1/2 mile community radius, pedestrian walkways and the locations of the residential development(s) and Basic Services surrounding the project site.		CIV
			Final Design	Option 2: List (including business name and type) of all Basic Services facilities within the 1/2 mile radius, keyed to site vicinity plan.		CIV
SS3		Brownfield Redevelopment	Final Design	Narrative describing contamination and the remediation activities included in project. Include statement indicating how site was determined to be a brownfield.		CIV
			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
SS4.1		Alternative Transportation: Public Transportation Access	Final Design	Statement indicating which option for compliance applies. State whether public transportation is existing or proposed and, if proposed, cite source of this information.		CIV
			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Option 1: LEED Site vicinity plan showing project site, mass transit stops and pedestrian path to them with path distance noted.		CIV
			Final Design	Option 2: LEED Site vicinity plan showing project site, bus stops and pedestrian path to them with path distance noted.		CIV
SS4.2		Alternative Transportation: Bicycle Storage & Changing Rooms	Final Design	FTE calculation. Bicycle storage spaces calculation. Shower/changing facilities calculation.		CIV
			Final Design	List of drawings that show the location(s) of bicycle storage areas. Statement indicating distance from building entrance.		CIV
			Final Design	List of drawings that show the location(s) of shower/changing facilities and, if located outside the building, statement indicating distance from building entrance.		CIV

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PAR		FEATURE	DUE AT		DATE	REV
SS4.3		Alternative Transportation: Low Emitting & Fuel Efficient Vehicles	Final Design	Statement indicating which option for compliance applies. FTE calculation. Statement indicating total parking capacity of site.		CIV
			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Option 1: Low-emission & fuel-efficient vehicle calculation.		CIV
			Final Design	Option 1: List of drawings and specification references that show location and number of preferred parking spaces for low-emission & fuel-efficient vehicles and signage.		CIV
			Final Design	Option 1: Statement indicating quantity, make, model and manufacturer of low-emission & fuel-efficient vehicles to be provided. Statement confirming vehicles are zero-emission or indicating ACEEE vehicle scores.		CIV
			Final Design	Option 2: Low-emission & fuel-efficient vehicle parking calculation.		CIV
			Final Design	Option 2: List of drawings and specification references that show location and number of preferred parking spaces and signage.		CIV
			Final Design	Option 3: Low-emission & fuel-efficient vehicle refueling station calculation.		CIV
			Final Design	Option 3: List of drawings and specifications indicating location and number of refueling stations, fuel type and fueling capacity for each station for an 8-hour period.		CIV
			Closeout	X Option 3: Construction product submittals indicating what was provided and confirming compliance with respect to fuel type and fueling capacity for each station for an 8-hour period.		CIV
SS4.4		Alternative Transportation: Parking Capacity	Final Design	Statement indicating which option for compliance applies.		CIV
			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Option 1: Preferred parking calculation including number of spaces required, total provided, preferred spaces provided and percentage.		CIV
			Final Design	Option 2: FTE calculation. Preferred parking calculation including number of spaces provided, preferred spaces provided and percentage.		CIV
			Final Design	Options 1 and 2: List of drawings and specification references that show location and number of preferred parking spaces and signage.		CIV
			Final Design	Option 3: Narrative indicating number of spaces required and provided and describing infrastructure and support programs with description of project features to support them.		CIV
SS5.1		Site Development: Protect or Restore Habitat	**Final Design	Option 1: List of drawing and specification references that convey site disturbance limits.		CIV
			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			**Final Design	Option 2: LEED site plan drawing that delineates boundaries of each preserved and restored habitat area with area (sf) noted for each.		CIV
			**Final Design	Option 2: Percentage calculation of restored/preserved habitat to total site area. List of drawings and specification references that convey restoration planting requirements.		CIV
SS5.2		Site Development: Maximize Open Space	Final Design	Option 2: LEED site plan drawing delineating boundary of vegetated open space adjacent to building with areas of building footprint and designated open space noted.		CIV
			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
SS6.1		Stormwater Design: Quantity Control	Final Design	Statement indicating which option for compliance applies.		CIV
			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Option 1: Indicate pre-development and post-development runoff rate(cfs) and runoff quantity (cf) -OR - Narrative describing site conditions, measures and controls to be implemented to prevent excessive stream velocities and erosion.		CIV
			Final Design	Option 2: Indicate pre-development and post-development runoff rate(cfs) and runoff quantity (cf). Indicate percent reduction in each.		CIV
SS6.2		Stormwater Design: Quality Control	Final Design	For non-structural controls, list all BMPs used and, for each, describe the function of the BMP and indicate the percent annual rainfall treated. List all structural controls and, for each, describe the pollutant removal and indicate the percent annual rainfall treated.		CIV
			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
SS7.1		Heat Island Effect: Non-Roof	**Final Design	LEED site plan drawing indicating locations and quantities of each paving type, including areas of shaded pavement. Percentage calculation indicating percentage of reflective/shaded/open grid area.		CIV
			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV

Thursday, November 18, 2010

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PAR		FEATURE	DUE AT		DATE	REV
SS7.2		Heat Island Effect: Roof	Final Design	Option 1: Percentage calculation indicating percentage of SRI compliant roof area. List of drawings and specification references that convey SRI requirements and roof slopes.		ARC
			Final Design	Option 1: List of specified roof materials indicating, for each, type, manufacturer, product name and identification if known, SRI value and roof slope.		ARC
			**Closeout	Option 1: List of installed roof materials indicating, for each, manufacturer, product name and identification, SRI value and roof slope.		PE
			Closeout	X Option 1: Manufacturer published product data or certification confirming SRI		PE
			Final Design	Option 2: Percentage calculation indicating percentage of vegetated roof area.		ARC
			Final Design	Option 3: Combined reflective and green roof calculation.		ARC
			Final Design	Option 3: List of specified roof materials indicating, for each, type, manufacturer, product name and identification if known, SRI value and roof slope.		ARC
			**Closeout	Option 3: List of installed roof materials indicating, for each, manufacturer, product name and identification, SRI value and roof slope.		PE
			Closeout	X Option 3: Manufacturer published product data or certification confirming SRI		PE
SS8		Light Pollution Reduction	Final Design	Interior Lighting: List of drawings and specification references that convey interior lighting requirements (location and type of all installed interior lighting, location of non-opaque exterior envelope surfaces, allowing confirmation that maximum candela value from interior fixtures does not intersect non-opaque building envelope surfaces). - OR - List of drawings and specification references that show automatic lighting controls compliance with credit requirement.		ELEC
			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		ELEC
			Final Design	Exterior Lighting: List of drawings and specification references that convey exterior lighting requirements (location and type of all site lighting and building facade/landscape lighting).		ELEC
			Final Design	Exterior Site Lighting Power Density (LPD): Tabulation for exterior site lighting indicating, for each location identification or description, units of measure, area or distance of the location, actual LPD using units consistent with ASHRAE 90.1, and the ASHRAE allowable LPD for that type of location. Percentage calculation of actual versus allowable LPD for all site lighting.		ELEC
			Final Design	Exterior Building Facade/Landscape Lighting Power Density (LPD): Tabulation for exterior building facade/landscape lighting indicating, for each location identification or description, units of measure, area or distance of the location, actual LPD using units consistent with ASHRAE 90.1, and the ASHRAE allowable LPD for that type of location. Percentage calculation of actual versus allowable LPD for all building facade/landscape lighting.		ELEC
			Final Design	Exterior Lighting IESNA Zone: Indicate which IESNA zone is applicable to the project.		ELEC
			Final Design	Exterior Lighting Site Lumen table indicating, for each fixture type, quantity installed, initial lamp lumens per luminaire, initial lamp lumens above 90 degrees from Nadir, total lamp lumens and total lamp lumens above 90 degrees. Percentage of site lamp lumens above 90 degrees from nadir to total lamp lumens.		ELEC
			Final Design	Exterior Lighting Narrative describing analysis used for addressing requirements for light trespass at site boundary and beyond.		ELEC
CATEGORY 2 – WATER EFFICIENCY						
WEPR1		Water Use Reduction: 20% Reduction	Final Design	Statement confirming which occupancy breakdown applies (default or special). For special occupancy breakdown, indicate source and explanation for ratio.		MEC
			Final Design	Occupancy calculation including male/female numbers for FTEs, visitors, students, customers, residential and other type occupants/users		MEC
			Final Design	Statement indicating percent of male restrooms with urinals. Statement indicating annual days of operation.		MEC

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				Baseline flush fixture calculation spreadsheet indicating, for each fixture type, gender, flush rate, daily uses per person for each occupant type identified in occupancy calculation and annual baseline flush fixture water usage.		MEC
				Design case flush fixture calculation spreadsheet indicating, for each fixture type, gender, fixture manufacturer, fixture model number, flush rate, percent of occupants using this fixture type, daily uses per person for each occupant type identified in occupancy calculation and annual design case flush fixture water usage.		MEC
			Closeout	X Manufacturer published product data or certification confirming fixture water usage.		PE
WE1.1		Water Efficient Landscaping: Reduce by 50%	Final Design	Statement indicating which option for compliance applies.		CIV
			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Calculation indicating, for baseline and design case, total water applied, total potable water applied, total non-potable water applied. Design case percent potable water reduction. If nonpotable water is used, indicate source of nonpotable water.		CIV
			Final Design	List of landscape plan drawings.		CIV
			Final Design	Narrative describing landscaping and irrigation design strategies, including water use calculation methodology used to determine savings and, if non-potable water is used, specific information about source and available quantity.		CIV
WE1.2		Water Efficient Landscaping: No Potable Water Use or No Irrigation	Same as WE1.1	Same as WE1.1		CIV
WE2		Innovative Wastewater Technologies	Final Design	Statement confirming which option for compliance applies.		MEC
			Final Design	Statement confirming which occupancy breakdown applies (default or special). For special occupancy breakdown, indicate source and explanation for ratio.		MEC
			Final Design	Occupancy calculation including male/female numbers for FTEs, visitors, students, customers, residential and other type occupants/users		MEC
			Final Design	Statement indicating percent of male restrooms with urinals. Statement indicating annual days of operation.		MEC
			Final Design	Baseline flush fixture calculation spreadsheet indicating, for each fixture type, gender, flush rate, daily uses per person for each occupant type identified in occupancy calculation and annual baseline flush fixture water usage.		MEC
			Final Design	Design case flush fixture calculation spreadsheet indicating, for each fixture type, gender, fixture manufacturer, fixture model number, flush rate, percent of occupants using this fixture type, daily uses per person for each occupant type identified in occupancy calculation and annual design case flush fixture water usage.		MEC
			Final Design	Option 1: If onsite non-potable water is used, identify source(s), indicate annual quantity from each source and indicate total annual quantity from all onsite non-potable water sources.		MEC
			Final Design	Option 1: Summary calculation indicating baseline annual water consumption, design case annual water consumption, non-potable annual water consumption and total percentage annual water savings.		MEC
			Final Design	Option 2: Statement confirming on-site treatment of all generated wastewater to tertiary standards and all treated wastewater is either infiltrated or used on-site.		MEC
			Final Design	Option 2: List of drawing and specification references that convey design of on-site wastewater treatment features.		CIV
			Final Design	Option 2: On-site water treatment quantity calculation indicating all on-site wastewater source(s), annual quantity treated, annual quantity infiltrated and annual quantity re-used on site from each source and totals for annual quantity treated, annual quantity infiltrated and annual quantity re-used on site from all sources.		CIV
			Final Design	Option 2: Wastewater summary calculation indicating design case annual flush fixture water usage, annual on-site water treatment and percentage sewage conveyance reduction.		MEC
			Final Design	Narrative describing project strategy for reduction of potable water use for sewage conveyance, including specific information on reclaimed water usage and treated wastewater usage.		MEC
WE3		Water Use Reduction: 30% - 40% Reduction	Same as WEPR1	Same as WEPR1		MEC

CATEGORY 3 – ENERGY AND ATMOSPHERE

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PAR		FEATURE	DUE AT					
EAPR1		Fundamental Commissioning of the Building Energy Systems (PREREQUISITE)	**Final Design	**Owner's Project Requirements document				ALL MEC, ELEC
			**Final Design	**Basis of Design document for commissioned systems				MEC, ELEC
			**Final Design	**Commissioning Plan				MEC, ELEC
			Closeout	Statement confirming all commissioning requirements have been incorporated into construction documents.				PE
			Closeout	Commissioning Report				PE
EAPR2		Minimum Energy Performance (PREREQUISITE)	Final Design	Statement listing the mandatory provisions of ASHRAE 90.1 that project meets relative to compliance with this prerequisite and indicating which compliance path was used.				MEC ELEC ARC
			Final Design	Statement indicating which compliance path option applies.				MEC
			Final Design	Option 1: Statement confirming simulation software capabilities and confirming assumptions and methodology.				MEC
			Final Design	Option 1: General information including simulation program, principal heating source, percent new construction and renovation, weather file, climate zone and Energy Star Target Finder score.				MEC
			Final Design	Option 1: Space summary listing, for each building use, the conditioned area, unconditioned area and total area and include total area for each category				MEC
			Final Design	Option 1: List of all simulation output advisory message data and show difference between baseline and proposed design				MEC
			Final Design	Option 1: Comparison summary for energy model inputs including description of baseline and design case energy model inputs, showing both by element type				MEC
			Final Design	Option 1: Energy type summary listing, for each energy type, utility rate description, units of energy and units of demand				MEC
			Final Design	Option 1: Statement indicating whether project uses on-site renewable energy. If yes, list all sources and indicate, for each source, backup energy type, annual energy generated, rated capacity and renewable energy cost				MEC
			Final Design	Option 1: If analysis includes exceptional calculation methods, statement describing how exceptional calculation measure cost savings is determined				MEC
			Final Design	Option 1: If analysis includes exceptional calculation methods, for each exceptional calculation method indicate energy types and, for each energy type, annual energy savings, annual cost savings, and brief descriptive narrative				MEC
			Final Design	Option 1: Baseline performance rating compliance report table indicating, for each energy end use, whether it is a process load, energy type, annual and peak energy demand for all four orientations. For each orientation indicate total annual energy use for each orientation and total annual process energy use.				MEC
			Final Design	Option 1: Baseline energy cost table indicating, for each energy type, annual cost for all four orientations and building total energy cost.				MEC
			Final Design	Option 1: Proposed Design performance rating compliance report table indicating, for each energy end use, whether it is a process load, energy type, annual and peak energy demand, baseline annual and peak energy demand and percent savings. Indicate total annual energy use and total annual process energy use for both proposed design and baseline and percent savings.				MEC
			Final Design	Option 1: Proposed Design energy cost table indicating, for each energy type, annual cost for all four orientations and building total energy cost.				MEC
			Final Design	Option 1: Energy cost and consumption by energy type report indicating, for each energy type, proposed design and baseline annual use and annual cost, percent savings annual use and annual cost. Indicate for renewable energy annual energy generated and annual cost. Indicate exceptional calculations annual energy savings and annual cost savings. Indicate building total annual energy use, annual energy cost for proposed design and baseline and indicate percent savings annual energy use and annual energy cost.				MEC

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			Final Design	Option 1: Compliance summaries from energy simulation software. If software does not produce compliance summaries provide output summaries and example input summaries for baseline and proposed design supporting data in the tables. Output summaries must include simulated energy consumption by end use and total energy use and cost by energy type. Example input summaries should represent most common systems and must include occupancy, use pattern, assumed envelope component sizes and descriptive features and assumed mechanical equipment types and descriptive features		MEC
			Final Design	Option 1: Energy rate tariff from project energy providers (only if not using LEED Reference Guide default rates)		MEC
EAPR3		Fundamental Refrigerant Management (PREREQUISITE)	Final Design	Statement indicating which option for compliance applies.		MEC
			Final Design	Option 2: Narrative describing phase out plan, including specific information on phase out dates and refrigerant quantities.		MEC
EA1		Optimize Energy Performance	Final Design	Statement indicating which compliance path option applies.		MEC
			Final Design	Option 1: Statement confirming simulation software capabilities and confirming assumptions and methodology.		MEC
			Final Design	Option 1: General information including simulation program, principal heating source, percent new construction and renovation, weather file, climate zone and Energy Star Target Finder score.		MEC
			Final Design	Option 1: Space summary listing, for each building use, the conditioned area, unconditioned area and total area and include total area for each category		MEC
			Final Design	Option 1: List of all simulation output advisory message data and show difference between baseline and proposed design		MEC
			Final Design	Option 1: Comparison summary for energy model inputs including description of baseline and design case energy model inputs, showing both by element type		MEC
			Final Design	Option 1: Energy type summary listing, for each energy type, utility rate description, units of energy and units of demand		MEC
			Final Design	Option 1: Statement indicating whether project uses on-site renewable energy. If yes, list all sources and indicate, for each source, backup energy type, annual energy generated, rated capacity and renewable energy cost		MEC
			Final Design	Option 1: If analysis includes exceptional calculation methods, statement describing how exceptional calculation measure cost savings is determined		MEC
			Final Design	Option 1: If analysis includes exceptional calculation methods, for each exceptional calculation method indicate energy types and, for each energy type, annual energy savings, annual cost savings, and brief descriptive narrative		MEC
			Final Design	Option 1: Baseline performance rating compliance report table indicating, for each energy end use, whether it is a process load, energy type, annual and peak energy demand for all four orientations. For each orientation indicate total annual energy use for each orientation and total annual process energy use.		MEC
			Final Design	Option 1: Baseline energy cost table indicating, for each energy type, annual cost for all four orientations and building total energy cost.		MEC
			Final Design	Option 1: Proposed Design performance rating compliance report table indicating, for each energy end use, whether it is a process load, energy type, annual and peak energy demand, baseline annual and peak energy demand and percent savings. Indicate total annual energy use and total annual process energy use for both proposed design and baseline and percent savings.		MEC
			Final Design	Option 1: Proposed Design energy cost table indicating, for each energy type, annual cost for all four orientations and building total energy cost.		MEC
			Final Design	Option 1: Energy cost and consumption by energy type report indicating, for each energy type, proposed design and baseline annual use and annual cost, percent savings annual use and annual cost. Indicate for renewable energy annual energy generated and annual cost. Indicate exceptional calculations annual energy savings and annual cost savings. Indicate building total annual energy use, annual energy cost for proposed design and baseline and indicate percent savings annual energy use and annual energy cost.		MEC

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			Final Design	Option 1: Compliance summaries from energy simulation software. If software does not produce compliance summaries provide output summaries and example input summaries for baseline and proposed design supporting data in the tables. Output summaries must include simulated energy consumption by end use and total energy use and cost by energy type. Example input summaries should represent most common systems and must include occupancy, use pattern, assumed envelope component sizes and descriptive features and assumed mechanical equipment types and descriptive features		MEC
			Final Design	Option 1: Energy rate tariff from project energy providers (only if not using LEED Reference Guide default rates)		MEC
EA2.1		On-Site Renewable Energy	Final Design	Statement indicating which compliance path option applies.		ELEC
			Final Design	List all on-site renewable energy sources and indicate, for each source, backup energy type, annual energy generated, rated capacity and renewable energy cost. Indicate total annual energy use (all sources), total annual energy cost (all sources) and percent renewable energy cost.		ELEC MEC
			Final Design	Option 1: Indicate, for renewable energy, proposed design total annual energy generated and annual cost.		ELEC MEC
			Final Design	Option 2: Indicate CBECS building type and building gross area. Provide the following CBECS data: median annual electrical intensity, median annual non-electrical fuel intensity, average electric energy cost, average non-electric fuel cost, annual electric energy use and cost, annual non-electric fuel use and cost.		ELEC MEC
			Final Design	Option 2: Narrative describing renewable systems and explaining calculation method used to estimate annual energy generated, including factors influencing performance.		ELEC MEC
EA2.2		On-Site Renewable Energy	Same as EA2.1	Same as EA2.1		ELEC MEC
EA2.3		On-Site Renewable Energy	Same as EA2.1	Same as EA2.1		ELEC MEC
EA3		Enhanced Commissioning	**Final Design	**Owner's Project Requirements document (OPR)		ALL
			**Final Design	**Basis of Design document for commissioned systems (BOD)		ELEC MEC
			**Final Design	**Commissioning Plan		ELEC MEC
			Closeout	Statement confirming all commissioning requirements have been incorporated into construction documents.		PE
			Closeout	**Commissioning Report		PE
			**Final Design	Statement by CxA confirming Commissioning Design Review		
			Closeout	Statement by CxA confirming review of Contractor submittals for compliance with OPR and BOD		PE
			Closeout	**Systems Manual		PE
			Closeout	Statement by CxA confirming completion of O&M staff and occupant training		PE
			Closeout	**Scope of work for post-occupancy review of building operation, including plan for resolution of outstanding issues		PE
			**Predesign	Statement confirming CxA qualifications and contractual relationships relative to work on this project, demonstrating that CxA is an independent third party.		MEC
EA4		Enhanced Refrigerant Management	Final Design	Refrigerant impact calculation table with all building data and calculation values as shown in LEED 2009 Reference Guide Example Calculations		MEC
			Final Design	Narrative describing any special circumstances or explanatory remarks		
			Closeout	X Cut sheets highlighting refrigerant data for all HVAC components.		PE
EA5		Measurement & Verification	Closeout	Statement indicating which compliance path option applies.		PE
			Closeout	Measurement and Verification Plan including Corrective Action Plan		PE
			Closeout	**Scope of work for post-occupancy implementation of M&V plan including corrective action plan.		PE
EA6		Green Power	Closeout	Statement indicating which compliance path option applies.		PE
			Closeout	Option 1: Indicate proposed design total annual electric energy usage		PE
			Closeout	Option 2: Indicate actual total annual electric energy usage		PE
			Closeout	Option 3: Calculation indicating building type, total gross area, median electrical intensity and annual electric energy use		PE

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PAR		FEATURE	DUE AT		DATE	REV
			Closeout	Green power provider summary table indicating, for each purchase type, provider name, annual quantity green power purchased and contract term. Indicate total annual green power use and indicate percent green power		PE
			Closeout	Narrative describing how Green Power or Green Tags are purchased		PE
CATEGORY 4 – MATERIALS AND RESOURCES						
MRPR1		Storage & Collection of Recyclables (PREREQUISITE)	Final Design	Statement confirming that recycling area will accommodate recycling of plastic, metal, paper, cardboard and glass. Narrative indicating any other materials addressed and coordination with pickup.		ARC
MR1.1		Building Reuse: Maintain 55% of Existing Walls, Floors & Roof	**Final Design	If project includes a building addition, confirm that area of building addition does not exceed 2x the area of the existing building.		ARC
			**Final Design	Spreadsheet listing, for each building structural/envelope element, the existing area and reused area. Total percent reused.		ARC
MR1.2		Building Reuse: Maintain 75% of Existing Walls, Floors & Roof	Same as MR1.1	Same as MR1.1		ARC
MR1.3		Building Reuse: Maintain 95% of Existing Walls, Floors & Roof	Same as MR1.1	Same as MR1.1		ARC
MR1.4		Building Reuse: Maintain 50% of Interior Non-Structural Elements	**Final Design	If project includes a building addition, confirm that area of building addition does not exceed 2x the area of the existing building.		ARC
			**Final Design	Spreadsheet listing, for each building interior non-structural element, the existing area and reused area. Total percent reused.		ARC
MR2.1		Construction Waste Management: Divert 50% From Disposal	**Preconstruction	Waste Management Plan		PE
			**Construction Quarterly and Closeout	Spreadsheet calculations indicating material description, disposal/diversion location (or recycling hauler), weight, total waste generated, total waste diverted, diversion percentage		PE
			**Construction Quarterly and Closeout	Receipts/tickets for all items on spreadsheet		PE
MR2.2		Construction Waste Management: Divert 75% From Disposal	Same as MR2.1	Same as MR2.1		PE
MR3.1		Materials Reuse: 5%	Closeout	Statement indicating total materials value and whether default or actual.		PE
			Closeout	Spreadsheet calculations indicating, for each reused/salvaged material, material description, source or vendor, cost. Total reused/salvaged materials percentage.		PE
MR3.2		Materials Reuse: 10%	Same as MR3.1	Same as MR3.1		PE
MR4.1		Recycled Content: 10% (post-consumer + 1/2 pre-consumer)	Closeout	Statement indicating total materials value and whether default or actual.		PE
			Closeout	Spreadsheet calculations indicating, for each recycled content material, material name/description, manufacturer, cost, post-consumer recycled content percent, pre-consumer recycled content percent, source of recycled content data. Total post-consumer content materials cost, total pre-consumer content materials cost, total combined recycled content materials cost, recycled content materials percentage.		PE
			Final Design or NLT Preconstruction	**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal.		PE
			Closeout	Manufacturer published product data or certification, confirming recycled content percentages in spreadsheet		PE
MR4.2		Recycled Content: 20% (post-consumer + 1/2 pre-consumer)	Same as MR4.1	Same as MR4.1		PE
MR5.1		Regional Materials: 10% Extracted, Processed & Manufactured Regionally	Closeout	Statement indicating total materials value and whether default or actual.		PE
			Closeout	Spreadsheet calculations indicating, for each regional material, material name/description, manufacturer, cost, percent compliant, harvest distance, manufacture distance, source of manufacture and harvest location data. Total regional materials cost, regional materials percentage.		PE
			Preconstruction	**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal.		PE
			Closeout	Manufacturer published product data or certification confirming regional material percentages in spreadsheet		PE

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MR5.2		Regional Materials:20% Extracted, Processed & Manufactured Regionally	Same as MR5.1	Same as MR5.1		PE
MR6		Rapidly Renewable Materials	Closeout	Statement indicating total materials value and whether default or actual.		PE
			Closeout	Spreadsheet calculations indicating, for each rapidly renewable material, material name/description, manufacturer, cost, rapidly renewable content percent, rapidly renewable product value. Total rapidly renewable product value, rapidly renewable materials percentage.		PE
			Final Design	**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal.		ARC
			Closeout	X Manufacturer published product data or certification confirming rapidly renewable material percentages in spreadsheet		PE
MR7		Certified Wood	Closeout	Statement indicating total materials value and whether default or actual.		PE
			Closeout	Spreadsheet calculations indicating, for each certified wood material, material name/description, vendor, cost, wood component percent, certified wood percent of wood component, FSC chain of custody certificate number. Total certified wood product value, certified wood materials percentage.		PE
			Final Design or NLT Preconstruction	**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal.		PE
			Closeout	X Vendor invoices, FSC chain of custody certificates and manufacturer published product data or certification confirming all certified wood materials percentages in spreadsheet.		PE
INDOOR ENVIRONMENTAL QUALITY						
EQPR1		Minimum IAQ Performance (PREREQUISITE)	Final Design	Statement indicating which option for compliance applies, stating applicable criteria/requirement, and confirming that project has been designed to meet the applicable requirements.		MEC
			Final Design	Narrative describing the project's ventilation design, including specifics about fresh air intake volumes and special considerations.		MEC
EQPR2		Environmental Tobacco Smoke (ETS) Control (PREREQUISITE)	Final Design	Statement indicating which option for compliance applies, stating applicable criteria/requirement, and confirming that project has been designed to meet the applicable requirements.		ARC
			Final Design	List of drawing and specification references that convey conformance to applicable requirements (signage, exhaust system, room separation details, etc).		ARC
EQ1		Outdoor Air Delivery Monitoring	Final Design	Statement indicating which option for compliance applies and confirming that project has been designed to meet the applicable requirements.		MEC
			Final Design	List of drawing and specification references that convey conformance to applicable requirements.		MEC
			Final Design	Narrative describing the project's ventilation design and CO2 monitoring system, including specifics about monitors, operational parameters and setpoints.		MEC
			Closeout	X Cut sheets for CO2 monitoring system.		PE
EQ2		Increased Ventilation	Final Design	Statement indicating which option for compliance applies and confirming that project has been designed to meet the applicable requirements.		MEC
			Final Design	Narrative describing the project's ventilation design, including specifics about zone fresh air intake volumes and demonstrating compliance.		MEC
			Final Design	Option 2: Narrative describing design method used for determining natural ventilation design, including calculation methodology/model results and demonstrating compliance.		MEC
			Final Design	List of drawing and specification references that convey conformance to applicable requirements.		MEC
EQ3.1		Construction IAQ Management Plan: During Construction	**Preconstruction	Construction IAQ Management Plan		PE
			Closeout	Statement confirming whether air handling units were operated during construction		PE
			Closeout	Dated jobsite photos showing examples of IAQ management plan practices being implemented. Label photos to indicate which practice they demonstrate. Minimum one photo of each practice at each building.		PE

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PAR		FEATURE	DUE AT			
			Closeout	Spreadsheet indicating, for each filter installed during construction, the manufacturer, model number, MERV rating, location installed, and if it was replaced immediately prior to occupancy.		PE
EQ3.2		Construction IAQ Management Plan: Before Occupancy	**Preconstruction	Construction IAQ Management Plan		PE
			Closeout	Statement indicating which option for compliance applies and confirming that required activities have occurred that meet the applicable requirements.		PE
			Closeout	Option 1a: Narrative describing the project's flushout process, including specifics about temperature, airflow and duration, special considerations (if any) and demonstrating compliance.		PE
			Closeout	Option 1b: Narrative describing the project's pre-occupancy and post-occupancy flushout processes, including specifics about temperature, airflow and duration, special considerations (if any) and demonstrating compliance.		PE
			Closeout	Option 2: Narrative describing the project's IAQ testing process, including specifics about contaminants tested for, locations, remaining work at time of test, retest parameters and special considerations (if any).		PE
			Closeout	Option 2: IAQ testing report demonstrating compliance.		PE
EQ4.1		Low Emitting Materials: Adhesives & Sealants	Closeout	Spreadsheet indicating, for each applicable indoor adhesive, sealant and sealant primer used, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data.		PE
			Closeout	Spreadsheet indicating, for each applicable indoor aerosol adhesive, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data - OR - Statement confirming no indoor aerosol adhesives were used for the project.		PE
			Closeout	Manufacturer published product data or certification confirming material VOCs in spreadsheet	X	PE
EQ4.2		Low Emitting Materials: Paints & Coatings	Closeout	Spreadsheet indicating, for each applicable indoor paint and coating used, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data.		PE
			Closeout	Spreadsheet indicating, for each applicable indoor anti-corrosive/anti-rust paint and coating used, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data - OR - Statement confirming no indoor anti-corrosive/anti-rust paints were used for the project .		PE
			Closeout	Manufacturer published product data or certification confirming material VOCs in spreadsheet	X	PE
EQ4.3		Low Emitting Materials: Flooring Systems	Closeout	Spreadsheet indicating, for each indoor flooring system used, the manufacturer, product name/model number, if it meets LEED requirement (yes/no) and source of LEED compliance data.		PE
			Closeout	Spreadsheet indicating, for each indoor carpet cushion used, the manufacturer, product name/model number, if it meets LEED requirement (yes/no) and source of LEED compliance data - OR - Statement confirming no indoor carpet cushion was used for the project.		PE
			Closeout	Manufacturer published product data or certification confirming material compliance label in spreadsheet	X	PE
EQ4.4		Low Emitting Materials: Composite Wood & Agrifiber Products	Closeout	Spreadsheet indicating, for each indoor composite wood and agrifiber product used, the manufacturer, product name/model number, if it contains added urea formaldehyde (yes/no) and source of LEED compliance data.		PE
			Closeout	Manufacturer published product data or certification confirming material urea formaldehyde in spreadsheet	X	PE
EQ5		Indoor Chemical & Pollutant Source Control	Closeout	Spreadsheet indicating, for each permanent entryway system used, the manufacturer, product name/model number and description of system.		PE
			Final Design	List of drawing and specification references that convey locations and installation methods for entryway systems.		ARC
			Final Design	Spreadsheet indicating, for each chemical use area, the room number, room name, description of room separation features (walls, floor/ceilings, openings) and pressure differential from surrounding spaces with doors closed - OR - Statement confirming that project includes no chemical use areas and that no hazardous cleaning materials are needed for building maintenance.		ARC MEC
			Final Design	If project includes chemical use areas: List of drawing and specification references that convey locations of chemical use areas, room separation features and exhaust system.		ARC

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PAR		FEATURE	DUE AT					
			Final Design	If project includes places where water and chemical concentrate mixing occurs: List of drawing and specification references that convey provisions for containment of hazardous liquid wastes OR - Statement confirming that project includes no places where water and chemical concentrate mixing occurs.				ARC MEC
			Closeout	If project includes chemical use areas: Spreadsheet indicating, for AHUs/mechanical ventilation equipment serving occupied areas, the manufacturer, model number, MERV rating, location installed, and if it was replaced immediately prior to occupancy (yes/no) - OR - Statement confirming that project does not use mechanical equipment for ventilation of occupied areas.				PE
EQ6.1		Controllability of Systems: Lighting	Final Design	Calculation indicating total number of individual workstations, number of workstations with individual lighting controls and the percentage of workstations with individual lighting controls.				ELEC
			Final Design	For each shared multi-occupant space, provide a brief description of lighting controls.				ELEC
			Final Design	Narrative describing lighting control strategy, including type and location of individual controls and type and location of controls in shared multi-occupant spaces.				ELEC
EQ6.2		Controllability of Systems: Thermal Comfort	Final Design	Calculation indicating total number of individual workstations, number of workstations with individual thermal comfort controls and the percentage of workstations with individual thermal comfort controls.				MEC
			Final Design	For each shared multi-occupant space, provide a brief description of thermal comfort controls.				MEC
			Final Design	Narrative describing thermal comfort control strategy, including type and location of individual and shared multi-occupant controls.				MEC
EQ7.1		Thermal Comfort: Design	Final Design	Design criteria spreadsheet indicating, for spring, summer, fall and winter, maximum indoor space design temperature, minimum indoor space design temperature and maximum indoor space design humidity.				MEC
			Final Design	Narrative describing method used to establish thermal comfort control conditions and how systems design addresses the design criteria, including compliance with the referenced standard.				MEC
EQ7.2		Thermal Comfort: Verification	Final Design	Narrative describing the scope of work for the thermal comfort survey, including corrective action plan development				MEC
			Final Design	List of drawing and specification references that convey permanent monitoring system.				MEC
EQ8.1		Daylight & Views: Daylight 75% of Spaces	Final Design	Option 2: Table indicating all regularly occupied spaces with space area and space area with compliant daylight zone. Sum of regularly occupied areas and regularly occupied areas with compliant daylight zone. Percentage calculation of areas with compliant daylight zone to total regularly occupied areas.				ARC
			Final Design	Option 1: Simulation model method, software and output data				ELEC
			Final Design	Option 1: Table indicating all regularly occupied spaces with space area, space area with minimum 25 footcandles daylighting illumination, and method of providing glare control. Sum of regularly occupied areas and regularly occupied areas with 25 fc daylighting. Percentage calculation of areas with 25 fc daylighting to total regularly occupied areas.				ELEC
			Final Design	For all occupied spaces excluded from the calculation, provide narrative indicating reasons for excluding the space.				ARC
			Final Design	List of drawing and specification references that convey exterior glazed opening head and sill heights, glazing performance properties and glare control/sunlight redirection devices.				ARC
			Closeout	X Manufacturer published product data or certification confirming glazing Tvis in spreadsheet				PE
EQ8.2		Daylight & Views: Views for 90% of Spaces	Final Design	Table indicating all regularly occupied spaces with space area and space area with access to views. Sum of regularly occupied areas and regularly occupied areas with access to views. Percentage calculation of areas with views to total regularly occupied areas.				ARC
			Final Design	For all occupied spaces excluded from the calculation, provide narrative indicating reasons for excluding the space.				ARC
			Final Design	LEED Floor plan drawings showing line of sight diagramming of views areas in each regularly occupied space. List of drawing/specification references that convey exterior glazed opening head and sill heights.				ARC

INNOVATION & DESIGN PROCESS

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PAR		FEATURE	DUE AT	REQUIRED DOCUMENTATION	DATE	REV
		LEED-NC v3 Submittals (OCT09)				
IDc1.1		Innovation in Design	Final Design	Narrative describing intent, requirement for credit, project approach to the credit. List of drawings and specification references that convey implementation of credit. All other documentation that validates claimed credit.		
IDc1.2		Innovation in Design	Final Design			
IDc1.3		Innovation in Design	Final Design			
IDc1.4		Innovation in Design	Final Design			
IDc2		LEED Accredited Professional	Final Design	Narrative indicating name of LEED AP, company name of LEED AP, description of LEED AP's role and responsibilities in the project.		ARC

ATTACHMENT F
Version 07-07-2010

BUILDING INFORMATION MODELING REQUIREMENTS

1.0 Section 1 - Submittal Format

1.1. Design Deliverables. Develop all designs using Building Information Modeling (BIM) and Computer Aided Design (CAD) software. Design submittal drawings shall be Full size size, suitable for half-size scaled reproduction.

2.0 Section 2 – Design Requirements

2.1. BIM Model and Facility Data. Contractor shall use BIM application(s) and software(s) to develop project designs. "Facility Data" is defined as associated intelligent attribute data. The "Model" is defined as 3D graphics that includes Facility Data and output as described in the paragraph 'Output' below. Contractors will use the Model to produce accurate Construction Documents. For each Center of Standardization (CoS) facility type included in this project, all BIM Models and associated Facility Data shall be submitted in Bentley Systems BIM V8 Workspace with associated USACE Bentley BIM Workspace (which includes specific standard BIM libraries and definitions). This Workspace can be downloaded from the CAD/BIM Technology Center. [Where available, the workspace will be specific to this CoS Facility Standard Design. The Contractor will be provided a baseline multi-discipline BIM Project Model for the CoS Facility Standard Design type, where such a model exists (for the purposes of site adaptation).] The USACE Bentley BIM Workspace is dependent on specific versions of the Bentley BIM suite of products and only the versions of the software that are listed in the Contractor instructions included with the USACE BIM Workspace are permitted to be used.

2.1.1. Reference. Refer to ERDC TR-06-10, "U.S. Army Corps of Engineers Building Information Modeling Road Map" from the CAD/BIM Technology Center website for more information on the USACE BIM implementation goals.

2.2. Drawings. Deliver CAD files used for the creation of the Construction Documents Drawings per requirements in Section 01 33 16, the criteria of the USACE Tulsa District, and as noted herein. Specification of a CAD file format for these Drawings does not limit which BIM application(s) or software(s) may be used for project development and execution.

2.2.1. IFC Support. The Contractor's selected BIM application(s) and software(s) must support the IFC (Industry Foundation Class - see www.iai-tech.org). Submit any deviations from or additions to the IFC property sets for any new spaces, systems, and equipment for Government approval.

2.2.2. Submittal Requirements. BIM submittals shall be fully interoperable, compatible, and editable with the Bentley BIM tools. Use the specified version of the USACE Bentley BIM Workspace and conform to the requirements of **Sections 3 and 4 below**.

2.2.3. BIM Project Execution Plan.

2.2.3.1. Develop a BIM Project Execution Plan ("Plan" or "PxP") documenting the BIM and analysis technologies selected for the Project Model (integrated with the AEC CAD Standard) from concept development through As-Builts as a design, production, coordination, construction, and documentation tool and the collaborative process by which it shall be executed. See Section 7 for additional guidance on developing the Plan.

2.2.4. BIM Requirements.

2.2.4.1. Facility Data. Develop the Facility Data consisting of a set of intelligent elements for the Model (e.g., doors, air handlers, electrical panels). This Facility Data shall include all material definitions and attributes that are necessary for the Project facility design and construction. Additional data in support of Section 6 Contractor Electives is encouraged.

2.2.4.2. Model Content. The Model and Facility Data shall include, at a minimum, the requirements of Section 4 below.

2.2.4.3. Model Granularity. Models may vary in level of detail for individual elements within a model, but at a minimum must include all features that would be included on a quarter inch (1/4" = 1'0") scaled drawing (e.g. at least 1/16th, 1/8th and 1/4th), or appropriately scaled civil drawings.

2.2.4.4. Output. Submitted CAD drawings (e.g., plans, elevations, sections, schedules, details, etc.) shall be derived (commonly known as extractions, views or sheets) and maintained from the submitted Model and Facility Data.

2.3. Quality Control. Implement quality control (QC) parameters for the Model, including:

2.3.1. Model Standards Checks. QC validation used to ensure that the Project Facility Data set has no undefined, incorrectly defined or duplicated elements. Report non-compliant elements and corrective action plan to correct non-compliant elements. Provide the government with detailed justification and request government approval for any non-compliant element which the contractor proposes to be allowed to remain in the Model.

2.3.2. CAD Standards Checks. QC checking performed to ensure that the fonts, dimensions, line styles, levels and other construction document formatting issues are followed per the A/E/C CADD Standard.

2.3.3. Other Parameters. Develop such other QC parameters as Contractor deems appropriate for the Project and provide to the Government for concurrence.

2.4. Design and Construction Reviews. Perform design and construction reviews at each submittal stage under Section 3 to test the Model, including:

2.4.1. Visual Checks. Checking to ensure the design intent has been followed and that there are no unintended elements in the Model.

2.4.2. Interference Management Checks. Locate conflicting spatial data in the Model where two elements are occupying the same space. Log hard interferences (e.g., mechanical vs. structural or mechanical vs. mechanical overlaps in the same location) and soft interferences, (e.g., conflicts regarding equipment clearance, service access, fireproofing, insulation) in a written report and resolve.

2.4.3. IFC Coordination View. Provide an IFC Coordination View in IFC Express format for all deliverables. Provide exported property set data for all IFC supported named building elements.

2.4.4. Other Parameters. Develop such other Review parameters as the Contractor deems appropriate for the Project and provide to the Government for concurrence..

3.0 Section 3 – Design Stage Submittal Requirements

3.1. General Submittal Requirements.

3.1.1. Provide submittals in compliance with BIM Project Execution Plan deliverables at stages as described hereinafter.

3.1.2. At each Stage in Paragraphs 3.3 through 3.6, provide a Contractor-certified written report confirming that consistency checks as identified in Paragraphs 2.3 and 2.4 have been completed. This report shall be discussed as part of the review process and shall address cross-discipline interferences, if any.

3.1.3. At each Stage in Paragraphs 3.3 through 3.6, provide the Government with:

- The Model, Facility Data, Workspace and CAD Data files in native Bentley BIM/CAD.

- A 3-D interactive review format of the Model in Bentley Navigator, Autodesk Navisworks, Adobe 3D PDF 7.0 (or later), Google Earth KMZ or other format per Plan requirements. The file format for reviews can change between submittals.

- A list of all submitted files. The list should include a description, directory, and file name for each file submitted. For all CAD sheets, include the sheet title and sheet number. Identify files that have been produced from the submitted Model and Facility Data.

3.1.4. The Government will confirm acceptability of all submittals identified in Section 3 in coordination with the USACE Tulsa BIM Manager

3.2. Initial Design Conference Submittal.

3.2.1. Submit a digital copy of the Plan where, in addition to Paragraph 3.1.4, the USACE Geographic District BIM Manager will coordinate with the USACE CoS BIM Manager to confirm acceptability of the Plan or advise as to additional processes or activities necessary to be incorporated.

3.2.2. Within thirty (30) days after the approval of the Plan, conduct a demonstration to review the Plan for clarification, and to verify the functionality of Model technology workflow and processes. If modifications are required, the Contractor shall complete the modifications and resubmit the Plan and perform subsequent demonstration for Government acceptance. There will be no payment for design or construction until the Plan is acceptable to the Government. The Government may also withhold payment for design and construction for unacceptable performance in executing the approved Plan.

3.3. Interim Design Submittals.

3.3.1. BIM and CAD Data. The Model shall include the requirements identified in Paragraph 2.2.4 as applicable to the Interim Design package(s).

3.4. Final Design Submissions and Design Complete Submittals.

3.4.1. BIM and CAD Data. The Model shall include the requirements identified in Paragraph 2.2.4. Acceptance according to Paragraph 3.1.4 is required before commencement of construction, as described in Paragraph 3.7.6 of Section 01 33 16.

3.5. Construction Submittals – Over-The-Shoulder Progress Reviews. Periodic quality control meetings or construction progress review meetings shall include quality control reviews on the implementation and use of the Model, including interference management and design change tracking information.

3.6. Final As-Builts BIM and CAD Data Submittal. Submit the final Model, Facility Data, and CAD files reflecting as-built conditions for Government Approval, as specified in Section 01 78 02.00 10, PROJECT CLOSEOUT.

4.0 Section 4 – BIM Model Minimum Requirements and Output

4.1. General Provisions. The deliverable Model shall be developed to include the systems described below as they would be built and the processes of installing them, and to reflect final as-built conditions. The deliverable model at the interim design stage and at the final design stage (“released for construction”) shall be developed to include as many of the systems described below as are necessary and appropriate at that design stage.

4.2. Architectural/Interior Design. The Architectural systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4”=1’0”) scaled drawing. Additional minimum Model requirements include:

4.2.1. Spaces. The Model shall include spaces defining accurate net square footage and net volume, and holding data for the room finish schedule for including room names and numbers. Include Programmatic Information provided by the Government or validated program to verify design space against programmed space, using this information to validate area quantities.

4.2.2. Walls and Curtain Walls. Each wall shall be depicted to the exact height, length, width and ratings (thermal, acoustic, fire) to properly reflect wall types. The Model shall include all walls, both interior and exterior, and the necessary intelligence to produce accurate plans, sections and elevations depicting these design elements.

- 4.2.3. Doors, Windows and Louvers. Doors, windows and louvers shall be depicted to represent their actual size, type and location. Doors and windows shall be modeled with the necessary intelligence to produce accurate window and door schedules.
- 4.2.4. Roof. The Model shall include the roof configuration, drainage system, penetrations, specialties, and the necessary intelligence to produce accurate plans, building sections and generic wall sections where roof design elements are depicted.
- 4.2.5. Floors. The floor slab shall be developed in the structural Model and then referenced by the architectural Model for each floor of the Project building.
- 4.2.6. Ceilings. All heights and other dimensions of ceilings, including soffits, ceiling materials, or other special conditions shall be depicted in the Model with the necessary intelligence to produce accurate plans, building sections and generic wall sections where ceiling design elements are depicted.
- 4.2.7. Vertical Circulation. All continuous vertical components (i.e., non-structural shafts, architectural stairs, handrails and guardrails) shall be accurately depicted and shall include the necessary intelligence to produce accurate plans, elevations and sections in which such design elements are referenced.
- 4.2.8. Architectural Specialties and Woodwork. All architectural specialties (i.e., toilet room accessories, toilet partitions, grab bars, lockers, and display cases) and woodwork (i.e., cabinetry and counters) shall be accurately depicted with the necessary intelligence to produce accurate plans, elevations and sections in which such design elements are referenced.
- 4.2.9. Signage. The Model shall include all signage and the necessary intelligence to produce accurate plans and schedules.
- 4.2.10. Schedules. Provide door, window, hardware sets using BHMA designations, flooring, wall finish, and signage schedules from the Model, indicating the type, materials and finishes used in the design.
- 4.3. Furniture. The furniture systems Model may vary in level of detail for individual elements within a Model, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing, and have necessary intelligence to produce accurate plans. Representation of furniture elements is to be 2D. Contractor may provide a minimal number of 3D representations as examples. Examples of furniture include, but are not limited to, desks, furniture systems, seating, tables, and office storage.
- 4.3.1. Furniture Coordination. Furniture that makes use of electrical, data or other features shall include the necessary intelligence to produce coordinated documents and data.
- 4.4. Equipment. The Model may vary in level of detail for individual elements within a Model. Equipment shall be depicted to meet layout requirements with the necessary intelligence to produce accurate plans and minimum schedules depicting their configuration. Examples of equipment include but are not limited to copiers, printers, refrigerators, ice machines and microwaves.
- 4.4.1. Schedules. Provide furniture and equipment schedules from the model indicating the materials, finishes, mechanical, and electrical requirements.
- 4.5. Structural. The structural systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Additional minimum Model requirements include:
- 4.5.1. Foundations. All necessary foundation and/or footing elements, with necessary intelligence to produce accurate plans and elevations
- 4.5.2. Floor Slabs. Structural floor slabs shall be depicted, including all necessary recesses, curbs, pads, closure pours, and major penetrations accurately depicted.

- 4.5.3. Structural Steel. All steel columns, primary and secondary framing members, and steel bracing for the roof and floor systems (including decks), including all necessary intelligence to produce accurate structural steel framing plans and related building/wall sections.
- 4.5.4. Cast-in-Place Concrete. All walls, columns, and beams, including necessary intelligence to produce accurate plans and building/wall sections depicting cast-in-place concrete elements.
- 4.5.5. Expansion/Contraction Joints. Joints shall be accurately depicted.
- 4.5.6. Stairs. The structural Model shall include all necessary openings and framing members for stair systems, including necessary intelligence to produce accurate plans and building/wall sections depicting stair design elements.
- 4.5.7. Shafts and Pits. The structural Model shall include all necessary shafts, pits, and openings, including necessary intelligence to produce accurate plans and building/wall sections depicting these design elements.
- 4.6. Mechanical. The mechanical systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Small diameter (less than 1-1/2" NPS) field-routed piping is not required in the model. Additional minimum Model requirements include:
- 4.6.1. HVAC. All necessary heating, ventilating, air-conditioning and specialty equipment, including air distribution ducts for supply, return, and ventilation and exhaust ducts, including control system, registers, diffusers, grills and hydronic baseboards with necessary intelligence to produce accurate plans, elevations, building/wall sections and schedules.
- 4.6.1.1. Mechanical Piping. All necessary piping and fixture layouts, and related equipment, including necessary intelligence to produce accurate plans, elevations, building/wall sections, and schedules.
- 4.6.2. Plumbing. All necessary plumbing piping and fixture layouts, floor and area drains, and related equipment, including necessary intelligence to produce accurate plans, elevations, building/wall sections, riser diagrams, and schedules.
- 4.6.3. Equipment Clearances. All HVAC and Plumbing equipment clearances shall be modeled for use in interference management and maintenance access requirements.
- 4.6.4. Elevator Equipment. The Model shall include the necessary equipment and control system, including necessary intelligence to produce accurate plans, sections and elevations depicting these design elements.
- 4.7. Electrical/Telecommunications. The electrical systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Small diameter (less than 1-1/2"Ø) field-routed conduit is not required in the model. Additional minimum Model requirements include:
- 4.7.1. Interior Electrical Power and Lighting. All necessary interior electrical components (i.e., lighting, receptacles, special and general purpose power receptacles, lighting fixtures, panelboards, cable trays and control systems), including necessary intelligence to produce accurate plans, details and schedules. Lighting and power built into furniture/equipment shall be modeled.
- 4.7.2. Special Electrical Systems. All necessary special electrical components (i.e., security, Mass Notification, Public Address, nurse call and other special occupancies, and control systems), including necessary intelligence to produce accurate plans, details and schedules.
- 4.7.3. Grounding Systems. Grounding Systems. All necessary grounding components (i.e., lightning protection systems, static grounding systems, communications grounding systems, bonding), including necessary intelligence to produce accurate plans, details and schedules.

4.7.4. Communications. All existing and new communications service controls and connections, both above ground and underground with necessary intelligence to produce accurate plans, details and schedules. Cable tray routing shall be modeled without detail of cable contents.

4.7.5. Exterior Building Lighting. All necessary exterior lighting with necessary intelligence to produce accurate plans, elevations and schedules. The exterior building lighting Model shall include all necessary lighting, relevant existing and proposed support utility lines and equipment required with necessary intelligence to produce accurate plans, details and schedules.

4.7.6. Equipment Clearances. The model shall incorporate and define all electrical and communications working spaces, clearances, and required access

4.8. Fire Protection. The fire protection system Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Additional minimum Model requirements include:

4.8.1. Fire Protection System. All relevant fire protection components (i.e., branch piping, sprinkler heads, fittings, drains, pumps, tanks, sensors, control panels) with necessary intelligence to produce accurate plans, elevations, building/wall sections, riser diagrams, and schedules. All fire protection piping shall be modeled.

4.8.2. Fire Alarms. Fire alarm/mass notification devices and detection system shall be indicated with necessary intelligence to produce accurate plans depicting them.

4.9. Civil. The civil Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a one inch (1"=100') scaled drawing. Additional minimum Model requirements include:

4.9.1. Terrain (DTM). All relevant site conditions and proposed grading, including necessary intelligence to produce accurate Project site topographical plans and cross sections.

4.9.2. Drainage. All existing and new drainage piping, including upgrades thereto, including necessary intelligence to produce accurate plans and profiles for the Project site.

4.9.3. Storm Water and Sanitary Sewers. All existing and new sewer structures and piping, including upgrades thereto, on the Project site with necessary connections to mains or other distribution points as appropriate, including necessary intelligence to produce accurate plans and profiles for the Project site.

4.9.4. Utilities. All necessary new utilities connections from the Project building(s) to the existing or newly-created utilities, and all existing above ground and underground utility conduits, including necessary intelligence to produce accurate plans and site-sections.

4.9.5. Roads and Parking. All necessary roadways and parking lots or parking structures, including necessary intelligence to produce accurate plans, profiles and cross-sections.

5.0 Section 5 - Ownership and Rights in Data

5.1. Ownership. The Government has ownership of and rights at the date of Closeout Submittal to all CAD files, BIM Model, and Facility Data developed for the Project in accordance with FAR Part 27, clauses incorporated in Section 00 72 00, Contract Clauses and Special Contract Requirement 1.14 GOVERNMENT RE-USE OF DESIGN (Section 00 73 00). The Government may make use of this data following any deliverable.

6.0 Section 6 – Contractor Electives

6.1. Applicable Criteria. If the Contractor elected to include one or more of the following features as an elective in its accepted contract proposal for additional credit during the source selection, as described in the proposal submission requirements and evaluation criteria, the following criteria are requirements, as applicable to those elective feature(s).

6.2. COBIE Compliance. The Model and Facility Data for the Project shall fulfill Construction Operations Building Information Exchange (COBIE) requirements as defined by the Whole Building Design Guide organization, including all requirements for the indexing and submission of Portable Document Format (PDF) and other appropriate file formats that would otherwise be printed and submitted in compliance with Project operations and maintenance handover requirements.

6.3. Project Scheduling using the Model. In the BIM Execution Plan and during the Preliminary BIM Execution Plan Review, provide an overview of the use of BIM in the development and support of the project construction schedule.

6.3.1. Submittal Requirements. During the Submittal stages, the Contractor shall deliver the construction schedule with information derived from the Model.

6.3.1.1. Construction Submittals – Over-The-Shoulder Progress Reviews. Periodic quality control meetings or construction progress review meetings shall include quality control reviews on the implementation and use of the Model for project scheduling.

6.4. Cost Estimating. In the BIM Execution Plan and during the Preliminary BIM Execution Plan Review, provide an overview of the use of BIM in the development and support of cost estimating requirements, or other applications such as cost analysis and estimate validation.

6.4.1. Submittal Requirements. During the Submittal stages, the Contractor shall deliver cost estimating information derived from the Model.

6.4.2. Project completion. At project completion, the Contractor shall provide an MII (Micro Computer Aided Cost Estimating System Generation II) Cost Estimate which follows the USACE Cost Engineering Military Work Breakdown System (WBS), a modified Unifomat, to at least the sub-systems level and uses quantity information supplied directly from BIM output to the maximum extent possible, though other "Gap" quantity information will be included as necessary for a complete and accurate cost estimate.

6.4.2.1. Sub system level extracted quantities from the BIM for use within the estimate shall be provided according to how detailed line items or tasks should be installed/built so that accurate costs can be developed and/or reflected. Therefore, when developing a BIM, the designer shall be cognizant of what tasks need to be separated appropriately at the beginning stages of model development, such as tasks done on the first floor versus the same task on higher floors that will be more labor intensive and therefore need to have a separate quantity and be priced differently. Tasks and their extracted quantities from the BIM shall be broken down by their location (proximity in the structure) as well as the complexity of its installation.

6.4.2.2. At all design stages it shall be understood that BIM output as described in this document will not generate all quantities that are necessary in order to develop a complete and accurate cost estimate of the project based on the design. An example of this would be plumbing that is less than 1.5" diameter and therefore not expected to be modeled due to granularity; this information is commonly referred to as The Gap. Quantities from The Gap and their associated costs shall be included in the final project actual cost estimates as well.

6.5. Other Analyses and Reports. Structural, energy and efficiency, EPACT 2005 & EISA 2007, lighting design, daylighting, electrical power, psychrometric processing, shading, programming, LEED, fire protection, code compliance, Life Cycle Cost, acoustic, plumbing.

7.0 Section 7 – BIM Project Execution Plan Template

7.1. Contractors will utilize the latest version of the USACE BIM PROJECT EXECUTION PLAN (USACE PxP) Template to develop an acceptable Plan. The template can be downloaded from the CAD/BIM Technology Center website.

ATTACHMENT G**DESIGN SUBMITTAL DIRECTORY AND SUBDIRECTORY FILE ARRANGEMENT**

Organize electronic design submittal files in a subdirectory/file structure in accordance with the following table. The Contractor may suggest a slightly different structure, subject to the discretion of the government.

Design Submittal Directory and Subdirectory File Arrangement.

Directory	Sub-Directory	Sub-Directory or Files	Files
Submittal/Package Name	Narratives	PDF file or files with updated design narrative for each applicable design discipline	
	Drawings	PDF (subdirectory)	Single PDF file with all applicable drawing sheets - bookmarked by sheet number and name
		BIM (subdirectory) See Attachment F.	BIM project folder (with files) per the USACE Workspace. Include an Excel drawing index file with each drawing sheet listed by sheet #, name and corresponding dgn file name (Final Design & Design Complete only)
	Design Analysis & Calculations	Individual PDF files containing design analysis and calculations for each discipline applicable to the submittal	
		PDF file with Fire Protection and Life Safety Code Review checklist	
	LEED	PDF file with updated Leed Check List	
		PDF file or files with LEED Templates for each point with applicable documentation included in each file.	
		LEED SUBMITTALS	
	Energy Analysis	PDF with baseline energy consumption analysis	
		PDF with actual building energy consumption analysis	
	Specifications	Single PDF file with table of contents and all applicable specifications sections.	
		Submittal Register (Final Design & Design Complete submittal only)	
	Design Quality Control	PDF file or files with DQC checklist(s) and/or statements	
	Building Rendering(s)	PDF file of rendering for each building type included in contract (Final Design & Design Complete).	

**SECTION 01 45 04.00 10
CONTRACTOR QUALITY CONTROL**

1.0 GENERAL

1.1. REFERENCES

1.2. PAYMENT

2.0 PRODUCTS (NOT APPLICABLE)

3.0 EXECUTION

3.1. GENERAL REQUIREMENTS

3.2. QUALITY CONTROL PLAN

3.3. COORDINATION MEETING

3.4. QUALITY CONTROL ORGANIZATION

3.5. SUBMITTALS AND DELIVERABLES

3.6. CONTROL

3.7. TESTS

3.8. COMPLETION INSPECTION

3.9. DOCUMENTATION

3.10. NOTIFICATION OF NONCOMPLIANCE

1.0 GENERAL

1.1. REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Refer to the latest edition, as of the date of the contract solicitation.

- ASTM INTERNATIONAL (ASTM)
- ASTM D 3740 Minimum Requirements for Agencies
Engaged in the Testing and/or Inspection
of Soil and Rock as Used in Engineering
Design and Construction
- ASTM E 329 Agencies Engaged in the Testing
and/or Inspection of Materials Used in
Construction
- U.S. ARMY CORPS OF ENGINEERS (USACE)
ER 1110-1-12 Quality Management

1.2. PAYMENT

There will be no separate payment for providing and maintaining an effective Quality Control program. Include all costs associated therewith in the applicable unit prices or lump-sum prices contained in the Contract Line Item Schedule.

2.0 PRODUCTS (Not Applicable)

3.0 EXECUTION

3.1. GENERAL REQUIREMENTS

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause titled "Inspection of Construction." The quality control system shall consist of plans, procedures, and organization necessary to produce an end product, which complies with the contract requirements. The system shall cover all design and construction operations, both onsite and offsite, and shall be keyed to the proposed design and construction sequence. The site project superintendent is responsible for the quality of work on the job and is subject to removal by the Contracting Officer for non-compliance with the quality requirements specified in the contract. The site project superintendent in this context shall be the highest level manager responsible for the overall construction activities at the site, including quality and production. The site project superintendent shall maintain a physical presence at the site at all times, except as otherwise acceptable to the Contracting Officer, and shall be responsible for all construction and construction related activities at the site.

3.2. QUALITY CONTROL PLAN

Furnish for Government review, not later than 30 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause titled "Inspection of Construction." The plan shall identify personnel, procedures, control, instructions, tests, records, and forms to be used. The Government will consider an interim plan for the first 30 days of operation. Design and construction may begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. The Government will not permit work outside of the features of work included in an accepted interim plan to begin until acceptance of a CQC Plan or another interim plan containing the additional features of work to be started. Where the applicable Code issued by the International Code Council calls for an inspection by the Building Official, the Contractor shall include the inspections in the Quality Control Plan and shall perform the inspections. The Designer of Record shall develop a program for any special inspections required by the applicable International Codes and the Contractor shall perform these inspections, using qualified inspectors. Include the special inspection plan in the QC Plan.

3.2.1. Content of the CQC Plan

The CQC Plan shall include, as a minimum, the following to cover all design and construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agents subcontractors, designers of record, consultants, architect/engineers (AE), fabricators, suppliers, and purchasing agents:

3.2.1.1. A description of the quality control organization. Include a chart showing lines of authority and an acknowledgment that the CQC staff shall implement the three phase control system for all aspects of the work specified. A CQC System Manager shall report to the project superintendent or someone higher in the contractor's organization.

3.2.1.2. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function. Also include those responsible for performing and documenting the inspections required by the International Codes and the special inspection program developed by the designer of record.

3.2.1.3. A copy of the letter to the CQC System Manager, signed by an authorized official of the firm, which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Furnish copies of these letters.

3.2.1.4. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents subcontractors, designers of record, consultants, architect engineers (AE), offsite fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

3.2.1.5. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. Use only Government approved Laboratory facilities.

3.2.1.6. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

3.2.1.7. Procedures for tracking design and construction deficiencies from identification through acceptable corrective action. These procedures shall establish verification that identified deficiencies have been corrected.

3.2.1.8. Reporting procedures, including proposed reporting formats.

3.2.1.9. A list of the definable features of work. A definable feature of work is a task, which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable feature under a particular section. This list will be agreed upon during the coordination meeting.

3.2.1.10. A list of all inspections required by the International Codes and the special inspection program required by the code and this contract.

3.2.2. Additional Requirements for Design Quality Control (DQC) Plan

The following additional requirements apply to the Design Quality Control (DQC) plan:

3.2.2.1. The Contractor's QCP Plan shall provide and maintain a Design Quality Control (DQC) Plan as an effective quality control program which will assure that all services required by this design-build contract are performed and provided in a manner that meets professional architectural and engineering quality standards. As a minimum, competent, independent reviewers identified in the DQC Plan shall review all documents. Use personnel who were not involved in the design effort to produce the design to perform the independent technical review (ITR). The ITR is intended as a quality control check of the design. Include, at least, but not necessarily limited to, a review of the contract requirements (the accepted contract or task order proposal and amended RFP), the basis of design, design calculations, the design configuration management documentation and check the design documents for

errors, omissions, and for coordination and design integration. The ITR team is not required to examine, compare or comment concerning alternate design solutions but should concentrate on ensuring that the design meets the contract requirements. Correct errors and deficiencies in the design documents prior to submitting them to the Government.

3.2.2.2. Include in the DQC Plan the discipline-specific checklists to be used during the design and quality control of each submittal. Submit these completed checklists at each design phase as part of the project documentation.

3.2.2.3. A Design Quality Control Manager, who has the responsibility of being cognizant of and assuring that all documents on the project have been coordinated, shall implement the DQC Plan. This individual shall be a person who has verifiable engineering or architectural design experience and is a registered professional engineer or architect. Notify the Government, in writing, of the name of the individual, and the name of an alternate person assigned to the position.

3.2.3. Acceptance of Plan

Government acceptance of the Contractor's plan is required prior to the start of design and construction. Acceptance is conditional and will be predicated on satisfactory performance during the design and construction. The Government reserves the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.4. Notification of Changes

After acceptance of the CQC Plan, notify the Government in writing of any proposed change. Proposed changes are subject to Government acceptance.

3.3. COORDINATION MEETING

After the Postaward Conference, before start of design or construction, and prior to acceptance by the Government of the CQC Plan, the Contractor and the Government shall meet and discuss the Contractor's quality control system. Submit the CQC Plan for review a minimum of 7 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations, design activities, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. The Government will prepare minutes of the meeting for signature by both parties. The minutes shall become a part of the contract file. There may be occasions when either party will call for subsequent conferences to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4. QUALITY CONTROL ORGANIZATION

3.4.1. Personnel Requirements

The requirements for the CQC organization are a CQC System Manager, a Design Quality Manager, and sufficient number of additional qualified personnel to ensure contract compliance. The CQC organization shall also include personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly. The Contractor's CQC staff shall maintain a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure contract compliance. The CQC staff shall be subject to acceptance by the Contracting Officer. Provide adequate office space, filing systems and other resources as necessary to maintain an effective and fully functional CQC organization. Promptly furnish complete records of all letters, material submittals, shop drawing submittals, schedules and all other project documentation to the CQC organization. The CQC organization shall be responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the Contracting Officer.

3.4.2. CQC System Manager

Identify as CQC System Manager an individual within the onsite work organization who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System

Manager shall be a graduate engineer, graduate architect, or a BA/BS graduate of an ACCE accredited construction management college program. The CQC system Manager may alternately be an engineering technician with at least 2 years of college and an ICC certification as a Commercial Building Inspector (Residential Building Inspector certification will be required for Military Family Housing projects). In addition, the CQC system manager shall have a minimum of 5 years construction experience on construction similar to this contract. The CQC System Manager shall be on the site at all times during construction and shall be employed by the prime Contractor. Assign the CQC System Manager no other duties (except may also serve as Safety and Health Officer, if qualified and if allowed by Section 00 73 00). Identify an alternate for the CQC System Manager in the plan to serve in the event of the System Manager's absence. The requirements for the alternate shall be the same as for the designated CQC System Manager but the alternate may have other duties in addition to serving in a temporary capacity as the acting QC manager.

3.4.3. CQC Personnel

3.4.3.1. In addition to CQC personnel specified elsewhere in the contract provide specialized CQC personnel to assist the CQC System Manager in accordance with paragraph titled Area Qualifications.

3.4.3.2. These individuals may be employees of the prime or subcontractor; be responsible to the CQC System Manager; **are not intended to be full time, but must be physically present at the construction site during work on their areas of responsibility**; have the necessary education and/or experience in accordance with the experience matrix listed herein. These individuals may perform other duties but must be allowed sufficient time to perform their assigned quality control duties as described in the Quality Control Plan. **One person may cover more than one area, provided that they are qualified to perform QC activities for the designated areas below and provided that they have adequate time to perform their duties:**

3.4.4. Experience Matrix

3.4.4.1. Area Qualifications

3.4.4.1.1. Civil - Graduate Civil Engineer or (BA/BS) graduate in construction management with 4 years experience in the type of work being performed on this project or engineering technician with 5 yrs related experience.

3.4.4.1.2. Mechanical - Graduate Mechanical Engineer or (BA/BS) graduate in construction management with 4 yrs related experience or engineering technician with an ICC certification as a Commercial Mechanical Inspector with 5 yrs related experience.

3.4.4.1.3. Electrical - Graduate Electrical Engineer or (BA/BS) graduate in construction management with 4 yrs related experience or engineering technician with an ICC certification as a Commercial Electrical Inspector with 5 yrs related experience.

3.4.4.1.4. Structural - Graduate Structural Engineer or (BA/BS) graduate in construction management with 4 yrs related experience or person with an ICC certification as a Reinforced Concrete Special Inspector and Structural Steel and Bolting Special Inspector (as applicable to the type of construction involved) with 5 yrs related experience.

3.4.4.1.5. Plumbing - Graduate Mechanical Engineer or (BA/BS) graduate in construction management with 4 yrs related experience, or person with an ICC certification as a Commercial Plumbing Inspector with 5 yrs related experience.

3.4.4.1.6. Concrete, Pavements and Soils Materials Technician (present while performing tests) with 2 yrs experience for the appropriate area

3.4.4.1.7. Testing, Adjusting and Balancing Specialist must be a member (TAB) Personnel of AABC or an experienced technician of the firm certified by the NEBB (present while testing, adjusting, balancing).

3.4.4.1.8. Design Quality Control Manager Registered Architect or Professional Engineer (not required on the construction site)

3.4.4.1.9. Registered Fire Protection Engineer with 4 years related experience or engineering technician with 5 yrs related experience (but see requirements for Fire Protection Engineer of Record to witness final testing in Section 01 10 00, paragraph 5.10, Fire Protection).

3.4.4.1.10. QC personnel assigned to the installation of the telecommunication system or any of its components shall be Building Industry Consulting Services International (BICSI) Registered Cabling Installers, Technician Level. Submit documentation of current BICSI certification. In lieu of BICSI certification, QC personnel shall have a minimum of 5 years experience in the installation of the specified copper and fiber optic cable and components. They shall have factory or factory approved certification from each equipment manufacturer indicating that they are qualified to install and test the provided products. QC personnel shall witness and certify the testing of telecommunications cabling and equipment.

3.4.5. Additional Requirement

In addition to the above experience and/or education requirements the CQC System Manager shall have completed the course entitled "Construction Quality Management for Contractors". This course is periodically offered at Ft. Worth District Office, 819 Taylor Street, Ft. Worth, TX. Inquire of the District or Division sponsoring the course for fees and other expenses involved, if any, for attendance at this course.

3.4.6. Organizational Changes

When it is necessary to make changes to the CQC staff, the Contractor shall revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

3.5. SUBMITTALS AND DELIVERABLES

Make submittals as specified in Section 01 33 00 **SUBMITTAL PROCEDURES**. The CQC organization shall certify that all submittals and deliverables are in compliance with the contract requirements.

3.6. CONTROL

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. The CQC organization shall conduct at least three phases of control for each definable feature of the construction work as follows:

3.6.1. Preparatory Phase

Perform this phase prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase shall include:

3.6.1.1. A review of each paragraph of applicable specifications, reference codes, and standards. Make a copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field at the preparatory inspection. Maintain these copies in the field, available for use by Government personnel until final acceptance of the work.

3.6.1.2. A review of the contract drawings.

3.6.1.3. A check to assure that all materials and/or equipment have been tested, submitted, and approved.

3.6.1.4. Review of provisions that have been made to provide required control inspection and testing.

3.6.1.5. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.

3.6.1.6. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.

3.6.1.7. A review of the appropriate activity hazard analysis to assure safety requirements are met.

3.6.1.8. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.

3.6.1.9. A check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.

3.6.1.10. Discussion of the initial control phase.

3.6.1.11. Notify the Government at least 24 hours in advance of beginning the preparatory control phase. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. Document the results of the preparatory phase actions by separate minutes prepared by the CQC System Manager and attached to the daily CQC report. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2. Initial Phase

Accomplish this phase at the beginning of a definable feature of work. Include the following actions:

3.6.2.1. Check work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.

3.6.2.2. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.

3.6.2.3. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

3.6.2.4. Resolve all differences.

3.6.2.5. Check safety to include compliance with and upgrading of the Accident Prevention plan and activity hazard analysis. Review the activity analysis with each worker.

3.6.2.6. Notify the Government at least 24 hours in advance of beginning the initial phase. The CQC System Manager shall prepare and attach to the daily CQC report separate minutes of this phase. Indicate exact location of initial phase for future reference and comparison with follow-up phases.

3.6.2.7. Repeat the initial phase any time acceptable specified quality standards are not being met.

3.6.3. Follow-up Phase

Perform daily checks to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. The checks shall be made a matter of record in the CQC documentation. Conduct final follow-up checks and correct deficiencies prior to the start of additional features of work which may be affected by the deficient work. Do not build upon nor conceal non-conforming work.

3.6.4. Additional Preparatory and Initial Phases

Conduct additional preparatory and initial phases on the same definable features of work if: the quality of on-going work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision or work crew; if work on a definable feature is resumed after a substantial period of inactivity; or if other problems develop.

3.7. TESTS

3.7.1. Testing Procedure

Perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements and project design documents. Upon request, furnish to the Government

duplicate samples of test specimens for possible testing by the Government. Testing includes operation and/or acceptance tests when specified. The Contractor shall procure the services of a Corps of Engineers approved testing laboratory, or establish an approved testing laboratory at the project site. The Contractor may elect to use a laboratory certified and accredited by the Concrete and cement Reference Laboratory (CCRL) or by AASHTO Materials Reference Laboratory (AMRL) for testing procedures that those organizations certify. The Contractor shall perform the following activities and record and provide the following data:

3.7.1.1. Verify that testing procedures comply with contract requirements and project design documents.

3.7.1.2. Verify that facilities and testing equipment are available and comply with testing standards.

3.7.1.3. Check test instrument calibration data against certified standards.

3.7.1.4. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.

3.7.1.5. Include results of all tests taken, both passing and failing tests, recorded on the CQC report for the date taken. Include specification paragraph reference, location where tests were taken, and the sequential control number identifying the test. If approved by the Contracting Officer, actual test reports may be submitted later with a reference to the test number and date taken. Provide an information copy of tests performed by an offsite or commercial test facility directly to the Contracting Officer. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

3.7.2. Testing Laboratories

3.7.2.1. Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel shall meet criteria detailed in ASTM D 3740 and ASTM E 329.

3.7.2.2. Capability Recheck

If the selected laboratory fails the capability check, the Government will assess the Contractor a charge of \$1,375 to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the contract amount due the Contractor.

3.7.3. Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests, and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.7.4. Furnishing or Transportation of Samples for Government Quality Assurance Testing

The Contractor is responsible for costs incidental to the transportation of samples or materials. Deliver samples of materials for test verification and acceptance testing by the Government to the Corps of Engineers Laboratory, f.o.b., at the following address:

- For delivery by mail:
 - As directed by the Contracting Officer
 - As directed
 - As directed
 - As directed
- For other deliveries:
 - As directed by the Contracting Officer

As directed

As directed

As directed

The area or resident office will coordinate, exact delivery location, and dates for each specific test.

3.8. COMPLETION INSPECTION

3.8.1. Punch-Out Inspection

Near the end of the work, or any increment of the work established by a time stated in the SPECIAL CONTRACT REQUIREMENTS Clause, "Commencement, Prosecution, and Completion of Work", or by the specifications, the CQC Manager shall conduct an inspection of the work. Prepare a punch list of items which do not conform to the approved drawings and specifications and include in the CQC documentation, as required by paragraph DOCUMENTATION. The list of deficiencies shall include the estimated date by which the deficiencies will be corrected. The CQC System Manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished, the Contractor shall notify the Government that the facility is ready for the Government Pre-Final inspection.

3.8.2. Pre-Final Inspection

As soon as practicable after the notification above, the Government will perform the pre-final inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. The Contractor's CQC System Manager shall ensure that all items on this list have been corrected before notifying the Government, so that a Final inspection with the customer can be scheduled. Correct any items noted on the Pre-Final inspection in a timely manner. Accomplish these inspections and any deficiency corrections required by this paragraph within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

3.8.3. Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative shall attend the final acceptance inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups and major commands may also attend. The Government will formally schedule the final acceptance inspection based upon results of the Pre-Final inspection. Provide notice to the Government at least 14 days prior to the final acceptance inspection and include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the contract clause titled "Inspection of Construction".

3.9. DOCUMENTATION

3.9.1. Maintain current records providing factual evidence that required quality control activities and/or tests have been performed. These records shall include the work of subcontractors and suppliers using government-provided software, QCS (see Section 01 45 01.10). The report includes, as a minimum, the following information:

3.9.1.1. Contractor/subcontractor and their area of responsibility.

3.9.1.2. Operating plant/equipment with hours worked, idle, or down for repair.

3.9.1.3. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.

- 3.9.1.4. Test and/or control activities performed with results and references to specifications/drawings requirements. Identify the applicable control phase (Preparatory, Initial, Follow-up). List deficiencies noted, along with corrective action.
- 3.9.1.5. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.
- 3.9.1.6. Submittals and deliverables reviewed, with contract reference, by whom, and action taken.
- 3.9.1.7. Offsite surveillance activities, including actions taken.
- 3.9.1.8. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
- 3.9.1.9. Instructions given/received and conflicts in plans and/or specifications.
- 3.9.1.10. Provide documentation of design quality control activities. For independent design reviews, provide, as a minimum, identity of the ITR team, the ITR review comments, responses and the record of resolution of the comments.
- 3.9.2. Contractor's verification statement.

These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. Furnish the original and one copy of these records in report form to the Government daily within 24 hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, submit one report for every 7 days of no work and on the last day of a no work period. Account for all calendar days throughout the life of the contract. The first report following a day of no work shall be for that day only. The CQC System Manager shall sign and date reports. The report shall include copies of test reports and copies of reports prepared by all subordinate quality control personnel. The Contractor may submit these forms electronically, in lieu of hard copy.

3.10. NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

End of Section 01 45 04.00 10

**SECTION 01 50 02.DSXX
TEMPORARY CONSTRUCTION FACILITIES**

1.0 OVERVIEW

1.1. GENERAL REQUIREMENTS

1.3. BULLETIN BOARD, PROJECT SIGN, AND PROJECT SAFETY SIGN

1.0 OVERVIEW

1.1. GENERAL REQUIREMENTS

1.1.1. This section contains requirements specifically applicable to this task order. The requirements of Base ID/IQ contract Section 01 50 02 apply to this task order, except as otherwise specified herein.

1.3. BULLETIN BOARD, PROJECT SIGN, AND PROJECT SAFETY SIGN

1.3.1. Bulletin Board (As Specified in Base contract)

1.3.2. Project and Safety Signs (Added to Stress standardization of signs, in the event that the Base ID/IQ Section 01 50 02 does not contain this information)

Erect a project sign and a site safety sign with informational details as provided by the Government at the Post award conference, within 15 days prior to any work activity on project site. Update the safety sign data daily, with light colored metallic or non-metallic numerals. Remove the signs from the site upon completion of the project. Engineer Pamphlet EP 310-1-6a contains the standardized layout and construction details for the signs. It can be found through a GOOGLE Search or try <http://www.usace.army.mil/publications/eng-pamphlets/ep310-1-6a/s-16.pdf>.

End of Section 01 50 02.DSXX

Section 01 57 23 STORM WATER POLLUTION PREVENTION PLAN: See Appendix MM for the Storm Water Pollution Prevention Plan.

APPENDIX A

GEOTECHNICAL INFORMATION

FORT BLISS, TEXAS

THAAD BATTERY

GEOTECHNICAL DATA

NOTE: Geotechnical information is from the FY10 THAAD TEMF site that is located in the adjacent to the FY11 THAAD TEMF site. Use the attached information for proposal purposes. After award, the successful contractor shall perform independent investigations and testing in accordance with Appendix KK.

Requirements for the Design-Build Contractor's Foundation and Pavement Design Analysis. The successful proposer shall provide a Foundation and Pavement Design Analysis after contract award. The Foundation and Pavement Design Analysis (Report) shall include a description of the project, including a discussion of any unusual features of the project, a discussion for each structure that requires a foundation system, and a discussion of each pavement type. The foundation, pavement, and material analyses shall be performed by and sealed by a licensed professional engineer.

(1) Recommended Foundation System(s). If more than one foundation system is recommended, separate subparagraphs shall be used to discuss each foundation system. The subparagraphs shall provide a detailed description of the foundation system as well as specific design and construction requirements. The location and type of structure supported by that foundation system should also be discussed. Foundation design parameters and considerations should be provided and shall include as a minimum the following items: allowable bearing pressure(s); bearing elevations for each recommended foundation system; a minimum depth the foundation system shall bear below outside finished grade; foundation spacing requirements; foundation structural design methodology to be used; shrink-swell potential of the active subgrade; the design loads used to size the foundation elements; special considerations for deformation sensitive areas such as restrooms or other areas (i.e., tiled areas); a modulus of subgrade reaction; soil unit weights; at-rest and active earth pressure coefficients; anticipated settlement/differential settlement; and applicability (of each of the aforementioned items) to the design.

It is anticipated that a shallow foundation system consisting of reinforced concrete continuous spread and/or spot spread footings will be suitable for the proposed facilities. Footings should bear at a uniform depth, but at least 2.0 feet below outside finish grade. Footings should be sized for an allowable bearing capacity of 2.0 ksf (net). Due to the potential presence of loose sand in the upper 2.5 feet, it is recommended that footings should bear at least 2.5 feet below existing grade, if permitted by site grading requirements. If, due to site grading requirements, footings must be placed at depths shallower than 2.5 feet below existing grade, or if footings must be placed in fill above existing grade, the existing soils below the footings should be removed (excavated) to a depth of 2.5 feet below existing grade. Nonexpansive fill shall then be placed in controlled lifts not exceeding 8 inches in loose thickness and compacted to at least 95 percent of maximum laboratory density as determined in accordance with ASTM D 1557 between the excavation surface and the base of the footings. The earthwork (fill type and compaction) requirements also apply to footings that must be founded in fill above existing grade. Footings founded within fill above existing grade or at depths shallower than 2.5 feet below existing grade, in compliance with the earthwork requirements specified herein, should be sized for an allowable bearing pressure of 2.0 ksf (net). The load used to size the footings should consist of full dead load plus that portion of the live load that acts more or less continuously, usually 50 percent.

Floor slabs placed on-grade should be isolated from any portion of the building structure using 1/2-inch expansion joints. In doing so, the building structure-floor slab interface should be designed to accept vertical movements so that the operation of the facility will not be affected. This will result in the best performance. Transitional areas, such as door openings, can be doweled to prevent offsets from occurring. In these areas, the slab should bear on the grade beam to create a single joint at one face of the grade beam. Slab edges should extend to the outside face of the grade beam at the exterior door locations. A polyethylene vapor barrier (10-mil minimum) should be placed beneath floor slabs supported on-grade; however, a capillary water barrier is not required.

Nonexpansive soils are satisfactory materials having a plasticity index not less than 4 nor greater than 12 when tested in accordance with ASTM D 4518. On-site soils can be used as nonexpansive fill if they meet the aforementioned material definition. Satisfactory materials include materials classified in ASTM D 2487 as GW, GM, GC, GP, SW, SP, SM, SC, CL, and CH and shall be free of trash, debris, roots or other organic matter, or stones larger than 3 inches in any dimension.

(2) Subgrade Preparation. This section shall include a discussion on all requirements for excavation of existing subgrade materials, removal of existing unsuitable materials, replacement of excavated materials with nonexpansive and satisfactory materials, and minimum thickness of nonexpansive fill beneath

building foundations. Provide compaction requirements in accordance with ASTM D 1557 for the raw subgrade, fill, and backfill materials. Foundation and pavement material definitions shall be presented.

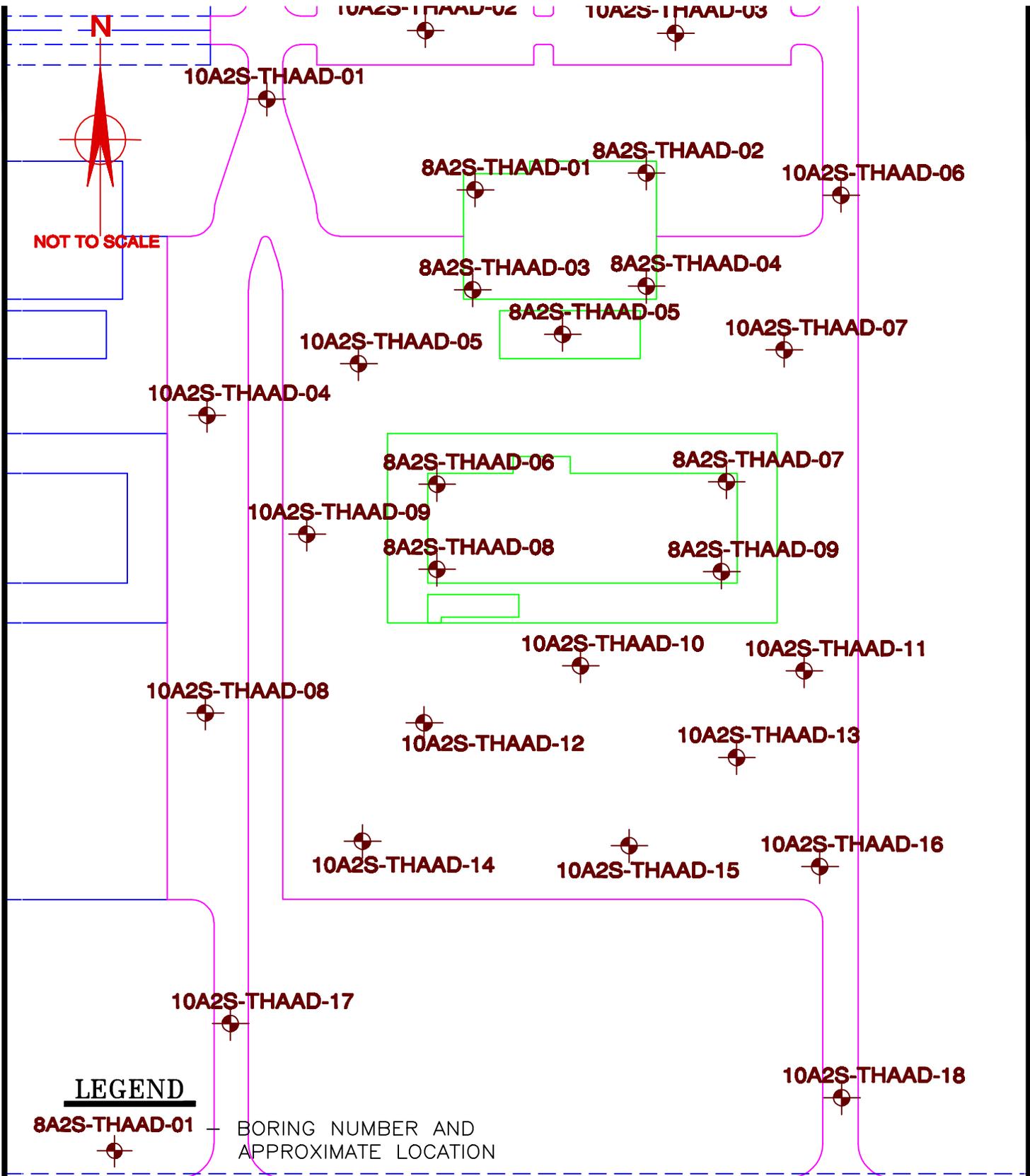
(3) Recommended Pavement Sections. Provide separate subparagraphs for each rigid, flexible (if required), and aggregate-surfaced pavement structure included in the project. Each pavement design shall include as a minimum the following items: traffic types, road classifications and design indexes; subgrade strength values (CBR and modulus of subgrade reaction values for the specified compactive effort); pavement material thicknesses and compaction requirements; and concrete flexural strength for designated time frame. Compaction requirements for pavement material layers shall be in accordance with ASTM D 1557.

(4) Exhibits to be Included in the Design-Build Contractor's Foundation and Pavement Design Analysis. The following exhibits shall be included in the Design-Build contractor's Foundation and Pavement Design Analysis. The Design-Build contractor may use the information provided in this report to satisfy these requirements, or may supplement the information provided herein with additional subsurface drilling and testing, at his option. Required exhibits to be included with the Design-Build contractor's Foundation and Pavement Design Analysis include:

- Site Plan with Boring Locations and Legend;
- Boring Logs;
- Plasticity Chart;
- Standard Penetration Tests versus Depth of Boring (if applicable);
- Moisture Content versus Depth (Chart);
- Moisture Content-Liquid Limit-Plastic Limit versus Depth (Chart);
- Strength Tests Results versus Depth (Chart);
- Tabulation of Laboratory Test Results (to include Boring Number, Sample Number, Depth, Laboratory Classification, Visual Descriptions, Grain Size Analysis (%Gravel, %Sand, %Fines), LL, PL, PI, MC, Unit Weight, and Strength Test Data;
- Consolidation-Expansion Tests/Swell Pressure Tests (if applicable).

APPENDIX A

BORING LOCATIONS & LOGS OF BORINGS



Raba Kistner
 Engineering • Testing • Environmental
 Facilities • Infrastructure

**BORING LOCATION MAP
 TERMINAL HIGH ALTITUDE
 AREA DEFENSE BATTERY
 FORT BLISS, TEXAS**

PROJECT No.:
AEA09-060-00

FIGURE 1
 Thursday, September 18, 2010

DRILLING LOG		DIVISION Southwestern		INSTALLATION Fort Worth District			SHEET 1 OF 1 SHEETS																					
1. PROJECT THAAD Battery				10. SIZE AND TYPE OF BIT Carbide H.S. Auger Bit (7" O.D.)																								
2. LOCATION (Coordinates or Station) Fort Bliss, Texas; N 31.80309; W 106.41377				11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL																								
3. DRILLING AGENCY Raba-Kistner Consultants (SW), Inc.				12. MANUFACTURER'S DESIGNATION OF DRILL CME-75																								
4. HOLE NO. (As shown on drawing title and file number) 8A2S-THAAD-01				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED 10	UNDISTURBED 0																					
5. NAME OF DRILLER Derek Duenez				14. TOTAL NUMBER CORE BOXES N/A																								
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED --- DEG. FROM VERT.				15. ELEVATION GROUND WATER (ft) Dry																								
7. THICKNESS OF OVERBURDEN (ft) N/A				16. DATE HOLE STARTED 6-Nov-09 COMPLETED 6-Nov-09																								
8. DEPTH DRILLED INTO ROCK (ft) N/A (ft)				17. ELEVATION TOP OF HOLE (ft) N/A																								
9. TOTAL DEPTH OF HOLE (ft) 25 (ft)				18. TOTAL CORE RECOVERY FOR BORING N/A %																								
				19. GEOLOGIST Carlos Serrano, E.I.T.																								
ELEVATION (feet-MSL) a	DEPTH (feet) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BLOW COUNT e	% RECOVERY f	SAMPLE INTERVAL g	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) h	COMPOSITE SAMPLE INTERVAL i																				
	3.5		SILTY SAND (SM) slightly moist, loose, reddish-brown, slightly moist - topped with gravel at surface	10		0.0 1.5	SPT= 3-4-6																					
	8.0		CLAYEY SAND (SC) calcareous, medium dense, slightly moist	36		2.5 4.0	SPT = 9-17-19																					
	25.0		POORLY GRADED SAND (SP) medium dense, grayish-brown, slightly moist to dry with trace gravel - dense to very dense at 15 feet	18		5.0 6.5	SPT = 7-8-10																					
				15		7.5 9.0	SPT = 5-7-8																					
				26		10.0 11.5	SPT = 4-11-15																					
				30		12.5 14.0	SPT = 7-13-17																					
				44		15.0 16.5	SPT = 9-17-27																					
				81		17.5 19.0	SPT = 15-35-46																					
				79		20.0 21.5	SPT= 15-36-43																					
				81		23.5 25.0	SPT= 19-37-44																					
Boring Terminated																												
NOTES: 1. Free water was not observed during drilling operations. 2. Backfilled with soil cuttings-cement grout. 3. Boring location coordinates in NAD 83, in decimal degrees. 4. Surface resistivity measurements per ASTM G57: $r=191.5aR$, where r is soil resistivity (ohms-cm), a is spacing (feet) and R is measured resistance (ohms):																												
<table border="0"> <tr> <td>a</td> <td>r</td> </tr> <tr> <td>1</td> <td>15,895</td> </tr> <tr> <td>2</td> <td>14,171</td> </tr> <tr> <td>2.5</td> <td>15,320</td> </tr> <tr> <td>3</td> <td>16,661</td> </tr> <tr> <td>4</td> <td>19,150</td> </tr> <tr> <td>5</td> <td>22,023</td> </tr> <tr> <td>10</td> <td>28,725</td> </tr> <tr> <td>15</td> <td>31,598</td> </tr> <tr> <td>20</td> <td>34,470</td> </tr> </table>				a	r	1	15,895	2	14,171	2.5	15,320	3	16,661	4	19,150	5	22,023	10	28,725	15	31,598	20	34,470					
a	r																											
1	15,895																											
2	14,171																											
2.5	15,320																											
3	16,661																											
4	19,150																											
5	22,023																											
10	28,725																											
15	31,598																											
20	34,470																											

DRILLING LOG		DIVISION Southwestern		INSTALLATION Fort Worth District			SHEET 1 OF 1 SHEETS	
1. PROJECT THAAD Battery				10. SIZE AND TYPE OF BIT Carbide H.S. Auger Bit (7" O.D.)				
2. LOCATION (Coordinates or Station) Fort Bliss, Texas; N 31.80312; W 106.41326				11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL				
3. DRILLING AGENCY Raba-Kistner Consultants (SW), Inc.				12. MANUFACTURER'S DESIGNATION OF DRILL CME-75				
4. HOLE NO. (As shown on drawing title and file number) 8A2S-THAAD-02				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED 10		UNDISTURBED 0
5. NAME OF DRILLER Derek Duenez				14. TOTAL NUMBER CORE BOXES N/A				
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED --- DEG. FROM VERT.				15. ELEVATION GROUND WATER (ft) Dry				
7. THICKNESS OF OVERBURDEN (ft) N/A				16. DATE HOLE STARTED 6-Nov-09 COMPLETED 6-Nov-09				
8. DEPTH DRILLED INTO ROCK (ft) N/A (ft)				17. ELEVATION TOP OF HOLE (ft) N/A				
9. TOTAL DEPTH OF HOLE (ft) 25 (ft)				18. TOTAL CORE RECOVERY FOR BORING N/A %				
				19. GEOLOGIST Carlos Serrano, E.I.T.				
ELEVATION (feet-MSL) a	DEPTH (feet) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BLOW COUNT e	% RECOVERY f	SAMPLE INTERVAL g	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) h	COMPOSITE SAMPLE INTERVAL i
	3.0	[Pattern]	SILTY SAND (SM) medium dense, reddish-brown, moist topped with gravel at surface	15		0.0 1.5	SPT= 5-6-8	
	7.0	[Pattern]	CLAYEY SAND (SC) calcareous, medium dense, tan, slightly moist	14		2.5 4.0	SPT= 8-7-7	
	9.0	[Pattern]	SILTY SAND (SM) medium dense, brown, with trace gravel	14		5.0 6.5	SPT= 5-7-7	
	25.0	[Pattern]	POORLY GRADED SAND (SP) medium dense, grayish-brown, slightly moist to dry, with trace gravel - dense to very dense below 12.5 feet	15		7.5 9.0	SPT= 4-6-9	
				22		10.0 11.5	SPT= 6-10-12	
				43		12.5 14.0	SPT= 8-21-22	
				39		15.0 16.5	SPT= 11-19-20	
				53		17.5 19.0	SPT= 12-25-28	
				54		20.0 21.5	SPT= 15-23-31	
				73		23.5 25.0	SPT= 20-33-40	
Boring Terminated								
NOTES: 1. Free water was not observed during drilling operations. 2. Backfilled with soil cuttings-cement grout. 3. Boring location coordinates in NAD 83, in decimal degrees.								

DRILLING LOG		DIVISION Southwestern		INSTALLATION Fort Worth District			SHEET 1 OF 1 SHEETS	
1. PROJECT THAAD Battery				10. SIZE AND TYPE OF BIT Carbide H.S. Auger Bit (7" O.D.)				
2. LOCATION (Coordinates or Station) Fort Bliss, Texas; N 31.80283; W 106.41375				11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL				
3. DRILLING AGENCY Raba-Kistner Consultants (SW), Inc.				12. MANUFACTURER'S DESIGNATION OF DRILL CME-75				
4. HOLE NO. (As shown on drawing title and file number) 8A2S-THAAD-03				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED 10		UNDISTURBED 0
5. NAME OF DRILLER Derek Duenez				14. TOTAL NUMBER CORE BOXES N/A				
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED --- DEG. FROM VERT.				15. ELEVATION GROUND WATER (ft) Dry				
7. THICKNESS OF OVERBURDEN (ft) N/A				16. DATE HOLE STARTED 3-Nov-09 COMPLETED 3-Nov-09				
8. DEPTH DRILLED INTO ROCK (ft) N/A (ft)				17. ELEVATION TOP OF HOLE (ft) N/A				
9. TOTAL DEPTH OF HOLE (ft) 25 (ft)				18. TOTAL CORE RECOVERY FOR BORING N/A %				
				19. GEOLOGIST Carlos Serrano, E.I.T.				
ELEVATION (feet-MSL) a	DEPTH (feet) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BLOW COUNT e	% RECOVERY f	SAMPLE INTERVAL g	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) h	COMPOSITE SAMPLE INTERVAL i
	2.0		SILTY SAND (SM) medium dense, reddish-brown, moist - topped with gravel at surface	20		0.0 1.5	SPT= 3-9-11	
	8.0		CLAYEY SAND (SC) calcareous, medium dense, slightly moist	18		2.5 4.0	SPT= 9-10-8	
	12.0		SILTY SAND (SM) loose, brown, slightly moist, with trace gravel	25		5.0 6.5	SPT= 8-12-13	
				7		7.5 9.0	SPT= 2-3-4	
				10		10.0 11.5	SPT= 4-5-5	
			POORLY GRADED SAND (SP) dense, light brown to grayish-brown, slightly moist with trace gravel	28		12.5 14.0	SPT= 7-12-16	
				37		15.0 16.5	SPT= 8-16-21	
			- very dense from 17.5 feet	64		17.5 19.0	SPT= 11-27-37	
			- lense clay at 20.5 feet	74		20.0 21.5	SPT= 17-32-42	
	25.0			78/ 10"		23.5 25.0	SPT= 22-38-40/ 4"	
Boring Terminated								
NOTES: 1. Free water was not observed during drilling operations. 2. Backfilled with soil cuttings-cement grout. 3. Boring location coordinates in NAD 83, in decimal degrees.								

DRILLING LOG		DIVISION Southwestern		INSTALLATION Fort Worth District			SHEET 1 OF 1 SHEETS	
1. PROJECT THAAD Battery				10. SIZE AND TYPE OF BIT Carbide H.S. Auger Bit (7" O.D.)				
2. LOCATION (Coordinates or Station) Fort Bliss, Texas; N 31.80287; W 106.41325				11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL				
3. DRILLING AGENCY Raba-Kistner Consultants (SW), Inc.				12. MANUFACTURER'S DESIGNATION OF DRILL CME-75				
4. HOLE NO. (As shown on drawing title and file number) 8A2S-THAAD-04				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED 10	UNDISTURBED 0	
5. NAME OF DRILLER Derek Duenez				14. TOTAL NUMBER CORE BOXES		N/A		
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED --- DEG. FROM VERT.				15. ELEVATION GROUND WATER (ft)		Dry		
7. THICKNESS OF OVERBURDEN (ft) N/A				16. DATE HOLE		STARTED 6-Nov-09	COMPLETED 6-Nov-09	
8. DEPTH DRILLED INTO ROCK (ft) N/A (ft)				17. ELEVATION TOP OF HOLE (ft)		N/A		
9. TOTAL DEPTH OF HOLE (ft) 25 (ft)				18. TOTAL CORE RECOVERY FOR BORING N/A %				
				19. GEOLOGIST Carlos Serrano, E.I.T.				
ELEVATION (feet-MSL) a	DEPTH (feet) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BLOW COUNT e	% RECOVERY f	SAMPLE INTERVAL g	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) h	COMPOSITE SAMPLE INTERVAL i
	2.5		SILTY SAND (SM) medium dense, reddish-brown, slightly moist - topped with gravel at surface	16		0.0 1.5	SPT= 3-8-8	
	7.0		CLAYEY SAND (SC) medium dense, light brown, slightly moist, with calcareous material - calcareous, dense, tan below 5 feet	19		2.5 4.0	SPT= 8-8-11	
	12.0		SILTY SAND (SM) medium dense, brown, slightly moist	47		5.0 6.5	SPT= 15-25-22	
			POORLY GRADED SAND (SP) dense, grayish-brown, dry - very dense with trace gravel below 20 feet	12		7.5 9.0	SPT= 7-6-6	
				16		10.0 11.5	SPT= 5-7-9	
				30		12.5 14.0	SPT= 6-12-18	
				39		15.0 16.5	SPT= 8-18-21	
				45		17.5 19.0	SPT= 10-18-27	
				59		20.0 21.5	SPT= 12-26-33	
				74		23.5 25.0	SPT= 16-30-44	
			Boring Terminated NOTES: 1. Free water was not observed during drilling operations. 2. Backfilled with soil cuttings-cement grout. 3. Boring location coordinates in NAD 83, in decimal degrees.					

DRILLING LOG		DIVISION Southwestern		INSTALLATION Fort Worth District			SHEET 1 OF 1 SHEETS	
1. PROJECT THAAD Battery				10. SIZE AND TYPE OF BIT Carbide H.S. Auger Bit (7" O.D.)				
2. LOCATION (Coordinates or Station) Fort Bliss, Texas; N 31.80278; W 106.41344				11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL				
3. DRILLING AGENCY Raba-Kistner Consultants (SW), Inc.				12. MANUFACTURER'S DESIGNATION OF DRILL CME-75				
4. HOLE NO. (As shown on drawing title and file number) 8A2S-THAAD-05				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED 8		UNDISTURBED 0
5. NAME OF DRILLER Derek Duenez				14. TOTAL NUMBER CORE BOXES N/A				
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED --- DEG. FROM VERT.				15. ELEVATION GROUND WATER (ft) Dry				
7. THICKNESS OF OVERBURDEN (ft) N/A				16. DATE HOLE				
				STARTED 3-Nov-09		COMPLETED 3-Nov-09		
8. DEPTH DRILLED INTO ROCK (ft) N/A (ft)				17. ELEVATION TOP OF HOLE (ft) N/A				
9. TOTAL DEPTH OF HOLE (ft) 20 (ft)				18. TOTAL CORE RECOVERY FOR BORING N/A %				
				19. GEOLOGIST Carlos Serrano, E.I.T.				
ELEVATION (feet-MSL) a	DEPTH (feet) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BLOW COUNT e	% RECOVERY f	SAMPLE INTERVAL g	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) h	COMPOSITE SAMPLE INTERVAL i
	2.5		SILTY SAND (SM) medium dense, reddish-brown, slightly moist - topped with gravel at surface	15		0.0 1.5	SPT= 5-7-8	
	7.0		CLAYEY SAND (SC) medium dense, slightly moist - calcareous tan from 2-1/2 to 5 feet	40		2.5 4.0	SPT= 13-19-21	
	8.0		- loose, light brown, with calcareous material below 5 feet	23		5.0 6.5	SPT= 7-12-11	
			SILTY SAND (SM) loose, light brown, slightly moist, with trace gravel	12		7.5 9.0	SPT= 4-4-8	
			POORLY GRADED SAND (SP) medium dense, grayish-brown, slightly moist - with trace gravel from 8 to 12.5 feet	19		10.0 11.5	SPT= 3-8-11	
				31		12.5 14.0	SPT= 7-14-17	
				31		15.0 16.5	SPT= 9-13-18	
	20.0			68		18.5 20.0	SPT= 15-29-39	
Boring Terminated								
NOTES: 1. Free water was not observed during drilling operations. 2. Backfilled with soil cuttings-cement grout. 3. Boring location coordinates in NAD 83, in decimal degrees.								

DRILLING LOG		DIVISION Southwestern		INSTALLATION Fort Worth District			SHEET 1 OF 1 SHEETS																					
1. PROJECT THAAD Battery				10. SIZE AND TYPE OF BIT Carbide H.S. Auger Bit (7" O.D.)																								
2. LOCATION (Coordinates or Station) Fort Bliss, Texas; N 31.80238; W 106.41391				11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL																								
3. DRILLING AGENCY Raba-Kistner Consultants (SW), Inc.				12. MANUFACTURER'S DESIGNATION OF DRILL CME-75																								
4. HOLE NO. (As shown on drawing title and file number) 8A2S-THAAD-06				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED 10		UNDISTURBED 0																				
5. NAME OF DRILLER Derek Duenez				14. TOTAL NUMBER CORE BOXES		N/A																						
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED --- DEG. FROM VERT.				15. ELEVATION GROUND WATER (ft)		Dry																						
7. THICKNESS OF OVERBURDEN (ft) N/A				16. DATE HOLE		STARTED 3-Nov-09		COMPLETED 3-Nov-09																				
8. DEPTH DRILLED INTO ROCK (ft) N/A (ft)				17. ELEVATION TOP OF HOLE (ft)		N/A																						
9. TOTAL DEPTH OF HOLE (ft) 25 (ft)				18. TOTAL CORE RECOVERY FOR BORING N/A %																								
				19. GEOLOGIST Carlos Serrano, E.I.T.																								
ELEVATION (feet-MSL) a	DEPTH (feet) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BLOW COUNT e	% RECOVERY f	SAMPLE INTERVAL g	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) h	COMPOSITE SAMPLE INTERVAL i																				
	4.5		SILTY SAND (SM) loose, reddish-brown, moist - with trace calcareous material below 3 feet	9		0.0 1.5	SPT= 3-5-4																					
	6.5		CLAYEY SAND (SC) medium dense, light brown, slightly moist, with calcareous material	11		2.5 4.0	SPT= 3-6-5																					
	8.0		SILTY SAND (SM) medium dense, light brown, slightly moist	11		5.0 6.5	SPT= 4-4-7																					
			POORLY GRADED SAND (SP) medium dense, slightly moist, grayish-brown - dense with trace gravel from 12.5 to 17 feet	13		7.5 9.0	SPT= 5-7-6																					
				19		10.0 11.5	SPT= 4-8-11																					
				29		12.5 14.0	SPT= 4-12-17																					
				35		15.0 16.5	SPT= 6-17-18																					
				48		17.5 19.0	SPT= 12-21-27																					
				67		20.0 21.5	SPT= 13-23-44																					
	25.0			65		23.5 25.0	SPT= 22-33-32																					
Boring Terminated																												
NOTES: 1. Free water was not observed during drilling operations. 2. Backfilled with soil cuttings-cement grout. 3. Boring location coordinates in NAD 83, in decimal degrees. 4. Surface resistivity measurements per ASTM G57: $r=191.5aR$, where r is soil resistivity (ohms-cm), a is spacing (feet) and R is measured resistance (ohms):																												
<table border="0"> <tr> <td>a</td> <td>r</td> </tr> <tr> <td>1</td> <td>13,788</td> </tr> <tr> <td>2</td> <td>13,022</td> </tr> <tr> <td>2.5</td> <td>13,884</td> </tr> <tr> <td>3</td> <td>14,363</td> </tr> <tr> <td>4</td> <td>16,852</td> </tr> <tr> <td>5</td> <td>19,150</td> </tr> <tr> <td>10</td> <td>21,065</td> </tr> <tr> <td>15</td> <td>22,980</td> </tr> <tr> <td>20</td> <td>19,150</td> </tr> </table>				a	r	1	13,788	2	13,022	2.5	13,884	3	14,363	4	16,852	5	19,150	10	21,065	15	22,980	20	19,150					
a	r																											
1	13,788																											
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15	22,980																											
20	19,150																											

DRILLING LOG		DIVISION Southwestern		INSTALLATION Fort Worth District			SHEET 1 OF 1 SHEETS	
1. PROJECT THAAD Battery				10. SIZE AND TYPE OF BIT Carbide H.S. Auger Bit (7" O.D.)				
2. LOCATION (Coordinates or Station) Fort Bliss, Texas; N 31.80241; W 106.41303				11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL				
3. DRILLING AGENCY Raba-Kistner Consultants (SW), Inc.				12. MANUFACTURER'S DESIGNATION OF DRILL CME-75				
4. HOLE NO. (As shown on drawing title and file number) 8A2S-THAAD-07				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED 10	UNDISTURBED 0	
5. NAME OF DRILLER Derek Duenez				14. TOTAL NUMBER CORE BOXES N/A				
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED --- DEG. FROM VERT.				15. ELEVATION GROUND WATER (ft) Dry				
7. THICKNESS OF OVERBURDEN (ft) N/A				16. DATE HOLE				
				STARTED 4-Nov-09		COMPLETED 4-Nov-09		
8. DEPTH DRILLED INTO ROCK (ft) N/A (ft)				17. ELEVATION TOP OF HOLE (ft) N/A				
9. TOTAL DEPTH OF HOLE (ft) 25 (ft)				18. TOTAL CORE RECOVERY FOR BORING N/A %				
				19. GEOLOGIST Carlos Serrano, E.I.T.				
ELEVATION (feet-MSL) a	DEPTH (feet) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BLOW COUNT e	% RECOVERY f	SAMPLE INTERVAL g	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) h	COMPOSITE SAMPLE INTERVAL i
	2.0		SILTY SAND (SM) loose, reddish-brown, - topped with gravel at surface	6		0.0 1.5	SPT= 4-3-3	
	7.0		CLAYEY SAND (SC) loose to medium dense, tan, slightly moist	20		2.5 4.0	SPT= 8-12-8	
				8		5.0 6.5	SPT= 4-4-4	
			POORLY GRADED SAND (SP) light brown to grayish-brown, moist, with trace gravel	15		7.5 9.0	SPT= 4-7-8	
				22		10.0 11.5	SPT= 5-10-12	
				35		12.5 14.0	SPT= 8-16-19	
				38		15.0 16.5	SPT= 9-16-22	
				65		17.5 19.0	SPT= 13-28-37	
				63		20.0 21.5	SPT= 14-29-34	
	25.0			93/ 11.5"		23.5 25.0	SPT= 25-43-50/ 5.5"	
			Boring Terminated NOTES: 1. Free water was not observed during drilling operations. 2. Backfilled with soil cuttings-cement grout. 3. Boring location coordinates in NAD 83, in decimal degrees.					

DRILLING LOG		DIVISION Southwestern		INSTALLATION Fort Worth District			SHEET 1 OF 1 SHEETS	
1. PROJECT THAAD Battery				10. SIZE AND TYPE OF BIT Carbide H.S. Auger Bit (7" O.D.)				
2. LOCATION (Coordinates or Station) Fort Bliss, Texas; N 31.80219; W 106.41393				11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL				
3. DRILLING AGENCY Raba-Kistner Consultants (SW), Inc.				12. MANUFACTURER'S DESIGNATION OF DRILL CME-75				
4. HOLE NO. (As shown on drawing title and file number) 8A2S-THAAD-08				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED 10		UNDISTURBED 0
5. NAME OF DRILLER Derek Duenez				14. TOTAL NUMBER CORE BOXES N/A				
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED --- DEG. FROM VERT.				15. ELEVATION GROUND WATER (ft) Dry				
7. THICKNESS OF OVERBURDEN (ft) N/A				16. DATE HOLE STARTED 2-Nov-09 COMPLETED 2-Nov-09				
8. DEPTH DRILLED INTO ROCK (ft) N/A (ft)				17. ELEVATION TOP OF HOLE (ft) N/A				
9. TOTAL DEPTH OF HOLE (ft) 25 (ft)				18. TOTAL CORE RECOVERY FOR BORING N/A %				
				19. GEOLOGIST Carlos Serrano, E.I.T.				
ELEVATION (feet-MSL) a	DEPTH (feet) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BLOW COUNT e	% RECOVERY f	SAMPLE INTERVAL g	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) h	COMPOSITE SAMPLE INTERVAL i
	3.5		SILTY SAND (SM) medium dense to dense, reddish-brown, moist - topped with gravel at surface	24		0.0 1.5	SPT= 7-14-10	
	8.0		CLAYEY SAND (SC) calcareous, medium dense, tan, slightly moist	45		2.5 4.0	SPT= 17-24-21	
	10.0		SILTY SAND with GRAVEL (SM) medium dense, brown, slightly moist	21		5.0 6.5	SPT= 8-11-10	
	18.0		POORLY GRADED SAND with GRAVEL (SP) dense, grayish-brown, slightly moist to dry	25		7.5 9.0	SPT= 7-12-13	
	23.0		SILTY SAND (SM) very dense, brown, moist	26		10.0 11.5	SPT= 6-11-15	
	25.0		POORLY GRADED SAND (SP) very dense, dry, with trace gravel	58		12.5 14.0	SPT= 15-22-36	
				49		15.0 16.5	SPT= 12-21-28	
				49		17.5 19.0	SPT= 14-20-29	
				Ref/ 6"		20.0 21.5	SPT= Ref (50)/ 6"	
				75/ 9"		23.5 25.0	SPT= 25-39-36/ 3"	
Boring Terminated NOTES: 1. Free water was not observed during drilling operations. 2. Backfilled with soil cuttings-cement grout. 3. Boring location coordinates in NAD 83, in decimal degrees.								

DRILLING LOG		DIVISION Southwestern		INSTALLATION Fort Worth District			SHEET 1 OF 1 SHEETS	
1. PROJECT THAAD Battery				10. SIZE AND TYPE OF BIT Carbide H.S. Auger Bit (7" O.D.)				
2. LOCATION (Coordinates or Station) Fort Bliss, Texas; N 31.80217; W 106.41309				11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL				
3. DRILLING AGENCY Raba-Kistner Consultants (SW), Inc.				12. MANUFACTURER'S DESIGNATION OF DRILL CME-75				
4. HOLE NO. (As shown on drawing title and file number) 8A2S-THAAD-09				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED 10	UNDISTURBED 0	
5. NAME OF DRILLER Derek Duenez				14. TOTAL NUMBER CORE BOXES N/A				
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED --- DEG. FROM VERT.				15. ELEVATION GROUND WATER (ft) Dry				
7. THICKNESS OF OVERBURDEN (ft) N/A				16. DATE HOLE STARTED 4-Nov-09 COMPLETED 4-Nov-09				
8. DEPTH DRILLED INTO ROCK (ft) N/A (ft)				17. ELEVATION TOP OF HOLE (ft) N/A				
9. TOTAL DEPTH OF HOLE (ft) 25 (ft)				18. TOTAL CORE RECOVERY FOR BORING N/A %				
				19. GEOLOGIST Carlos Serrano, E.I.T.				
ELEVATION (feet-MSL) a	DEPTH (feet) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BLOW COUNT e	% RECOVERY f	SAMPLE INTERVAL g	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) h	COMPOSITE SAMPLE INTERVAL i
	3.0		SILTY SAND (SM) medium dense, brown, slightly moist topped with gravel at surface	26		0.0 1.5	SPT= 6-13-13	
	5.5		CLAYEY SAND (SC) calcareous, medium dense, tan, slightly moist	18		2.5 4.0	SPT= 7-8-10	
	9.0		SILTY SAND (SM) medium dense, brown, slightly moist	22		5.0 6.5	SPT= 6-10-12	
			POORLY GRADED SAND with GRAVEL (SP) medium dense, grayish-brown, dry - dense to very dense, with trace gravel below 13 feet	11		7.5 9.0	SPT= 3-5-6	
				16		10.0 11.5	SPT= 3-6-10	
				41		12.5 14.0	SPT= 9-17-24	
				44		15.0 16.5	SPT= 12-18-26	
				56		17.5 19.0	SPT= 16-24-32	
				78		20.0 21.5	SPT= 14-30-48	
	25.0			83/ 10"		23.5 25.0	SPT= 27-42-41/4"	
Boring Terminated NOTES: 1. Free water was not observed during drilling operations. 2. Backfilled with soil cuttings-cement grout. 3. Boring location coordinates in NAD 83, in decimal degrees.								

DRILLING LOG		DIVISION Southwestern		INSTALLATION Fort Worth District			SHEET 1 OF 1 SHEETS	
1. PROJECT THAAD Battery				10. SIZE AND TYPE OF BIT Carbide H.S. Auger Bit (7" O.D.)				
2. LOCATION (Coordinates or Station) Fort Bliss, Texas; N 31.803; W 106.4143				11. DATUM FOR ELEVATION SHOWN (<i>TBM or MSL</i>) MSL				
3. DRILLING AGENCY Raba-Kistner Consultants, Inc.				12. MANUFACTURER'S DESIGNATION OF DRILL CME-75				
4. HOLE NO. (<i>As shown on drawing title and file number</i>) 10A2S-THAAD-01				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED 4		UNDISTURBED 0
5. NAME OF DRILLER Derek Duenez				14. TOTAL NUMBER CORE BOXES		N/A		
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED --- DEG. FROM VERT.				15. ELEVATION GROUND WATER (ft)		Dry		
7. THICKNESS OF OVERBURDEN (ft) N/A				16. DATE HOLE		STARTED 2-Nov-09		COMPLETED 2-Nov-09
8. DEPTH DRILLED INTO ROCK (ft) N/A (ft)				17. ELEVATION TOP OF HOLE (ft)		N/A		
9. TOTAL DEPTH OF HOLE (ft) 10 (ft)				18. TOTAL CORE RECOVERY FOR BORING		N/A %		
				19. GEOLOGIST Carlos Serrano, E.I.T.				
ELEVATION (feet-MSL) a	DEPTH (feet) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BLOW COUNT e	% RECOVERY f	SAMPLE INTERVAL g	REMARKS (<i>Drilling time, water loss, depth weathering, etc., if significant</i>) h	COMPOSITE SAMPLE INTERVAL i
	2.5		SILTY SAND (SM) medium dense, reddish-brown, moist - topped with gravel at surface	20		0.0 1.5	SPT= 4-11-9	
	4.5		CLAYEY SAND (SC) medium dense, light brown, with calcareous material	16		2.5 4.0	SPT= 9-7-9	
	8.5		SILTY SAND (SM) medium dense, light brown, slightly moist, with trace calcareous material	16		5.0 6.5	SPT= 4-7-9	
	10.0		POORLY GRADED SAND (SP) medium dense, brown, slightly moist, with trace gravel	21		8.5 10.0	SPT= 5-9-12	
			Boring Terminated NOTES: 1. Free water was not observed during drilling operations. 2. Backfilled with soil cuttings-cement grout. 3. Boring location coordinates in NAD 83, in decimal degrees.					

DRILLING LOG		DIVISION Southwestern		INSTALLATION Fort Worth District			SHEET 1 OF 1 SHEETS	
1. PROJECT THAAD Battery				10. SIZE AND TYPE OF BIT Carbide H.S. Auger Bit (7" O.D.)				
2. LOCATION (Coordinates or Station) Fort Bliss, Texas; N 31.80341; W 106.41386				11. DATUM FOR ELEVATION SHOWN (<i>TBM or MSL</i>) MSL				
3. DRILLING AGENCY Raba-Kistner Consultants, Inc.				12. MANUFACTURER'S DESIGNATION OF DRILL CME-75				
4. HOLE NO. (<i>As shown on drawing title and file number</i>) 10A2S-THAAD-02				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED 4	UNDISTURBED 0	
5. NAME OF DRILLER Derek Duenez				14. TOTAL NUMBER CORE BOXES N/A				
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED --- DEG. FROM VERT.				15. ELEVATION GROUND WATER (ft) Dry				
7. THICKNESS OF OVERBURDEN (ft) N/A				16. DATE HOLE STARTED 5-Nov-09 COMPLETED 5-Nov-09				
8. DEPTH DRILLED INTO ROCK (ft) N/A (ft)				17. ELEVATION TOP OF HOLE (ft) N/A				
9. TOTAL DEPTH OF HOLE (ft) 10 (ft)				18. TOTAL CORE RECOVERY FOR BORING N/A %				
				19. GEOLOGIST Carlos Serrano, E.I.T.				
ELEVATION (feet-MSL) a	DEPTH (feet) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BLOW COUNT e	% RECOVERY f	SAMPLE INTERVAL g	REMARKS (<i>Drilling time, water loss, depth weathering, etc., if significant</i>) h	COMPOSITE SAMPLE INTERVAL i
			SILTY SAND (SM) medium dense, brown, slightly moist - topped with gravel at surface	18		0.0 1.5	SPT= 4-8-10	
	3.0			36		2.5 4.0	SPT= 11-18-18	
			CLAYEY SAND (SC) calcareous, dense, brown, dry - medium dense below 5 feet	17		5.0 6.5	SPT= 7-8-9	
	9.0			11		8.5 10.0	SPT= 3-5-6	
	10.0		POORLY GRADED SAND (SP) medium dense, brown, slightly moist, with trace gravel					
			Boring Terminated NOTES: 1. Free water was not observed during drilling operations. 2. Backfilled with soil cuttings-cement grout. 3. Boring location coordinates in NAD 83, in decimal degrees.					

DRILLING LOG		DIVISION Southwestern		INSTALLATION Fort Worth District			SHEET 1 OF 1 SHEETS	
1. PROJECT THAAD Battery				10. SIZE AND TYPE OF BIT Carbide H.S. Auger Bit (7" O.D.)				
2. LOCATION (Coordinates or Station) Fort Bliss, Texas; N 31.80309; W 106.4136				11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL				
3. DRILLING AGENCY Raba-Kistner Consultants, Inc.				12. MANUFACTURER'S DESIGNATION OF DRILL CME-75				
4. HOLE NO. (As shown on drawing title and file number) 10A2S-THAAD-03				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED 4	UNDISTURBED 0	
5. NAME OF DRILLER Derek Duenez				14. TOTAL NUMBER CORE BOXES N/A				
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED --- DEG. FROM VERT.				15. ELEVATION GROUND WATER (ft) Dry				
7. THICKNESS OF OVERBURDEN (ft) N/A				16. DATE HOLE STARTED COMPLETED 5-Nov-09 5-Nov-09				
8. DEPTH DRILLED INTO ROCK (ft) N/A (ft)				17. ELEVATION TOP OF HOLE (ft) N/A				
9. TOTAL DEPTH OF HOLE (ft) 10 (ft)				18. TOTAL CORE RECOVERY FOR BORING N/A %				
				19. GEOLOGIST Carlos Serrano, E.I.T.				
ELEVATION (feet-MSL) a	DEPTH (feet) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BLOW COUNT e	% RECOVERY f	SAMPLE INTERVAL g	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) h	COMPOSITE SAMPLE INTERVAL i
	2.5		SILTY SAND (SM) medium dense, reddish-brown, moist	15		0.0 1.5	SPT= 2-6-9	
	5.5		CLAYEY SAND (SC) calcareous, dense, reddish-brown, dry	31		2.5 4.0	SPT= 15-19-12	
	9.0		SILTY SAND (SM) medium dense, light brown, slightly moist, with calcareous material	15		5.0 6.5	SPT= 4-7-8	
	10.0		POORLY GRADED SAND (SP) medium dense, brown, slightly moist, with trace gravel	17		8.5 10.0	SPT= 7-7-10	
			Boring Terminated NOTES: 1. Free water was not observed during drilling operations. 2. Backfilled with soil cuttings-cement grout. 3. Boring location coordinates in NAD 83, in decimal degrees.					

DRILLING LOG		DIVISION Southwestern		INSTALLATION Fort Worth District			SHEET 1 OF 1 SHEETS	
1. PROJECT THAAD Battery				10. SIZE AND TYPE OF BIT Carbide H.S. Auger Bit (7" O.D.)				
2. LOCATION (Coordinates or Station) Fort Bliss, Texas; N 31.80269; W 106.41434				11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL				
3. DRILLING AGENCY Raba-Kistner Consultants, Inc.				12. MANUFACTURER'S DESIGNATION OF DRILL CME-75				
4. HOLE NO. (As shown on drawing title and file number) 10A2S-THAAD-04				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED 4		UNDISTURBED 0
5. NAME OF DRILLER Derek Duenez				14. TOTAL NUMBER CORE BOXES N/A				
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED --- DEG. FROM VERT.				15. ELEVATION GROUND WATER (ft) Dry				
7. THICKNESS OF OVERBURDEN (ft) N/A				16. DATE HOLE				
				STARTED 2-Nov-09		COMPLETED 2-Nov-09		
8. DEPTH DRILLED INTO ROCK (ft) N/A (ft)				17. ELEVATION TOP OF HOLE (ft) N/A				
9. TOTAL DEPTH OF HOLE (ft) 10 (ft)				18. TOTAL CORE RECOVERY FOR BORING N/A %				
				19. GEOLOGIST Carlos Serrano, E.I.T.				
ELEVATION (feet-MSL) a	DEPTH (feet) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BLOW COUNT e	% RECOVERY f	SAMPLE INTERVAL g	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) h	COMPOSITE SAMPLE INTERVAL i
	2.0		SILTY SAND (SM) medium dense, reddish-brown, moist	21		0.0 1.5	SPT= 8-10-11	
			CLAYEY SAND (SC) dense, light brown, with calcareous material	36		2.5 4.0	SPT= 18-18-18	
			- with trace calcareous material below 5 feet	29		5.0 6.5	SPT= 10-13-16	
	9.0			15		8.5 10.0	SPT= 3-4-11	
	10.0		POORLY GRADED SAND with GRAVEL (SP) medium dense, brown, dry					
			Boring Terminated NOTES: 1. Free water was not observed during drilling operations. 2. Backfilled with soil cuttings-cement grout. 3. Boring location coordinates in NAD 83, in decimal degrees.					

DRILLING LOG		DIVISION Southwestern		INSTALLATION Fort Worth District			SHEET 1 OF 1 SHEETS	
1. PROJECT THAAD Battery				10. SIZE AND TYPE OF BIT Carbide H.S. Auger Bit (7" O.D.)				
2. LOCATION (Coordinates or Station) Fort Bliss, Texas; N 31.80268; W 106.41393				11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL				
3. DRILLING AGENCY Raba-Kistner Consultants, Inc.				12. MANUFACTURER'S DESIGNATION OF DRILL CME-75				
4. HOLE NO. (As shown on drawing title and file number) 10A2S-THAAD-05				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED 4	UNDISTURBED 0	
5. NAME OF DRILLER Derek Duenez				14. TOTAL NUMBER CORE BOXES		N/A		
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED --- DEG. FROM VERT.				15. ELEVATION GROUND WATER (ft)		Dry		
7. THICKNESS OF OVERBURDEN (ft) N/A				16. DATE HOLE		STARTED 2-Nov-09	COMPLETED 2-Nov-09	
8. DEPTH DRILLED INTO ROCK (ft) N/A (ft)				17. ELEVATION TOP OF HOLE (ft)		N/A		
9. TOTAL DEPTH OF HOLE (ft) 10 (ft)				18. TOTAL CORE RECOVERY FOR BORING N/A %				
				19. GEOLOGIST Carlos Serrano, E.I.T.				
ELEVATION (feet-MSL) a	DEPTH (feet) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BLOW COUNT e	% RECOVERY f	SAMPLE INTERVAL g	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) h	COMPOSITE SAMPLE INTERVAL i
	3.5		SILTY SAND (SM) medium dense, reddish-brown, slightly moist - topped with gravel at surface	13		0.0 1.5	SPT= 4-7-6	
			CLAYEY SAND (SC) medium dense, slightly moist - calcareous, tan from 3.5 to 5 feet - light brown, with calcareous material below 5 feet	12		2.5 4.0	SPT= 8-7-5	
	7.5			20		5.0 6.5	SPT= 4-7-13	
			POORLY GRADED SAND (SP) grayish-brown, dry, with trace gravel	Grab Sample		8.5 10.0		
	10.0							
			Boring Terminated NOTES: 1. Free water was not observed during drilling operations. 2. Backfilled with soil cuttings-cement grout. 3. Boring location coordinates in NAD 83, in decimal degrees.					

DRILLING LOG		DIVISION Southwestern		INSTALLATION Fort Worth District			SHEET 1 OF 1 SHEETS	
1. PROJECT THAAD Battery				10. SIZE AND TYPE OF BIT Carbide H.S. Auger Bit (7" O.D.)				
2. LOCATION (Coordinates or Station) Fort Bliss, Texas; N 31.80315; W 106.4129				11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL				
3. DRILLING AGENCY Raba-Kistner Consultants, Inc.				12. MANUFACTURER'S DESIGNATION OF DRILL CME-75				
4. HOLE NO. (As shown on drawing title and file number) 10A2S-THAAD-06				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED 4	UNDISTURBED 0	
5. NAME OF DRILLER Derek Duenez				14. TOTAL NUMBER CORE BOXES N/A				
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED --- DEG. FROM VERT.				15. ELEVATION GROUND WATER (ft) Dry				
7. THICKNESS OF OVERBURDEN (ft) N/A				16. DATE HOLE				
				STARTED 4-Nov-09		COMPLETED 4-Nov-09		
8. DEPTH DRILLED INTO ROCK (ft) N/A (ft)				17. ELEVATION TOP OF HOLE (ft) N/A				
9. TOTAL DEPTH OF HOLE (ft) 10 (ft)				18. TOTAL CORE RECOVERY FOR BORING N/A %				
				19. GEOLOGIST Carlos Serrano, E.I.T.				
ELEVATION (feet-MSL) a	DEPTH (feet) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BLOW COUNT e	% RECOVERY f	SAMPLE INTERVAL g	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) h	COMPOSITE SAMPLE INTERVAL i
			SILTY SAND (SM) loose, reddish-brown - topped with gravel at surface	10		0.0 1.5	SPT= 4-6-4	
	3.5		CLAYEY SAND (SC) slightly moist - calcareous, loose, tan from 3.5 to 5 feet - loose, brown, with calcareous material below 5 feet	10		2.5 4.0	SPT= 8-7-3	
	8.5		POORLY GRADED SAND (SP) medium dense, grayish brown, moist, with trace gravel	7		5.0 6.5	SPT= 2-3-4	
	10.0		POORLY GRADED SAND (SP) medium dense, grayish brown, moist, with trace gravel	12		8.5 10.0	SPT= 4-5-7	
			Boring Terminated NOTES: 1. Free water was not observed during drilling operations. 2. Backfilled with soil cuttings-cement grout. 3. Boring location coordinates in NAD 83, in decimal degrees.					

DRILLING LOG		DIVISION Southwestern		INSTALLATION Fort Worth District			SHEET 1 OF 1 SHEETS	
1. PROJECT THAAD Battery				10. SIZE AND TYPE OF BIT Carbide H.S. Auger Bit (7" O.D.)				
2. LOCATION (Coordinates or Station) Fort Bliss, Texas; N 31.80265; W 106.41297				11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL				
3. DRILLING AGENCY Raba-Kistner Consultants, Inc.				12. MANUFACTURER'S DESIGNATION OF DRILL CME-75				
4. HOLE NO. (As shown on drawing title and file number) 10A2S-THAAD-07				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED 4	UNDISTURBED 0	
5. NAME OF DRILLER Derek Duenez				14. TOTAL NUMBER CORE BOXES N/A				
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED --- DEG. FROM VERT.				15. ELEVATION GROUND WATER (ft) Dry				
7. THICKNESS OF OVERBURDEN (ft) N/A				16. DATE HOLE				
				STARTED 3-Nov-09		COMPLETED 3-Nov-09		
8. DEPTH DRILLED INTO ROCK (ft) N/A (ft)				17. ELEVATION TOP OF HOLE (ft) N/A				
9. TOTAL DEPTH OF HOLE (ft) 10 (ft)				18. TOTAL CORE RECOVERY FOR BORING N/A %				
				19. GEOLOGIST Carlos Serrano, E.I.T.				
ELEVATION (feet-MSL) a	DEPTH (feet) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BLOW COUNT e	% RECOVERY f	SAMPLE INTERVAL g	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) h	COMPOSITE SAMPLE INTERVAL i
	2.0		SILTY SAND (SM) medium dense, reddish-brown, moist - topped with gravel at surface	15		0.0 1.5	SPT= 3-8-7	
	7.0		CLAYEY SAND (SC) calcareous, very dense, tan, dry	51		2.5 4.0	SPT= 22-28-23	
	10.0		SILTY SAND (SM) medium dense, brown, with trace gravel	18		5.0 6.5	SPT= 7-8-10	
				15		8.5 10.0	SPT= 5-6-9	
			Boring Terminated NOTES: 1. Free water was not observed during drilling operations. 2. Backfilled with soil cuttings-cement grout. 3. Boring location coordinates in NAD 83, in decimal degrees.					

DRILLING LOG		DIVISION Southwestern		INSTALLATION Fort Worth District			SHEET 1 OF 1 SHEETS	
1. PROJECT THAAD Battery				10. SIZE AND TYPE OF BIT Carbide H.S. Auger Bit (7" O.D.)				
2. LOCATION (Coordinates or Station) Fort Bliss, Texas; N 31.80198; W 106.41436				11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL				
3. DRILLING AGENCY Raba-Kistner Consultants, Inc.				12. MANUFACTURER'S DESIGNATION OF DRILL CME-75				
4. HOLE NO. (As shown on drawing title and file number) 10A2S-THAAD-08				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED 4	UNDISTURBED 0	
5. NAME OF DRILLER Derek Duenez				14. TOTAL NUMBER CORE BOXES N/A				
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED --- DEG. FROM VERT.				15. ELEVATION GROUND WATER (ft) Dry				
7. THICKNESS OF OVERBURDEN (ft) N/A				16. DATE HOLE STARTED 2-Nov-09 COMPLETED 2-Nov-09				
8. DEPTH DRILLED INTO ROCK (ft) N/A (ft)				17. ELEVATION TOP OF HOLE (ft) N/A				
9. TOTAL DEPTH OF HOLE (ft) 10 (ft)				18. TOTAL CORE RECOVERY FOR BORING N/A %				
				19. GEOLOGIST Carlos Serrano, E.I.T.				
ELEVATION (feet-MSL) a	DEPTH (feet) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BLOW COUNT e	% RECOVERY f	SAMPLE INTERVAL g	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) h	COMPOSITE SAMPLE INTERVAL i
	2.0		SILTY SAND (SM) medium dense, brown, slightly moist	30		0.0 1.5	SPT= 8-13-17	
	5.0		CLAYEY SAND (SC) medium dense, light brown, with calcareous material	28		2.5 4.0	SPT= 9-14-14	
	9.0		SILTY SAND (SM) medium dense, light brown, with trace calcareous material	11		5.0 6.5	SPT= 6-4-7	
	10.0		POORLY GRADED SAND (SP) medium dense, graysih-brown, dry, with trace gravel	16		8.5 10.0	SPT= 3-6-10	
			Boring Terminated NOTES: 1. Free water was not observed during drilling operations. 2. Backfilled with soil cuttings-cement grout. 3. Boring location coordinates in NAD 83, in decimal degrees.					

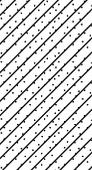
DRILLING LOG		DIVISION Southwestern		INSTALLATION Fort Worth District			SHEET 1 OF 1 SHEETS	
1. PROJECT THAAD Battery				10. SIZE AND TYPE OF BIT Carbide H.S. Auger Bit (7" O.D.)				
2. LOCATION (Coordinates or Station) Fort Bliss, Texas; N 31.80206; W 106.41357				11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL				
3. DRILLING AGENCY Raba-Kistner Consultants, Inc.				12. MANUFACTURER'S DESIGNATION OF DRILL CME-75				
4. HOLE NO. (As shown on drawing title and file number) 10A2S-THAAD-10				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED 4	UNDISTURBED 0	
5. NAME OF DRILLER Derek Duenez				14. TOTAL NUMBER CORE BOXES N/A				
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED --- DEG. FROM VERT.				15. ELEVATION GROUND WATER (ft) Dry				
7. THICKNESS OF OVERBURDEN (ft) N/A				16. DATE HOLE				
				STARTED 4-Nov-09		COMPLETED 4-Nov-09		
8. DEPTH DRILLED INTO ROCK (ft) N/A (ft)				17. ELEVATION TOP OF HOLE (ft) N/A				
9. TOTAL DEPTH OF HOLE (ft) 10 (ft)				18. TOTAL CORE RECOVERY FOR BORING N/A %				
				19. GEOLOGIST Carlos Serrano, E.I.T.				
ELEVATION (feet-MSL) a	DEPTH (feet) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BLOW COUNT e	% RECOVERY f	SAMPLE INTERVAL g	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) h	COMPOSITE SAMPLE INTERVAL i
	2.5		SILTY SAND (SM) medium dense, reddish-brown, moist	21		0.0 1.5	SPT= 4-9-12	
	8.0		CLAYEY SAND (SC) medium dense, slightly moist - calcareous, tan, from 2.5 to 5 feet - light brown, with calcareous material below 5 feet	29 20		2.5 4.0 5.0 6.5	SPT= 9-14-15 SPT= 6-9-11	
	10.0		SILTY SAND (SM) medium dense, light brown, slightly moist, with trace calcareous material and gravel	17		8.5 10.0	SPT= 8-9-8	
			Boring Terminated NOTES: 1. Free water was not observed during drilling operations. 2. Backfilled with soil cuttings-cement grout. 3. Boring location coordinates in NAD 83, in decimal degrees.					

DRILLING LOG		DIVISION Southwestern		INSTALLATION Fort Worth District			SHEET 1 OF 1 SHEETS	
1. PROJECT THAAD Battery				10. SIZE AND TYPE OF BIT Carbide H.S. Auger Bit (7" O.D.)				
2. LOCATION (Coordinates or Station) Fort Bliss, Texas; N 31.80202; W 106.41293				11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL				
3. DRILLING AGENCY Raba-Kistner Consultants, Inc.				12. MANUFACTURER'S DESIGNATION OF DRILL CME-75				
4. HOLE NO. (As shown on drawing title and file number) 10A2S-THAAD-11				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED 4	UNDISTURBED 0	
5. NAME OF DRILLER Derek Duenez				14. TOTAL NUMBER CORE BOXES N/A				
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED --- DEG. FROM VERT.				15. ELEVATION GROUND WATER (ft) Dry				
7. THICKNESS OF OVERBURDEN (ft) N/A				16. DATE HOLE		STARTED 4-Nov-09	COMPLETED 4-Nov-09	
8. DEPTH DRILLED INTO ROCK (ft) N/A (ft)				17. ELEVATION TOP OF HOLE (ft) N/A				
9. TOTAL DEPTH OF HOLE (ft) 10 (ft)				18. TOTAL CORE RECOVERY FOR BORING N/A %				
				19. GEOLOGIST Carlos Serrano, E.I.T.				
ELEVATION (feet-MSL) a	DEPTH (feet) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BLOW COUNT e	% RECOVERY f	SAMPLE INTERVAL g	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) h	COMPOSITE SAMPLE INTERVAL i
			SILTY SAND (SM) medium dense, brown, moist - topped with gravel at surface	19		0.0 1.5	SPT= 7-11-8	
	3.5		CLAYEY SAND (SC) medium dense - calcareous, tan, dry from 3.5 to 5 feet - light brown, with calcareous material below 5 feet	35		2.5 4.0	SPT= 16-21-14	
	9.0		SILTY SAND (SM) medium dense, brown, slightly moist, with trace gravel	20		5.0 6.5	SPT= 9-10-10	
	10.0		SILTY SAND (SM) medium dense, brown, slightly moist, with trace gravel	13		8.5 10.0	SPT= 5-5-8	
			Boring Terminated NOTES: 1. Free water was not observed during drilling operations. 2. Backfilled with soil cuttings-cement grout. 3. Boring location coordinates in NAD 83, in decimal degrees.					

DRILLING LOG		DIVISION Southwestern		INSTALLATION Fort Worth District			SHEET 1 OF 1 SHEETS	
1. PROJECT THAAD Battery				10. SIZE AND TYPE OF BIT Carbide H.S. Auger Bit (7" O.D.)				
2. LOCATION (Coordinates or Station) Fort Bliss, Texas; N 31.80194; W 106.41395				11. DATUM FOR ELEVATION SHOWN (<i>TBM or MSL</i>) MSL				
3. DRILLING AGENCY Raba-Kistner Consultants, Inc.				12. MANUFACTURER'S DESIGNATION OF DRILL CME-75				
4. HOLE NO. (<i>As shown on drawing title and file number</i>) 10A2S-THAAD-12				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED 4		UNDISTURBED 0
5. NAME OF DRILLER Derek Duenez				14. TOTAL NUMBER CORE BOXES N/A				
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED --- DEG. FROM VERT.				15. ELEVATION GROUND WATER (ft) Dry				
7. THICKNESS OF OVERBURDEN (ft) N/A				16. DATE HOLE STARTED 2-Nov-09 COMPLETED 2-Nov-09				
8. DEPTH DRILLED INTO ROCK (ft) N/A (ft)				17. ELEVATION TOP OF HOLE (ft) N/A				
9. TOTAL DEPTH OF HOLE (ft) 10 (ft)				18. TOTAL CORE RECOVERY FOR BORING N/A %				
				19. GEOLOGIST Carlos Serrano, E.I.T.				
ELEVATION (feet-MSL) a	DEPTH (feet) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BLOW COUNT e	% RECOVERY f	SAMPLE INTERVAL g	REMARKS (<i>Drilling time, water loss, depth weathering, etc., if significant</i>) h	COMPOSITE SAMPLE INTERVAL i
			SILTY SAND (SM) medium dense, brown, moist - topped with gravel at surface	22		0.0 1.5	SPT= 8-11-11	
	3.0		CLAYEY SAND (SC) - calcareous, very dense, dry from 3 to 5.5 feet - medium dense, slightly moist, with	58		2.5 4.0	SPT= 21-36-22	
	9.0		POORLY GRADED SAND (SP) grayish-borwn, dry, with trace gravel	13		5.0 6.5	SPT= 7-7-6	
	10.0		Boring Terminated NOTES: 1. Free water was not observed during drilling operations. 2. Backfilled with soil cuttings-cement grout. 3. Boring location coordinates in NAD 83, in decimal degrees.	15		8.5 10.0	SPT= 5-6-9	

DRILLING LOG		DIVISION Southwestern		INSTALLATION Fort Worth District			SHEET 1 OF 1 SHEETS	
1. PROJECT THAAD Battery				10. SIZE AND TYPE OF BIT Carbide H.S. Auger Bit (7" O.D.)				
2. LOCATION (Coordinates or Station) Fort Bliss, Texas; N 31.80176; W 106.41316				11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL				
3. DRILLING AGENCY Raba-Kistner Consultants, Inc.				12. MANUFACTURER'S DESIGNATION OF DRILL CME-75				
4. HOLE NO. (As shown on drawing title and file number) 10A2S-THAAD-13				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED 4		UNDISTURBED 0
5. NAME OF DRILLER Derek Duenez				14. TOTAL NUMBER CORE BOXES N/A				
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED --- DEG. FROM VERT.				15. ELEVATION GROUND WATER (ft) Dry				
7. THICKNESS OF OVERBURDEN (ft) N/A				16. DATE HOLE				
				STARTED 4-Nov-09		COMPLETED 4-Nov-09		
8. DEPTH DRILLED INTO ROCK (ft) N/A (ft)				17. ELEVATION TOP OF HOLE (ft) N/A				
9. TOTAL DEPTH OF HOLE (ft) 10 (ft)				18. TOTAL CORE RECOVERY FOR BORING N/A %				
				19. GEOLOGIST Carlos Serrano, E.I.T.				
ELEVATION (feet-MSL) a	DEPTH (feet) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BLOW COUNT e	% RECOVERY f	SAMPLE INTERVAL g	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) h	COMPOSITE SAMPLE INTERVAL i
	2.0		SILTY SAND (SM) loose, reddish-brown, slightly moist - topped iwth gravel at surface	9		0.0 1.5	SPT= 4-5-4	
	8.0		CLAYEY SAND (SC) calcareous, dense - tan from 2 to 5 feet - medium dense, brown, with calcareous material 5 feet	31		2.5 4.0	SPT= 18-17-14	
	10.0		POORLY GRADED SAND (SP) medium dense, grayish-brown, dry, with trace gravel	14		5.0 6.5	SPT= 7-7-7	
			POORLY GRADED SAND (SP) medium dense, grayish-brown, dry, with trace gravel	18		8.5 10.0	SPT= 5-8-10	
			Boring Terminated NOTES: 1. Free water was not observed during drilling operations. 2. Backfilled with soil cuttings-cement grout. 3. Boring location coordinates in NAD 83, in decimal degrees.					

DRILLING LOG		DIVISION Southwestern		INSTALLATION Fort Worth District			SHEET 1 OF 1 SHEETS	
1. PROJECT THAAD Battery				10. SIZE AND TYPE OF BIT Carbide H.S. Auger Bit (7" O.D.)				
2. LOCATION (Coordinates or Station) Fort Bliss, Texas; N 31.80163; W 106.41404				11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL				
3. DRILLING AGENCY Raba-Kistner Consultants, Inc.				12. MANUFACTURER'S DESIGNATION OF DRILL CME-75				
4. HOLE NO. (As shown on drawing title and file number) 10A2S-THAAD-14				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED 4	UNDISTURBED 0	
5. NAME OF DRILLER Derek Duenez				14. TOTAL NUMBER CORE BOXES N/A				
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED --- DEG. FROM VERT.				15. ELEVATION GROUND WATER (ft) Dry				
7. THICKNESS OF OVERBURDEN (ft) N/A				16. DATE HOLE		STARTED 5-Nov-09	COMPLETED 5-Nov-09	
8. DEPTH DRILLED INTO ROCK (ft) N/A (ft)				17. ELEVATION TOP OF HOLE (ft) N/A				
9. TOTAL DEPTH OF HOLE (ft) 10 (ft)				18. TOTAL CORE RECOVERY FOR BORING N/A %				
				19. GEOLOGIST Carlos Serrano, E.I.T.				
ELEVATION (feet-MSL) a	DEPTH (feet) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BLOW COUNT e	% RECOVERY f	SAMPLE INTERVAL g	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) h	COMPOSITE SAMPLE INTERVAL i
			SILTY SAND (SM) medium dense, brown, slightly moist	26		0.0 1.5	SPT= 7-14-12	
	3.5			50/ 6"		2.5 4.0	SPT= 39-50/6"	
			CLAYEY SAND (SC) calcareous, very dense, brown, slightly moist - medium dense below 5 feet	25		5.0 6.5	SPT= 6-11-14	
	8.5							
			POORLY GRADED SAND (SP) medium dense, grayish-brown, slightly moist, with trace gravel	23		8.5 10.0	SPT= 7-11-12	
	10.0							
			Boring Terminated NOTES: 1. Free water was not observed during drilling operations. 2. Backfilled with soil cuttings-cement grout. 3. Boring location coordinates in NAD 83, in decimal degrees.					

DRILLING LOG		DIVISION Southwestern		INSTALLATION Fort Worth District			SHEET 1 OF 1 SHEETS	
1. PROJECT THAAD Battery				10. SIZE AND TYPE OF BIT Carbide H.S. Auger Bit (7" O.D.)				
2. LOCATION (Coordinates or Station) Fort Bliss, Texas; N 31.80157; W 106.41352				11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL				
3. DRILLING AGENCY Raba-Kistner Consultants, Inc.				12. MANUFACTURER'S DESIGNATION OF DRILL CME-75				
4. HOLE NO. (As shown on drawing title and file number) 10A2S-THAAD-15				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED 4	UNDISTURBED 0	
5. NAME OF DRILLER Derek Duenez				14. TOTAL NUMBER CORE BOXES N/A				
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED --- DEG. FROM VERT.				15. ELEVATION GROUND WATER (ft) Dry				
7. THICKNESS OF OVERBURDEN (ft) N/A				16. DATE HOLE STARTED 5-Nov-09 COMPLETED 5-Nov-09				
8. DEPTH DRILLED INTO ROCK (ft) N/A (ft)				17. ELEVATION TOP OF HOLE (ft) N/A				
9. TOTAL DEPTH OF HOLE (ft) 10 (ft)				18. TOTAL CORE RECOVERY FOR BORING N/A %				
				19. GEOLOGIST Carlos Serrano, E.I.T.				
ELEVATION (feet-MSL) a	DEPTH (feet) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BLOW COUNT e	% RECOVERY f	SAMPLE INTERVAL g	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) h	COMPOSITE SAMPLE INTERVAL i
	0.2		ASPHALT (approximately 2 inches)					
	0.8		BASE Course (approximately 7 inches)					
			SILTY SAND (SM) medium dense, reddish-brown, moist	15		1.0 2.5	SPT= 4-9-6	
	3.0		CLAYEY SAND (SC) loose, brown, moist, with trace calcareous material	7		2.5 4.0	SPT= 3-3-4	
			- medium dense, below 5 feet	13		5.0 6.5	SPT= 3-6-7	
	10.0		- with calcareous material below 3.5 feet	16		8.5 10.0	SPT= 4-7-9	
			Boring Terminated NOTES: 1. Free water was not observed during drilling operations. 2. Backfilled with soil cuttings-cement grout. 3. Boring location coordinates in NAD 83, in decimal degrees.					

DRILLING LOG		DIVISION Southwestern		INSTALLATION Fort Worth District			SHEET 1 OF 1 SHEETS	
1. PROJECT THAAD Battery				10. SIZE AND TYPE OF BIT Carbide H.S. Auger Bit (7" O.D.)				
2. LOCATION (Coordinates or Station) Fort Bliss, Texas; N 31.80155; W 106.4129				11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL				
3. DRILLING AGENCY Raba-Kistner Consultants, Inc.				12. MANUFACTURER'S DESIGNATION OF DRILL CME-75				
4. HOLE NO. (As shown on drawing title and file number) 10A2S-THAAD-16				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED 4	UNDISTURBED 0	
5. NAME OF DRILLER Derek Duenez				14. TOTAL NUMBER CORE BOXES N/A				
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED --- DEG. FROM VERT.				15. ELEVATION GROUND WATER (ft) Dry				
7. THICKNESS OF OVERBURDEN (ft) N/A				16. DATE HOLE				
8. DEPTH DRILLED INTO ROCK (ft) N/A (ft)				STARTED 6-Nov-09		COMPLETED 6-Nov-09		
9. TOTAL DEPTH OF HOLE (ft) 10 (ft)				17. ELEVATION TOP OF HOLE (ft) N/A				
				18. TOTAL CORE RECOVERY FOR BORING N/A %				
				19. GEOLOGIST Carlos Serrano, E.I.T.				
ELEVATION (feet-MSL) a	DEPTH (feet) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BLOW COUNT e	% RECOVERY f	SAMPLE INTERVAL g	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) h	COMPOSITE SAMPLE INTERVAL i
	0.1		ASPHALT (approximately 1.5 inches)					
	0.8		BASE Course (approximately 8 inches)					
			FILL: SILTY SAND (SM) loose, reddish-brown, moist	10		1.0 2.5	SPT= 3-4-6	
				7		2.5 4.0	SPT= 4-3-4	
	4.0		SILTY SAND (SM) reddish-brown, moist					
	5.0		CLAYEY SAND (SC) calcareous, medium dense, tan, slightly moist	13		5.0 6.5	SPT= 9-7-6	
	8.5							
	10.0		POORLY GRADED SAND (SP) medium dense, brown, slightly moist, with trace gravel	18		8.5 10.0	SPT= 5-7-11	
			Boring Terminated NOTES: 1. Free water was not observed during drilling operations. 2. Backfilled with soil cuttings-cement grout. 3. Boring location coordinates in NAD 83, in decimal degrees.					

DRILLING LOG		DIVISION Southwestern		INSTALLATION Fort Worth District			SHEET 1 OF 1 SHEETS	
1. PROJECT THAAD Battery				10. SIZE AND TYPE OF BIT Carbide H.S. Auger Bit (7" O.D.)				
2. LOCATION (Coordinates or Station) Fort Bliss, Texas; N 31.80117; W 106.41444				11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL				
3. DRILLING AGENCY Raba-Kistner Consultants, Inc.				12. MANUFACTURER'S DESIGNATION OF DRILL CME-75				
4. HOLE NO. (As shown on drawing title and file number) 10A2S-THAAD-17				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED 4		UNDISTURBED 0
5. NAME OF DRILLER Derek Duenez				14. TOTAL NUMBER CORE BOXES N/A				
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED --- DEG. FROM VERT.				15. ELEVATION GROUND WATER (ft) Dry				
7. THICKNESS OF OVERBURDEN (ft) N/A				16. DATE HOLE STARTED 5-Nov-09 COMPLETED 5-Nov-09				
8. DEPTH DRILLED INTO ROCK (ft) N/A (ft)				17. ELEVATION TOP OF HOLE (ft) N/A				
9. TOTAL DEPTH OF HOLE (ft) 10 (ft)				18. TOTAL CORE RECOVERY FOR BORING N/A %				
				19. GEOLOGIST Carlos Serrano, E.I.T.				
ELEVATION (feet-MSL) a	DEPTH (feet) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BLOW COUNT e	% RECOVERY f	SAMPLE INTERVAL g	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) h	COMPOSITE SAMPLE INTERVAL i
	0.2		ASPHALT (approximately 2 inches)					
	1.0		BASE Course (approximately 8 inches)					
	2.0		FILL: SILTY SAND (SM) loose, reddish-brown, very moist	10		1.0 2.5	SPT= 3-3-7	
	3.0		SILTY SAND (SM) medium dense, reddish-brown, moist	13		2.5 4.0	SPT= 6-6-7	
			CLAYEY SAND (SC) - calcareous, medium dense, tan, slightly moist from 3 to 5 feet					
			- loose, light brown, slightly moist, with calcareous material below 5 feet	10		5.0 6.5	SPT= 5-5-5	
	9.0		POORLY GRADED SAND (SP) medium dense, grayish-brown, slightly moist, with trace gravel	13		8.5 10.0	SPT= 4-5-8	
	10.0		Boring Terminated NOTES: 1. Free water was not observed during drilling operations. 2. Backfilled with soil cuttings-cement grout. 3. Boring location coordinates in NAD 83, in decimal degrees.					

DRILLING LOG		DIVISION Southwestern		INSTALLATION Fort Worth District			SHEET 1 OF 1 SHEETS	
1. PROJECT THAAD Battery				10. SIZE AND TYPE OF BIT Carbide H.S. Auger Bit (7" O.D.)				
2. LOCATION (Coordinates or Station) Fort Bliss, Texas; N 31.80091; W 106.41275				11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL				
3. DRILLING AGENCY Raba-Kistner Consultants, Inc.				12. MANUFACTURER'S DESIGNATION OF DRILL CME-75				
4. HOLE NO. (As shown on drawing title and file number) 10A2S-THAAD-18				13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN		DISTURBED 4	UNDISTURBED 0	
5. NAME OF DRILLER Derek Duenez				14. TOTAL NUMBER CORE BOXES N/A				
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED --- DEG. FROM VERT.				15. ELEVATION GROUND WATER (ft) Dry				
7. THICKNESS OF OVERBURDEN (ft) N/A				16. DATE HOLE STARTED 5-Nov-09 COMPLETED 5-Nov-09				
8. DEPTH DRILLED INTO ROCK (ft) N/A (ft)				17. ELEVATION TOP OF HOLE (ft) N/A				
9. TOTAL DEPTH OF HOLE (ft) 10 (ft)				18. TOTAL CORE RECOVERY FOR BORING N/A %				
				19. GEOLOGIST Carlos Serrano, E.I.T.				
ELEVATION (feet-MSL) a	DEPTH (feet) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	BLOW COUNT e	% RECOVERY f	SAMPLE INTERVAL g	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) h	COMPOSITE SAMPLE INTERVAL i
	0.2		ASPHALT (approximately 2 inches)					
	1.2		BASE Course (approximately 12 inches)					
	3.0		SILTY SAND (SM) medium dense, reddish-brown, very moist	16		1.0 2.5	SPT= 6-8-8	
	5.0		CLAYEY SAND (SC) loose, light brown, moist, with calcareous material	8		2.5 4.0	SPT= 3-4-4	
	10.0		SILTY SAND (SM) loose, reddish-brown, moist	9		5.0 6.5	SPT= 3-4-5	
			Boring Terminated NOTES: 1. Free water was not observed during drilling operations. 2. Backfilled with soil cuttings-cement grout. 3. Boring location coordinates in NAD 83, in decimal degrees.	14		8.5 10.0	SPT= 6-7-7	

APPENDIX B

DYNAMIC CONE PENETROMETER (DCP) TESTING DATA SHEETS

DYNAMIC CONE PENETROMETER DATA SHEET						
Project No.:	PN 72665			Date Tested:	12/2/2009	
Name:	FORT BLISS THAAD BATTERY			Existing HMAC/Flex. Base?	No	
Test Location:	10A2S-THAAD-02			Water Table Depth:	n/a ft	
Drilling Agency:	RABA-KISTNER CONSULTANTS (SW), INC.			Soil Type:	See Boring Log	
(1) Number of Blows	(2) Cumulative Penetration / Reading (mm)	(3) Penetration Between Readings (mm)	(4) Penetration per Blow Count (mm)	(5) Hammer Blow Factor	(6) DCP Index (mm/blow)	(7) CBR (%)
0	60	Datum	-	-	-	-
1	125	65	65	1	65	3
1	170	45	45	1	45	4
1	205	35	35	1	35	5
1	235	30	30	1	30	6
1	260	25	25	1	25	8
1	280	20	20	1	20	10
1	300	20	20	1	20	10
5	370	70	14	1	14	15
5	440	70	14	1	14	15
5	480	40	8	1	8	30
5	510	30	6	1	6	40
10	570	60	6	1	6	40
10	640	70	7	1	7	35
10	720	80	8	1	8	30
5	770	50	10	1	10	20
5	820	50	10	1	10	20
5	855	35	7	1	7	35
5	890	35	7	1	7	35
5	925	35	7	1	7	35
5	950	25	5	1	5	50

- (1) Number of hammer blows between test readings
 (2) Cumulative penetration after each set of hammer blows, scale reading
 (3) Difference in cumulative penetration between readings (actual soil penetration)
 (4) (3) Divided by (1)
 (5) Enter 1 for 8-kg (17.6-lb) hammer; 2 for 4.6-kg (10.1lb) hammer
 (6) (4) X (5)
 (7) From CBR versus DCP correlation table ASTM D6951-03

DYNAMIC CONE PENETROMETER DATA SHEET						
Project No.:	PN 72665			Date Tested:	12/2/2009	
Name:	FORT BLISS THAAD BATTERY			Existing HMAC/Flex. Base?	No	
Test Location:	10A2S-THAAD-05			Water Table Depth:	n/a ft	
Drilling Agency:	RABA-KISTNER CONSULTANTS (SW), INC.			Soil Type:	See Boring Log	
(1) Number of Blows	(2) Cumulative Penetration / Reading (mm)	(3) Penetration Between Readings (mm)	(4) Penetration per Blow Count (mm)	(5) Hammer Blow Factor	(6) DCP Index (mm/blow)	(7) CBR (%)
0	60	Datum	-	-	-	-
1	120	60	60	1	60	3
1	155	35	35	1	35	5
2	220	65	33	1	32	6
2	270	50	25	1	25	8
2	310	40	20	1	20	10
1	340	30	30	1	30	6
1	370	30	30	1	30	6
1	410	40	40	1	40	5
1	445	35	35	1	35	5
2	500	55	28	1	27	7
5	550	50	10	1	10	20
10	585	35	4	1	3	80
10	615	30	3	1	3	80
10	665	50	5	1	5	50
10	710	45	5	1	4	60
10	750	40	4	1	4	60
10	790	40	4	1	4	60
10	830	40	4	1	4	60
10	900	70	7	1	7	35
6	950	50	8	1	8	30

- (1) Number of hammer blows between test readings
(2) Cumulative penetration after each set of hammer blows, scale reading
(3) Difference in cumulative penetration between readings (actual soil penetration)
(4) (3) Divided by (1)
(5) Enter 1 for 8-kg (17.6-lb) hammer; 2 for 4.6-kg (10.1lb) hammer
(6) (4) X (5)
(7) From CBR versus DCP correlation table ASTM D6951-03

DYNAMIC CONE PENETROMETER DATA SHEET						
Project No.:	PN 72665			Date Tested:	12/2/2009	
Name:	FORT BLISS THAAD BATTERY			Existing HMAC/Flex. Base?	No	
Test Location:	10A2S-THAAD-07			Water Table Depth:	n/a ft	
Drilling Agency:	RABA-KISTNER CONSULTANTS (SW), INC.			Soil Type:	See Boring Log	
(1) Number of Blows	(2) Cumulative Penetration / Reading (mm)	(3) Penetration Between Readings (mm)	(4) Penetration per Blow Count (mm)	(5) Hammer Blow Factor	(6) DCP Index (mm/blow)	(7) CBR (%)
0	60	Datum	-	-	-	-
1	110	50	50	1	50	4
1	140	30	30	1	30	6
1	165	25	25	1	25	8
1	190	25	25	1	25	8
5	270	80	16	1	16	13
5	360	90	18	1	18	11
10	570	210	21	1	21	10
10	640	70	7	1	7	35
10	690	50	5	1	5	50
10	720	30	3	1	3	80
10	730	10	1	1	1	100
10	750	20	2	1	2	100
10	760	10	1	1	1	100
10	790	30	3	1	3	80
10	820	30	3	1	3	80
10	840	20	2	1	2	100
10	865	25	3	1	2	100
10	890	25	3	1	2	100
10	920	30	3	1	3	80
10	950	30	3	1	3	80

- (1) Number of hammer blows between test readings
 (2) Cumulative penetration after each set of hammer blows, scale reading
 (3) Difference in cumulative penetration between readings (actual soil penetration)
 (4) (3) Divided by (1)
 (5) Enter 1 for 8-kg (17.6-lb) hammer; 2 for 4.6-kg (10.1lb) hammer
 (6) (4) X (5)
 (7) From CBR versus DCP correlation table ASTM D6951-03

DYNAMIC CONE PENETROMETER DATA SHEET						
Project No.:	PN 72665			Date Tested:	12/2/2009	
Name:	FORT BLISS THAAD BATTERY			Existing HMAC/Flex. Base?	No	
Test Location:	10A2S-THAAD-08			Water Table Depth:	n/a ft	
Drilling Agency:	RABA-KISTNER CONSULTANTS (SW), INC.			Soil Type:	See Boring Log	
(1) Number of Blows	(2) Cumulative Penetration / Reading (mm)	(3) Penetration Between Readings (mm)	(4) Penetration per Blow Count (mm)	(5) Hammer Blow Factor	(6) DCP Index (mm/blow)	(7) CBR (%)
0	70	Datum	-	-	-	-
1	100	30	30	2	60	3
1	130	30	30	2	60	3
5	190	60	12	2	24	8
5	240	50	10	2	20	10
5	285	45	9	2	18	11
5	340	55	11	2	22	9
5	420	80	16	2	32	6
10	460	40	4	2	8	30
10	490	30	3	2	6	40
5	510	20	4	1	4	60
10	545	35	4	1	3	80
10	580	35	4	1	3	80
10	625	45	5	1	4	60
10	680	55	6	1	5	50
10	725	45	5	1	4	60
10	760	35	4	1	3	80
10	800	40	4	1	4	60
10	835	35	4	1	3	80
10	890	55	6	1	5	50
10	950	60	6	1	6	40

- (1) Number of hammer blows between test readings
 (2) Cumulative penetration after each set of hammer blows, scale reading
 (3) Difference in cumulative penetration between readings (actual soil penetration)
 (4) (3) Divided by (1)
 (5) Enter 1 for 8-kg (17.6-lb) hammer; 2 for 4.6-kg (10.1lb) hammer
 (6) (4) X (5)
 (7) From CBR versus DCP correlation table ASTM D6951-03

DYNAMIC CONE PENETROMETER DATA SHEET						
Project No.:	PN 72665			Date Tested:	12/2/2009	
Name:	FORT BLISS THAAD BATTERY			Existing HMAC/Flex. Base?	No	
Test Location:	10A2S-THAAD-09			Water Table Depth:	n/a ft	
Drilling Agency:	RABA-KISTNER CONSULTANTS (SW), INC.			Soil Type:	See Boring Log	
(1) Number of Blows	(2) Cumulative Penetration / Reading (mm)	(3) Penetration Between Readings (mm)	(4) Penetration per Blow Count (mm)	(5) Hammer Blow Factor	(6) DCP Index (mm/blow)	(7) CBR (%)
0	60	Datum	-	-	-	-
1	105	45	45	1	45	4
2	180	75	38	1	37	5
2	230	50	25	1	25	8
5	320	90	18	1	18	11
10	485	165	17	1	16	13
10	560	75	8	1	7	35
10	610	50	5	1	5	50
10	650	40	4	1	4	60
10	680	30	3	1	3	80
10	720	40	4	1	4	60
10	760	40	4	1	4	60
10	790	30	3	1	3	80
10	825	35	4	1	3	80
10	840	15	2	1	1	100
10	860	20	2	1	2	100
10	875	15	2	1	1	100
10	900	25	3	1	2	100
10	920	20	2	1	2	100
10	935	15	2	1	1	100
10	950	15	2	2	3	80

- (1) Number of hammer blows between test readings
 (2) Cumulative penetration after each set of hammer blows, scale reading
 (3) Difference in cumulative penetration between readings (actual soil penetration)
 (4) (3) Divided by (1)
 (5) Enter 1 for 8-kg (17.6-lb) hammer; 2 for 4.6-kg (10.1lb) hammer
 (6) (4) X (5)
 (7) From CBR versus DCP correlation table ASTM D6951-03

DYNAMIC CONE PENETROMETER DATA SHEET						
Project No.:	PN 72665			Date Tested:	12/2/2009	
Name:	FORT BLISS THAAD BATTERY			Existing HMAC/Flex. Base?	No	
Test Location:	10A2S-THAAD-11			Water Table Depth:	n/a ft	
Drilling Agency:	RABA-KISTNER CONSULTANTS (SW), INC.			Soil Type:	See Boring Log	
(1) Number of Blows	(2) Cumulative Penetration / Reading (mm)	(3) Penetration Between Readings (mm)	(4) Penetration per Blow Count (mm)	(5) Hammer Blow Factor	(6) DCP Index (mm/blow)	(7) CBR (%)
0	60	Datum	-	-	-	-
1	110	50	50	1	50	4
1	140	30	30	1	30	6
1	170	30	30	1	30	6
5	240	70	14	1	14	15
5	310	70	14	1	14	15
5	410	100	20	1	20	10
5	475	65	13	1	13	16
5	530	55	11	1	11	20
5	580	50	10	1	10	20
5	640	60	12	1	12	18
5	740	100	20	1	20	10
1	760	20	20	1	20	10
1	790	30	30	1	30	6
1	810	20	20	1	20	10
1	840	30	30	1	30	6
1	865	25	25	1	25	8
10	900	35	4	1	3	80
10	930	30	3	1	3	80
10	950	20	2	1	2	100
						-

- (1) Number of hammer blows between test readings
 (2) Cumulative penetration after each set of hammer blows, scale reading
 (3) Difference in cumulative penetration between readings (actual soil penetration)
 (4) (3) Divided by (1)
 (5) Enter 1 for 8-kg (17.6-lb) hammer; 2 for 4.6-kg (10.1lb) hammer
 (6) (4) X (5)
 (7) From CBR versus DCP correlation table ASTM D6951-03

DYNAMIC CONE PENETROMETER DATA SHEET						
Project No.:	PN 72665			Date Tested:	12/2/2009	
Name:	FORT BLISS THAAD BATTERY			Existing HMAC/Flex. Base?	No	
Test Location:	10A2S-THAAD-12			Water Table Depth:	n/a ft	
Drilling Agency:	RABA-KISTNER CONSULTANTS (SW), INC.			Soil Type:	See Boring Log	
(1) Number of Blows	(2) Cumulative Penetration / Reading (mm)	(3) Penetration Between Readings (mm)	(4) Penetration per Blow Count (mm)	(5) Hammer Blow Factor	(6) DCP Index (mm/blow)	(7) CBR (%)
0	65	Datum	-	-	-	-
1	100	35	35	1	35	5
1	125	25	25	1	25	8
1	145	20	20	1	20	10
5	190	45	9	2	18	11
5	240	50	10	2	20	10
5	280	40	8	2	16	13
5	325	45	9	2	18	11
5	375	50	10	2	20	10
5	430	55	11	2	22	9
5	470	40	8	2	16	13
10	510	40	4	2	8	30
10	550	40	4	2	8	30
10	590	40	4	2	8	30
5	630	40	8	2	16	13
10	670	40	4	2	8	30
10	690	20	2	2	4	60
						-
						-
						-
						-

- (1) Number of hammer blows between test readings
 (2) Cumulative penetration after each set of hammer blows, scale reading
 (3) Difference in cumulative penetration between readings (actual soil penetration)
 (4) (3) Divided by (1)
 (5) Enter 1 for 8-kg (17.6-lb) hammer; 2 for 4.6-kg (10.1lb) hammer
 (6) (4) X (5)
 (7) From CBR versus DCP correlation table ASTM D6951-03

DYNAMIC CONE PENETROMETER DATA SHEET						
Project No.:	PN 72665			Date Tested:	12/3/2009	
Name:	FORT BLISS THAAD BATTERY			Existing HMAC/Flex. Base?	Yes	
Test Location:	10A2S-THAAD-15			Water Table Depth:	n/a ft	
Drilling Agency:	RABA-KISTNER CONSULTANTS (SW), INC.			Soil Type:	See Boring Log	
(1) Number of Blows	(2) Cummulative Penetration / Reading (mm)	(3) Penetration Between Readings (mm)	(4) Penetration per Blow Count (mm)	(5) Hammer Blow Factor	(6) DCP Index (mm/blow)	(7) CBR (%)
0	105	Datum	-	-	-	-
5	135	30	6	1	6	40
10	180	45	5	1	4	60
10	230	50	5	1	5	50
10	280	50	5	1	5	50
10	340	60	6	1	6	40
10	400	60	6	1	6	40
10	485	85	9	1	8	30
10	545	60	6	1	6	40
10	610	65	7	1	6	40
10	690	80	8	1	8	30
10	800	110	11	1	11	20
5	890	90	18	1	18	11
4	950	60	15	1	15	14
						-
						-
						-
						-
						-
						-
						-

- (1) Number of hammer blows between test readings
(2) Cumulative penetration after each set of hammer blows, scale reading
(3) Difference in cummulative penetration between readings (actual soil penetration)
(4) (3) Divided by (1)
(5) Enter 1 for 8-kg (17.6-lb) hammer; 2 for 4.6-kg (10.1lb) hammer
(6) (4) X (5)
(7) From CBR versus DCP correlation table ASTM D6951-03

APPENDIX C

ADDITIONAL FIELD TESTING DATA

APPENDIX B
LIST OF DRAWINGS
NOT USED

APPENDIX C

UTILITY CONNECTIONS

SEE APPENDIX J – DRAWINGS

APPENDIX D

RESULTS OF FIRE FLOW TESTS

With construction on going in the THAAD and JLENS area of the post, the infrastructure portion of the water system is being improved by a separate contract. The fire hydrant test data from the study attached will be outdated. The static pressure experienced in the new waterlines should be expected to remain approximately 50 psi, the prior pressure before construction. The actual line residual pressure will not be determined until new tests are run after construction is complete. The nodes for testing will also change from the prior test data as new fire hydrants are installed on the new water lines and relocated from the existing locations. The infrastructure and fire pump construction is a separate contract from the "THAAD Battery II TEMF Infrastructure and Hardstand" package and will be nearing completion during start of the this construction. Please coordinate with the USACE COR and field representatives during design and construction.

The fire flow data generated for the fire system with the addition of the fire pump and distribution system may also need to be verified at the completion of the water line construction. The data provided for the fire flows should be the basis for building fire system design. The actual pressures experienced in the fire system may be different from the study and may need to be evaluated to verify building design and actual field conditions. Please coordinate with the USACE COR and field representatives during design and construction.

Fire Water Pipe Calculations

From Fire Flow Study 11-6-2009

Static Pressure: ~54 psi (existing line) (result from retest 6-22-2010)

Node 15 pressure: 106.96 psi available

Required flow: 1250 GPM "C" factor of 140

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FIRE WATER PIPE FRICTION & ELEVATION LOSS CALCULATIONS

SITE: THAAD JLENS

A. GENERAL INFORMATION :

FLOW TEST DATA (FIRE HYDRANTS 5800-26 / 5800-27 ON 06-22-2010)

STATIC PRESSURE :	54	PSI
RESIDUAL PRESSURE :	20	PSI
FLOW @ RESIDUAL PRESSURE	650	GPM
FLOW @ 20 PSI	650	GPM

PUMP OFF LOW WATER LEVEL IN TANK ELEVATION: 3896.5'

DESIGN IS BASED ON THE REQUIRED FLOW OF 1250 GPM. THE DOMESTIC WATER SYSTEM DOES NOT HAVE ADEQUATE VOLUME TO SATISFY THE DEMAND. GROUND STORAGE WATER TANKS WITH FIRE PUMP WILL BE REQUIRED TO PROVIDE THE REQUIRED FIRE FLOW.

FRICTION LOSS CALCULATIONS BASED ON 1250 GPM WITH A "C" FACTOR OF 140.

SEE FOLLOWING DRAWING F-1 FOR NODE LOCATIONS.

B. FIRE PUMP SUCTION FROM GROUND STORAGE TANK**LINE 1 (NODE 1 TO NODE 2S)**

8" DIA. @ 100 LF
 (1) T @ 35 ELF = 35 ELF
 (6) 90 DEGREE ELLS @ 13 ELF = 78 ELF
 (2) GV @ 4 ELF = 8 ELF

TOTAL: 221 ELF OF 8" DIA. PIPE X 0.0102 PSI/FT LOSS = 2.25 PSI LOSS

ELEVATION : DIFFERENCE BETWEEN 3896.5 (NODE 1) AND
 3894.0' (NODE 2S) = 1.08 PSI

1.08 PSI (NODE 1) - 2.25 PSI = **-1.17 PSI AVAILABLE @ (NODE 2S)**

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FIRE WATER PIPE FRICTION & ELEVATION LOSS CALCULATIONS

SITE: THAAD JLENS

B. FIRE PUMP DISCHARGE

BASED ON 115 PSI FIRE PUMP SUPPLY AT 1250 GPM

-1.17 PSI (NODE 2S) + 115 PSI (PUMP BOOST) = 113.83 PSI (NODE 2D)

LINE 2 (NODE 2D TO NODE 3)

8" DIA. @ 20 LF

(1) T @ 35 ELF = 35 ELF

(1) BFV @ 30 ELF = 30 ELF

(1) CV @ 45 ELF

TOTAL: 130 ELF OF 8" DIA. PIPE X 0.0102 PSI/FT LOSS = 1.33 PSI LOSS

ELEVATION : DIFFERENCE BETWEEN 3894.0 (NODE 2D) AND
3894.0' (NODE 2) = 0.0 PSI113.83 PSI (NODE 2D) - 1.33 PSI = **112.5 PSI AVAILABLE @ (NODE 3)**LINE 3 (NODE 3 TO NODE 4)

10" DIA. @ 36 LF

(3) 90 DEGREE ELLS @ 16 ELF = 48 ELF

TOTAL: 84 ELF OF 10" DIA. PIPE X 0.0035 PSI/FT LOSS = 0.29 PSI LOSS

ELEVATION : DIFFERENCE BETWEEN 3894.0 (NODE 3) AND
3885.4' (NODE 4) = 3.72 PSI112.5 PSI (NODE 3) - 0.29 PSI + 3.72 PSI = **115.93 PSI AVAILABLE @ (NODE 4)**LINE 4 (NODE 4 TO NODE 5)

10" DIA. @ 187 LF

(2) 45 DEGREE ELLS @ 11 ELF = 22 ELF

(1) GV @ 5 ELF = 5 ELF

TOTAL: 214 ELF OF 10" DIA. PIPE X 0.0035 PSI/FT LOSS = 0.75 PSI LOSS

ELEVATION : DIFFERENCE BETWEEN 3885.4 (NODE 4) AND
3885.2' (NODE 5) = 0.1 PSI115.93 PSI (NODE 4) - 0.75 PSI + 0.1 PSI = **115.28 PSI AVAILABLE @ (NODE 5)**

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FIRE WATER PIPE FRICTION & ELEVATION LOSS CALCULATIONS

SITE: THAAD JLENS

LINE 5 (NODE 4 TO NODE 6)

10" DIA. @ 200 LF
(1) GV @ 5 ELF = 5 ELF

TOTAL: 205 ELF OF 10" DIA. PIPE X 0.0035 PSI/FT LOSS = 0.72 PSI LOSS

ELEVATION : DIFFERENCE BETWEEN 3885.4 (NODE 4) AND
3884.9' (NODE 6) = 0.22 PSI

115.28 PSI (NODE 4) - 0.72 PSI + 0.22 PSI = **114.78 PSI AVAILABLE @ (NODE 6)**LINE 6 (NODE 6 TO NODE 7)

8" DIA. @ 20 LF
(1) T @ 35 ELF = 35 ELF
(1) GV @ 4 ELF = 4 ELF

TOTAL: 59 ELF OF 8" DIA. PIPE X 0.0102 PSI/FT LOSS = 0.60 PSI LOSS

ELEVATION : DIFFERENCE BETWEEN 3884.9 (NODE 6) AND
3884.9' (NODE 7) = 0.0 PSI

114.78 PSI (NODE 6) - 0.60 PSI = **114.18 PSI AVAILABLE @ (NODE 7)**LINE 7 (NODE 6 TO NODE 8)

10" DIA. @ 245 LF

TOTAL: 245 ELF OF 10" DIA. PIPE X 0.0035 PSI/FT LOSS = 0.86 PSI LOSS

ELEVATION : DIFFERENCE BETWEEN 3884.9 (NODE 6) AND
3884.3' (NODE 8) = 0.26 PSI

114.78 PSI (NODE 6) - 0.86 PSI + 0.26 PSI = **114.18 PSI AVAILABLE @ (NODE 8)**

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FIRE WATER PIPE FRICTION & ELEVATION LOSS CALCULATIONS

SITE: THAAD JLENS

LINE 8 (NODE 8 TO NODE 9)

8" DIA. @ 20 LF

(1) T @ 35 ELF = 35 ELF

(1) GV @ 4 ELF = 4 ELF

TOTAL: 59 ELF OF 8" DIA. PIPE X 0.0102 PSI/FT LOSS = 0.60 PSI LOSS

ELEVATION : DIFFERENCE BETWEEN 3884.3 (NODE 8) AND
3884.3' (NODE 9) = 0.0 PSI114.18 PSI (NODE 8) - 0.60 PSI = **113.58 PSI AVAILABLE @ (NODE 9)**LINE 9 (NODE 8 TO NODE 10)

10" DIA. @ 715 LF

(2) 45 DEGREE ELLS @ 11 ELF = 22 ELF

(1) GV @ 5 ELF = 5 ELF

TOTAL: 742 ELF OF 10" DIA. PIPE X 0.0035 PSI/FT LOSS = 2.60 PSI LOSS

ELEVATION : DIFFERENCE BETWEEN 3884.3 (NODE 8) AND
3884.1' (NODE 10) = 0.1 PSI114.18 PSI (NODE 8) - 2.60 PSI + 0.1 PSI = **111.68 PSI AVAILABLE @ (NODE 10)**LINE 10 (NODE 10 TO NODE 11)

8" DIA. @ 90 LF

(1) T @ 35 ELF = 35 ELF

(1) GV @ 4 ELF = 4 ELF

TOTAL: 129 ELF OF 8" DIA. PIPE X 0.0102 PSI/FT LOSS = 1.32 PSI LOSS

ELEVATION : DIFFERENCE BETWEEN 3884.1 (NODE 10) AND
3884.3' (NODE 11) = - 0.1 PSI111.68 PSI (NODE 10) - 1.32 PSI - 0.1 PSI = **110.35 PSI AVAILABLE @ (NODE 11)**

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FIRE WATER PIPE FRICTION & ELEVATION LOSS CALCULATIONS

SITE: THAAD JLENS

LINE 11 (NODE 10 TO NODE 12)

10" DIA. @ 220 LF
 (1) GV @ 5 ELF = 5 ELF

TOTAL: 225 ELF OF 10" DIA. PIPE X 0.0035 PSI/FT LOSS = 0.79 PSI LOSS

ELEVATION : DIFFERENCE BETWEEN 3884.1 (NODE 10) AND
 3885.8' (NODE 12) = - 0.74 PSI

111.68 PSI (NODE 10) - 0.79 PSI - 0.74 PSI = **110.15 PSI AVAILABLE @ (NODE 12)**LINE 12 (NODE 12 TO NODE 13)

8" DIA. @ 90 LF
 (1) T @ 35 ELF = 35 ELF
 (1) GV @ 4 ELF = 4 ELF

TOTAL: 129 ELF OF 8" DIA. PIPE X 0.0102 PSI/FT LOSS = 1.32 PSI LOSS

ELEVATION : DIFFERENCE BETWEEN 3885.8' (NODE 12) AND
 3885.9' (NODE 13) = - 0.1 PSI

110.15 PSI (NODE 12) - 1.32 PSI - 0.1 PSI = **108.73 PSI AVAILABLE @ (NODE 13)**LINE 13 (NODE 12 TO NODE 14)

10" DIA. @ 278 LF

TOTAL: 278 ELF OF 10" DIA. PIPE X 0.0035 PSI/FT LOSS = 0.97 PSI LOSS

ELEVATION : DIFFERENCE BETWEEN 3885.8' (NODE 12) AND
 3887.9' (NODE 14) = - 0.90 PSI

110.15 PSI (NODE 12) - 0.97 PSI - 0.90 PSI = **108.28 PSI AVAILABLE @ (NODE 14)**

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FIRE WATER PIPE FRICTION & ELEVATION LOSS CALCULATIONS

SITE: THAAD JLENS

LINE 14 (NODE 14 TO NODE 15)

8" DIA. @ 90 LF

(1) T @ 35 ELF = 35 ELF

(1) GV @ 4 ELF = 4 ELF

TOTAL: 129 ELF OF 8" DIA. PIPE X 0.0102 PSI/FT LOSS = 1.32 PSI LOSS

ELEVATION : DIFFERENCE BETWEEN 3887.9' (NODE 14) AND
3887.9' (NODE 15) = 0.0 PSI108.28 PSI (NODE 14) - 1.32 PSI = **106.96 PSI AVAILABLE @ (NODE 15)**LINE 15 (NODE 14 TO NODE 16)

10" DIA. @ 188 LF

TOTAL: 188 ELF OF 10" DIA. PIPE X 0.0035 PSI/FT LOSS = 0.66 PSI LOSS

ELEVATION : DIFFERENCE BETWEEN 3887.9' (NODE 14) AND
3888.5' (NODE 16) = - 0.26 PSI108.28 PSI (NODE 14) - 0.66 PSI - 0.26 PSI = **107.36 PSI AVAILABLE @ (NODE 16)**LINE 16 (NODE 16 TO NODE 17)

8" DIA. @ 90 LF

(1) T @ 35 ELF = 35 ELF

(1) GV @ 4 ELF = 4 ELF

TOTAL: 129 ELF OF 8" DIA. PIPE X 0.0102 PSI/FT LOSS = 1.32 PSI LOSS

ELEVATION : DIFFERENCE BETWEEN 3888.5' (NODE 16) AND
3888.5' (NODE 17) = 0.0 PSI107.36 PSI (NODE 16) - 1.32 PSI = **103.21 PSI AVAILABLE @ (NODE 17)**

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FIRE WATER PIPE FRICTION & ELEVATION LOSS CALCULATIONS

SITE: THAAD JLENS

LINE 17 (NODE 16 TO NODE 18)

10" DIA. @ 124 LF

TOTAL: 124 ELF OF 10" DIA. PIPE X 0.0035 PSI/FT LOSS = 0.43 PSI LOSS

ELEVATION : DIFFERENCE BETWEEN 3888.5' (NODE 16) AND
3888.5' (NODE 17) = 0.0 PSI107.36 PSI (NODE 16) - 0.43 PSI = **106.93 PSI AVAILABLE @ (NODE 18)**LINE 18 (NODE 18 TO NODE 19)

10" DIA. @ 25 LF

(1) GV @ 5 ELF = 5 ELF

TOTAL: 30 ELF OF 10" DIA. PIPE X 0.0035 PSI/FT LOSS = 0.12 PSI LOSS

ELEVATION : DIFFERENCE BETWEEN 3888.5' (NODE 18) AND
3888.5' (NODE 19) = 0.0 PSI106.93 PSI (NODE 18) - 0.12 PSI = **106.81 PSI AVAILABLE @ (NODE 19)**LINE 19 (NODE 18 TO NODE 20)

10" DIA. @ 137 LF

(1) T @ 50 ELF = 50 ELF

(1) GV @ 5 ELF = 5 ELF

TOTAL: 192 ELF OF 10" DIA. PIPE X 0.0035 PSI/FT LOSS = 0.67 PSI LOSS

ELEVATION : DIFFERENCE BETWEEN 3888.5' (NODE 18) AND
3891.1' (NODE 20) = - 1.13 PSI106.93 PSI (NODE 18) - 0.61 PSI - 1.13 PSI = **105.19 PSI AVAILABLE @ (NODE 20)**

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FIRE WATER PIPE FRICTION & ELEVATION LOSS CALCULATIONS

SITE: THAAD JLENS

LINE 20 (NODE 20 TO NODE 21)

8" DIA. @ 72 LF

(1) T @ 35 ELF = 35 ELF

(1) GV @ 4 ELF = 4 ELF

TOTAL: 111 ELF OF 8" DIA. PIPE X 0.0102 PSI/FT LOSS = 1.13 PSI LOSS

ELEVATION : DIFFERENCE BETWEEN 3891.1' (NODE 20) AND
3891.1' (NODE 21) = 0.0 PSI105.19 PSI (NODE 20) - 1.13 PSI = **104.06 PSI AVAILABLE @ (NODE 21)**LINE 21 (NODE 20 TO NODE 22)

10" DIA. @ 432 LF

(4) 45 DEGREE ELLS @ 11 ELF = 44 ELF

TOTAL: 476 ELF OF 10" DIA. PIPE X 0.0035 PSI/FT LOSS = 1.67 PSI LOSS

ELEVATION : DIFFERENCE BETWEEN 3891.1' (NODE 20) AND
3892.3' (NODE 22) = - 1.2 PSI105.19 PSI (NODE 20) - 1.67 PSI - 1.20 PSI = **102.32 PSI AVAILABLE @ (NODE 22)**LINE 22 (NODE 22 TO NODE 23)

8" DIA. @ 87 LF

(1) T @ 35 ELF = 35 ELF

(1) GV @ 4 ELF = 4 ELF

TOTAL: 126 ELF OF 8" DIA. PIPE X 0.0102 PSI/FT LOSS = 1.29 PSI LOSS

ELEVATION : DIFFERENCE BETWEEN 3892.3' (NODE 22) AND
3892.3' (NODE 23) = 0.0 PSI102.32 PSI (NODE 22) - 1.29 PSI = **101.03 PSI AVAILABLE @ (NODE 23)**

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FIRE WATER PIPE FRICTION & ELEVATION LOSS CALCULATIONS

SITE: THAAD JLENS

LINE 23 (NODE 22 TO NODE 24)

8" DIA. @ 215 LF

(1) T @ 35 ELF = 35 ELF

(2) 45 DEGREE ELLS @ 9 ELF = 18 ELF

(1) GV @ 4 ELF = 4 ELF

TOTAL: 272 ELF OF 8" DIA. PIPE X 0.0102 PSI/FT LOSS = 2.77 PSI LOSS

ELEVATION : DIFFERENCE BETWEEN 3892.3' (NODE 22) AND
3892.5' (NODE 24) = - 0.13 PSI102.32 PSI (NODE 22) - 2.77 PSI - 0.13 PSI = **99.42 PSI AVAILABLE @ (NODE 24)**LINE 24 (NODE 22 TO NODE 25)

10" DIA. @ 203 LF

TOTAL: 203 ELF OF 10" DIA. PIPE X 0.0035 PSI/FT LOSS = 0.71 PSI LOSS

ELEVATION : DIFFERENCE BETWEEN 3892.3' (NODE 22) AND
3891.3' (NODE 25) = 0.43 PSI102.32 PSI (NODE 22) - 0.71 PSI + 0.43 PSI = **102.04 PSI AVAILABLE @ (NODE 25)**LINE 25 (NODE 25 TO NODE 26)

8" DIA. @ 185 LF

(1) T @ 35 ELF = 35 ELF

(2) 45 DEGREE ELLS @ 9 ELF = 18 ELF

(1) 90 DEGREE ELL @ 13 ELF = 13 ELF

(1) GV @ 4 ELF = 4 ELF

TOTAL: 255 ELF OF 8" DIA. PIPE X 0.0102 PSI/FT LOSS = 3.06 PSI LOSS

ELEVATION : DIFFERENCE BETWEEN 3891.3' (NODE 25) AND
3891.0' (NODE 26) = 0.13 PSI102.04 PSI (NODE 25) - 3.06 PSI + 0.13 PSI = **99.11 PSI AVAILABLE @ (NODE 26)**

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FIRE WATER PIPE FRICTION & ELEVATION LOSS CALCULATIONS

SITE: THAAD JLENS

LINE 26 (NODE 25 TO NODE 27)

10" DIA. @ 65 LF

TOTAL: 65 ELF OF 10" DIA. PIPE X 0.0035 PSI/FT LOSS = 0.23 PSI LOSS

ELEVATION : DIFFERENCE BETWEEN 3891.3' (NODE 25) AND
3892.36' (NODE 27) = - 0.46 PSI102.04 PSI (NODE 25) - 0.23 PSI - 0.46 PSI = **101.35 PSI AVAILABLE @ (NODE 27)**LINE 27 (NODE 27 TO NODE 28)

8" DIA. @ 87 LF

(1) T @ 35 ELF = 35 ELF

(1) GV @ 4 ELF = 4 ELF

TOTAL: 126 ELF OF 8" DIA. PIPE X 0.0102 PSI/FT LOSS = 1.29 PSI LOSS

ELEVATION : DIFFERENCE BETWEEN 3892.36' (NODE 27) AND
3892.52' (NODE 28) = - 0.1 PSI101.35 PSI (NODE 27) - 1.29 PSI - 0.1 PSI = **99.96 PSI AVAILABLE @ (NODE 28)**

**THAAD, JLENS AND SUSTAINMENT
BRIGADE FIRE PROTECTION AUTOMATIC
SPRINKLER FIRE SYSTEMS STUDY
FORT BLISS, TEXAS**

For:



**U.S. ARMY CORPS OF ENGINEERS
FT. WORTH DISTRICT**

JACOBS / HUITT-ZOLIARS

November 6, 2009



US Army Corps of Engineers Fort Worth District

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Appendix A - Fort Bliss Water Service Company - Flow Test Reports

Appendix B - Fire Protection Automatic Sprinkler Calculations

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SECTION 1.0 – INTRODUCTION AND BACKGROUND

1.1 – OBJECTIVE

The objective of this study is to analyze the existing water services to the THAAD, JLENS and the Sustainment Brigade Facilities sites for proposed and future building fire suppression system requirements. The study will include verification of the existing, proposed (Phase 1) and future water flow and pressure requirements for automatic sprinklers throughout the proposed and future COF's, TEMF's and Deploy Storage Buildings located on these sites. This study will utilize the fire hydrant flow tests data and calculations necessary to evaluate available water at each site. This study will determine whether fire pump(s) and ground water storage reservoir(s) will be required to provide adequate fire flow and pressure for automatic sprinkler systems within the buildings. In addition, this study will determine the availability and capacity of electrical power for fire pump(s).

This study will include schematic site drawings to indicate flow test locations, proposed locations of fire pump(s), ground storage water tanks and proposed distribution and service mains to proposed and future buildings. In addition, drawings will indicate where electrical power for fire pump houses will be supplied from.

1.2 – PROJECT INFORMATION

Fort Bliss is located in Texas near the City of El Paso. The approximate latitude, longitude coordinates of the site are 106°23' West and 31°49' North. The approximate elevation of Fort Bliss is 4000 ft.

This project consists of three sites, THAAD, JLENS and the Sustainment Brigade Facility all located within the Main Cantonment Area. THAAD and JLENS are located adjacent to one another and the Sustainment Brigade Facility is located away from the others. New TEMF's, COF's and Storage buildings are proposed for these sites.

This study will address whether the existing water supply to the three sites can support automatic sprinkler fire protection in the proposed Phase 1 and future buildings planned to be added to these sites. This study will also address if fire booster pumps or ground storage water tanks with fire pumps will be required.



SECTION 2.0 – EXISTING CONDITIONS AND CONSTRAINTS

2.1 – EXISTING WATER DISTRIBUTION

Each site has access to existing water mains with fire hydrants near the proposed project sites. These mains are intended to be used as fire water service for the automatic sprinkler systems in the proposed (Phase 1) and future buildings.

Most of the existing distribution mains are very old asbestos cement (AC) pipe with some dating back to the late 1950's. Old asbestos cement mains tend to have poor flow characteristics after several years of service. In addition, most of the distribution mains throughout these areas are 8 inch and less in diameter. When these mains were installed, very few if any buildings had automatic sprinkler protection and distribution mains were basically designed for domestic water supply only. The present automatic sprinkler systems of the proposed and future buildings located on these three sites will have high fire hazard design requirements and will require more than 6 times the present water demand.

The Texas Commission on Environmental Quality TCEQ requires that the automatic sprinkler system combined with outside fire hose demand can not reduce the domestic water supply main residual pressure below 20 psi. If this cannot be accomplished, a ground storage water tank will be required.

2.2 – THAAD AND JLENS SITES FLOW TESTS ON EXISTING MAINS

The THAAD site has an existing looped 8 inch asbestos cement water main in Pershing Road running along the south side of the proposed project site (See attached Drawing FT-1, Appendix C). Two hydrants have been tested and the Fire Flow Tests results are as follows:

Fire Flow Test #1A

Hydrant Tested: #5800-26

Street: Pershing Road (East of Abernethy)

Date of Test: 09-11-2009

Size and Type of Main: 8" AC

Outlet Nozzle: 2-1/2"



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Static Pressure: 50 psi
Residual Pressure: 26 psi
Pitot Pressure: 15 psi
Flow: 650 gpm
Flow @ 20 psi: 733 gpm

Fire Flow Test #1B

Hydrant Tested: #5800-27

Street: Pershing Road (East of Abernethy)
Date of Test: 09-11-2009
Size and Type of Main: 8" AC
Outlet Nozzle: 2-1/2"
Static Pressure: 50 psi
Residual Pressure: 26 psi
Pitot Pressure: 12 psi
Flow: 581 gpm
Flow @ 20 psi: 656 gpm

The JLENS site has existing water mains on two sides of the site (See attached Drawing FT-1, Appendix C). Existing looped 8 inch asbestos cement water mains run along the north side of the proposed project site in Pershing Road and on the west side of the proposed project site in Abernethy Street. The results of fire flow tests on the two hydrants off the 8 inch main in Pershing Road are indicated above (Fire Flow Test #1A and #1B). The fire flow tests results off the two hydrants tested in Abernethy Street are as follows:

Fire Flow Test #2A:

Hydrant Tested: #5800-35

Street: Abernethy Street (South of Pershing)
Date of Test: 09-11-2009
Size and Type of Main: 8" AC
Outlet Nozzle: 2-1/2"
Static Pressure: 52 psi
Residual Pressure: 31 psi
Pitot Pressure: 20 psi



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Flow: 750 gpm

Flow @ 20 psi: 942 gpm

Fire Flow Test #2B

Hydrant Tested: #5800-36

Street: Abernethy Street (South of Pershing)

Date of Test: 09-11-2009

Size and Type of Main: 8" AC

Outlet Nozzle: 2-1/2"

Static Pressure: 50 psi

Residual Pressure: 26 psi

Pitot Pressure: 18 psi

Flow: 712 gpm

Flow @ 20 psi: 803 gpm

The water distribution mains that supply the THAAD and JLENS sites are supplied by an existing 1.5 Million Gallon Elevated Water Storage Tank (# 5301) located east off JEB Stuart Road. This elevated tank supplies a 16 inch concrete steel cylinder (CSC) supply main that connects into a looped 16 inch CSC distribution main that runs north and south in JEB Stuart Road. This 16 inch main supplies a looped 8 inch AC water main that runs east and west in Pershing Road that supply flow tested Fire Hydrants #5800-26 and #5800-27. The 16 inch supply main from the Elevated Water Storage Tank #5301 has Fire hydrant #5300-15 in the line. The result of fire flow test on Fire Hydrant #5300-15 is indicated below (Fire Flow Test #3) as follows:

Fire Flow Test # 3

Hydrant Tested: #5300-15

Street: JEB Stuart Road (Near and West of Elevated Tank #5301)

Date of Test: 10-20-2009

Size and Type of Main: 16" CSC

Outlet Nozzle: 2-1/2"

Static Pressure: 54 psi

Residual Pressure: 40 psi

Pitot Pressure: 35 psi



Flow: 993 gpm

Flow @ 20 psi: 1603 gpm

Fort Bliss Water Service Company Flow Test Reports at the THAAD and JLENS sites are found in Appendix A.

2.3 – SUSTAINMENT BRIGADE SITE FLOW TESTS ON EXISTING MAINS

The Sustainment Brigade site has existing water mains on three sides (See attached Drawing FT-2, Appendix C). Existing looped 8 inch AC water mains run along the north side of the proposed project site in Haan Road and on the south side of the proposed project site in Stennis Street. The largest main is an existing looped 14 inch CSC water main running along the west side of the proposed project site in Carrington Road. The fire flow tests results off the two hydrants tested in Carrington Road are as follows:

Fire Flow Test #4A:

Hydrant Tested: #2900-06

Street: Carrington Road (Between Haan & Stennis)

Date of Test: 10-16-2009

Size and Type of Main: 14" CSC

Outlet Nozzle: 2-1/2"

Static Pressure: 60 psi

Residual Pressure: 38 psi

Pitot Pressure: 37 psi

Flow: 1021 gpm

Flow @ 20 psi: 1410 gpm

Fire Flow Test #4B

Hydrant Tested: #2900-07

Street: Carrington Road (Between Haan & Stennis)

Date of Test: 10-16-2009

Size and Type of Main: 14" CSC

Outlet Nozzle: 2-1/2"

Static Pressure: 60 psi



Residual Pressure: 40 psi

Pitot Pressure: 37 psi

Flow: 1021 gpm

Flow @ 20 psi: 1484 gpm

The fire flow test results off the two hydrants tested in Haan Road are as follows:

Fire Flow Test #5A:

Hydrant Tested: #2900-09

Street: Haan Road (Between Carrington & Cramer)

Date of Test: 10-14-2009

Size and Type of Main: 8" AC

Outlet Nozzle: 2-1/2"

Static Pressure: 64 psi

Residual Pressure: 54 psi

Pitot Pressure: 50 psi

Flow: 1186 gpm

Flow @ 20 psi: 2641 gpm

Fire Flow Test #5B

Hydrant Tested: #2900-10

Street: Haan Road (Between Carrington & Cramer)

Date of Test: 10-14-2009

Size and Type of Main: 8" AC

Outlet Nozzle: 2-1/2"

Static Pressure: 64 psi

Residual Pressure: 56 psi

Pitot Pressure: 40 psi

Flow: 1061 gpm

Flow @ 20 psi: 2664 gpm



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Fort Worth District

The fire flow test results off the two hydrants tested in Stennis Street are as follows:

Fire Flow Test #6A:

Hydrant Tested: #2900-22

Street: Stennis Street (Between Carrington & Cramer)

Date of Test: 10-14-2009

Size and Type of Main: 8" AC

Outlet Nozzle: 2-1/2"

Static Pressure: 50 psi

Residual Pressure: 40 psi

Pitot Pressure: 35 psi

Flow: 993 gpm

Flow @ 20 psi: 1797 gpm

Fire Flow Test #6B

Hydrant Tested: #2900-23

Street: Stennis Street (Between Carrington & Cramer)

Date of Test: 10-14-2009

Size and Type of Main: 8" AC

Outlet Nozzle: 2-1/2"

Static Pressure: 50 psi

Residual Pressure: 40 psi

Pitot Pressure: 30 psi

Flow: 919 gpm

Flow @ 20 psi: 1663 gpm

Fort Bliss Water Service Company Flow Test Reports at the Sustainment Brigade site are found in Appendix A.

2.4 – ELECTRICAL REQUIREMENTS

Proposed electric power for the THAAD and JLENS site fire suppression pump system will be available from a 13.2 KV switch to be installed as part of the JLENS project. The switch will be located south of Pershing Road and east of Abernethy Street. See attached Drawing FT-1 for



primary power switch location. Power shall be routed from the 13.2 KV switch underground to a 45 KVA 13.2KV to 208Y/120V pad mounted transformer at the fire pump location. The transformer shall include fuse protection on the primary side. The transformer shall supply a 125 amp panelboard mounted on the fire pump foundation pad. Circuit breakers on the panelboard shall supply the fire pump, fire alarm control panel, fire alarm transmitter, and a transient voltage surge suppression panel.

Proposed electric power for the Sustainment Brigade Facility site is available from a 13.2 KV overhead power line that runs west and east on the south side of Haan Road to the intersection with Cramer Street. See attached drawing FT-2 for primary power overhead line and pole location. Fused cutouts shall be provided at the 13.2 KV riser pole. 13.2 KV power shall be routed from the riser pole underground to a 45 KVA 13.2 KV to 208Y/120V pad mounted transformer at the fire pump location. The transformer shall include fuse protection on the primary side. The transformer shall supply a 125 amp panelboard mounted on the fire pump foundation pad. Circuit breakers on the panelboard shall supply the fire pump, fire alarm control panel, fire alarm transmitter, and a transient voltage surge suppression panel.

2.5 – CRITERIA

The following Codes and Standards apply to the Fire Protection System design and construction:

- UFC 3-600-01 Unified Facilities Criteria “Fire Protection Engineering for Facilities” 9-26-2009
- NFPA 13-2010, National Fire Protection Association “Installation of Sprinkler Systems”
- NFPA 20-2010, National Fire Protection Association “Installation of Stationary Pumps”
- NFPA 22-2010, National Fire Protection Association “Water Tanks for Private Fire Protection”
- NFPA 24-2010, National Fire Protection Association “Private Fire Service Mains”
- NFPA 70-2008, National Fire Protection Association “National Electrical Code”
- NFPA 70E-2004, National Fire Protection Association “Standard for Electrical Safety in the Workplace”



SECTION 3.0 – PROPOSED AND FUTURE FACILITIES AND HAZARD PROJECTIONS

3.1 –HAZARD PROJECTIONS

The three proposed sites THAAD, JLENS and the Sustainment Brigade Facilities will all have new COF's, TEMF's and Deploy Storage Buildings locations. All of these buildings will be fully fire sprinkled with the hydraulically most demanding water requirement basis of design as follows:

COF: Design hazard is based on a wet type automatic sprinkler system at Ordinary Hazard Group 2 with a design density of 0.20 gpm/sf over the hydraulically most remote 3000 sf. Water supply demand is 1920 gpm at 20 psi. Water supply duration is 60 minutes.

TEMF: Miscellaneous Rack Storage of Class IV Commodities stored in open racks 12 feet high or less. Design hazard is based on a wet type automatic sprinkler system at Extra Hazard Group 2 with a design density of 0.30 gpm/sf over the hydraulically most remote 3000 sf. Water supply demand is 1920 gpm at 20 psi for a duration of 120 minutes.

Deploy Storage Building: Miscellaneous Floor Storage of Class IV Commodities stored on floor up to 8 feet high or less. Design hazard is based on a dry type automatic sprinkler system at Ordinary Hazard Group 2 with a design density of 0.20 gpm/sf over the hydraulically most remote 3900 sf. Water supply demand duration is 60 minutes.

The highest hazard requiring the greatest fire flow demand are the TEMF's.



SECTION 4.0 – AUTOMATIC SPRINKLER CALCULATIONS

Calculations are based on 8 inch minimum PVC C900 pipe fire pump suction with proposed and future fire water distribution mains throughout each site and service to each building. Also, the calculations are based on the TEMF facilities, which are the highest hazard and require the greatest flow and pressure demand.

For Fire Protection Automatic Sprinkler Calculations of the COF, TEMF and Deploy Storage see Appendix B.

4.1 – TYPICAL COF, DEPLOY STORAGE AND TEMF

The first three sets of calculations are typical COF, Deploy Storage and TEMF Calculations which indicate the typical required demand for each specific building without a fire pump. This is based on a minimum piping friction loss in both the exterior and interior of the building.

4.2 – THAAD AND JLENS TEMF WITH PUMP AND GROUND STORAGE TANK

The next set of calculations is based on the THAAD and JLENS site for the TEMF which is the highest hazard of the buildings with fire pump and ground storage tank. This calculation shows the available water from the best flow test, the system automatic sprinkler demand and required fire pump and ground storage tank required capacities.

4.3 – SUSTAINMENT BRIGADE TEMF WITH PUMP AND NO GROUND STORAGE TANK

The next set of calculations is based on the Sustainment Brigade site for the TEMF which is the highest hazard of the buildings with fire booster pump. This calculation shows the available water from the best flow test, the system automatic sprinkler demand and required fire booster pump capacity.



SECTION 5.0 – SUMMARY

From the results of the fire flow tests and calculations, all three sites indicate inadequate pressure and will require fire pumps. In addition, the THAAD and JLENS sites indicate inadequate water supply volume and will require a ground storage water tank with fire pump. Required capacity of the ground storage water tank is 120 minutes of design fire flow. The rated capacity of each fire pump will need to be 1250 gpm.

5.1 – THAAD AND JLENS SITES RESULTS AND RECOMMENDATIONS

Results from Fire Flow Test #3 on Fire Hydrant #5300-15 near the existing Elevated Storage Water Tank #5301 indicate the available water from the existing main is 1603 gpm at 20 psi. The automatic sprinkler and outside hose demand is 1920 gpm at 20 psi and the automatic sprinkler demand is 1170 gpm at 77 psi.

Because the existing water mains at the site do not have the capacity to supply the systems with enough water volume, a ground storage water tank and fire pump will be required. Since the THAAD and JLENS sites are next to each other, our recommendation is to provide the THAAD and JLENS sites from one ground storage water tank and diesel powered fire pump designed to service both sites. The ground storage tank capacity is based on the greatest hazard which is the TEMF. The automatic sprinkler system design will require 150,000 gallons of storage and the fire pump capacity will need to be able to supply a minimum of 1170 gpm at 88 psi. The fire water main from the fire pump is recommended to be 8 inch minimum suction, distribution and supply mains.

The estimated construction cost estimate for the recommended fire protection water supply system for the THAAD and JLENS sites including the ground storage water tank and fire pump and the suction, distribution and service piping and related electrical for Phase 1 is \$1,445,000.

For locations of above ground storage water tank, fire pump and proposed suction, distribution and supply piping layout at the THAAD and JLENS sites see Schematic Drawing FT-1 in Appendix C at the end of this Report.



5.2 – Sustainment Brigade Site Results and Recommendations

Results from Fire Flow Test #5B on Fire Hydrant #2900-10 in Haan Road indicate the available water from the existing main is 2664 gpm at 20 psi. The automatic sprinkler and exterior hose demand is 1920 gpm at 20 psi and automatic sprinkler demand is 1170 gpm at 88 psi.

The existing water main has enough water volume to supply the automatic sprinkler and exterior hose demand but it does not have enough water pressure. No ground storage tank will be required but a fire booster pump will be necessary to boost the automatic sprinkler system pressure. A 1250 gpm at 55 psi diesel driven fire booster pump will be required to supply enough water to supply the hydraulically most remote hazard in the TEMF. Available water pressure on the suction side of the booster pump will be 54 psi. The fire water main from the fire pump is recommended to be 8 inch minimum suction, distribution and supply mains.

The estimated construction cost estimate for the recommended fire protection water supply system for the Sustainment Brigade site including the fire booster pump and the suction, distribution and service piping for Phase 1 is \$860,000.

For location of fire pump and proposed distribution and supply piping layout at the Sustainment Brigade site see Schematic Drawing FT-2 in Appendix C at the end of this Report.



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APPENDIX A

FORT BLISS WATER SERVICE COMPANY

FLOW TEST REPORTS



Fort Bliss
WATER SERVICES COMPANY
 A Subsidiary of American States Utility Services, Inc.

FLOW TEST REPORT

LOCATION Bldg # 5800 Area
TEST MADE BY Jorge Zalce
REPRESENTATIVE OF F.B.W.S.C
WITNESS Juan Del La Riva
PURPOSE OF TEST Hydrant fire flow
IF PUMPS AFFECT TEST, PUMPS WERE OFF
INDICATE PUMPS

DATE 9/11/2009
TIME 1400

FLOW HYDRANTS 5800-27
RESIDUAL HYDRANTS 5800-26

HYDRANT NO.	MAKE	lead valve	working	YEAR	OUTLET NOZZLE (IN)	OUTLET NOZZLE COEFFICIENT	STATIC PRESSURE (PSI)	RESIDUAL PRESSURE (PSI)	PITOT PRESSURE (PSI)	FLOW (GPM)	FLOW @ 20 PSI (GPM)
27 - 5800 Area	Muller	Y	Y	No Date	2.5	0.9	50	26	12	581	656
26 - 5800 Area	Muller	Y	Y	1958	2.5	0.9	50	26	15	650	733

* All Test were performed using dual hydrants



Fort Bliss
WATER SERVICES COMPANY
 A Subsidiary of American States Utility Services, Inc.

FLOW TEST REPORT

LOCATION Bldg # 5800 Area
TEST MADE BY Jorge Zalce
REPRESENTATIVE OF F.B.W.S.C
WITNESS Juan Del La Riva
PURPOSE OF TEST Hydrant fire flow
IF PUMPS AFFECT TEST, PUMPS were off
INDICATE PUMPS

DATE 9/11/2009
TIME 1500

FLOW HYDRANTS 5800-36
RESIDUAL HYDRANTS 5800-35

HYDRANT NO.	MAKE	lead valve	working	YEAR	OUTLET NOZZLE (IN)	OUTLET NOZZLE COEFFICIENT	STATIC PRESSURE (PSI)	RESIDUAL PRESSURE (PSI)	PITOT PRESSURE (PSI)	FLOW (GPM)	FLOW @ 20 PSI (GPM)
36 - 5800 Area	Kennedy	N	N	2000	2.5	0.9	50	26	18	712	803
35 - 5800 Area	Muller	Y	Y	1958	2.5	0.9	52	31	20	750	942

* All Test were performed using dual hydrants



FLOW TEST REPORT

LOCATION Hydrant 5300-15 Near Elevated Tank 5301
TEST MADE BY Juan Del La Riva
REPRESENTATIVE OF F.B.W.S.C.
WITNESS Cesar Garcia
PURPOSE OF TEST hydrant fire flow
IF PUMPS AFFECT TEST, BOOSTER PUMPS WERE OFF
INDICATE PUMPS

DATE 10/20/2009
TIME 2:30

FLOW HYDRANTS 5300-15
RESIDUAL HYDRANTS

HYDRANT NO.	MAKE	lead valve	working	YEAR	OUTLET NOZZLE (IN)	OUTLET NOZZLE COEFFICIENT	STATIC PRESSURE (PSI)	RESIDUAL PRESSURE (PSI)	PITOT PRESSURE (PSI)	FLOW (GPM)	FLOW @ 20 PSI (GPM)
5300-15	Muller	Y	Y	1966	2.5	0.9	54	40	35	993	1603



Fort Bliss
WATER SERVICES COMPANY
 A Subsidiary of American States Utility Services, Inc.

FLOW TEST REPORT

LOCATION Bldg # 2900 Area (Carrington & Haan)
TEST MADE BY Jorge Zalce
REPRESENTATIVE OF F.B.W.S.C
WITNESS Juan Del La Riva
PURPOSE OF TEST Hydrant fire flow
IF PUMPS AFFECT TEST, PUMPS were on
INDICATE PUMPS

DATE 9/16/2009
TIME 1:00

FLOW HYDRANTS 2900-6
RESIDUAL HYDRANTS 2900-7

HYDRANT NO.	MAKE	lead valve	working	YEAR	OUTLET NOZZLE (IN)	OUTLET NOZZLE COEFFICIENT	STATIC PRESSURE (PSI)	RESIDUAL PRESSURE (PSI)	PITOT PRESSURE (PSI)	FLOW (GPM)	FLOW @ 20 PSI (GPM)
6 - 2900 Area	Muller	N		1976	2.5	0.9	60	38	37	1021	1410
7 - 2900 Area	Muller	N		1976	2.5	0.9	60	40	37	1021	1484

* All Test were performed using dual hydrants



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 A Subsidiary of American States Utility Services, Inc.

FLOW TEST REPORT

LOCATION #2900-10 Haan (between Carrington & Kramer)
TEST MADE BY Juan Del La Riva
REPRESENTATIVE OF F.B.W.S.C.
WITNESS Cesar Garcia
PURPOSE OF TEST hydrant fire flow
IF PUMPS AFFECT Booster Pumps were off
TEST, INDICATE PUMPS

FLOW HYDRANTS #2900-9
RESIDUAL HYDRANTS #2900-10

HYDRANT NO.	MAKE	lead valve	working	YEAR	OUTLET NOZZLE (IN)	OUTELT NOZZLE COEFFICIENT	STATIC PRESSURE (PSI)	RESIDUAL PRESSURE (PSI)	PITOT PRESSURE (PSI)	FLOW (GPM)	FLOW @ 20 PSI (GPM)
#2900-9	Muller	Y	Y	1976	2.5	0.9	64	54	50	1186	2641
#2900-10	Muller	Y	Y	2001	2.5	0.9	64	56	40	1061	2664

* All Test were performed using dual hydrants



FLOW TEST REPORT

LOCATION #2900-23 Stennis (between Carrington & Kramer)
TEST MADE BY Juan Del La Riva
REPRESENTATIVE OF F.B.W.S.C.

WITNESS Cesar Garcia
PURPOSE OF TEST hydrant fire flow
IF PUMPS AFFECT Booster Pumps were off
TEST, INDICATE PUMPS

DATE 10/14/2009
TIME 11:00

FLOW HYDRANTS #2900-23
RESIDUAL HYDRANTS #2900-22

HYDRANT NO.	MAKE	lead valve	working	YEAR	OUTLET NOZZLE (IN)	OUTLET NOZZLE COEFFICIENT	STATIC PRESSURE (PSI)	RESIDUAL PRESSURE (PSI)	PITOT PRESSURE (PSI)	FLOW (GPM)	FLOW @ 20 PSI (GPM)
#2900-23	Muller	Y	Y	1997	2.5	0.9	50	40	30	919	1663
#2900-22	Muller	N	N	2001	2.5	0.9	50	40	35	993	1797

* All Test were performed using dual hydrants



APPENDIX B

FIRE PROTECTION AUTOMATIC SPRINKLER CALCULATIONS

HUITT - ZOLLARS, INC.

SHEET NO: 1	OF: 2
DESIGN: TSB	CHECKED: SEP

DATE: 11-12-2009	PROJECT NO: 01-4844.01	PROJECT: FT BLISS THAAD, JLENS AND SUSTAINMENT BRIGADE
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REVISED DATE:

FIRE PROTECTION AUTOMATIC SPRINKLER CALCULATIONS

BUILDING: TYPICAL COF WITH NO PUMP

A. GENERAL INFORMATION (FLOW TEST DATA :FIRE HYDRANT 5300-15 ON 09-11-2009) :

STATIC PRESSURE :		PSI
RESIDUAL PRESSURE :		PSI
FLOW @ RESIDUAL PRESSURE		GPM
FLOW @ 20 PSI		GPM

B. DESIGN BASIS :

DESIGN IS BASED ON ORDINARY HAZARD GROUP 2 WITH A MINIMUM DENSITY OF 0.2 GPM/SF OVER 3000 SF.

ROOF PITCH IS 1IN 6 OR LESS.

C. REQUIRED WATER FLOW :

AUTOMATIC SPRINKLER DEMAND :			
0.2 GPM/SQ. FT. (DENSITY) X 3000 SQ. FT.			
(DESIGN AREA) X 30 % (OVERAGE) =	780	GPM	
HOSE STREAM DEMAND (EXTRA HAZARD GROUP 1) =	0	GPM	
OTHER (IN RACK SPRINKLERS)	0	GPM	
TOTAL WATER DEMAND =	780	GPM	

D. REQUIRED WATER PRESSURE :

STANDPIPE - END HOSE PRESSURE =	0	PSI
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AUTOMATIC SPRINKLER - MOST REMOTE HEAD PRESSURE :

0.2 GPM/SQ. FT. (DENSITY) X 130 SQ. FT.		
(AREA/SPRINKLER) 8 K FACTOR SQUARED=	10.6	PSI

(K FACTOR = 5.6 FOR 0.50" SPRINKLER ORIFICE)

(K FACTOR = 8.0 FOR 0.75" SPRINKLER ORIFICE)

ELEVATION LOSS :

35 FT. (BLDG. HEIGHT) X 0.433 PSI/ FT. =	15.2	PSI
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EXTERIOR PIPING FRICTION LOSS :

(UTILIZING 10" DISTRIBUTION AND 8" SUPPLY MAINS)	8	PSI
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HUITT - ZOLLARS, INC.

SHEET NO: 2	OF: 2
DESIGN: TSB	CHECKED: SEP

DATE: 11-12-2009	PROJECT NO: 01-4844.01	PROJECT: FT BLISS THAAD, JLENS AND SUSTAINMENT BRIGADE
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REVISED DATE:

FIRE PROTECTION AUTOMATIC SPRINKLER CALCULATIONS

BUILDING: TYPICAL COF WITH NO PUMP

INTERIOR PIPING FRICTION LOSS :		
(20 PSI MINIMUM) =	20	PSI
BACKFLOW PREVENTER FRICTION LOSS =	5	PSI
SAFETY FACTOR =	10	PSI
TOTAL REQUIRED WATER PRESSURE =	68.7	PSI

HUITT - ZOLLARS, INC.

SHEET NO: 1	OF: 2
DESIGN: TSB	CHECKED: SEP

DATE: 11-12-2009	PROJECT NO: 01-4844.01	PROJECT: FT BLISS THAAD, JLENS AND SUSTAINMENT BRIGADE
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REVISED DATE:

FIRE PROTECTION AUTOMATIC SPRINKLER CALCULATIONS

BUILDING: TYPICAL DEPLOY STORAGE WITH NO PUMP

A. GENERAL INFORMATION:

STATIC PRESSURE :		PSI
RESIDUAL PRESSURE :		PSI
FLOW @ RESIDUAL PRESSURE		GPM
FLOW @ 20 PSI		GPM

B. DESIGN BASIS :

DESIGN IS BASED ON MISCELLANEOUS FLOOR STORAGE OF CLASS IV COMMODITIES STORED ON FLOOR 8 FEET HIGH OR LESS. DESIGN HAZARD IS BASED ON AN ORDINARY HAZARD DRY PIPE AUTOMATIC SPRINKLER SYSTEM WITH A DENSITY OF 0.2 GPM/SF OVER 3900 SF AS PER UFC 3-600, TABLE 4.1.

ROOF PITCH IS 1IN 6 OR LESS.

C. REQUIRED WATER FLOW :

AUTOMATIC SPRINKLER DEMAND :				
0.2 GPM/SQ. FT. (DENSITY) X 3900 SQ. FT.				
(DESIGN AREA) X 30 % (OVERAGE) =		1014		GPM
HOSE STREAM DEMAND (EXTRA HAZARD GROUP 1) =		0		GPM
OTHER (IN RACK SPRINKLERS)		0		GPM
TOTAL REQUIRED WATER DEMAND =		1014		GPM

D. REQUIRED WATER PRESSURE :

STANDPIPE - END HOSE PRESSURE =		0		PSI
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AUTOMATIC SPRINKLER - MOST REMOTE HEAD PRESSURE :

0.2 GPM/SQ. FT. (DENSITY) X 130 SQ. FT.				
(AREA/SPRINKLER) 8 K FACTOR SQUARED=		10.6		PSI

(K FACTOR = 5.6 FOR 0.50" SPRINKLER ORIFICE)

(K FACTOR = 8.0 FOR 0.75" SPRINKLER ORIFICE)

ELEVATION LOSS :

35 FT. (BLDG. HEIGHT) X 0.433 PSI/ FT. =		15.2		PSI
--	--	------	--	-----

EXTERIOR PIPING FRICTION LOSS :

(UTILIZING 10" DISTRIBUTION AND 8" SUPPLY MAINS)		8		PSI
--	--	---	--	-----

HUITT - ZOLLARS, INC.

SHEET NO: 2	OF: 2
DESIGN: TSB	CHECKED: SEP

DATE: 11-12-2009	PROJECT NO: 01-4844.01	PROJECT: FT BLISS THAAD, JLENS AND SUSTAINMENT BRIGADE
------------------	------------------------	--

REVISED DATE:

FIRE PROTECTION AUTOMATIC SPRINKLER CALCULATIONS

BUILDING: TYPICAL DEPLOY STORAGE WITH NO PUMP

INTERIOR PIPING FRICTION LOSS :		
(20 PSI MINIMUM) =	20	PSI
BACKFLOW PREVENTER FRICTION LOSS =	5	PSI
SAFETY FACTOR =	10	PSI
TOTAL REQUIRED WATER PRESSURE =	68.7	PSI

HUITT - ZOLLARS, INC.

SHEET NO: 1	OF: 2
DESIGN: TSB	CHECKED: SEP

DATE: 11-12-2009	PROJECT NO: 01-4844.01	PROJECT: FT BLISS THAAD, JLENS AND SUSTAINMENT BRIGADE
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REVISED DATE:

FIRE PROTECTION AUTOMATIC SPRINKLER CALCULATIONS

BUILDING: TYPICAL TEMF WITH NO PUMP

A. GENERAL INFORMATION (FLOW TEST DATA :FIRE HYDRANT 5800-35 ON 09-11-2009) :

STATIC PRESSURE :		PSI
RESIDUAL PRESSURE :		PSI
FLOW @ RESIDUAL PRESSURE		GPM
FLOW @ 20 PSI		GPM

B. DESIGN BASIS :

DESIGN IS BASED ON MISCELLANEOUS RACK STORAGE OF CLASS IV COMMODITIES STACKED ON OPEN RACKS 12 FEET OR LESS IN HEIGHT. MINIMUM DESIGN OF AUTOMATIC SPRINKLERS SHALL BE EXTRA HAZARD GROUP 1 OCCUPANCY (0.30 GPM/SF OVER 3000 SF) AS PER NFPA13-2007, TABLE13.2.1.

ROOF PITCH IS 1IN 6 OR LESS.

C. REQUIRED WATER FLOW :

AUTOMATIC SPRINKLER DEMAND :			
0.3	GPM/SQ. FT. (DENSITY) X	3000	SQ. FT.
(DESIGN AREA)	X	30	% (OVERAGE) =
			1170 GPM
HOSE STREAM DEMAND (EXTRA HAZARD GROUP 1) =			
			0 GPM
OTHER (IN RACK SPRINKLERS)			
			0 GPM
TOTAL REQUIRED WATER DEMAND =			
			1170 GPM

D. REQUIRED WATER PRESSURE :

STANDPIPE - END HOSE PRESSURE =		0	PSI
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AUTOMATIC SPRINKLER - MOST REMOTE HEAD PRESSURE :

0.3	GPM/SQ. FT. (DENSITY) X	100	SQ. FT.
(AREA/SPRINKLER)	X	8	K FACTOR SQUARED=
			14.1 PSI

(K FACTOR = 5.6 FOR 0.50" SPRINKLER ORIFICE)

(K FACTOR = 8.0 FOR 0.75" SPRINKLER ORIFICE)

ELEVATION LOSS :

35	FT. (BLDG. HEIGHT) X	0.433	PSI/ FT. =
			15.2 PSI

EXTERIOR PIPING FRICTION LOSS :

(UTILIZING 10" DISTRIBUTION AND 8" SUPPLY MAINS)			
			8 PSI

HUITT - ZOLLARS, INC.

SHEET NO: 2	OF: 2
DESIGN: TSB	CHECKED: SEP

DATE: 11-12-2009	PROJECT NO: 01-4844.01	PROJECT: FT BLISS THAAD, JLENS AND SUSTAINMENT BRIGADE
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REVISED DATE:

FIRE PROTECTION AUTOMATIC SPRINKLER CALCULATIONS

BUILDING: TYPICAL TEMF WITH NO PUMP

INTERIOR PIPING FRICTION LOSS :		
(20 PSI MINIMUM) =	20	PSI
BACKFLOW PREVENTER FRICTION LOSS =	5	PSI
SAFETY FACTOR =	10	PSI
TOTAL REQUIRED WATER PRESSURE =	72.2	PSI

HUITT - ZOLLARS, INC.

SHEET NO: 1	OF: 2
DESIGN: TSB	CHECKED: SEP

DATE: 11-12-2009	PROJECT NO: 01-484401.01	PROJECT: FT BLISS THAAD, JLENS AND SUSTAINMENT BRIGADE
------------------	--------------------------	--

REVISED DATE:

FIRE PROTECTION AUTOMATIC SPRINKLER CALCULATIONS

BUILDING: THAAD & JLENS TEMF WITH PUMP AND GROUND STORAGE WATER TANK

A. GENERAL INFORMATION (FLOW TEST DATA :FIRE HYDRANT 5800-26 ON 09-11-2009) :

STATIC PRESSURE :	50	PSI
RESIDUAL PRESSURE :	26	PSI
FLOW @ RESIDUAL PRESSURE	650	GPM
FLOW @ 20 PSI	733	GPM

B. DESIGN BASIS :

DESIGN IS BASED ON MISCELLANEOUS RACK STORAGE OF CLASS IV COMMODITIES STACKED ON OPEN RACKS 12 FEET OR LESS IN HEIGHT. MINIMUM DESIGN OF AUTOMATIC SPRINKLERS SHALL BE EXTRA HAZARD GROUP 1 OCCUPANCY (0.30 GPM/SF OVER 3000 SF) AS PER NFPA13-2007, TABLE13.2.1.

ROOF PITCH IS 1IN 6 OR LESS.

C. REQUIRED WATER FLOW :

AUTOMATIC SPRINKLER DEMAND :			
0.3 GPM/SQ. FT. (DENSITY) X 3000 SQ. FT.			
(DESIGN AREA) X 30 % (OVERAGE) =	1170	GPM	
HOSE STREAM DEMAND (EXTRA HAZARD GROUP 1) =	0	GPM	
OTHER (IN RACK SPRINKLERS)	0	GPM	
TOTAL WATER DEMAND =	1170	GPM	

D. REQUIRED WATER PRESSURE :

STANDPIPE - END HOSE PRESSURE =	0	PSI
---------------------------------	---	-----

AUTOMATIC SPRINKLER - MOST REMOTE HEAD PRESSURE :

0.3 GPM/SQ. FT. (DENSITY) X 100 SQ. FT.		
(AREA/SPRINKLER) 8 K FACTOR SQUARED=	14.1	PSI

(K FACTOR = 5.6 FOR 0.50" SPRINKLER ORIFICE)

(K FACTOR = 8.0 FOR 0.75" SPRINKLER ORIFICE)

ELEVATION LOSS :

35 FT. (BLDG. HEIGHT) X 0.433 PSI/ FT. =	15.2	PSI
--	------	-----

EXTERIOR PIPING FRICTION LOSS : (BASED ON 1170 GPM SPRK.)

10 MAIN SIZE (IN.) :	2500	LF X
0.0032 PSI/LF =	8.0	PSI

HUITT - ZOLLARS, INC.

SHEET NO: 2	OF: 2
DESIGN: TSB	CHECKED: SEP

DATE: 11-12-2009	PROJECT NO: 01-4844.01	PROJECT: FT BLISS THAAD, JLENS AND SUSTAINMENT BRIGADE
------------------	------------------------	--

REVISED DATE:

FIRE PROTECTION AUTOMATIC SPRINKLER CALCULATIONS

BUILDING: THAAD & JLENS TEMF WITH PUMP AND GROUND STORAGE WATER TANK

EXTERIOR PIPING FRICTION LOSS : (BASED ON 1170 GPM SPRK.)

8	MAIN SIZE (IN.) :	1000	LF X		
0.0093	PSI/LF =			9.3	PSI

INTERIOR PIPING FRICTION LOSS :
(20 PSI MINIMUM) =

20 PSI

BACKFLOW PREVENTER FRICTION LOSS =

0 PSI

SAFETY FACTOR =

10 PSI

TOTAL REQUIRED WATER PRESSURE =

76.5 PSI

E. PRESSURE SUMMARY :

TOTAL REQUIRED WATER PRESSURE =	76.5
AVAILABLE RESIDUAL PRESSURE (SEE GRAPH) =	0.0
EXCESS PRESSURE =	0.0
REQUIRED PUMP BOOST =	100.0

F. BOOSTER PUMP SELECTION :

TYPE :	HORIZONTAL SPLIT CASE - DIESEL				
MANUFACTURER AND MODEL :	FAIRBANKS MORSE #6-1824BF				
SUCTION SIZE (IN) :	8	DISCHARGE SIZE(IN):	6		
1250 GPM @	100	PSI			
175 HP	1750	RPM @	120	VAC - 1 PH	

G. GROUND STORAGE RESERVOIR CAPACITY:

1170 GPM TOTAL WATER DEMAND X	
120 MINUTES =	140400 GALS.

H. GROUND STORAGE RESERVOIR SELECTION:

HEIGHT :	20	FT.	DIAMETER :	34	FT.
NOMINAL CAPACITY	150,000 GALS.				

HUITT - ZOLLARS, INC.

SHEET NO: 1	OF: 3
DESIGN: TSB	CHECKED: SEP

DATE: 11-12-2009	PROJECT NO: 01-4844.01	PROJECT: FT BLISS THAAD, JLENS AND SUSTAINMENT BRIGADE
------------------	------------------------	--

REVISED DATE:

FIRE PROTECTION AUTOMATIC SPRINKLER CALCULATIONS

BUILDING: SUSTAINMENT BRIGADE TEMF WITH PUMP AND NO GROUND STORAGE WATER TANK

A. GENERAL INFORMATION (FLOW TEST DATA :FIRE HYDRANT 5300-15 ON 09-11-2009) :

STATIC PRESSURE :	64	PSI
RESIDUAL PRESSURE :	56	PSI
FLOW @ RESIDUAL PRESSURE	1061	GPM
FLOW @ 20 PSI	2664	GPM

B. DESIGN BASIS :

DESIGN IS BASED ON MISCELLANEOUS RACK STORAGE OF CLASS IV COMMODITIES STACKED ON OPEN RACKS 12 FEET OR LESS IN HEIGHT. MINIMUM DESIGN OF AUTOMATIC SPRINKLERS SHALL BE EXTRA HAZARD GROUP 1 OCCUPANCY (0.30 GPM/SF OVER 3000 SF) AS PER NFPA13-2007, TABLE13.2.1.

ROOF PITCH IS 1IN 6 OR LESS.

C. REQUIRED WATER FLOW :

AUTOMATIC SPRINKLER DEMAND :		
0.3 GPM/SQ. FT. (DENSITY) X	3000 SQ. FT.	
(DESIGN AREA) X	30 % (OVERAGE) =	1170 GPM
HOSE STREAM DEMAND (EXTRA HAZARD GROUP 1) = 0 GPM		
OTHER (IN RACK SPRINKLERS) 0 GPM		
TOTAL WATER DEMAND = 1170 GPM		

D. REQUIRED WATER PRESSURE :

STANDPIPE - END HOSE PRESSURE = 0 PSI

AUTOMATIC SPRINKLER - MOST REMOTE HEAD PRESSURE :

0.3 GPM/SQ. FT. (DENSITY) X	100 SQ. FT.	
(AREA/SPRINKLER)	8 K FACTOR SQUARED=	14.1 PSI

(K FACTOR = 5.6 FOR 0.50" SPRINKLER ORIFICE)

(K FACTOR = 8.0 FOR 0.75" SPRINKLER ORIFICE)

ELEVATION LOSS :

30 FT. (BLDG. HEIGHT) X	0.433 PSI/ FT. =	13.0 PSI
-------------------------	------------------	----------

EXTERIOR PIPING FRICTION LOSS : (BASED ON 1170 GPM SPRK.)

10 MAIN SIZE (IN.) :	2900 LF X	
0.0032 PSI/LF =		9.3 PSI

HUITT - ZOLLARS, INC.

SHEET NO: 2	OF: 3
DESIGN: TSB	CHECKED: SEP

DATE: 11-12-2009	PROJECT NO: 01-4844.01	PROJECT: FT BLISS THAAD, JLENS AND SUSTAINMENT BRIGADE
------------------	------------------------	--

REVISED DATE:

FIRE PROTECTION AUTOMATIC SPRINKLER CALCULATIONS

BUILDING: SUSTAINMENT BRIGADE TEMF WITH PUMP AND NO GROUND STORAGE WATER TANK

EXTERIOR PIPING FRICTION LOSS : (BASED ON 1170 GPM SPRK.)			
8	MAIN SIZE (IN.) :	1800	LF X
0.0093	PSI/LF =	16.7	PSI
INTERIOR PIPING FRICTION LOSS :			
(20 PSI MINIMUM) =			
		20	PSI
BACKFLOW PREVENTER FRICTION LOSS =			
		5	PSI
SAFETY FACTOR =			
		10	PSI
TOTAL REQUIRED WATER PRESSURE =			
		88.1	PSI

E. PRESSURE SUMMARY :

TOTAL REQUIRED WATER PRESSURE =	88.1
AVAILABLE RESIDUAL PRESSURE (SEE GRAPH) =	54.4
EXCESS PRESSURE =	-33.7
REQUIRED PUMP BOOST =	55.0

F. BOOSTER PUMP SELECTION :

TYPE :	HORIZONTAL SPLIT CASE - DIESEL		
MANUFACTURER AND MODEL :	FAIRBANKS MORSE #6-1823CF		
SUCTION SIZE (IN) :	8	DISCHARGE SIZE(IN):	6
1250 GPM @	55	PSI	
73 HP	1750	RPM @	120 VAC - 1 PH
4000 FEET ELEVATION			
120 DEGREES F AMBIENT TEMPERATURE			

G. GROUND STORAGE RESERVOIR CAPACITY:	NA
1170 GPM TOTAL WATER DEMAND X	
MINUTES =	0 GALS.

H. GROUND STORAGE RESERVOIR SELECTION:	NA
HEIGHT : FT. DIAMETER :	FT.
NOMINAL CAPACITY:	GALS.

HUITT - ZOLLARS, INC.

SHEET NO: 3	OF: 3
DESIGN: TSB	CHECKED: SEP

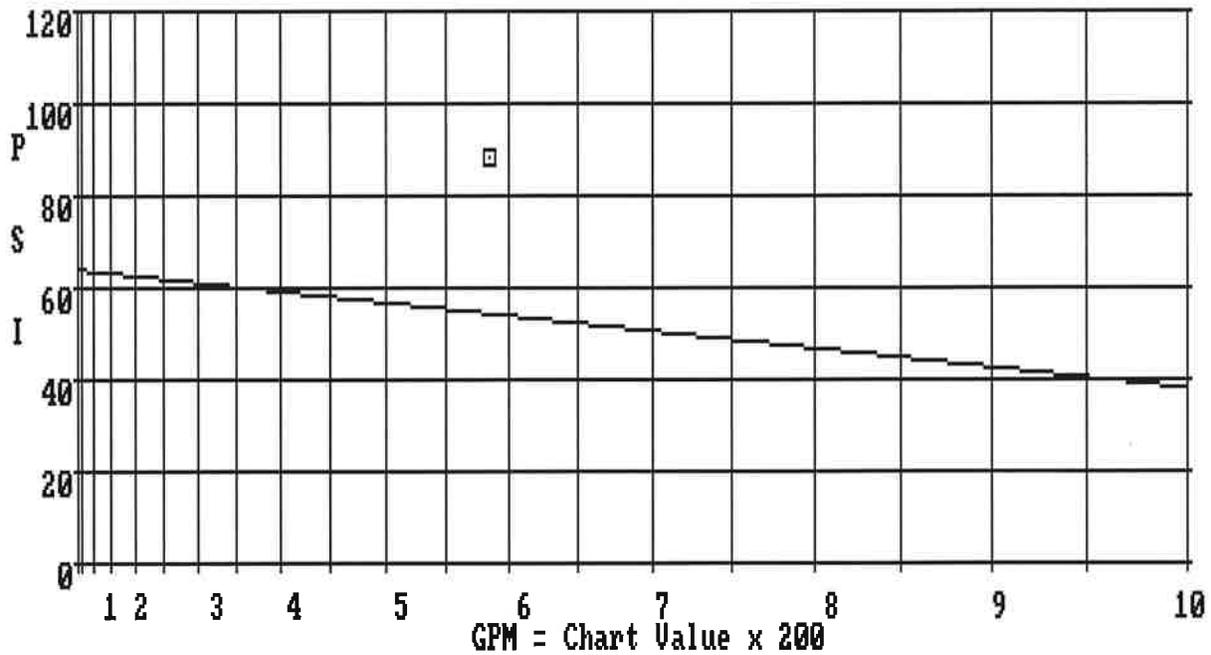
DATE: 11-12-2009	PROJECT NO: 01-4844.01	PROJECT: FT BLISS THAAD, JLENS AND SUSTAINMENT BRIGADE
------------------	------------------------	--

REVISED DATE:

FIRE PROTECTION AUTOMATIC SPRINKLER CALCULATIONS

BUILDING: SUSTAINMENT BRIGADE TEMF WITH PUMP AND NO GROUND STORAGE WATER TANK

HYDRAULICS SUPPLY/DEMAND GRAPH



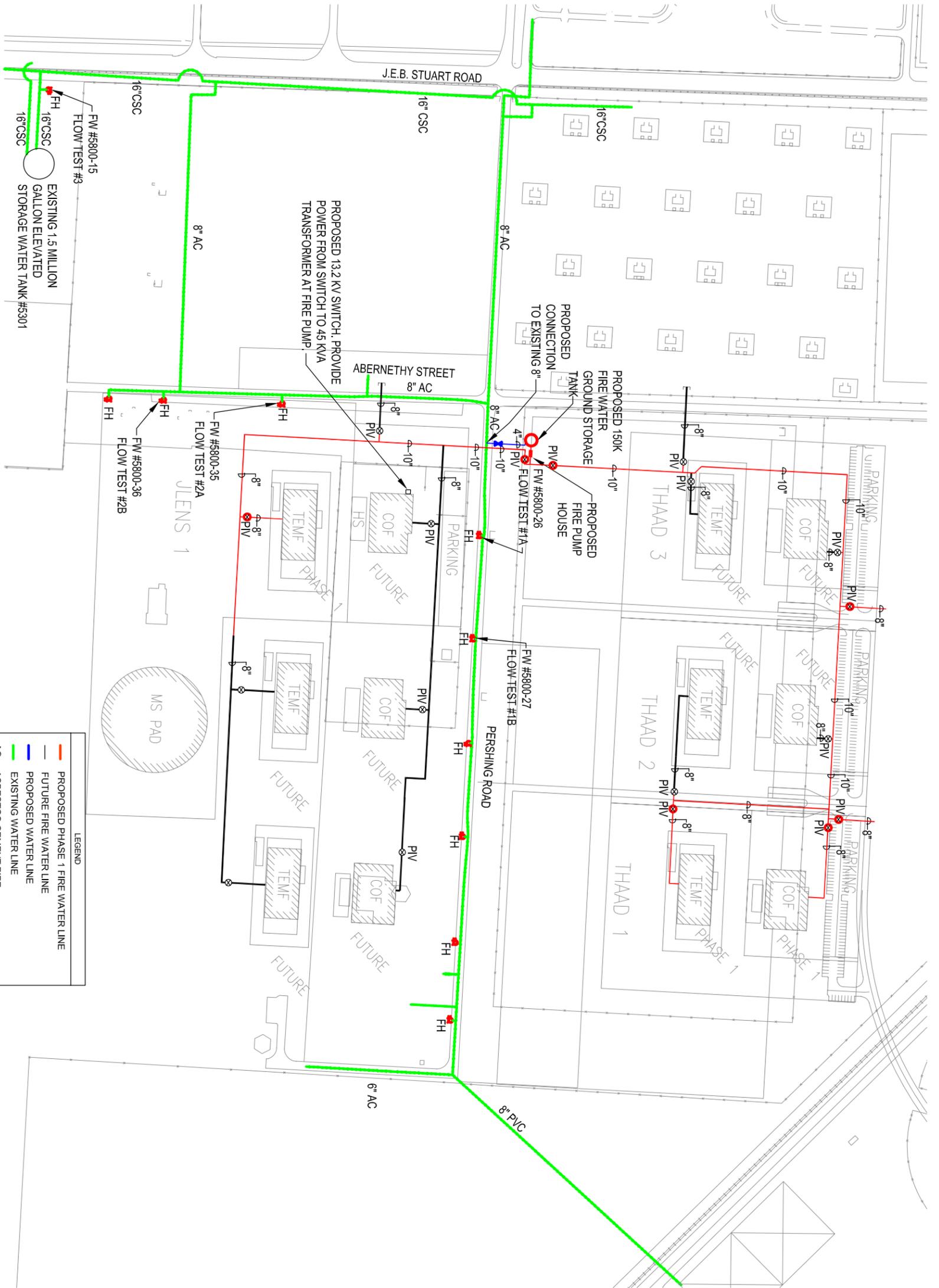
ADJUSTED HYDRANT DATA: 1061 GPM, 64 STATIC PSI, 56 RESIDUAL PSI
 DEMAND POINT DATA: 1170 GPM, 88.09 GAUGE PSI, -33.69 EXCESS PSI



US Army Corps
of Engineers
Fort Worth District

APPENDIX C

SCHEMATIC DRAWINGS



PROPOSED 13.2 KV SWITCH, PROVIDE POWER FROM SWITCH TO 45 KVA TRANSFORMER AT FIRE PUMP.

PROPOSED 150K FIRE WATER GROUND STORAGE TANK
 PROPOSED FIRE PUMP HOUSE
 PROPOSED CONNECTION TO EXISTING 8\"/>

THAAD AND JLENS SITE

LEGEND	
	PROPOSED PHASE 1 FIRE WATER LINE
	FUTURE FIRE WATER LINE
	PROPOSED WATER LINE
	EXISTING WATER LINE
	ASBESTOS CEMENT PIPE
	CONCRETE STEEL CYLINDER PIPE
	EXISTING FIRE HYDRANT
	PROPOSED PHASE 1 POST INDICATOR VALVE
	FUTURE POST INDICATOR VALVE
	VALVE IN BOX

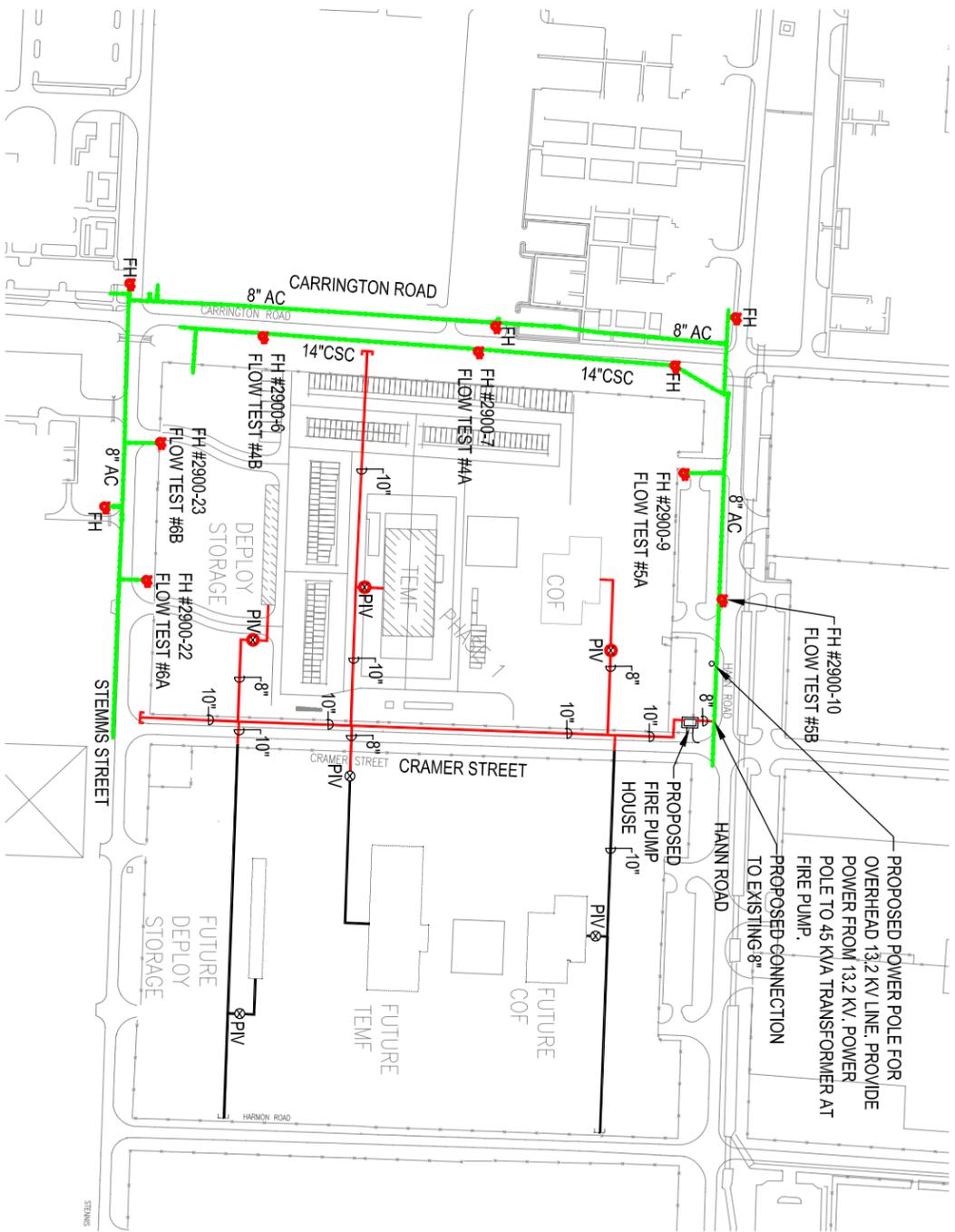
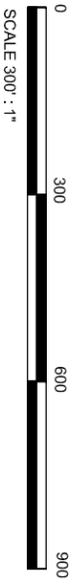


THAAD, JLENS AND SUSTAINMENT BRIGADE FIRE SYSTEM STUDY EXHIBIT



JACOBS/HUNT-ZOLLARS
 6688 North Central Expressway
 Suite 400, MB13
 Dallas, Texas 75206

DATE:	11-12-09
DRAWN:	LDM
DESIGNED:	TSB
CHECKED:	TSB
PROJ. NO.:	01-4844-01
SHEET:	FT-1



LEGEND	
	PROPOSED PHASE 1 FIRE WATER LINE
	FUTURE FIRE WATER LINE
	PROPOSED WATER LINE
	EXISTING WATER LINE
	ASBESTOS CEMENT PIPE
	CONCRETE STEEL CYLINDER PIPE
	EXISTING FIRE HYDRANT
	PROPOSED PHASE 1 POST INDICATOR VALVE
	FUTURE POST INDICATOR VALVE

SUSTAINMENT SITE



THAAD, JLENS AND SUSTAINMENT BRIGADE FIRE SYSTEM STUDY EXHIBIT



JACOBS/HUNT-ZOLLARS
 6688 North Central Expressway
 Suite 400, MB13
 Dallas, Texas 75206

DATE: 11-12-09
 DRAWN: LDM
 DESIGNED: TSB
 CHECKED: TSB
 PROJ. NO. 01-4844-01
 SHEET: FT-2

APPENDIX E

ENVIRONMENTAL INFORMATION

APPENDIX E
ENVIRONMENTAL DOCUMENTS
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- Potable Regulatory Policy (Policy Letter #16)
- Cross Connection Control Manual for Fort Bliss
- Fort Bliss Directorate of Public Works Environmental Division Requirements for Planning, Design and Construction
- * HAZMAT Storage

Potable Regulatory Policy (Policy Letter #16)

REPLY TO
ATTENTION OF:

DEPARTMENT OF THE ARMY
HEADQUARTERS, U. S. ARMY GARRISON COMMAND
BUILDING 1 PERSHING ROAD
FORT BLISS, TEXAS 79916-6812

IMSW-BLS-ZA

1 April 2006

POLICY LETTER #16

SUBJECT: Potable Water Regulatory Policy: Plumbing Customer Service Inspections (CSI) and Backflow Prevention Assembly Test Forms

1. **PURPOSE:** The Fort Bliss Water Services Company (FBWS) operates 9 water systems on Post: Fort Bliss Main Post, Biggs Army Air Field, Site Monitor, McGregor/Meyer Range Camp, Dona Ana Range Camp, Oro Grande Range Camp, Hueco Range Camp, SHORAD, and Redeye. FBWS is responsible for protecting the drinking water supply in accordance with State Regulations (Title 30 Texas Administrative Code 290.46(j), New Mexico Administrative Code 20.7.10.400(L)) from contamination or pollution which could result from improper water system plumbing construction or configuration.

2. Effective immediately, Customer Service Inspection certificates shall be completed prior to providing continuous water service to new construction or after significant plumbing renovations on any existing service or any existing service when the FBWS has reason to believe that cross-connections or other potential contaminant hazard exist or after any material improvement, correction, or addition to the water distribution facilities. As unacceptable plumbing practices are discovered, they shall be promptly eliminated to prevent possible contamination of the water supply. Also, any backflow prevention devices installed shall be installed in accordance with the Fort Bliss Cross-Connection Control Manual (FBCCCM), and tested in accordance with the FBCCCM.

3. **RESTRICTIONS:** The following unacceptable practices are prohibited:

a. No direct connection between the public drinking water supply and a potential source of contamination is permitted. Potential sources of contamination shall be isolated from the public water supply in accordance with the FBCCCM.

b. No cross-connection between the public water supply and a private water system is permitted. These potential threats to the public drinking water supply shall be eliminated at the service connection by the installation of an air-gap or a reduced pressure-zone backflow prevention device.

c. No connection which allows water to be returned to the public drinking water supply is permitted.

POLICY LETTER #16

SUBJECT: Potable Water Service Agreement: Plumbing Customer Service Inspections (CSI) and Backflow Test Forms

d. No pipe or pipe fitting which contains more than 8.0% lead may be used for the installation or repair of plumbing at any connection which provides water for human use.

e. No solder or flux which contains more than 0.2% lead can be used for the installation or repair of plumbing at any connection which provides water for human use.

3. This policy applies to work completed on all Fort Bliss facilities whether work is done by contract or in-house. Activities must insure that their contractors/ subcontractors follow this requirement.

4. Inspectors must possess proper credentials and be recognized as capable of conducting a customer service inspection certification by the State of Texas. Customer Service inspections may be performed by the following group members:

a. Plumbing Inspectors and Water Supply Protection Specialists licensed by the Texas State Board of Plumbing Examiners.

b. Customer Service Inspectors licensed by the Texas Commission of Environmental Compliance (TCEQ).

5. Recognized Backflow assembly testers must possess a current license from the TCEQ.

6. Submit completed customer service inspection and/or backflow test forms to the Directorate of Environment (DOE), IMSW-BLS-Z, Bldg 622, Attn: Water Program Manager, Fort Bliss, Texas 79916, or in person at bldg 622 room 111, or by fax at 568-1333. Copies of the FBCCCM are available from the DOE Water Program Manager, office phone number 568-6364. Forms will be maintained by the Directorate of Environment for a minimum of 10 years and be made readily available for review by the State regulatory entity.

- 2 Enclosures
- 1. CSI Certificate
- 2. Backflow Assembly Test Report

ROBERT T. BURNS
 COL, AD
 Commanding

FORT BLISS CUSTOMER SERVICE INSPECTION CERTIFICATE

Name of PWS: _____ PWS I.D.# _____

Bldg No. or Facility Description: _____

Contract # or Work Order #: _____

Contract issued by: _____ Prime Contractor: _____

Reason for Inspection:

- New construction
- Existing service where contaminant hazards are suspected
- Major renovation or expansion of distribution facilities

I _____, upon inspection of the private water distribution facilities connected to the aforementioned public water supply (PWS) do hereby certify that, to the best of my knowledge:

Compliance Non-compliance

- | | | |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | 1. No direct connection between the public drinking water supply and a potential source of contamination exists. Potential sources of contamination are isolated from the public water system by an air gap or an appropriate backflow prevention assembly in accordance with Commission regulations. |
| <input type="checkbox"/> | <input type="checkbox"/> | 2. No cross-connection between the public drinking water supply and a private water system exists. Where an actual air gap is not maintained between the public water supply and a private water supply, an approved reduced pressure-zone backflow prevention assembly is properly installed and a service agreement exists for annual inspection and testing by a certified backflow prevention assembly tester. |
| <input type="checkbox"/> | <input type="checkbox"/> | 3. No connection exists which would allow the return of water used for condensing, cooling or industrial processes back to the public water supply. |
| <input type="checkbox"/> | <input type="checkbox"/> | 4. No pipe or pipe fitting which contains more than 8.0% lead exists in private water distribution facilities installed on or after July 1, 1988. |
| <input type="checkbox"/> | <input type="checkbox"/> | 5. No solder or flux which contains more than 0.2% lead exists in private water distribution facilities installed on or after July 1, 1988. |

I further certify that the following materials were used in the installation of the private water distribution facilities:

- Service lines Lead Copper PVC Other
 Solder Lead Lead Free Solvent Weld Other

Copy of inspector's certification card submitted to DOE. yes no *(If no, please attach copy of inspector's certification card.)*

I recognize that this document shall become a permanent record of the aforementioned Public Water System and that I am legally responsible for the validity of the information I have provided.

Remarks: _____

Signature of Inspector

Registration Number

Title

Type of Registration

Date

<h2 style="margin: 0;">Fort Bliss</h2> <h3 style="margin: 0;">Backflow Prevention Assembly Test Report</h3> <p style="margin: 0;">ATZC-DOE, Building 622, Fort Bliss, TX 79916</p> <p style="margin: 0;">Phone: (915) 568-1041 Fax: (915) 568-1333</p>			
<p>General Information</p> <p>Area / Range Camp _____ Building Name _____</p> <p>Building Number _____ Building Location _____</p> <p>Point of Contact _____ Phone _____</p>			
<p>Current Assembly Information</p> <p>Manufacturer _____ Model _____</p> <p>Serial No. _____ Size _____ Tag _____</p> <p>Type of service: <input type="checkbox"/> Containment/Domestic <input type="checkbox"/> Containment/Fire System <input type="checkbox"/> Containment/Lawn Irr. <input type="checkbox"/> Isolation</p> <p>Specific physical location of assembly: _____</p> <p>Equipment or system isolated: _____</p>		<p>Removed Assembly Information</p> <p>Manufacturer _____</p> <p>Model _____</p> <p>Size _____</p> <p>Serial No. _____</p>	
		<p>Gauge Information ID _____</p> <p>Manufacturer _____</p> <p>Model _____</p> <p>Serial No. _____</p> <p>Last date of calibration _____</p>	
<p>Test Results Status <input type="checkbox"/> Pass <input type="checkbox"/> Fail</p>		<p>Additional Requirements <input type="checkbox"/> Yes <input type="checkbox"/> N/A</p> <p>Thermal Expansion Control Present? <input type="checkbox"/> No <input type="checkbox"/> Unknown (Containment domestic only)</p> <p>Requirements made known? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A</p> <p>Adequate Freeze Protection Present? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A</p> <p>Requirements made known? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A</p>	
<p style="text-align: center;">RP</p> <p>CV1 AR _____</p> <p>RV _____</p> <p>CV2 Tight? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>CV1 CR _____</p> <p>CV2 _____</p> <p>Buffer _____</p>	<p style="text-align: center;">DC</p> <p>CV1 _____</p> <p>CV2 _____</p>	<p style="text-align: center;">PVB SVB</p> <p>_____ AIV _____</p> <p>_____ CV _____</p>	<p>Comments or Repairs made: _____</p> <p>Test Type <input type="checkbox"/> Initial <input type="checkbox"/> Annual <input type="checkbox"/> Repair <input type="checkbox"/> Relocate</p>
<p>The backflow prevention assembly detailed on this report has been tested and maintained as required and is certified to be operating within acceptable parameters. I also certify that I tested this assembly and the test results are true.</p>			
<p>Technician ID _____ Name _____</p>		<p>Phone _____</p>	
<p>Signature _____</p>		<p>Time of Test _____ Date _____</p>	
<p>Firm _____</p>		<p>Address _____ City _____ State _____ Zip _____</p>	

Cross Connection Control Manual for Fort Bliss

United States Army Air Defense Artillery Center Fort Bliss, Texas

Cross-Connection Control Manual



FORT BLISS



Cross-Connection Control Manual

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ACRONYMS and ABBREVIATIONS

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Cross-Connection Control Manual

ACRONYMS and ABBREVIATIONS

AG	Air Gap
ANSI	American National Standards Institute
ASSE	American Society of Sanitary Engineers
AVB	Atmospheric Vacuum Breaker
DC	Double Creek Valve Assembly
FCCCHR	Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California
NMED	New Mexico Environment Department
PVB	Pressure Vacuum Breaker
RP	Reduced Pressure Principle Assembly
SVB	Spill-Resistant Pressure Vacuum Breaker
TCEQ	Texas Commission on Environmental Quality
UPC	Uniform Plumbing Code

Cross-Connection Control Manual**INTRODUCTION**

Congress passed the 1974 Safe Drinking Water Act (SDWA), Public Law 93-523, to protect public drinking water supplies from harmful contaminants. Because Ft. Bliss is located in New Mexico and Texas, the Texas Commission on Environmental Quality (TCEQ) and the New Mexico Environment Department (NMED) are responsible for implementing the standards of the SDWA within their respective states. The primary function of Ft. Bliss as a water purveyor is to provide safe drinking water. As a result, they may incur liability for the quality of water provided. The TCEQ and the NMED prohibit connections to the public water supply where a contamination hazard exists, unless the public water supply is protected by approved backflow prevention methods, devices, or assemblies.

Ft. Bliss has established and will provide for a Cross-Connection Control Program pursuant to Title 30, Texas Administrative Code, Chapter 290, Public Drinking Water; the Texas Health and Safety Code, Chapter 341, Minimum Standards of Sanitation and Health Protection Measures; and the New Mexico Environment Department, Title 20 Environmental Protection, Chapter 7, Wastewater and Water Supply Facilities. This Program safeguards the Ft. Bliss water distribution system from contamination by containing hazards at the service connection and/or within premises served by the Ft. Bliss water distribution system and by the installation, testing, and maintenance of backflow prevention methods, devices, or assemblies.

This manual is intended to augment the Ft. Bliss Cross-Connection Control Program and to serve as the minimum standard for implementing the Program. The manual adheres to the standards in the latest editions of The Manual for Cross-Connection Control by the Foundation for Cross-Connection Control and Hydraulic Research (FCCCHR) at the University of Southern California and the Uniform Plumbing Code (UPC). Included in the manual are technical specifications and standards to define proper backflow prevention assembly applications, installation details and criteria, test procedures, care of test equipment, and test report forms. The manual assigns or clarifies responsibilities of the Cross-Connection Control Program Manager, the backflow prevention technician, and private sector contractors.

Because Ft. Bliss must comply with the regulations of New Mexico and Texas, the provisions of this manual are applicable to both states. Wherever a provision of a state occurs that does not apply to the other state, the provision shall be noted as such.

No manual can remain current indefinitely. All holders of this manual should anticipate additions, deletions, and amendments. The Ft. Bliss Cross-Connection Control Program Manager will make available subsequent changes.

Cross-Connection Control Manual
DEFINITIONS**Approved Backflow Prevention Assembly**

An assembly that has been manufactured in full compliance with the American Water Works Association standards C510 and C511 and appears on the most current List of Approved Backflow Prevention Assemblies, published by the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California.

Auxiliary Water System

Any water supply on or available to the premises other than the Ft. Bliss water distribution system. These auxiliary waters are not under the sanitary control of Ft. Bliss and may include water from another public water supplier, wells, used or reclaimed water, or industrial fluids.

Backflow

The unintended or undesirable reversal of the normal water flow caused by either backsiphonage or backpressure.

Backflow Prevention Methods, Devices, and Assemblies

The types of backflow prevention methods, devices, and assemblies shall be based on the existing or potential degree of hazard, and backflow condition. The definitions for each type of backflow prevention method, device, or assembly listed below are contained in subsequent sections of this manual. The types are as follows:

Air gap	Method
Atmospheric vacuum breaker	Device
Double check valve	Assembly
Pressure vacuum breaker	Assembly
Reduced pressure principle	Assembly
Spill-resistant pressure vacuum breaker	Assembly

The definitions for each type of backflow prevention method, device, or assembly listed above are contained in subsequent sections of this manual

Backflow Prevention Technician

A person deemed knowledgeable and competent in the installation, testing, maintenance, and repair of backflow prevention assemblies as determined by successful completion of a training course approved by the Cross-Connection Control Program Manager.

Cross-Connection Control Manual**DEFINITIONS****Backpressure**

A form of backflow due to an increase of system pressure that is greater than supply pressure.

Backsiphonage

A form of backflow due to negative or decreased pressure in the water supply system.

Containment Cross-Connection Control

Provides protection of the water distribution system from the backflow of contaminants. This is accomplished by the installation of an air gap or an approved backflow prevention assembly at the water service connection. Containment cross-connection control does not provide protection to the occupants of the premises, but shall be considered as additional backflow protection and shall not negate the use of backflow prevention on internal hazards within a premises potable water system.

Contamination

The presence of any foreign substance (organic, inorganic, radiological, or biological) in water that tends to degrade its quality to constitute a health hazard or impair the usefulness of the potable water system.

Continuous Pressure

A point in the potable water system that may be subjected to operating pressure for more than twelve hours in a twenty-four hour period.

Cross Connection

A point in the potable water system that is connected directly, or has the potential of being connected, to a source of non-potable substance through which contaminants may enter the potable water system under any condition.

Cross Connection — Controlled

A cross connection with an approved backflow prevention method, device, or assembly properly installed and maintained so that it will continuously afford protection commensurate with the degree of hazard.

Cross-Connection Control Program Manager

The person designated to administer the Cross-Connection Control Program and who is currently recognized as a backflow prevention assembly technician.

Ft. Bliss

A publicly owned water and sewer agency located in and serving the people of Ft. Bliss.

Cross-Connection Control Manual**DEFINITIONS****Health Hazard**

An actual or potential threat of contamination if introduced into the potable water system that may cause death, injury, illness or spread of disease.

Isolation Cross-Connection Control

Provides protection to the occupants of a premises by the installation of approved backflow prevention methods, devices, or assemblies at each cross connection within the premises' potable water system.

Non-Health Hazard

An actual or potential threat of pollution if introduced into the potable water system that would constitute a nuisance, inconvenience, or be aesthetically objectionable.

Pollution

The presence of any foreign substance in the potable water system that tends to degrade its quality but not constitute a health hazard or impair the usefulness of the water.

Premises Potable Water System

Those parts of the premises or other areas beyond the water service connections that are utilized in conveying potable water to points of use.

System Hazard

An actual or imminent threat of contamination to the water distribution system presenting a danger to public health.

Water Distribution System

The network of conduits used for the delivery of potable water from the source to the water service connection.

Water Service Connection

The point of connection to the water distribution system carrying potable water to the building, other points of use, or distribution on the property.

Cross-Connection Control Manual**RESPONSIBILITIES****Cross-Connection Control Program Manager**

The Directorate of the Environment is responsible for the sanitary control of the Ft. Bliss water distribution system and the premises potable water system.

A member of the Directorate of the Environment shall be designated as the Cross-Connection Control Program Manager. The manager is responsible for all administrative duties and for maintaining an aggressive cross-connection control program within the Ft. Bliss water distribution system and all premises potable water systems.

The manager's responsibilities include but are not limited to:

1. Administration and enforcement of all the provisions of the cross-connection control program.
2. The prevention of contaminants from entering a premises potable water system by the use of backflow prevention methods, devices, and assemblies installed at each cross connection within the premises potable water system.
3. The prevention of contaminants originating within a premises potable water system from entering the Ft. Bliss water distribution system by the use of backflow prevention methods and assemblies installed at each water service connection.
4. The prevention of contaminants from entering the City of El Paso's water distribution system from the Ft. Bliss water distribution system by the use of backflow prevention methods and assemblies installed at each water service connection to Ft. Bliss.
5. The completion of a detailed cross-connection control survey of the entire water distribution system and all premises potable water systems every five years.
6. Affirm that all testing performed at Ft. Bliss meets the requirements of this manual. This is accomplished by reviewing test reports. The Cross-Connection Control Program Manager also may select a percentage of tests to witness or confirm by testing after the technician.
7. Ensure that all certified backflow prevention technicians are properly certified in New Mexico and Texas.
8. Review plumbing plans and inspect plumbing systems as they are installed for compliance with the cross-connection control program.
9. Inspect installations of backflow prevention methods, devices, and assemblies for compliance with this manual installed by Ft. Bliss personnel or by private sector contractors.
10. Require unacceptable plumbing practices to be promptly eliminated to prevent actual or potential contamination of the potable water system.

Cross-Connection Control Manual**RESPONSIBILITIES**

11. Establish an annual schedule of inspecting and testing all backflow prevention methods, devices, and assemblies.
12. Keep accurate records of installations, tests, inspections, and repairs made to backflow prevention assemblies for a minimum period of three years.

Backflow Prevention Technician

The Backflow Prevention Technician is responsible for safeguarding the Ft. Bliss water distribution system and all premises potable water systems. The technician's responsibilities include but is not limited to:

1. Register with the Cross-Connection Control Program Manager prior to testing backflow prevention assemblies within the jurisdiction of the Cross-Connection Control Program Manager. Each technician shall be issued an identification number that must appear on all backflow prevention assembly test report forms.
2. Submit reports of assembly testing and repairs to the Cross-Connection Control Program Manager within one week from the time the test was conducted. Testing of backflow prevention assemblies shall not be considered complete unless a satisfactory test report has been received by the Cross-Connection Control Program Manager
3. Inform the Cross-Connection Control Program Manager if any existing backflow prevention assembly is not installed commensurate with the degree of hazard, pressure conditions, or if the assembly is not installed in its required orientation.
4. Shall not alter the design or operation of backflow prevention methods, devices, and assemblies.
5. Maintain training requirements in New Mexico and Texas. New Mexico follows the FCCCHR policy whereby training requirements are renewed every three years. The TCEQ tester recognition is indefinite and does not require renewal. In order for technicians to be able test assemblies throughout Ft. Bliss, their training shall be renewed every three years.

Ft. Bliss Personnel and Private Sector Contractors

1. Ft. Bliss personnel and private sector contractors shall fully comply with the Ft. Bliss Cross-Connection Control Program. They are responsible for installing backflow prevention methods, devices, and assemblies in their required orientation, and in accordance with the proper degree of hazard and pressure condition as indicated in this manual.
2. Ft. Bliss personnel and private sector contractors shall notify the Cross-Connection Control Program Manager that backflow prevention methods, devices, and assemblies have been properly installed and are ready for inspection and testing. They shall be responsible for all parts and labor needed to prepare the assembly for its acceptance test.

Cross-Connection Control Manual

RESPONSIBILITIES

3. Newly installed assemblies shall not be placed into service until an acceptance test has been performed indicating satisfactory results.

Cross-Connection Control Manual**INFORMATION MANAGEMENT**

The Cross-Connection Control Program Manager shall utilize an information management system consisting of two databases — Survey and Testing.

Survey Database

1. The Cross-Connection Control Program Manager shall complete a detailed cross-connection control survey of the entire water distribution system and all premises potable water systems every five years. This will be accomplished by surveying twenty percent of all premises every year.
2. The survey shall be performed by experienced cross-connection control inspectors and shall include inspection of all exposed and visibly accessible potable water piping, water consuming equipment, lawn irrigation systems, and fire protection systems.
3. Cross-connection control inspectors shall use a survey form similar to the one shown on page 10.
4. The survey findings shall be documented into a cross-connection control Survey Information Management Database. The survey database shall produce reports that will include the location and identification of water uses, adequacy of existing protection, and corrective actions. The report will include the size and type of backflow prevention methods, devices, or assemblies needed, and a prioritized list of findings.

The survey database also shall produce water conservation reports listing the location and identification of all applicable plumbing fixtures and flow rates.

5. All of the items in the survey that require corrective action are considered a health hazard and shall be corrected as soon as possible. The following prioritized list shall be followed in planning corrective actions:

Priority 1 — Contamination imminent

Where conditions or activities exist in which the introduction of a contaminant to the premises potable water system or the water distribution system is imminent.

Priority 2 — Contamination potential

Where conditions or activities exist in which there is a potential for the introduction of a contaminant to the premises potable water system or the water distribution system.

Priority 3 — No action required

Where cross connections are under control by the presence of an approved backflow prevention method, device, or assembly and there is no imminent or potential threat of contamination to the premises potable water system or the water distribution system.

Cross-Connection Control Manual**INFORMATION MANAGEMENT****Priority 4 — Installation correction**

Where cross connections are under control by the presence of an approved backflow prevention method, device, or assembly; however, the installation may not be installed in full compliance with the UPC or FCCCHR and shall require corrective action.

Priority 5 — Piping system note

Where a portion of the piping system does not present a threat of contamination to the premises potable water system or the water distribution system but may be a concern such as piping leaks or safety hazards.

6. The survey shall include inspection of plumbing fixtures for water conservation compliance. The maximum water consumption flow rates and quantities for plumbing fixtures shall be in accordance with TCEQ, rule 290.252 and UPC, section 402.0. The following table describes the fixtures and maximum flow rates:

Maximum Flow Rates and Consumption for Plumbing Fixtures	
Plumbing Fixture	Maximum Flow Rate or Quantity
Water closet	1.6 gallons per flush
Urinal	1.0 gallons per flush
Shower head	2.5 gallons per minute
Sink, lavatory faucet, faucet aerator	2.2 gallons per minute
Faucet serving transient public	0.25 gallons per use & self-closing valve
Drinking fountain	Operated by self-closing valve
Emergency shower/eye wash	None

Cross-Connection Control Manual**INFORMATION MANAGEMENT****Testing Database**

1. The Cross-Connection Control Program Manager is responsible for all backflow prevention assembly testing within the jurisdiction of the Directorate of the Environment.
2. All backflow prevention assemblies shall be tested for proper operation by backflow prevention technicians registered with the Cross-Connection Control Program Manager.
3. Backflow prevention technicians shall use the test report form shown on page 17. The form may be recreated from the testing database
4. All backflow prevention assembly test reports — pass or fail — shall be entered into the Testing Information Management Database. The testing database shall produce individual and summary reports. The reports shall include relevant information such as area, building, assembly, test findings, repairs, thermal expansion measures, adequacy of freeze protection, test equipment used, and technician identification.
5. The testing database shall incorporate automated defaults for ensuring proper testing information. Test reports shall default to "Fail" until proper test findings are entered. The database also shall track annual and past due tests.

Cross-Connection Control Manual**TESTING PROCEDURES****Preparation for Testing Backflow Prevention Assemblies**

Prior to testing backflow prevention assemblies the backflow prevention technician shall:

1. Notify affected onsite personnel that the water service will be shut off during backflow prevention assembly testing.
2. Notify the authority having jurisdiction over fire protection systems, and any alarm-monitoring agency, that the water supply to the fire protection system will be shut off during the test procedure.
3. Examine the area for safety hazards, water leaks, or relief valve discharging.
4. Determine that the backflow prevention assembly is installed commensurate with the degree of hazard, pressure conditions, and required orientation.
5. Check that the assembly is the correct size and has the essential components for testing such as resilient seated, full ported shutoff valves and test ports.
6. Note the manufacturer, model, serial number, size, application, and physical location.

Backflow Prevention Assembly Testing

1. The Cross-Connection Control Program Manager is responsible for all backflow prevention assembly testing within the jurisdiction of the Directorate of the Environment.
2. All backflow prevention assemblies shall be tested for proper operation by backflow prevention technicians registered with the Cross-Connection Control Program Manager.
3. Testing shall take place at the time of installation, repair, or relocation and at least on an annual schedule thereafter or more often when required by the Cross-Connection Control Program Manager.
4. A copy of the test report indicating satisfactory operation of the backflow prevention assembly, and any repairs, shall be forwarded to the Cross-Connection Control Program Manager within one week from the time the test was completed.
5. Assemblies that fail the operational test shall be repaired, overhauled, and retested immediately by a recognized backflow prevention technician. Testing of the assemblies shall not be considered complete until a test report certifying that the assembly is operating correctly has been received by the Cross-Connection Control Program Manager.
6. Upon the completion of a satisfactory test, the backflow prevention technician shall attach a laminated tag to the assembly with the following information on one side:

Cross-Connection Control Manual**TESTING PROCEDURES**

"Directorate of the Environment, ATZC-DOE, Building 622, Fort Bliss, TX 79916, Phone: (915) 568-6364, Fax: (915) 568-1333"

The reverse side of the tag shall indicate the assembly's manufacturer, model, serial number, size, and tag number. The applicable values of check valves No. 1 & 2, relief valve, air inlet valve, check valve, and the test date shall also be indicated.

7. Testing of backflow prevention assemblies shall be in accordance with Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California. The following steps shall be used when testing reduced pressure principal backflow prevention assemblies:

Reduced Pressure Principle

1. Determine the apparent static pressure drop across check valve No. 1 in the direction of flow.
2. Determine that the differential pressure relief valve operates to maintain the zone between the two check valves at least 2.0 psi less than supply pressure.
3. Determine that check valve No. 2 closes tight in reverse flow.
4. Determine that the confirmed static pressure drop across check valve No. 1 is at least 3.0 psi greater than the relief valve opening point.
5. Determine that the static pressure drop across check valve No. 2 is at least 1.0 psid.
6. Determine that the comparison of the two readings of check valve No. 1 (1 and 4) is within 1.0 psid.

Double Check Valve

1. Determine that the static pressure drop across check valve No. 1 is at least 1.0 psid.
2. Determine that the static pressure drop across check valve No. 2 is at least 1.0 psid.

Pressure Vacuum Breakers

1. Determine that the pressure in the body when the air inlet valve opens is at least 1.0 psi.
2. Determine that the static pressure drop across the check valve is at least 1.0 psid.

Cross-Connection Control Manual**TESTING PROCEDURES****Spill-Resistant Pressure Vacuum Breakers**

1. Determine that the pressure in the body when the air inlet valve opens is at least 1.0 psi.
2. Determine that the differential pressure of the check valve in the direction of flow shall be at least 1.0 psid.

Note: For the SVB to operate correctly, the check valve must have a greater value than the air inlet valve.

Test Equipment Calibration

1. Backflow prevention assembly test equipment shall be calibrated annually in accordance with ANSI and ASSE 1064 standards by a qualified calibration facility.
2. The test equipment manufacturer, model, serial number, and last date of calibration shall be recorded on the backflow prevention assembly test report form.

Maintenance and Repair

To maintain backflow prevention assemblies in proper operating condition, the technician shall adhere to the following:

1. Test assemblies in accordance with this manual.
2. Use currently calibrated testing equipment.
3. Consult manufacturer's repair/maintenance manuals.
4. Observe general safety procedures.
5. Use only manufacturer's replacement parts.
6. Be prepared to repair assembly at time of testing by maintaining an inventory of replacement parts.
7. Avoid flipping rubber check valve discs. Flipping shall be considered a temporary measure only to enable continuation of water service until a new replacement disc is installed.
8. Retest assembly for proper operation immediately following repair.
9. Slowly repressurize assembly when returning assembly to normal operating condition.

Cross-Connection Control Manual

TEST REPORT FORM

<p>Fort Bliss 0710020 Backflow Prevention Assembly Test Report ATZC-DOE, Building 622, Fort Bliss, TX 79916 Phone: (915) 568-1041 Fax: (915) 568-1333</p>																
<p>General Information</p> Area / Range Camp _____ Building Name _____ Building Number _____ Building Location _____ Point of Contact _____ Phone _____																
<p>Current Assembly Information</p> Manufacturer _____ Model _____ Serial No. _____ Size _____ Tag _____ Type of service: <input type="checkbox"/> Containment/Domestic <input type="checkbox"/> Containment/Fire System <input type="checkbox"/> Containment/Lawn Irr. <input type="checkbox"/> Isolation Specific physical location of assembly: _____ Equipment or system isolated: _____	<p>Removed Assembly Information</p> Manufacturer _____ Model _____ Size _____ Serial No. _____ <hr/> <p>Gauge Information ID _____</p> Manufacturer _____ Model _____ Serial No. _____ Last date of calibrator _____															
<p>Test Results Status <input type="checkbox"/> Pass <input type="checkbox"/> Fail</p> <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">RP</td> <td style="width: 50%; text-align: center;">DC</td> </tr> <tr> <td>CV1 AR _____</td> <td>CV1 _____</td> </tr> <tr> <td>RV _____</td> <td>CV2 _____</td> </tr> <tr> <td>CV2 Tight? <input type="checkbox"/> Yes <input type="checkbox"/> No</td> <td></td> </tr> <tr> <td>CV1 CR _____</td> <td style="text-align: center;">PVB SVB</td> </tr> <tr> <td>CV2 _____</td> <td>AIV _____</td> </tr> <tr> <td>Buffer _____</td> <td>CV _____</td> </tr> </table>		RP	DC	CV1 AR _____	CV1 _____	RV _____	CV2 _____	CV2 Tight? <input type="checkbox"/> Yes <input type="checkbox"/> No		CV1 CR _____	PVB SVB	CV2 _____	AIV _____	Buffer _____	CV _____	<p>Additional Requirements <input type="checkbox"/> Yes <input type="checkbox"/> N/A</p> Thermal Expansion Control Present? <input type="checkbox"/> No <input type="checkbox"/> Unknown (Containment domestic only) Requirements made known? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <hr/> Adequate Freeze Protection Present? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A Requirements made known? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <hr/> Comments or Repairs made: _____ <hr/> Test Type <input type="checkbox"/> Initial <input type="checkbox"/> Annual <input type="checkbox"/> Repair <input type="checkbox"/> Relocate
RP	DC															
CV1 AR _____	CV1 _____															
RV _____	CV2 _____															
CV2 Tight? <input type="checkbox"/> Yes <input type="checkbox"/> No																
CV1 CR _____	PVB SVB															
CV2 _____	AIV _____															
Buffer _____	CV _____															
<p>The backflow prevention assembly detailed on this report has been tested and maintained as required and is certified to be operating within acceptable parameters. I also certify that I tested this assembly and the test results are true.</p> Technician ID _____ Name _____ Phone _____ Signature _____ Time of Test _____ Date _____ Firm _____ Address _____ City _____ State _____ Zip _____																

This form may be recreated from the Testing Database

Cross-Connection Control Manual**BACKFLOW PREVENTION METHODS, DEVICES, AND ASSEMBLIES**

Backflow Prevention Method, Device, and Assembly Application Table						
	Hazards			Pressures		
	Sewage	Health	Non-health	Back-Pressure	Back-Siphonage	Continuous Pressure
AG	Yes	Yes	Yes	Yes	Yes	Yes
AVB	No	Yes	Yes	No	Yes	No
DC	No	No	Yes	Yes	Yes	Yes
PVB	No	Yes	Yes	No	Yes	Yes
RP	No	Yes	Yes	Yes	Yes	Yes
SVB	No	Yes	Yes	No	Yes	Yes

AG	Air gap
AVB	Atmospheric vacuum breaker
DC	Double check valve assembly
PVB	Pressure vacuum breaker assembly
RP	Reduced pressure principle assembly
SVB	Spill-Resistant pressure vacuum breaker assembly

Backflow prevention methods, devices, and assemblies shall be installed and maintained in accordance with the proper degree of hazard, pressure condition, and orientation.

The AVB, PVB, SVB, and RP shall be used where health hazard matters are concerned. The DC shall only be used in non-health applications where convenience such as not draining the premises potable water system is the concern.

Cross-Connection Control Manual
CONTAINMENT CONTROL REQUIREMENTS

Containment Cross-Connection Control

1. No water service connection shall be permitted to any premises handling substances deleterious or hazardous to the public health without an air gap separation or an approved backflow prevention assembly installed at the water service connection.
2. Table "Minimum Containment Requirements" shows typical installations that require backflow prevention assemblies at the water service connections of the premises. This table may be supplemented by the Cross-Connection Control Program Manager upon the discovery of a potential hazard to the public water supply.

The table does not indicate use of the double check valve assembly (DC) in containment applications. The use of a DC must be restricted to non-health use only. The Cross-Connection Control Program Manager may allow the use of existing DCs on potable water supplies serving fire protection systems if the hydraulic design of the system cannot accommodate the pressure loss of a RP. Once performance of the water distribution system is upgraded existing fire protection systems shall be fitted with RPs.

3. All approved backflow prevention methods, devices, and assemblies shall be installed in their required orientation, in accordance with the proper degree of hazard and pressure condition as indicated in this manual.
4. Premises considered to pose a threat of contamination to the water distribution system shall be subject to a water use inspection. The Directorate of the Environment or its representatives shall have the right of entry to any land or buildings at reasonable times to make water use examinations or inspections. If cross connections are discovered during the premises water use survey that could result in the backflow of contaminants into the public water supply, Ft. Bliss shall immediately implement appropriate corrective actions.
5. At any premises where contamination hazards exist and there is adequate isolation cross-connection control in effect, the Cross-Connection Control Program Manager may determine that an air gap separation or an approved backflow prevention assembly may not be required at the water service connection.

Cross-Connection Control Manual
CONTAINMENT CONTROL REQUIREMENTS

This table is not an all-inclusive list and may be supplemented by the Cross-Connection Control Manager.

Backflow prevention methods, devices, and assemblies shall be installed and maintained in accordance with the proper degree of hazard, pressure condition, and orientation.

Typical premises or water uses that require containment control:	Method or assembly
Agricultural	AG or RP
Aircraft, missile plant	AG or RP
Animal grooming, processing, feedlot	AG or RP
Automotive repair, plant	AG or RP
Auxiliary water supply	AG or RP
Beverage processing	AG or RP
Cannery, packing house, rendering plant	AG or RP
Car washing	AG or RP
Chemical manufacturing	AG or RP
Clinic	AG or RP
Cold storage facility	AG or RP
Commercial laundry	AG or RP
Complex piping system	AG or RP
Construction water service point	AG or RP
Cooling system	AG or RP
Dairy, product processing	AG or RP
Dental office, laboratory	AG or RP
Docks, dockside facility	AG or RP
Dye plant	AG or RP
Fire protection system	AG or RP
Food processing plant	AG or RP
Garment finisher	AG or RP
Green house	AG or RP
Heating system	AG or RP
Hospital, mortuary, funeral home	AG or RP
Industrial system	AG or RP
Laundry	AG or RP

Cross-Connection Control Manual

Typical premises or water uses that require containment control:	Method or assembly
Lawn irrigation system	AG or RP
Lease space (shopping center, warehouse)	AG or RP
Manufacturing natural or synthetic rubber	AG or RP
Medical, surgical	AG or RP
Metal finishing, molding, forming, plating	AG or RP
Microchip fabrication	AG or RP
More than one connection to the public water supply	AG or RP
Nursing, convalescent home	AG or RP
Paper processing	AG or RP
Petroleum processing, storage	AG or RP
Photographic processing	AG or RP
Plastic injection	AG or RP
Power plant	AG or RP
Radiator shop	AG or RP
Radioactive material	AG or RP
Ready mix concrete	AG or RP
Reclaimed potable water system	AG or RP
Sand, gravel plant	AG or RP
School, laboratory	AG or RP
Sewage lift station, treatment plant	AG or RP
Slaughter house	AG or RP
Steam generating	AG or RP
Tall buildings	AG or RP
Taxidermy	AG or RP
Temporary service	AG or RP
Toxic substance	AG or RP
Uncontrolled cross connections	AG or RP
Veterinary	AG or RP
Water Storage vehicle	AG or RP
Water treatment	AG or RP
Well	AG or RP
Where inspection is restricted	AG or RP

Cross-Connection Control Manual
ISOLATION CONTROL REQUIREMENTS

Isolation Cross-Connection Control

1. No installation of any water operated equipment that may cause contamination of the premises potable water system shall be permitted unless it is equipped with an approved backflow prevention method, device, or assembly.
2. Requirements for backflow prevention methods, devices, and assemblies installed within the premises potable water system are for the safety and protection of the occupants of the premises.
3. In addition to performing cross-connection control surveys, the Cross-Connection Control Program Manager shall conduct inspections in response to water quality complaints to determine compliance with the provisions of the Cross-Connection Control Program. In the event cross connections require isolation control, the Cross-Connection Control Program Manager shall have approved backflow prevention methods, devices, and assemblies installed at specific locations within the premises potable water system.
4. Mandatory isolation cross-connection control requirements are shown in the table, "Minimum Isolation Cross-Connection Control Requirements" on page 21. This table is not an all-inclusive list of hazards that may be found and may be supplemented by the Cross-Connection Control Manager.
5. All approved backflow prevention methods, devices, and assemblies shall be installed in their required orientation, in accordance with the proper degree of hazard, and pressure condition as indicated in this manual.

Cross-Connection Control Manual
ISOLATION CONTROL REQUIREMENTS

This table is not an all-inclusive list and may be supplemented by the Cross-Connection Control Manager.

Backflow prevention methods, devices, and assemblies shall be installed and maintained in accordance with the proper degree of hazard, pressure condition, and orientation.

Typical water uses that require isolation control:	Method, device, or type of assembly					
	AG	RP	DC	PVB	SVB	AVB
Air conditioning system	Yes	Yes	No	Yes	Yes	Yes
Air washer	Yes	Yes	No	Yes	Yes	Yes
Aspirator	Yes	Yes	No	Yes	Yes	Yes
Autoclave	Yes	Yes	No	No	No	No
Auxiliary water supply	Yes	Yes	No	No	No	No
Bedpan washer	Yes	Yes	No	Yes	Yes	Yes
Boiler	Yes	Yes	No	No	No	No
Carbonation equipment	Yes	Yes	No	No	No	No
Chemical dispenser	Yes	Yes	No	Yes	Yes	Yes
Chilled potable water system	Yes	Yes	No	No	No	No
Chiller	Yes	Yes	No	No	No	No
Compressors (water cooled)	Yes	Yes	No	No	No	No
Cooling tower	Yes	Yes	No	No	No	No
Cuspidor	Yes	Yes	No	Yes	Yes	Yes
Decorative pond	Yes	Yes	No	Yes	Yes	Yes
Degreasing equipment	Yes	Yes	No	No	No	No
Drinking fountain	Yes	Yes	No	No	No	No
Evaporative cooler	Yes	Yes	No	Yes	Yes	Yes
Faucet with pull-out spout	Yes	Yes	No	Yes	Yes	Yes
Fire protection system	Yes	Yes	No	No	No	No
Fountains	Yes	Yes	No	Yes	Yes	Yes
Garbage disposal	Yes	Yes	No	Yes	Yes	Yes
Domestic heat exchanger	Yes	No	No	No	No	No
Heating system	Yes	Yes	No	No	No	No
Hose bibb	Yes	Yes	No	Yes	Yes	Yes
Hydrant (wall, yard)	Yes	Yes	No	Yes	Yes	Yes

Cross-Connection Control Manual
ISOLATION CONTROL REQUIREMENTS

Typical water uses that require isolation control:	Method, device, or type of assembly					
	AG	RP	DC	PVB	SVB	AVB
Industrial fluid	Yes	Yes	No	Yes	Yes	Yes
Kitchen equipment	Yes	Yes	No	Yes	Yes	Yes
Laboratory equipment	Yes	Yes	No	Yes	Yes	Yes
Lawn irrigation system	Yes	Yes	No	Yes	Yes	Yes
Medical equipment	Yes	Yes	No	Yes	Yes	Yes
Non-potable potable water system	Yes	Yes	No	No	No	No
Non-pressure vessel	Yes	Yes	No	Yes	Yes	Yes
Photo processing equipment	Yes	Yes	No	Yes	Yes	Yes
Pressure vessel	Yes	Yes	No	No	No	No
Receptors such as tanks, vats, sumps	Yes	Yes	No	Yes	Yes	Yes
Reclaimed water	Yes	Yes	No	No	No	No
Sewer, pump, ejector	Yes	Yes	No	No	No	No
Shampoo basin	Yes	Yes	No	Yes	Yes	Yes
Shower with hose	Yes	Yes	No	Yes	Yes	Yes
Sink (hand, janitor, dish, etc.)	Yes	Yes	No	No	No	No
Solar water heating equipment	Yes	Yes	No	No	No	No
Sterilizer	Yes	Yes	No	No	No	No
Swimming pool	Yes	Yes	No	Yes	Yes	Yes
Trap primer	Yes	Yes	No	No	No	No
Tub	Yes	Yes	No	Yes	Yes	Yes
Urinal	Yes	Yes	No	Yes	Yes	Yes
Water closet	Yes	Yes	No	Yes	Yes	Yes
Water closet flushometer tank	Yes	Yes	No	Yes	Yes	Yes
Water cooled equipment	Yes	Yes	No	Yes	Yes	Yes
Watering trough	Yes	Yes	No	Yes	Yes	Yes

Cross-Connection Control Manual**GENERAL REQUIREMENTS****Auxiliary Water Systems and/or Wells**

Premises having auxiliary water systems and/or wells that are connected to the water distribution system shall have the following options:

1. Permanently abandon use of the auxiliary water system and/or well by "plugging the well" in accordance with the Directorate of the Environment, or
2. Completely and permanently, sever the auxiliary water system and/or well from the potable water system in accordance with the Directorate of the Environment and install an air gap or a reduced pressure principle backflow prevention assembly at the water service connection.

Backflow Prevention Assembly Enclosures

1. Backflow prevention assemblies may be installed indoors provided provisions for drainage and accessibility for testing and maintenance are met.
2. Backflow prevention assemblies installed outdoors shall meet the following requirements:
 - a. Color (color shall be appealing to Fort Bliss's overall color scheme).
 - b. Durability (ability to withstand weather extremes, wind, sand, temperature change and remain exceptionally tough).
 - c. Vandal Protection: (ability to withstand hits, kicks, etc... without denting or cracking, intruder resistant and tagging resistant)
 - d. UV Protection (prevent discolorations of fabrics or breakdown of materials)
 - e. Vector Resistant (does not provide a habit for poisons vectors such as black widow, brown recluse, scorpions, rattle snakes, etc.).
 - f. Design (adequate drainage, protect from freezing, easily accessible for testing, maintenance, and repair).
3. Enclosures must be installed and maintained so that backflow prevention assemblies are safely accessible for testing, maintenance, and repair.

Carbonators

1. Water supplies to carbonators shall be provided with a reduced pressure backflow prevention assembly.
2. There shall be no copper piping between the assembly and carbonator equipment.

Chemical Dispensers

1. Water supplies to chemical dispensers shall be provided with an air gap, reduced pressure backflow prevention assembly, or a spill resistant pressure vacuum breaker assembly.

Cross-Connection Control Manual**GENERAL REQUIREMENTS**

2. Chemical dispensers shall be supplied directly from the premises potable water system.
3. Chemical dispensers shall not be supplied from other fixtures such as janitor sink faucets.

Construction Water Service

1. The Cross-Connection Control Program Manager shall designate a hydrant or stand pipe to assist contractors during construction.
2. A water meter and a reduced pressure backflow prevention assembly shall be maintained at all times of operation at the hydrant or stand pipe.

Fire Protection Systems

1. Fire protection systems are systems of pipes and equipment used exclusively to supply water for extinguishing fire. Potable water supplies serving new and existing fire protection systems, including but not limited to standpipes and automatic sprinkler systems, shall be protected with an air gap or a reduced pressure principle assembly.
2. Whenever a backflow prevention assembly is installed in the potable water supply to a new fire protection system, the hydraulic design of the system shall account for the pressure drop through the assembly.
3. Whenever a backflow prevention assembly is retrofitted in the potable water supply to an existing fire protection system, the hydraulic design of the system shall be checked to verify that there is sufficient water pressure available for satisfactory operation of the system.
4. The hydraulic design calculations for new and existing fire protection systems shall be submitted to the Cross-Connection Control Program Manager for approval prior to the installation.

Heat Exchangers

1. Heat exchangers used for domestic water heat transfer shall be double walled.
2. Single wall heat exchanges shall be prohibited and removed from operation as per UPC.

Labeling

1. To prevent sanitary fixtures from being connected to non-potable waters, and for safety and sanitation, the UPC requires that each plumbing fixture be provided with potable water.
2. In all buildings where potable water and non-potable water systems are installed, each system shall be clearly identified. Labels designating the liquid

Cross-Connection Control Manual**GENERAL REQUIREMENTS**

or gas being conveyed and the direction of flow will be colored coded as follows:

Potable water — green background with white lettering.

Nonpotable water — yellow background with black lettering.

3. The labeling shall occur every twenty feet and at least once per room, and shall be visible from floor level.
4. Each outlet and hose bibb in the nonpotable system shall be posted: "CAUTION: NONPOTABLE WATER, DO NOT DRINK"

Lawn Irrigation Systems

1. A person may not sell, design, consult, install, maintain, alter, repair, or service an irrigation in Texas unless the person is a licensed irrigator by the TCEQ. A person who is licensed as an installer may only connect an irrigation system to a water supply while being under the direct supervision of a licensed irrigator.
2. The premises potable water system shall be protected from lawn irrigation systems with an approved atmospheric vacuum breaker, pressure vacuum breaker, spill-resistant pressure vacuum breaker, or reduced pressure assembly installed commensurate with the device's/assembly's pressure condition and required orientation.
3. The water distribution system shall be protected from lawn irrigation systems with an approved pressure vacuum breaker, spill-resistant pressure vacuum breaker, or reduced pressure assembly installed commensurate with the assembly's pressure condition and required orientation.

Make up Water to Boilers and Chillers

1. Make up water connections to steam and hot water boilers shall be provided with a reduced pressure backflow prevention assembly.
2. The assembly shall be located in the inlet piping to the boiler's pressure reducing valve.

New Water Service Connections

The Cross-Connection Control Manager shall review all requests for new water service connections to determine if containment cross-connection control is needed. If it is determined that a containment backflow prevention assembly is required, the assembly must be installed, inspected and tested for proper operation before water service is established.

Cross-Connection Control Manual**GENERAL REQUIREMENTS****Parallel Installations**

1. Parallel installations of two or more backflow prevention assemblies of the same type is an effective means of insuring that uninterrupted water service is maintained during testing or repair, and is strongly recommended when such continuity is desired. Parallel installations shall be in accordance with the "Parallel Installation Table" on page 26.
2. The design and plan of implementation for parallel installations shall be submitted to the Cross-Connection Control Program Manager for approval prior to the installation.
3. Sites with service lines 10" or less shall utilize at least one line-sized assembly.
4. Where two line-sized assemblies are installed in parallel, one of the assemblies shall remain closed.
5. Sites with service lines 12" or larger shall utilize assemblies sized in accordance with the "Parallel Installation — Rated Flow Table" on page 12. The combined flow capacity of the parallel assemblies shall equal or exceed the flow capacity of the service line. For example: The combined flow capacity of two 8" assemblies (2 x 1600 gpm = 3200 gpm) would be sufficient on a 12" water service line (3000 gpm).
6. During testing and repair of parallel assemblies, the flow demand shall be reduced to match the flow rate of the remaining "on line" assembly. When a parallel assembly is left closed during normal operation, it shall be tested for proper operation before the main assembly is tested.
7. Where three parallel assemblies are sized in accordance with the "Parallel Installation — Rated Flow Table", one of the assemblies shall remain closed.

Parallel Installation Table		
Application	Service lines 10" and less	Service lines 12" and larger
Site can tolerate interruption of water service.	1 line sized BFP	2 rated flow sized BFPs in parallel
Site cannot tolerate interruption of water service, but can operate with reduced flow.	1 line sized BFP and one smaller in parallel to match reduced flow demand	2 rated flow sized BFPs in parallel
Site cannot tolerate interruption of water service or reduced flow.	2 line sized BFPs in parallel	3 rated flow sized BFPs in parallel

Cross-Connection Control Manual**GENERAL REQUIREMENTS**

Parallel Installation - Rated Flow	
Size of assembly or service line	Rated flow (gpm)
2-1/2	225
3	320
4	500
6	1000
8	1600
10	2300
12	3000
14	3700
16	4400

Tenant and Lease Facilities

1. Tenant and lease facilities such as fast food restaurants, service stations, snack bars, and sites used or managed by other than Ft. Bliss personnel, are considered to be premises having potable water systems that are impractical to ascertain whether or not proper isolation cross-connection control exists. Tenant / Lease facilities will require containment cross-connection control.
2. The Cross-Connection Control Manager shall maintain jurisdiction of containment backflow prevention assemblies on tenant and lease facilities and shall be included in the annual testing schedule.

Thermal Expansion

1. The installation of "non-return devices" such as backflow prevention assemblies, check valves, dual check valves, pressure reducing or pressure regulating valves, and water softeners between the water service connection and the domestic water heater may create a "closed domestic potable water system" preventing pressure relief through the building supply.
2. A UPC listed thermal expansion tank shall be installed between the "non return device" and the water storage tank heated by indirect means and heat input limited to 200,000 Btu/hr, water temperature limited to 210° F, and water capacity that does not exceed 120 gallons.
3. A thermal expansion tank shall be provided in accordance with ASME Code, Section VIII, Division 1, on boilers operating at pressures not exceeding 160 psig and water temperatures not exceeding 210° F when either of the following limitations is exceeded: heat input of 200,000 Btu/hr; or nominal

Cross-Connection Control Manual**GENERAL REQUIREMENTS**

water-containing capacity of 120 gallons (Texas Department of Licensing and Regulation, 16 Texas Administrative Code, Chapter 65). The thermal expansion tank shall be located on the cold water supply, the tank's air pressure matched to the system water pressure, and sized to total water heater capacity and supply pressure.

4. The backflow prevention technician shall indicate on the backflow prevention assembly test report form if the requirements for thermal expansion control are met.

Water Closets and Urinals

1. Water closet and urinal flushometer valves shall be equipped with an UPC listed atmospheric vacuum breaker.
2. The critical level of the vacuum breaker shall be at least six inches above the flood level rim of a water closet or the highest part of the urinal.
3. Water closet and urinal tanks shall be equipped with a UPC listed ball cock.

Water Treatment Units

Waste or discharge from reverse osmosis or other types of water treatment units shall enter the drainage system through an air gap.

Cross-Connection Control Manual
GENERAL REQUIREMENTS

Cross-Connection Control Manual**AIR GAP****Defined**

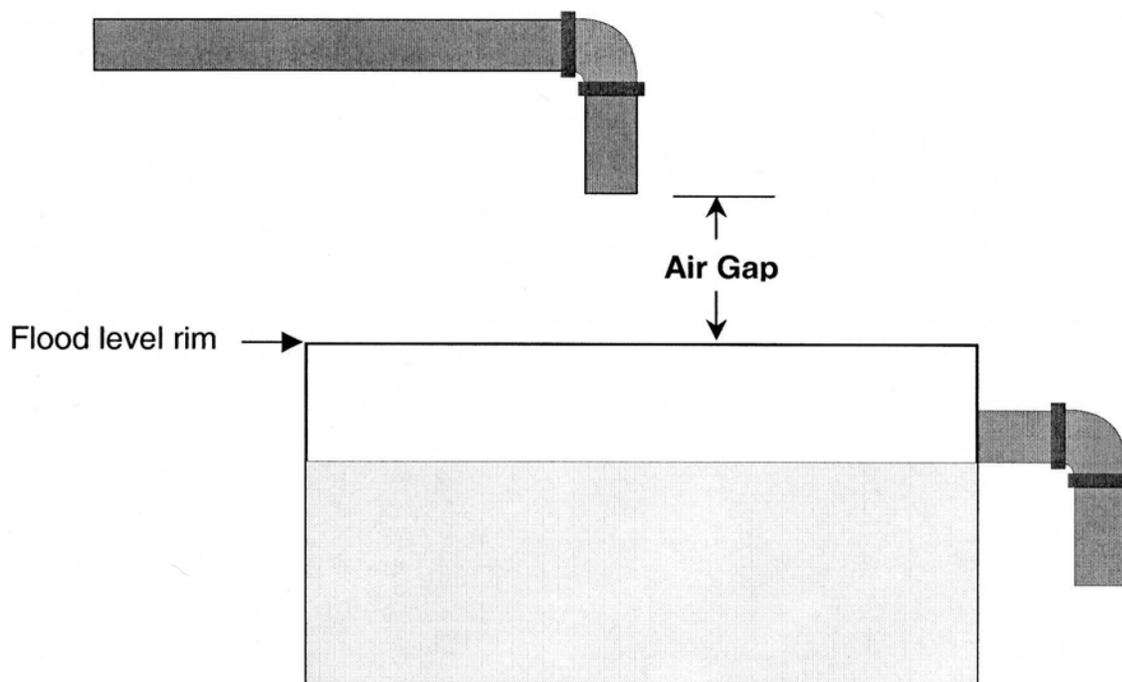
An air-gap is the unobstructed vertical distance through the free atmosphere between the discharge end of a potable water supply pipe and the flood level rim of an open or non-pressure vessel

Installation Requirements

1. The air gap must be at least twice the diameter of the water supply outlet above the flood level rim of a non-vessel or one inch, whichever is greater.
2. The air gap shall be installed with adequate access and clearance for inspection and located outside any enclosure or hooded area containing fumes that are toxic, poisonous, or corrosive.
3. A permanent platform is necessary whenever the air gap is installed more than five feet above floor or grade. The platform must be within five feet of the lowest part of the assembly and must meet all applicable safety standards and codes.

Inspection Requirements

Air gaps shall be inspected at the time of installation. In conjunction with testing backflow prevention assemblies at a particular site, or other activities, the technician shall inspect all air gaps to verify that the required vertical distance is maintained and that there is no hose connected to it. The air gap may be inspected more often when required by the Cross-Connection Control Program Manager.



Cross-Connection Control Manual
ATMOSPHERIC VACUUM BREAKER**Defined**

An atmospheric vacuum breaker consists of a float check, check seat, and an air inlet port. The AVB shall protect against health hazards under backsiphonage conditions only.

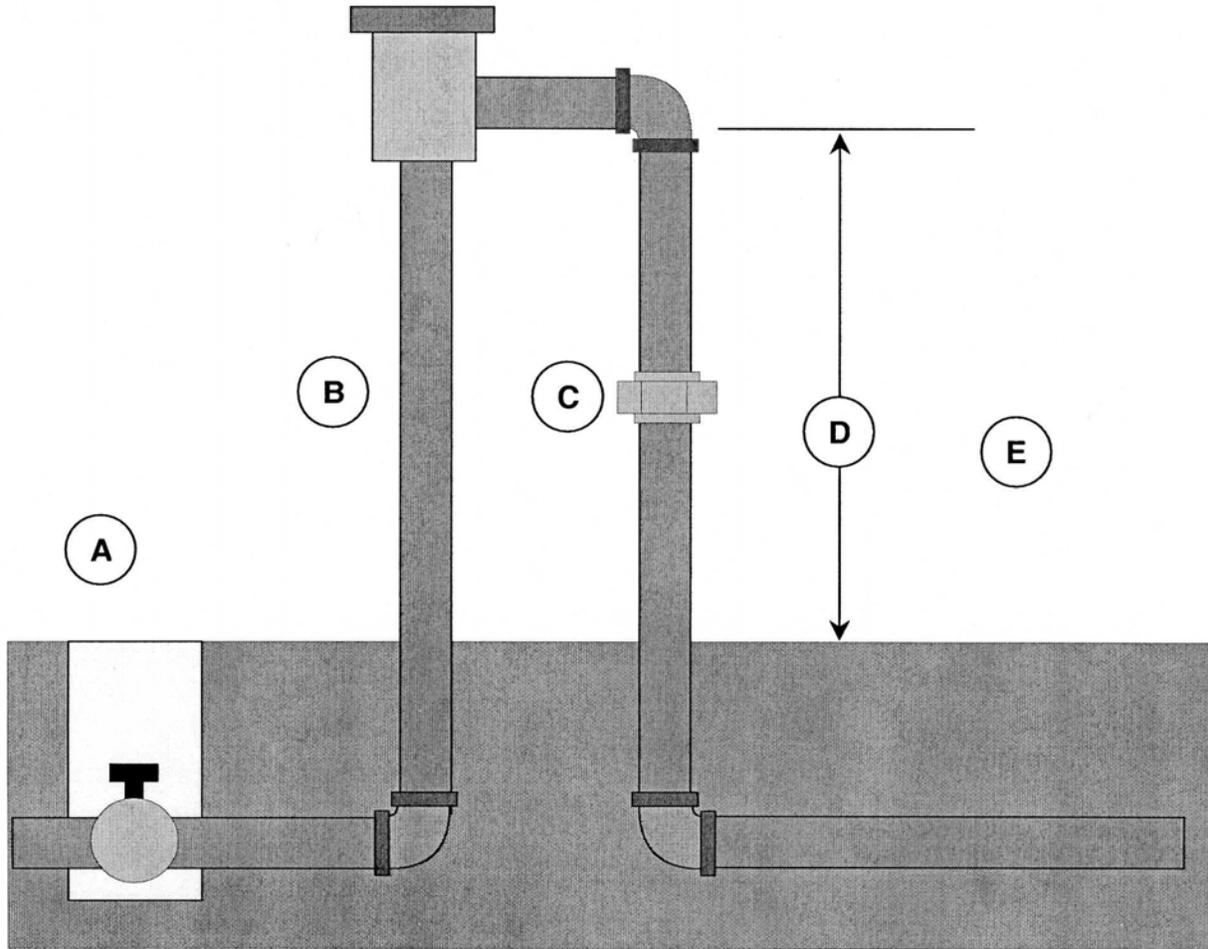
Installation Requirements

1. The AVB shall be used in isolation applications only. It shall not be used in containment applications.
2. The AVB shall be installed between 6" and 60" above grade, floor, or platform and at a minimum of 6" above the highest point of the device's outlet piping. The installation shall include unions.
3. There shall be no valves in the outlet piping of the AVB.
4. There shall be adequate drainage provisions to accommodate water discharge from flushing and operation.
5. Whenever the AVB is insulated, the insulation must be easy to remove in order to facilitate inspection and repair.
6. AVBs must be installed horizontal and plumb.
7. Immediately after installation and before service is restored, the device must be thoroughly flushed. This is accomplished by completely removing the float check and opening the inlet shut-off valve to flush debris that may foul the device.
8. The size of the AVB shall not be less than the size of the water supply piping.
9. The AVB shall be installed in accordance with the device's operating pressure and temperature rating.
10. The AVB shall be installed with adequate access and clearance for testing, maintenance, and repairs and outside any enclosure or hooded area containing fumes that are toxic, poisonous, or corrosive.
11. A permanent platform is necessary whenever the device is installed more than five feet above floor or grade. The platform must be within five feet of the lowest part of the device and must meet all applicable safety standards and codes.
12. The AVB shall be installed in accordance with the manufacturer's flow rate specifications. The flow rates and pressure loss due to increasing or decreasing flow rates will vary from one manufacturer to another.

Inspection Requirements

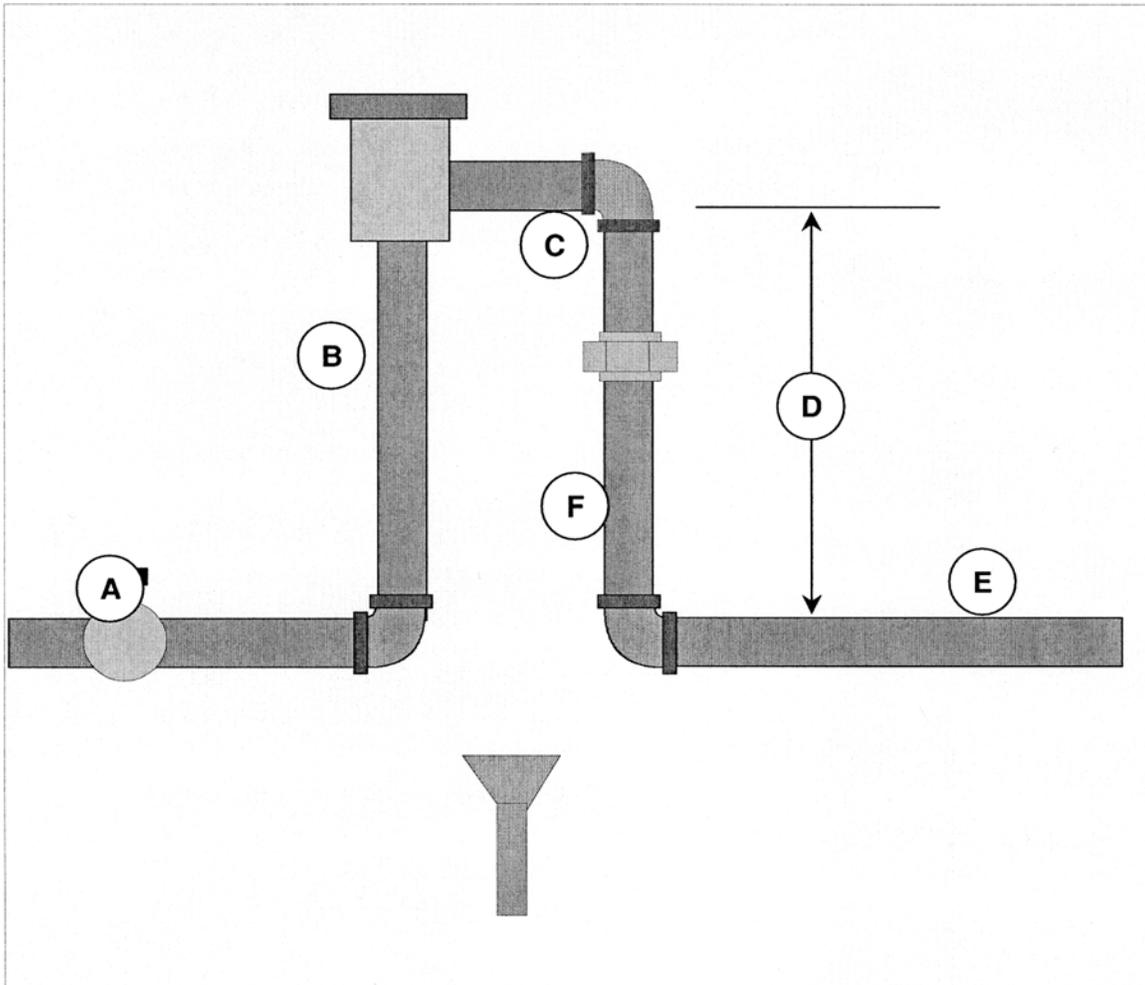
The AVB shall be inspected at the time of installation and on an annual schedule thereafter or more often when required by the Cross-Connection Control Program Manager.

Cross-Connection Control Manual
ATMOSPHERIC VACUUM BREAKER



Outdoor Isolation Installation	
A	Shut off valve
B	Service line — cement lined ductile iron, copper, or galvanized piping
C	Union — above grade
D	Minimum 6" above grade and all outlet piping. Installations more than 60" above grade or floor require a permanent platform.
E	No valves allowed in outlet piping

Cross-Connection Control Manual
ATMOSPHERIC VACUUM BREAKER



Outdoor Isolation Installation	
A	Shut off valve
B	Service line — cement lined ductile iron, copper, or galvanized piping
C	Union
D	Minimum 6" above grade and all outlet piping. Installations more than 60" above grade or floor require a permanent platform.
E	No valves allowed in outlet piping
F	Provide adequate drainage

Cross-Connection Control Manual

DOUBLE CHECK VALVE ASSEMBLY

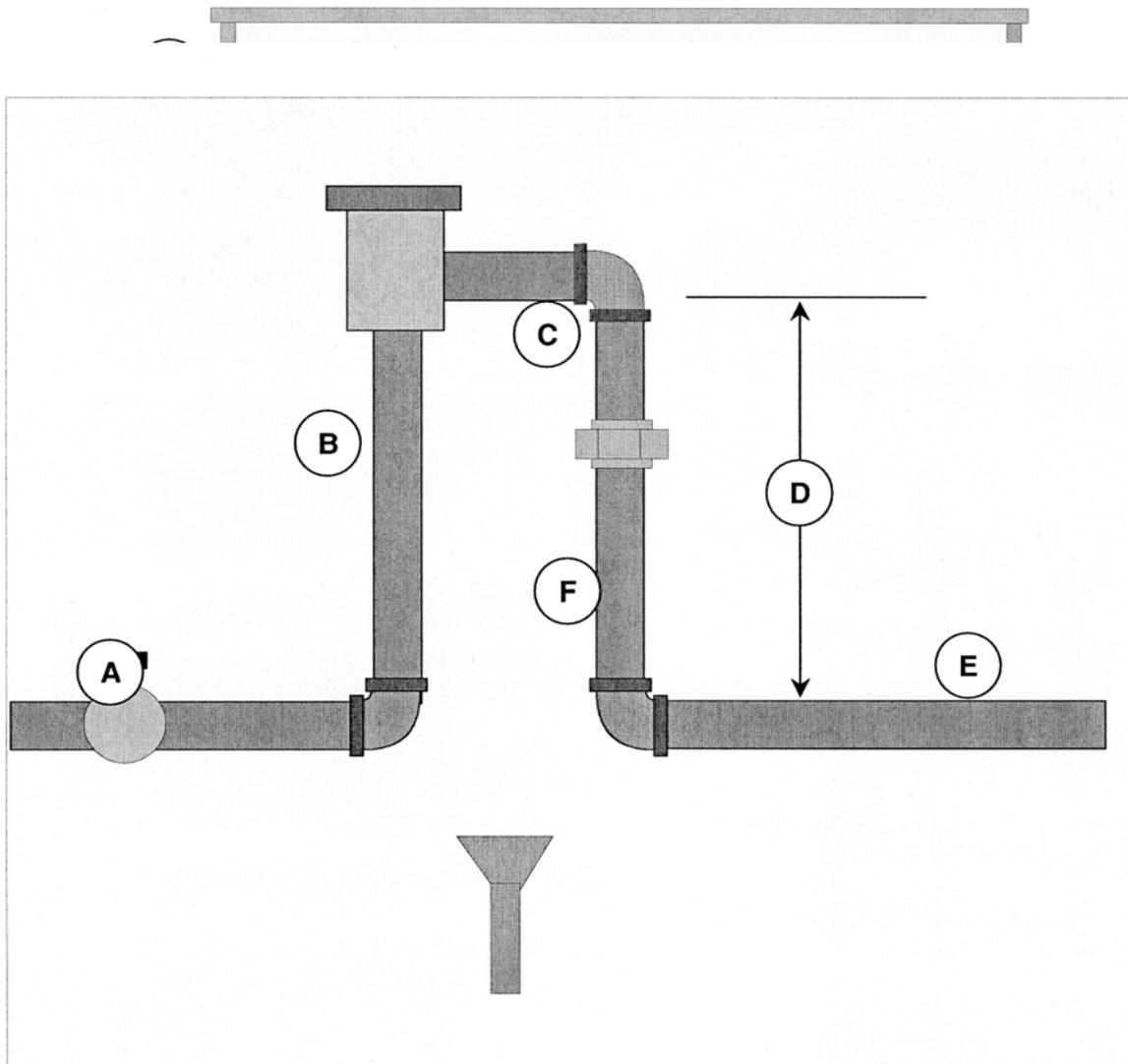
Double Check Valve Assembly Defined

A double check valve backflow prevention assembly consists of two independently acting internally loaded check valves, four properly located resilient seated test ports, and two resilient seated isolation valves at each end of the assembly.

Installation Requirements

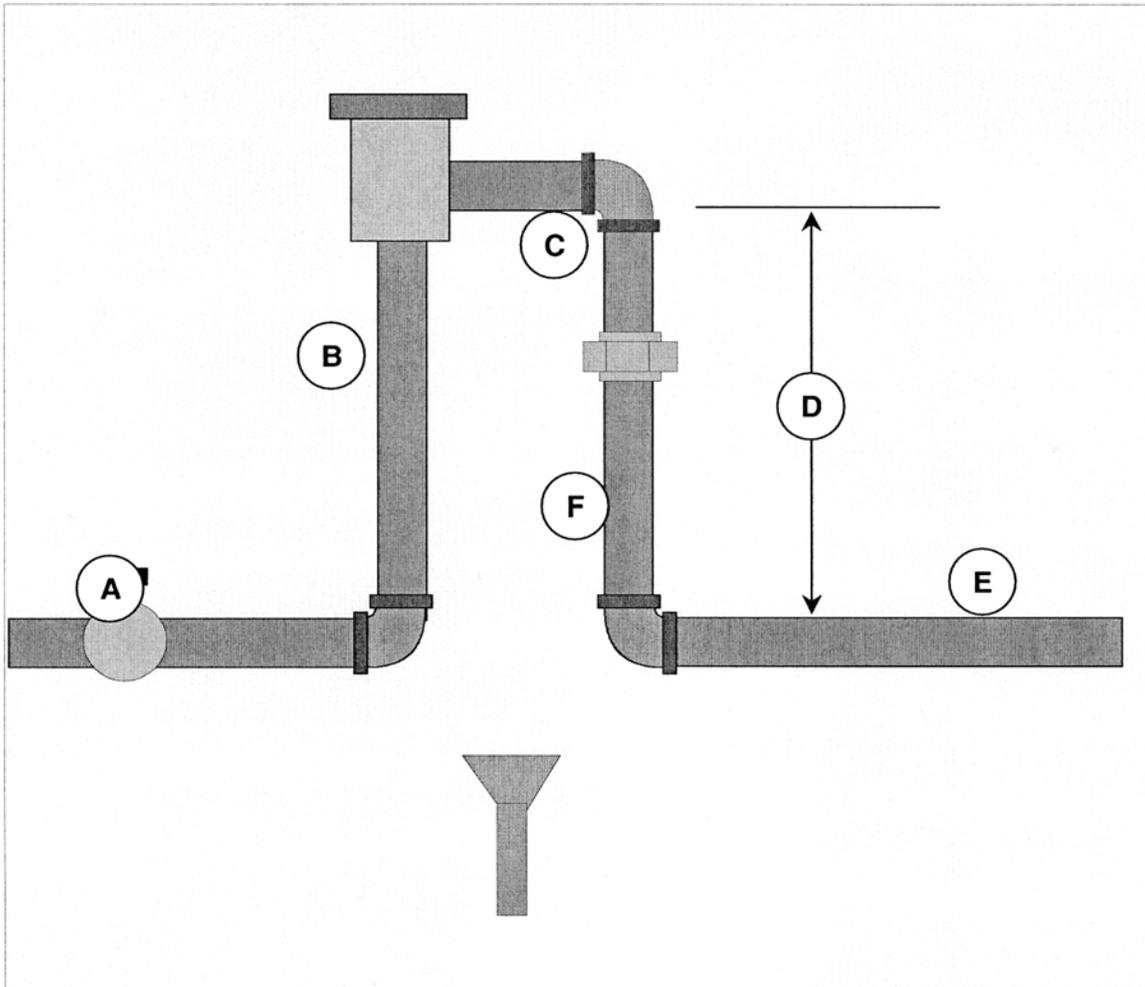
1. The DC must be installed between 12" and 36" above grade from the lowest part of the assembly for outdoor installations, and between 12" and 60" above floor or grade from the lowest part of the assembly for indoor installations.
2. The DC shall not be subjected to flooding. There shall be adequate drainage provisions to accommodate water discharge from flushing and testing.
3. Whenever the DC is insulated, the insulation must be easy to remove in order to facilitate testing and repair.
4. DCs must be installed horizontal and plumb unless specifically noted in the "List of Approved Backflow Prevention Assemblies" published by FCCCHR.
5. Thermal expansion and/or water hammer in the outlet piping of the assembly can cause excessive pressure (backpressure). A water hammer arrestor, thermal expansion tank, resilient seated check valve, or surge suppresser installed in the outlet piping is recommended to avoid damage to the piping system and the assembly.
6. Assemblies 2-1/2" and larger must be adequately supported.
7. Immediately after installation and before the assembly is tested or service is restored, the assembly must be thoroughly flushed. This is accomplished by completely removing the No. 1 check valve and opening the No. 1 shut-off valve to flush debris that may foul the assembly.
8. The size of the DC shall not be less than the size of the water supply piping.
9. The DC shall be installed in accordance with the assembly's operating pressure and temperature rating
10. The DC shall be installed with adequate access and clearance for testing, maintenance, and repairs and outside any enclosure or hooded area containing fumes that are toxic, poisonous, or corrosive.
11. A permanent platform is necessary whenever the assembly is installed more than five feet above floor or grade. The platform must be within five feet of the lowest part of the assembly and must meet all applicable safety standards and codes.
12. The DC shall be installed in accordance with the manufacturer's flow rate specifications. The flow rates and pressure loss due to increasing or decreasing flow rates will vary from one manufacturer to another.

Cross-Connection Control Manual
DOUBLE CHECK VALVE ASSEMBLY



Outdoor Installation	
A	Shutoff valve and valve box
B	Thrust blocking
C	Service line — cement line ductile iron, copper, or galvanized piping
D	Sleeve with insulation (typical)
E	4" concrete slab (3000 psi, reinforced w/1/2 rebar & 4" mesh, scored)
F	12" minimum / 36" maximum from lowest part of assembly
G	Metal supports on assemblies 2½" and greater (typical)
H	Unions or flanges — above grade (typical)

Cross-Connection Control Manual



Indoor Installations	
A	Service line — cement lined ductile iron, copper, or galvanized piping
B	Sleeve with insulation (typical)
C	12" minimum / 36" maximum from lowest part of assembly
D	Metal supports
E	Unions or flanges
F	Provide adequate drainage

Cross-Connection Control Manual**PRESSURE VACUUM BREAKER****Defined**

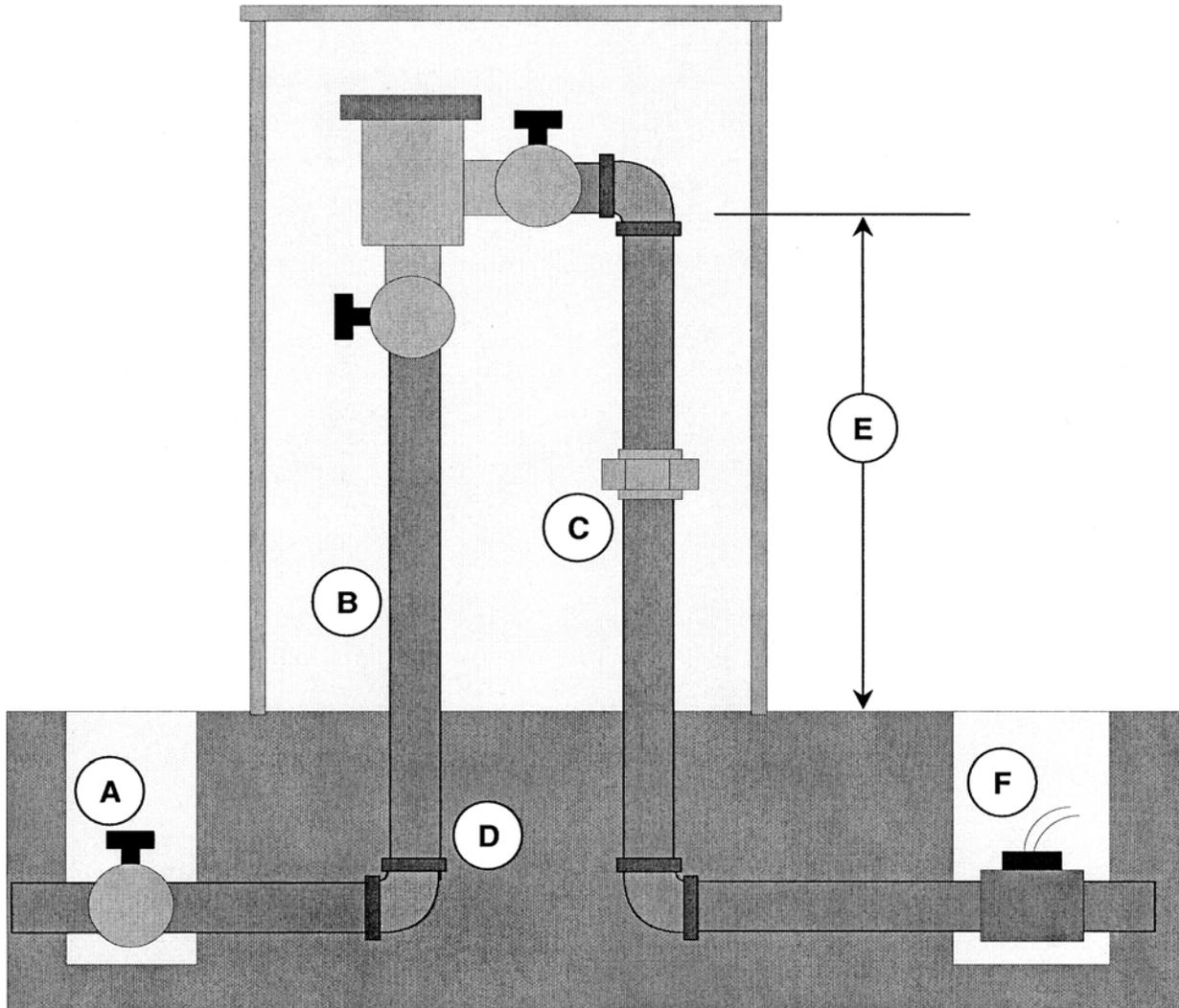
A pressure vacuum breaker assembly consists of an independently operating internally loaded check valve and an independently operating loaded air inlet valve on the discharge side of the check valve. The assembly shall be equipped with two properly located resilient seated test ports and two resilient seated isolation valves at each end of the assembly.

Installation Requirements

1. The PVB shall be installed between 12" and 60" above grade, floor, or platform and at a minimum of 12" above the highest point of the assembly's outlet piping. The assembly installation shall include unions.
2. There shall be adequate drainage provisions to accommodate water discharge from flushing and testing.
3. Whenever the PVB is insulated, the insulation must be easy to remove in order to facilitate testing and repair.
4. PVBs must be installed horizontal and plumb.
5. Immediately after installation and before the assembly is tested or service is restored, the assembly must be thoroughly flushed. This is accomplished by completely removing the air inlet valve and the check valve and opening the No. 1 shut-off valve to flush debris that may foul the assembly.
6. The size of the PVB shall not be less than the size of the water supply piping.
7. The PVB shall be installed in accordance with the assembly's operating pressure and temperature rating.
8. The PVB shall be installed with adequate access and clearance for testing, maintenance, and repairs and outside any enclosure or hooded area containing fumes that are toxic, poisonous, or corrosive.
9. A permanent platform is necessary whenever the assembly is installed more than five feet above floor or grade. The platform must be within five feet of the lowest part of the assembly and must meet all applicable safety standards and codes.
10. The PVB shall be installed in accordance with the manufacturer's flow rate specifications. The flow rates and pressure loss due to increasing or decreasing flow rates will vary from one manufacturer to another.
11. In containment applications, the PVB shall only be used for dedicated lawn irrigation systems such as parks, medians, and golf courses.

Cross-Connection Control Manual

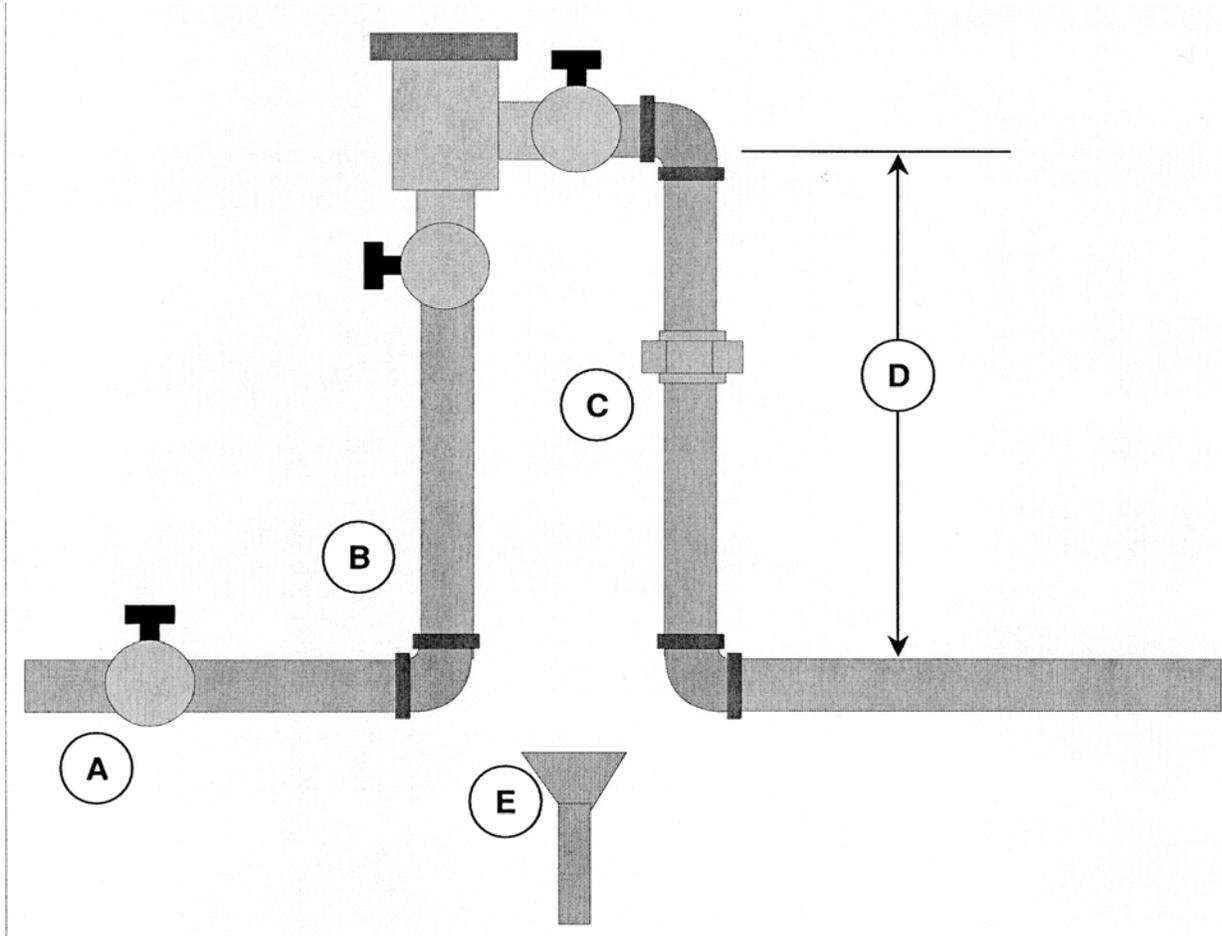
PRESSURE VACUUM BREAKER



Outdoor Installations	
A	Shut off valve
B	Service line — cement lined ductile iron, copper, or galvanized piping
C	Union — above grade
D	Protective enclosure
E	Minimum 12" above grade and all outlet piping. Installations more than 60" above grade or floor require a permanent platform
F	Master or zone valve — if applicable

Cross-Connection Control Manual

PRESSURE VACUUM BREAKER



Indoor Installation	
A	Shut off valve
B	Service line — cement lined ductile iron, copper, or galvanized piping
C	Union
D	Minimum 12" above all outlet piping. Installations more than 60" above grade or floor require a permanent platform
E	Provide adequate drainage

Cross-Connection Control Manual**REDUCED PRESSURE PRINCIPLE ASSEMBLY****Defined**

A reduced pressure principle backflow prevention assembly consists of two independently acting internally loaded check valves and a hydraulically operating, mechanically independent pressure differential relief valve located between the check valves and below the first check valve. The assembly shall be equipped with two properly located resilient seated test ports, and two resilient seated isolation valves at each end of the assembly.

Installation Requirements

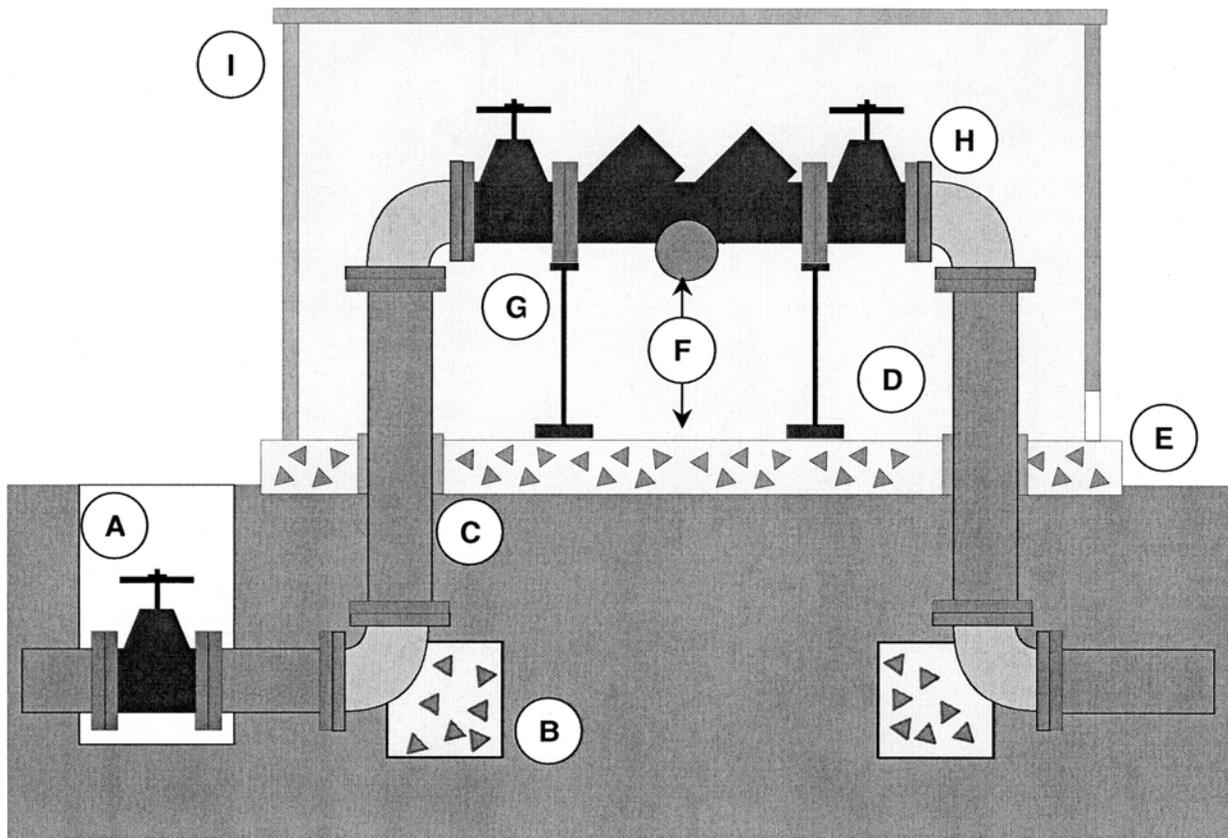
1. The RP must be installed between 12" and 36" above grade from the lowest part of the assembly for containment installations, and between 12" and 60" above floor or grade from the lowest part of the assembly for isolation installations. The assembly shall not be subjected to flooding.
2. Drainage requirements for the RP must be hydraulically calculated to handle the maximum relief valve discharge rate; see "Relief Valve Discharge Rates" chart on page 43. Most manufacturers' air-gap drains are designed to only handle occasional "spitting" from the relief valve and will not accommodate a full discharge. An approved air-gap separation at the relief valve is required.
3. RPs must be installed in locations where intermittent and continuous discharge from the relief valve will not be objectionable.
4. Whenever the RP is insulated, precautions must be taken to prevent blockage of the relief valve opening and access to components. The insulation must be easy to remove in order to facilitate testing and repair.
5. RPs must be installed horizontal and plumb unless specifically noted in the "List of Approved Backflow Prevention Assemblies" published by the FCCCHR.
6. Thermal expansion and/or water hammer in the outlet piping of the assembly can cause excessive pressure. A water hammer arrestor, thermal expansion tank, spring-loaded resilient seated check valve, or surge suppresser installed in the outlet piping is recommended to avoid damage to the piping system and the assembly.
7. Fluctuating inlet pressure may cause intermittent discharge of the relief valve and eventual fouling of the assembly. In a static condition, the zone between the two check valves must be maintained at least 2.0 psi below the supply pressure. A resilient seated check valve installed in the inlet piping of the RP is recommended to maintain constant pressure of the zone during water supply pressure fluctuations.
8. Assemblies 2-1/2" and larger must be adequately supported.
9. Immediately after installation and before the assembly is tested or service is restored, the assembly must be thoroughly flushed. This is accomplished by

Cross-Connection Control Manual**REDUCED PRESSURE PRINCIPLE ASSEMBLY**

completely removing the No. 1 check valve and opening the No. 1 shut-off valve to flush debris that may foul the assembly.

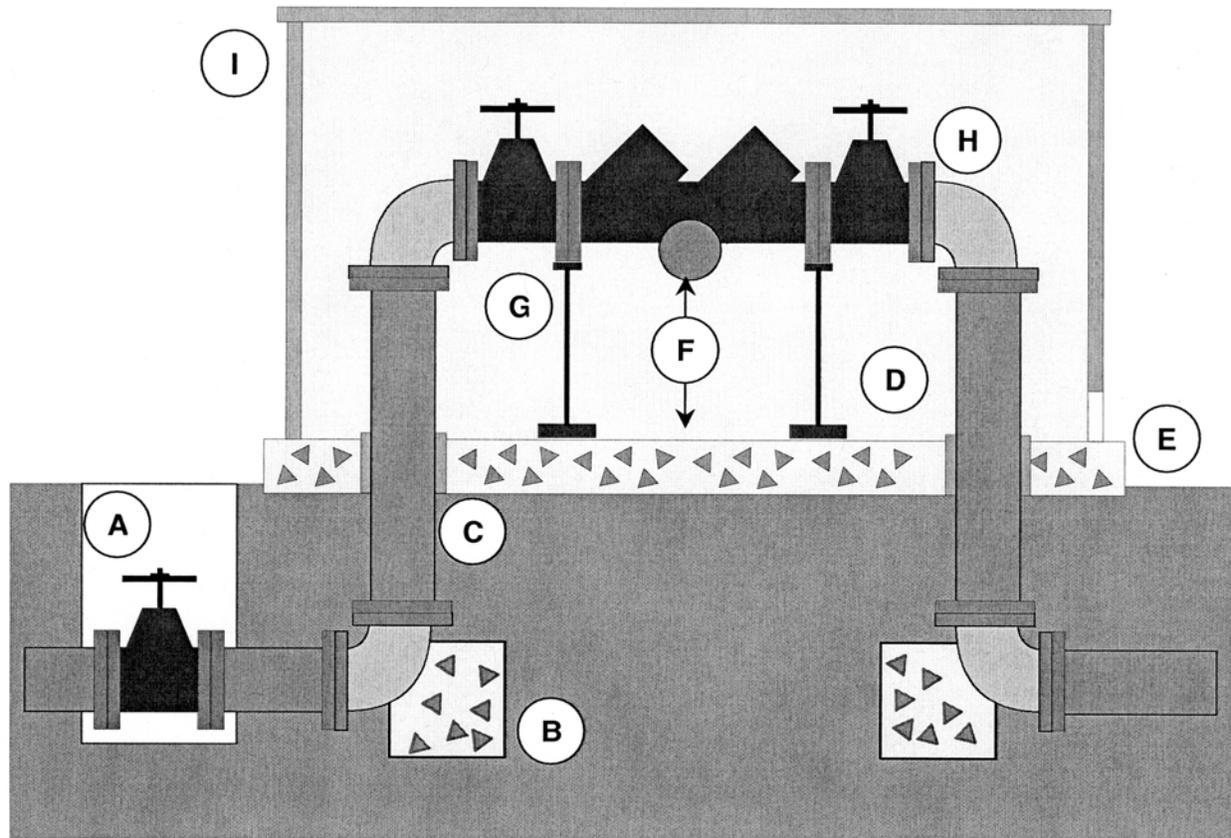
10. The size of the RP shall not be less than the size of the water supply piping.
11. The RP shall be installed in accordance with the assembly's operating pressure and temperature rating.
12. The RP shall be installed with adequate access and clearance for testing, maintenance, and repairs and outside any enclosure or hooded area containing fumes that are toxic, poisonous, or corrosive.
13. A permanent platform is necessary whenever the assembly is installed more than five feet above floor or grade. The platform must be within five feet of the lowest part of the assembly and must meet all applicable safety standards and codes.
14. The RP shall be installed in accordance with the manufacturer's flow rate specifications. The flow rates and pressure loss due to increasing or decreasing flow rates will vary from one manufacturer to another.

Cross-Connection Control Manual
REDUCED PRESSURE PRINCIPLE ASSEMBLY



Indoor Installations	
A	Service line — cement lined ductile iron, copper, or galvanized piping
B	Sleeve with insulation (typical)
C	12" minimum / 60" maximum from lowest part of assembly
D	Metal supports
E	Unions or flanges
F	Provide adequate drainage (see "Relief Valve Discharge Rates" page 43)

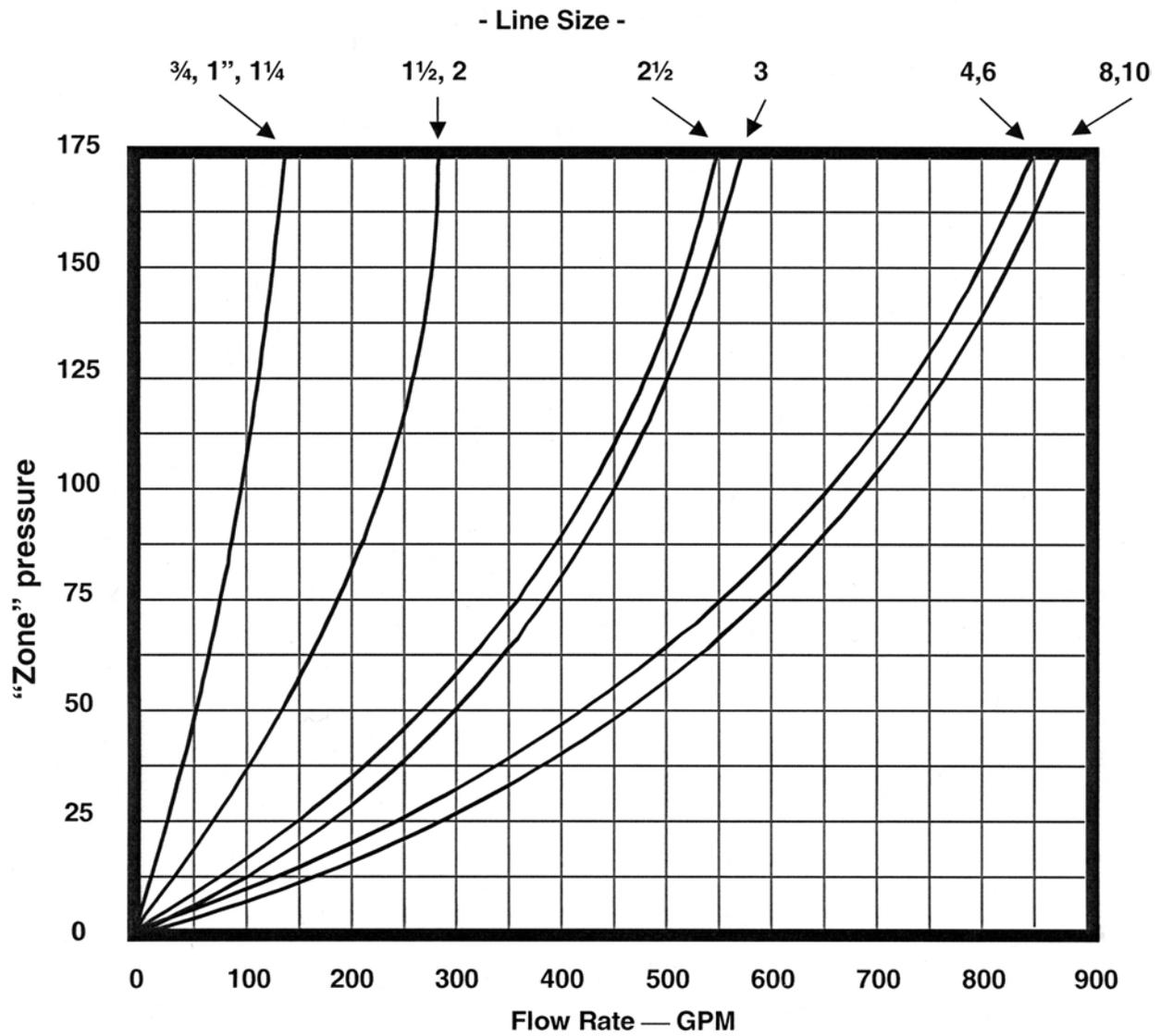
Cross-Connection Control Manual
REDUCED PRESSURE PRINCIPLE ASSEMBLY



Outdoor Installations	
A	Shutoff valve and valve box
B	Thrust blocking
C	Service line — cement lined ductile iron, copper, or galvanized piping
D	Sleeve with insulation (typical)
E	4" concrete slab (3000 psi, reinforced w/1/2" rebar & 4" mesh, scored)
F	12" minimum / 36" maximum from lowest part of assembly
G	Metal supports on assemblies 2½" and greater (typical)
H	Unions or flanges — above grade (typical)
I	Protective enclosure with drain (see "Relief Valve Discharge Rates" page 43)

Cross-Connection Control Manual
REDUCED PRESSURE PRINCIPLE ASSEMBLY

Relief Valve Discharge Rates



Flow Rate	Drain Size	Flow Rate	Drain Size
55	2	350	5
112	3	450	6
170	4	760	8

Cross-Connection Control Manual**SPILL-RESISTANT PRESSURE VACUUM ASSEMBLY****Defined**

A spill-resistant pressure vacuum breaker assembly consists of an independently operating internally loaded check valve and an independently operating loaded air inlet valve on the discharge side of the check valve. The assembly shall be equipped with one properly located resilient seated test port and vent valve and two resilient seated isolation valves at each end of the assembly.

Installation Requirements

1. The SVB is intended for indoor installations.
2. The installation requirements for the SVB are the same as the requirements for the PVB.

Cross-Connection Control Manual**EDUCATION & TRAINING****Education and Training**

The Cross-Connection Control Program Manager will establish and maintain cross-connection control education and training for Ft Bliss personnel. Continuous education and training of personnel is essential to insure that people involved in every part of the program have current information. Examples of continuous education and training are as follows:

1. Contractor orientation on acceptable new construction practices. This is applicable to all crafts prior to beginning work.
2. Awareness workshops for Ft. Bliss personnel such as engineers, inspectors, designers, janitorial, and all crafts.
3. Manufacturer hands on training on the use of product used at Ft. Bliss.
4. Forty-hour certification courses repeated every three years.
5. Distribution of printed material for building occupants.

Cross-Connection Control Manual**SEVERABILITY / VIOLATIONS****Severability**

If any provision, section, subsection, sentence, clause, or phrase of this manual, or the application of same to a given set of circumstances, is for any reason held to be invalid, the validity of the remaining portions of the manual shall not be affected.

Violations

The following shall be grounds for the discontinuance of water service:

- Removal or bypassing of any backflow prevention method, device, or assembly;
- Falsification of test reports;
- Obtaining water from a fire hydrant in violation of cross-connection control requirements;
- Connecting a fire protection system to a premises potable water system;
- Allowing uncontrolled cross connections to exist; or
- Failure to cooperate in the installation, maintenance, testing or inspection of backflow prevention assemblies as required by this guidance. Water service shall not be restored until such conditions are corrected.

Discontinuance of water service may be immediate, and without written notice, whenever, in the judgment of the Cross-Connection Control Program Manager, such action is necessary to protect the safety of the premises or the purity of the water distribution system.

Cross-Connection Control Manual

APPROVAL

Approved this ____ day of _____, 2001

By _____

Cross-Connection Control Manual**REFERENCES and WORKS CITED**

- 16 Texas Administrative Code, Chapter 65. Administrative Rules of the Texas Department of Licensing and Regulation.
- City of Albuquerque, Cross Connection Prevention and Control Ordinance. Albuquerque. 1995.
- El Paso Water Utilities Public Service Board. Cross-Connection Control Program, Manual of Procedures. El Paso. 1996.
- Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California. Manual of Cross-Connection Control. 9th ed. Los Angeles, 1993.
- International Association of Plumbing and Mechanical Officials. Uniform Plumbing Code. 2000 ed. Walnut, 1999.
- Lower Valley Water District, Cross-Connection Control Program, Manual of Procedures. Socorro. 1999.
- New Mexico Environment Department, Title 20 Environmental Protection, Chapter 7. Wastewater and Water Supply Facilities.
- Texas Administrative Code. Chapter 290, Public Drinking Water.
- Texas Health and Safety Code, Chapter 341. Minimum Standards of Sanitation and Health Protection Measures.

Revision Number: 4
 Revision Date: 30 March 2009

**Fort Bliss Directorate of Public Works Environmental Division
 Requirements for Planning, Design, and Construction**



PURPOSE

This document provides guidance on environmental requirements, policies, and general concerns based upon previous experiences pertaining to the Fort Bliss Army Installation. The purpose of this document is to ensure that all information gaps regarding environmental issues associated with proposed construction projects are closed. The information contained herein serves as an environmental reference for project stakeholders throughout all phases of construction-related activities (conceptual, proposal phase, design, and construction). Topics addressed are derived from a combination of feedback provided for NEPA project document reviews, and information communicated to stakeholders at construction-related project meetings by Directorate of Public Works-Environmental Division (DPW-E) staff. This is a living document, and as such, all information is subject to change as policies are revised, legal requirements change, and new environmental impacts are identified.

Note: All construction activities need to be reviewed by DPW-E prior to any ground disturbance to ensure there are no environmental issues, including historic properties.

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AIR QUALITY

Refrigeration (Comfort Cooling/Dining Facilities/Cold Storage)

The use of non-ODC (ozone depleting compounds) shall be used in any refrigeration unit. Class II ODC will be phased out starting 2020 and use of non-ODC will meet phase out deadline and requirements under Clean Air Act, Title VI (40 CRF 82).

ARCHEOLOGY

Archeological sites, artifacts, and historic buildings on Fort Bliss are protected by Federal law and Army regulations. Surface collection, excavation, or willful destruction of archeological sites and artifacts (arrowheads, pottery, bottles, etc.) is subject to criminal penalties including fines and incarceration. Disturbing human graves or remains is strictly protected by law. Willful excavation or disturbance of human burials is subject to criminal penalties including fines and incarceration. In the event of inadvertent discovery of archeological sites, artifacts, or human remains, cease work and contact DPW-E Archeology staff.

ASBESTOS

Asbestos Management Requirements

IAW 40 CFR 61 NESHAP, an asbestos survey is required to determine if regulated asbestos containing material (RACM) in excess of the regulatory thresholds will be disturbed. In the event that RACM will be removed above the regulatory thresholds, a 10- day notice to the State will be required to be submitted. All demolitions will require the 10-day notification regardless of whether a building contains asbestos. Asbestos disposal requires a Hazardous Waste Manifest for tracking purposes. Hazardous Waste Manifests for asbestos will be signed by the Asbestos Contractor as the Generator's Representative. In addition, asbestos must be disposed of by the contractor at an off-post approved landfill that accepts asbestos-containing material at the contractor's expense. All other regulated and hazardous wastes must be properly handled, stored, and disposed of in accordance with local, state, and federal laws and regulations.

LEAD

Lead Management Requirements

Prior to building demolition, a Toxicity Characteristic Leaching Procedure (TCLP) sample for lead shall be sampled and analyzed in accordance with EPA's SW 846 procedure. If the sample is determined to be above the TCLP threshold, the lead-containing material must be disposed of by the contractor at an off-post approved landfill that accepts lead-containing material at the contractor's expense. In the event that building material will be segregated, the waste stream will be identified and a TCLP sample shall be analyzed for Lead IAW EPA's SW 846 procedure. Only non lead-containing material may be offered for reuse.

Whole building demolition debris

Consists of all building components (painted and non-painted) to include wood, brick, cement (foundations), plaster, drywall, etc. that are torn down during demolition and collected for disposal. Waste characterization is based on analyses of samples that are "representative" of the waste. Therefore, proportionate quantities of the various structural components can be obtained (e.g., by coring or drilling through the materials) and combined for analyses in accordance with the TCLP requirements.

Partial Demolition (Building Renovation)

May consist of a variety of components (painted and non-painted) such as those in whole building demolition debris, but does not entail entire building/structure. Same sampling procedures as discussed above may be used. A second option involves careful predetermination and characterization of the individual components to allow for special waste handling and segregation procedures during the operations. Careful segregation is more feasible for renovations/partial demolitions than for whole building demolition and may reduce the volume of hazardous waste. Where segregation is not practical for a particular operation the overall "representative" sample approach should be used. A cost analyses may be beneficial to determine waste management practices

EPAS

The Army's Environmental Performance Assessment System (EPAS) program is administered through the DPW-E Multimedia Compliance Branch. The goal of this program is to administer environmental compliance audits objectively and comprehensively, provide professional and technically correct audits, and foster environmental responsibility in all personnel who can affect the environment at Fort Bliss. EPAS staff will coordinate with the appropriate construction project personnel to schedule audits.

HAZARDOUS MATERIAL

Definition

Any item or chemical which is a "health hazard" or "physical hazard" as defined by the Occupational Safety and Health Act (OSHA) in 29 CFR 1910.1200, which includes the following:

- (1) Chemicals which are carcinogens, toxic, or highly toxic agents, reproductive toxins; irritants, corrosives, sensitizers, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucus membranes.
- (2) Chemicals which are combustible liquids, compressed gases, explosives, flammable liquids, flammable solids, organic peroxides, oxidizers, pyrophorics, unstable (reactive) or water-reactive.

(3) Chemicals which in the course of normal handling, use, or storage operations may produce or release dusts, gases, fumes, vapors, mists or smoke which have any of the above characteristics.

(4) Any item or chemical which is reportable or potentially reportable or notifiable as inventory under the requirements of the Hazardous Chemical Reporting (40 CFR 370), or as an environmental release under the reporting requirements of the Toxic Chemical Release Reporting: Community Right To Know (40 CFR 372), which include chemicals with special characteristics which in the opinion of the manufacturer can cause harm to people, plants, or animals when released by spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other receptacles).

(5) Any item or chemical which, when being transported or moved, is a risk to public safety or an environmental hazard and is regulated as such by one or more of the following:

- (a) Department of Transportation Hazardous Materials Regulations (49 CFR 100–180).
- (b) International Maritime Dangerous Goods Code of the International Maritime Organization.
- (c) Dangerous Goods Regulations of the International Air Transport Association.
- (d) Technical Instructions of the International Civil Aviation Organization.
- (e) U.S. Air Force Joint Manual, Preparing Hazardous Materials for Military Air Shipments (AFJMAN 24–204).

Hazardous Material Storage-Interior

Any maintenance bay (Tactical Equipment Maintenance Facility (TEMF)) or other facility containing hazardous materials must allocate (in design documents) space for hazardous material storage areas (in accordance with compatibility of materials being stored). Specifically, the inside of the facility must contain a designated area for flammable lockers, and secondary containment for hazardous materials being used. Fluid distribution rooms within TEMFs require secondary containment for all hazardous materials (e.g., petroleum, oil, lubricant, and antifreeze products). Floor drains within fluid distribution rooms are not permitted.

Hazardous Material Storage-Exterior

The outside of the facility must contain a designated area for a self-contained Hazstore building (with segregated compartments to provide for storage of incompatible materials such as acids, caustics, reactive metals, ractive organic compounds, flammable solvents, and oxidizers) or buildings depending on quantities used. This area must also be able to be accessed by a 10K forklift. Hazardous material is always separated from hazardous waste and for this reason, Hazstore buildings should be considered discrete requirements for each media (materials and waste).

Best Management Practices (BMPs) for storm water require that secondary containment be provided to preclude rain flows from carrying hazardous material contaminants.

Roofs are BMPs that are usually built over these secondary containment areas to preclude evacuation of rain waters after each event from containment area. Unroofed areas have valves that allow rain water release from containments but are problematic because units leave valves open continuously to avoid opening and closing the valves after rain events. These areas are usually secured by fencing by the unit to protect costly materials for accountability reasons.

HAZARDOUS WASTE

Definition

A waste identified in Section 3, Part 261, Title 40, Code of Federal Regulations (40 CFR 261.3) or applicable foreign law, rule, or regulation.

Hazardous Waste Generation-Contractor

Hazardous waste generated incidental to the execution of service or construction contracts should be disposed of by the contractor performing the basic contract, at the contractor's expense, using the installation's generator identification number on the manifest. Such actions must be coordinated with the installation environmental coordinator and documented in writing.

Hazardous Waste Storage

Definition

As defined in 40 CFR 260.10, the holding of hazardous waste for a temporary period, at the end of which the hazardous waste is treated, disposed of, or stored elsewhere.

Description

Storage of hazardous waste requires control, segregation of compatibles, and secondary containment. HazStor buildings are preferred by DPW-E because they set a standard for storage and send a clear message that hazardous waste is highly regulated. Non-compliance with hazardous waste storage regulations results in expensive fines (\$15,000/day). HazStor buildings are weather tight, have ramps, secondary containment, shelving, and barriers to separate incompatibles. Although HazStor buildings are not required, their characteristics must be incorporated into all hazardous waste storage designs. Any new construction designs should include ramping (drums are heavy), material incompatibility (physical barriers), secondary containment, control, and proper signage. Two HazStor modulares (12'x24'); one being 3-compartments, and one being a single compartment is sufficient for each side of the current 2-sided motorpools.

HISTORICAL ARCHITECTURE

DPW-E maintains a list of buildings that require review under Section 106 of the National Historic Preservation Act prior to expenditure of funds for modification, repair,

renovation, or other change to the interior or exterior, including landscape. New construction and exterior renovations to existing facilities not on the list also requires review if the facility is within the viewshed. Contact DPW-E prior to starting work on any project involving new construction or changes to existing facilities or landscapes.

LANDSCAPING (AT ANY BUILDING)

Implementing the following recommendations will promote long term success resulting in water conservation, reduction in expenditures, and fewer maintenance needs.

(1) Use species from the “Top 10 Trees for Fort Bliss Landscape Projects” poster (copies available upon request). Tree selections include Honey Mesquite (*Prosopis glandulosa* var. *glandulosa*), Chinese Pistache (*Pistacia chinensis*), Western Soapberry (*Sapindus drummondii*), Honey Locust (*Gleditsia triacantha* var. *inermis*), Desert Willow (*Chilopsis linearis*), Afghan Pine (*Pinus eldarica*), and Escarpment Live Oak (*Quercus fusiformis*). These species are “water smart” plants, have fewer pests (if any), and once established, require little of no fertilization and will increase the chances for long term landscape success. These trees are either native or adaptable to the arid environment of Fort Bliss.

(2) An exhaustive list of low-water use trees, shrubs, and other plant options for our region can be consulted on species lists prepared by El Paso County, Texas. The Environmental Division has copies of these lists as well.

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)

All construction actions must undergo NEPA analysis prior to project ground-breaking. NEPA reviews may include project designs, specifications, and plans. A complete description of the action should be presented at the time of the generation of the 1391. The Fort Bliss NEPA Team will review and then generate a Tab J for the project that may include NEPA documentation. If the proposed action has been reviewed in previous documentation, that documentation must be supplied. If the project is part of a wider action or if project descriptions indicate a potential for significant action or for not meeting the screening criteria as set forth in 32 CFR 651.29, then the Tab J will not include the requisite NEPA documentation. Funding for separate NEPA analysis will then need to be obtained by you or the proponent through the proper funding process. This NEPA documentation can be at the level of an Environmental Assessment (EA) or an Environmental Impact Statement (EIS), so early planning is essential. The NEPA Coordinator, with concurrence of the NEPA Board, can assist in determining the level of analysis required, generating the proper documentation, and if possible, in changing the proposed action to one that will require a lower level of environmental review.

PESTICIDES

Pesticides are chemicals designed to kill a variety of pests, pose a health risk if mishandled, and are highly regulated. Only certified applicators that are coordinated with the Installation Pest Management Program (IPMP) are allowed to handle and apply

pesticides at Fort Bliss. Technicians are not approved to apply pesticides on the installation.

All contracts involving pesticide applications must be coordinated with the Installation Pest Management Coordinator (IPMC) at DPW-E. The types and amounts of pesticides used on the installation must be recorded and submitted to the IPMC using the IPMP formats.

PETROLEUM STORAGE TANKS

Automated Used POL Collection Systems

In the past, automated, pneumatic used oil and used antifreeze collection systems have been installed in several TAC shops. These systems have had numerous problems and have not worked well for Fort Bliss.

These systems are high maintenance and very expensive to repair. Common problems include but are not limited to:

- (1) The system continues to pump used oil/antifreeze into the Aboveground Storage Tank (AST) until it overflows or squirts fluid out thru the tank vent.
- (2) The collection sump overflows because the sensor in the sump does not trigger the pump. The expense to replace the pressure sensor device alone was \$5,000 at one site.
- (3) The underground lines get plugged-up from the debris in the used oil and antifreeze.
- (4) The underground lines need to be tightness tested annually and if they fail, the floor must be torn up to repair them. Cathodic protection is required for steel POL lines buried in concrete but these lines do not have it. All POL lines need to be installed aboveground to avoid these issues.

Automated systems are over-engineered and rely too heavily on mechanical devices that fail. There needs to be human involvement in the disposal of these used POL fluids to prevent spills and releases to the environment. In summary, these systems are too automated, resulting in lack of attention toward environmental issues.

The design plans usually refer to the used oil and antifreeze as “waste” oil and “waste” antifreeze. When the systems are installed, the word “waste oil” or “waste antifreeze” is usually painted on the tanks and piping. When a state or federal regulator sees the word “waste oil” he assumes that the oil is hazardous and contains solvents or other constituents besides oil. Therefore, label all used oil above ground oil tanks as “USED OIL”, and used antifreeze labeled as “USED ANTIFREEZE”.

Even if an AST has an automatic tank monitor (like a Veeder Root brand ATG), it should also have a visual gauge on the tank so that personnel can easily check the fluid level at a glance. This helps to prevent overfills and spills of used POL. If this gauge is a Morrison Clock Gauge, ensure that the gauge has a marking to indicate the capacity for the tank. Many people do not know how to read a clock gauge so they cannot tell when it is full. A simpler gauge that shows ¼, ½, ¾, Full is preferable.

Petroleum Storage Tanks

- (1) The used oil and antifreeze collection systems that have been installed in several motor pools at Fort Bliss are not well designed and have not worked well. They require frequent, expensive repairs and they also cause frequent overflows of their aboveground storage tanks. A better design is needed. Perhaps the best plan would be a simpler one where the soldiers empty the used POL into an AST by hand.
- (2) If fuel tankers are to be parked at motor pools, they need to have a secondary containment that will hold the contents of the largest tanker in the containment plus about 10% for rainwater. The containment needs to have a lockable drain on the low side to remove rainwater.
- (3) Underground Storage Tanks (USTs) are highly regulated and environmentally risky. ASTs make more sense.
- (4) Underground piping is an additional environmental burden. They need to be cathodically protected to prevent corrosion and they need to be tested for leaks annually. Try to avoid installing underground piping for POL.
- (5) Aboveground POL tanks should have double-wall construction, spill/overflow protection, and a release monitoring system (automatic tank gauge with alarm). The alarm should be located where someone can hear it. These tanks are the object of continuous fill/pump operations. A staircase adjacent to the tanks to make it safer for additions of fluids is appropriate. Currently, heavy 5 gallon containers are raised over the head making it unsafe and also more risky for spills. Secondary containment berms around the tanks are a good idea; spills can be contained in a limited area and easily cleaned up.
- (6) Aboveground POL tanks need to be located on a concrete pad. Even double-wall ASTs are prone to overfills and spillage so they need to be situated on a paved surface to avoid expensive cleanups of contaminated soil.

STORM WATER

Guidance for Construction Storm Water Pollution Prevention Plans (SWP3's) & Permits

Spills - All potentially polluting material should be labeled and stored in original containers where possible and be sealed or covered to prevent contact with storm water or storm water runoff. MSDS's of all materials must be maintained on site. A list of these materials should also be included in the SWP3. All spills or releases of hazardous waste, materials, fuels, oils or lubricants should be reported to Fort Bliss Fire Department (915) 568-1117 or (915) 568-5283. The Fire Department will notify other Fort Bliss entities including Environmental Division which will notify regulatory authorities if reportable quantity thresholds are exceeded.

Storage Tanks - Storage of liquid materials, including fuels, requires impervious secondary containment equal to 110% of stored capacity. A spill response kit shall be maintained at each fuel storage and dispensing location. Drip pans or other temporary containments shall be used during fuel transfers to prevent leaks at the most vulnerable locations; for example hose couplings and beneath the nozzle at the point of transfer to the vehicle. Any rain water accumulated in secondary

containments must be considered contaminated if oil or oil sheen is visible. Disposal of contaminated rain water must be coordinated with the installation the Petroleum Storage Tank Manager (915) 568-6959 or Storm Water Manager (915) 568-0794.

Disposing of hyper chlorinated water - During disinfection of newly installed waterlines, chlorinated water to be discharged to the environment (or storm water conveyance system) shall be neutralized to achieve a maximum residual chlorine concentration of 4 parts per million, in accordance with AWWA standard C651.

Construction Water Service - The Fort Bliss Water Services Company ((915) 569-5360) shall designate a hydrant or stand pipe to assist contractors during construction. A water meter and an approved backflow prevention assembly shall be maintained at all times of operation at the hydrant or standpipe. The water fill area shall be designed and maintained to insure that water does not accumulate causing a vector attractant or erosion. All backflow prevention assemblies shall be tested for proper operation by a backflow prevention technician registered with the Cross-Connection Control Program Manager (CCCM). Contact the CCCM at (915) 569-5359 to schedule testing. Testing shall take place at the time of installation, repair, or relocation and at least on an annual schedule thereafter or more often when required by the Cross-Connection Control Program Manager.

Hazardous Waste – Construction Site Operators must contact the Environmental Division, Hazardous Waste Program Manager for installation policies and guidance on hazardous waste management prior to accumulation of any HW waste at their sites. The Construction Site Operator is responsible for complying with state/federal hazardous waste management regulations, installation permit provisions, and installation HW Management Plan and SOPs and must provide the HW Program Manager with their waste transporter and disposal facility EPA identification numbers. Hazardous waste generated as result of construction or other activities on Fort Bliss property must be disposed of under authority of the Fort Bliss permit number and manifests must be signed by an authorized Fort Bliss Representative. Review and signature of the manifest must be scheduled with the Hazardous Waste Program Manager at (915) 569-6393 or (915) 568-7041.

Solid Waste / Recycling - The Fort Bliss landfill is only accessible to those contractors with a permit issued by the Directorate of Public Works, Building 777. All military construction, renovation and demolition projects shall include contract performance requirements for a 50% minimum diversion of construction and demolition (C&D) waste by weight, from landfill disposal. Contract specifications will include submission of a contractor's C&D Waste Management Plan prior to the start of site clearance. All weight tickets for materials resold, recycled or reused will be reported to the Environmental Division, solid waste program manager.

Air / Dust Control - Water shall be applied at all construction/demolition sites to include unpaved roads for egress and ingress, staging and storage areas, stockpiles and debris piles, and parking lots for employees and workers. Dust shall be controlled during earth work, grading, and related activities that can create dust. All open-bed trucks shall have a cover or tarp to control dust when handling or hauling earth, aggregate or debris. Crushed rock, gravel or crushed asphalt can be used or applied on in-plant or on-site roads, staging areas, and or park areas to minimize water usage and control dust.

Waste Water - No foreign items, construction debris, chemicals, oils, etc., shall be introduced into the sanitary sewer collection system. Storm water runoff shall be directed away from the sanitary sewer collection system and storm water shall not be disposed into the sanitary collection system. State licensed temporary toilet facilities (i.e. Porta Potties) shall be utilized. There shall be no temporary toilet vaults or septic tanks installed without proper authorization from ENVIRONMENTAL DIVISION.

Document Submission Requirements - A copy of the completed SWP3 including planned start and stop dates, completed NOI and copy of actual construction general permit to should be provided to:

Directorate of Public Works

Master Planning

Attn: IMWE-BLS-PWM (Bldg. 777)

Pleasanton & Chaffee Roads

Fort Bliss, TX 79916

(915) 568-2757, 5949, or 5933

The City of El Paso and Fort Bliss storm water conveyance systems are interconnected. As a result, a courtesy copy should also be provided for informational purposes to the City of El Paso,

Kareem Dallo, P.E. or Ziad Al-Dasouqi, P.E.

Development Services Department

City Hall, 5th floor

2-Civic Center Plaza

El Paso TX 79901

Off: (915) 541-4788

Additional Information - Question regarding storm water pollution prevention plans on Fort Bliss should be directed to Mr. Kelly Blough, Multimedia Compliance Branch, Construction Storm Water Program Manager, Environmental Division, Attn: IMWE-BLS-PWE (Bldg 622), Pleasonton & Taylor Roads, Fort Bliss, TX 79916, (915) 568-0794 (kelly.blough@us.army.mil) or Mr. Jack Lady (915) 568-0558 (jack.lady@us.army.mil).

Summary of Fort Bliss – Texas Construction Permitting Requirements

Area of Soil Disturbance	Regulatory Requirements
Less than 1 acre	Construction SWP3 and notice to state not required.
1 to less than 5 acres	Construction SWP3 is likely required though some short duration projects may qualify for waiver. SWP3 or waiver request must be coordinated through Environmental Division.
5 acres and greater	Construction SWP3 is required and must be coordinated through Environmental Division. NOI form and fee must be submitted to Texas Commission on Environmental Quality.

SWP3 = Storm Water Pollution Prevention Plan – Document following Texas Commission on Environmental Quality approved format that details the project and efforts to prevent migration of pollutants from construction site.

NOI = Notice of Intent – Texas Commission on Environmental Quality form that a construction site operator submits to the state in order to receive construction site permit coverage.

Summary of Fort Bliss – New Mexico Construction Permitting Requirements

Area of Soil Disturbance	Regulatory Requirements
Less than 1 acre	Construction SWP3 and notice of intent not required.
1 to less than 5 acres	Construction SWP3 is likely required though some short duration projects may qualify for waiver. SWP3 or waiver request must be coordinated through Environmental Division.
5 acres and greater	Construction SWP3 is required and must be coordinated through Environmental Division. NOI form and fee must be submitted to US Environmental Protection Agency Region VI.

SWP3 = Storm Water Pollution Prevention Plan – Document following USEPA region VI approved format that details the project and efforts to prevent migration of pollutants from construction site.

NOI = Notice of Intent – Federal form that a construction site operator submits to the USEPA Region VI in order to receive construction site permit coverage.

SOLID WASTE MANAGEMENT & RECYCLING

Construction Waste Management-Reporting Landfill Diversion

Army policy dated Feb. 06, 2006 states that all military construction, renovation, and demolition projects shall include contract performance requirements for a 50% minimum diversion of construction and demolition waste by weight, from landfill disposal. Contract specifications shall include submission of a contractor's C&D Waste Management Plan. Plan & diversion weights shall be submitted to the Solid Waste Program Manager, Directorate of Public Works-Environmental Division.

Recycling

Fort Bliss has single-stream recycling. This means that all recyclables will go into one container; no segregating. Papers (white, bagged shredded paper, magazines, cardboard, colored paper, newspapers), plastics (#1 and #2) and metal (tin & aluminum cans) all go into any blue recycling container (no more separating). Blue, deskside recycling containers are available by calling the Recycling Center at 568-1537. If your building has custodial service, the custodians will empty your recycling desk-side bin once a week. If you do not have custodial service, personnel will need to empty their recycling desk-side bins into the new outdoor recycling dumpster.

Any building that has a trash dumpster outside will also have a recycling dumpster. Architects-engineers (A-E) need to remember to include space outdoors for a recycling dumpster. Dining facilities need to include space for a roll-off because they generate lots of recyclables.

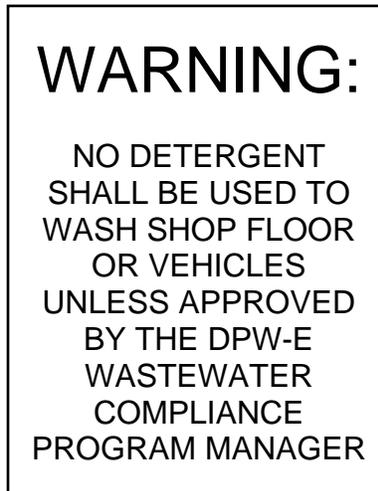
The dimensions for a recycling dumpster are 6 ft. wide X 5.5 ft deep X 6 ft. tall. The dimensions for roll-off are 22' 2" long X 7'7" wide X 6'6" tall.

WASTEWATER

Vehicle Maintenance Facilities and other repair facilities requiring washracks will have Oil Water Separators (OWS). All shop drains to the sewer systems will be placed so that they will not receive pollutants from repair activities. Repair activities (welding, painting, battery shops, grinding areas, etc.) will not produce waste streams that will find their way into the sewer drains.

OWS Signage

Proper OWS signage must also be included as described below:



(1) The oil/water separator (OWS) sign shall be approximately 2'-6" high by 2'-0" wide and white in color. Message lettering shall be all caps in black Helvetica and a minimum of 1-1/2" high. "WARNING" lettering shall be all caps in black Helvetica and a minimum of 3" high.

(2) The Contractor shall provide a minimum of two (2) signs per building for small and medium TEMFs and four (4) signs per building for large and extra large TEMFs. There shall be no less than one (1) sign centrally located per every four repair bays (eight repair work areas) and with no less than one (1) sign per side of building.

(3) Sign shall be permanently secured to the wall or structure with the bottom of sign at approximately 4'-0" above finished floor near the floor trench drains.

Dining Facilities/Kitchens must have grease traps and associated equipment to comply with local Fats, Oils, and Greases (FOG) requirements per El Paso Water Utilities Rule #15.

El Paso Water Utilities Public Service Board (PSB) Rule No. 9, together with applicable provisions of Rules and Regulations No. 1, No. 5, No. 6, and No. 15 set forth the uniform requirements for the discharge by any person of wastewater into El Paso's wastewater system.

Rule No. 9 states that no user shall discharge or cause to be discharged into El Paso's wastewater system any pollutant or wastewater except in conformity with Rule No. 9, the requirements of the act, the General Pretreatment Regulations in 40 C.F.R. Part 403, and applicable state laws. Rule No. 9 lists prohibited discharges, local pollutant limits, pre-treatment requirements, permitting requirements, permit conditions, reporting and monitoring requirements. Any discharges into the wastewater system must first be cleared by the Fort Bliss DPW-E.

Vehicle washing will be performed on approved wash racks where drains discharge through an Oil Water Separator. Washing that generates pollutants that exceed local wastewater limits and prohibited discharge standards must have appropriate controls to remove those pollutants prior to entering the sewer system. Vehicles that are excessively dirty (large amounts of mud or excessive amount of greases and oils) must be washed at the Central Wash Vehicle Facility to prevent from overloading the smaller motor pool wash racks.

Septic Tank and Leach Field Systems that are required because of the lack of connection to the sanitary sewer will only receive domestic type wastewater. No industrial or industrial like wastewater discharges (wash racks, defueling stations, OWS, etc) may be disposed into the septic tank. Septic Tanks, holding tanks and leach fields will not be authorized if a sanitary sewer tie-in is nearby. Septic tanks do not require a permit in the New Mexico Ranges but must be built to New Mexico standards.

WATER QUALITY

Potable Water Regulatory Policy

The Fort Bliss Water Services Company (FBWS) operates 9 water systems on Post: Fort Bliss Main Post, Biggs Army Air Field, Site Monitor, McGregor/Meyer Range Camp, Dona Ana Range Camp, Oro Grande Range Camp, Hueco Range Camp, SHORAD, and Redeye. The Directorate of Public Works (DPW) operates the Brigade Combat Team Facilities (BCTs) aka: East Biggs Water System, and the Combined Aviation Brigade Area (CAB) water system which is part of the Biggs AAF water system. DPW and FBWS are responsible for protecting the drinking water supply in accordance with State Regulations (Title 30 Texas Administrative Code 290.46(j), New Mexico Administrative Code 20.7.10.400(L)) from contamination or pollution which could result from improper water system plumbing construction or configuration. This policy only applies to the areas of the water system under the purview of the DPW. FBWS is responsible for their own policy for areas under their purview. Therefore, construction projects requiring potable water from the FBWS owned water system must be coordinated through FBWS, otherwise the following is applicable:

Customer Service Inspection certificates shall be completed prior to providing continuous water service to new construction or after significant plumbing renovations on any existing service or any existing service when the DPW has reason to believe that cross-connections or other potential contaminant hazard exist or after any material improvement, correction, or addition to the water distribution facilities which are under their respective purview. As unacceptable plumbing practices are discovered, they shall be promptly eliminated to prevent possible contamination of the water supply. Also, any backflow prevention devices installed shall be installed in accordance with the Fort Bliss Cross-Connection Control Manual (FBCCCM), and tested in accordance with the FBCCCM. Copies of the FBCCCM are available from the DPW-E Water Quality Manager.

The following practices are prohibited:

- (1) No direct connection between the public drinking water supply and a potential source of contamination is permitted. Potential sources of contamination shall be isolated from the public water supply in accordance with the FBCCCM.
- (2) No cross-connection between the public water supply and a private water system is permitted. These potential threats to the public drinking water supply shall be eliminated at the service connection by the installation of an air-gap or a reduced pressure-zone backflow prevention device.
- (3) No connection which allows water to be returned to the public drinking water supply is permitted.
- (4) No pipe or pipe fitting which contains more than 8.0% lead may be used for the installation or repair of plumbing at any connection which provides water for human use.
- (5) No solder or flux which contains more than 0.2% lead can be used for the installation or repair of plumbing at any connection which provides water for human use.

This policy applies to work completed on all Fort Bliss facilities whether work is done by contract or in-house. Activities must insure that their contractors/subcontractors follow this requirement.

Inspectors must possess proper credentials and be recognized as capable of conducting a customer service inspection certification by the State of Texas. Customer Service inspections may be performed by the following group members:

- (1) Plumbing Inspectors and Water Supply Protection Specialists licensed by the Texas State Board of Plumbing Examiners.
- (2) Customer Service Inspectors licensed by the Texas Commission of Environmental Compliance (TCEQ).

Recognized Backflow assembly testers must possess a current license from the TCEQ.

Submit completed customer service inspection and/or backflow test forms to:

Directorate of Public Works Environmental Division (DPW-E)

IMWE-BLS-PWE

Bldg 622

Attn: Water Quality Manager

Fort Bliss, Texas 79916

Completed forms may also be submitted in person at Building 622, or by fax at 568-1333. Forms will be maintained by the DPW-E for a minimum of 10 years and be made readily available for review by the State regulatory entity.

Lawn Irrigation

A person may not sell, design, consult, install, maintain, alter, repair, or service irrigation in the state of Texas unless the person is licensed by the Texas Commission on Environmental Quality (TCEQ). A person who is licensed as an installer may only connect an irrigation system to a water supply while being under the direct supervision of a licensed irrigator.

POINTS OF CONTACT

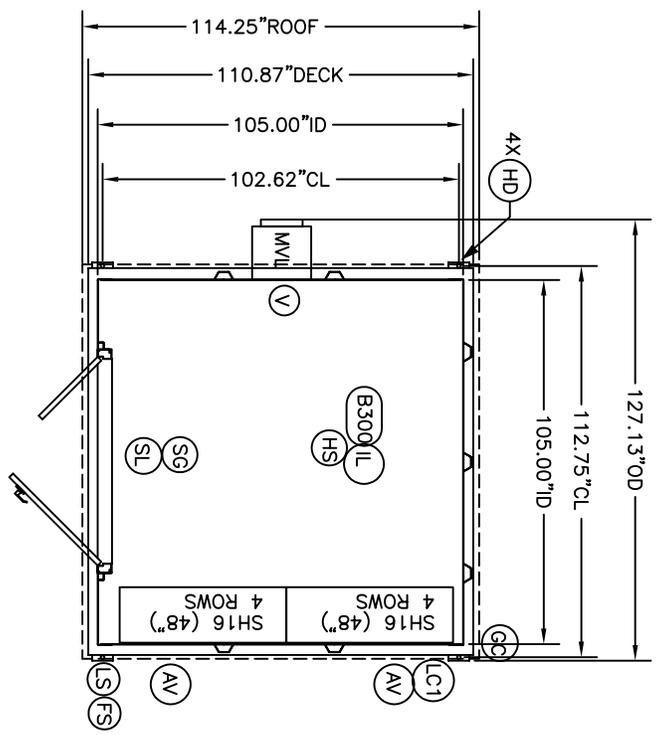
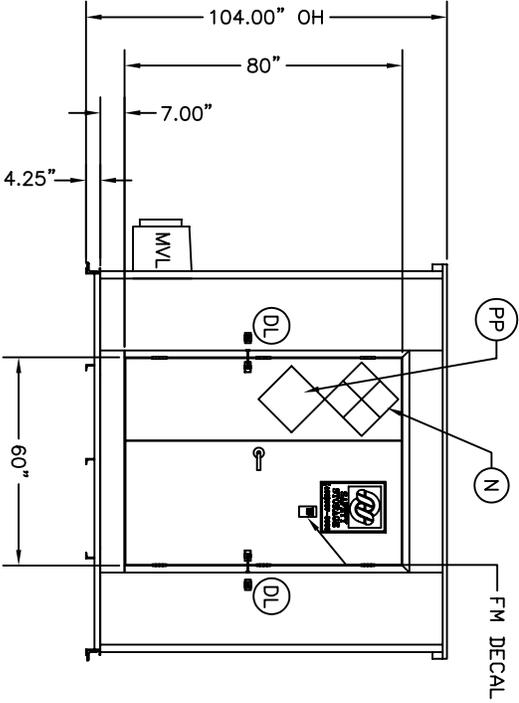
Air Quality 915-568-5724
Archeology 915-568-6746/6999
Asbestos/Lead Paint 915-568-0931
EPAS 915-568-7578/569-6297
Hazardous Materials 915-568-6989
Hazardous Waste 915-568-7041
Historical Architecture 915-568-3134/7464
Landscaping 915-568-6977
NEPA 915-568-3908
Pesticides 915-568-6977
Storage Tanks 915-568-6959
Storm Water 915-568-0794
Solid Waste Management & Recycling 915-568-5724
Wastewater/Water Quality 915-568-0558

Hazardous Materials Storage Facility

Attached are typical Hazardous Materials Storage Facilities currently used at Ft. Bliss. Inclusion of this information does not preclude the contractor from proposing another type of structure that meets the RFP requirements.

SAFETY STORAGE
 2301 BERT DUNE
 HOLLISTER, CA 95033
 PHONE: (408)337-5925
 FAX: (408)337-7403

MODEL 1010S



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LEGEND	
AV:	AIR INLET VENT
B300:	LIGHT, 300 WATT LAMP UPGRADE
DL:	DOOR LATCH
FS:	FAN SWITCH (NON-EXPLOSION PROOF)
GC:	GROUNDING CONNECTION
HD:	HOLD-DOWN BRACKET
HS:	HEAT SENSOR
IL:	INTERIOR LIGHT FIXTURE (EXPLOSION PROOF)
LC1:	LOAD CENTER
LS:	LIGHT SWITCH (NON-EXPLOSION PROOF)
MVL:	MECHANICAL VENTILATOR, LOW MOUNT 600 CFM (EXPLOSION PROOF)
N:	NFPA 704M RATING SIGN
PP:	PERMANENT D.O.T. PLACARD
SG:	STEEL FLOOR GRATING (GALVANIZED)
SH16:	SHELVING, 16" WITH 1" LIP
SL:	SUMP LINER (HDPE)
V:	VENT

CUSTOM COLOR
 EXTERIOR

- NOTES:
- ONE (1) DOUBLE 60"W x 80"H NR DOOR
 - PAINT SPECIFICATION:
 PRIMER COAT - EPOXY (EXTERIOR & INTERIOR)
 FINISH COAT - POLYURETHANE (EXTERIOR & INTERIOR)
 COLOR - STANDARD WHITE (INTERIOR)
 COLOR - CUSTOM TBD (EXTERIOR)
 - TOTAL 16" WIDE ADJUSTABLE STAINLESS STEEL SHELVING = 32'
 - 240/120V, 1 PHASE

SIGNATURE _____

NUMBER: MR-4683
 CUSTOMER: FORT BLISS
 DATE: 4/27/06 PREPARED BY: HJE
 SALES #: _____ PAGE 1 OF 2

MODEL 1010S



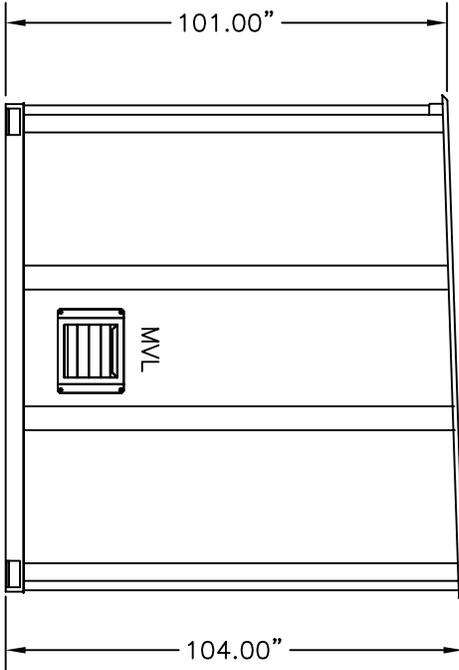
SAFETY STORAGE

2301 BERT DUNE
HOLLISTER, CA 95023
PHONE: (408)337-5995
FAX: (408)337-7403

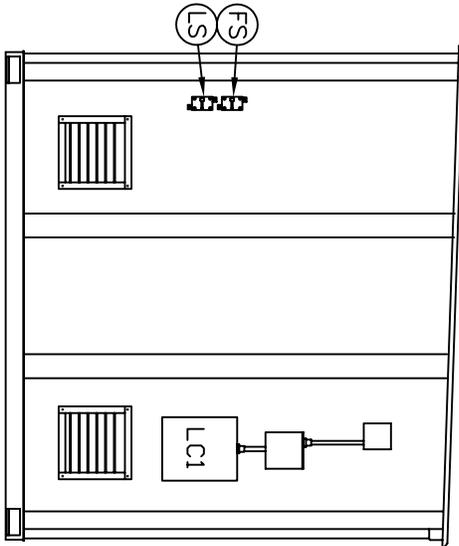
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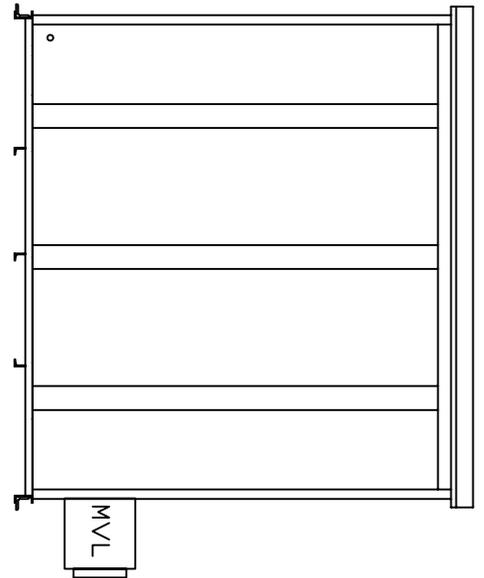
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LEFT END VIEW



RIGHT END VIEW



REAR VIEW

CUSTOM COLOR
EXTERIOR

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NUMBER: MR-4683

CUSTOMER: FORT BLISS

DATE: 4/27/06 PREPARED BY: HJE

SALES #: _____ PAGE 2 OF 2

Cage Code 47484		DUNS: 148223068	
Page	Item Number	Quantity	Description:
			CHEMICAL STORAGE LOCKERS
FN-5	1010S	1	Model 1010 S Nominal Dimensions: (LxWxH): 10' x 10' x 9' Steel Floor Grating with 500 psf uniform load capacity, One (1) Steel Double Door , Two (2) Air Inlet Vents
FN-11	B,24,a	32 Loneal foot	16 inch wide Shelving – stainless steel with 1 inch spill containment lip
FN-11	B,29	100 sq. ft.	Sump Liner
FN-13	D,8,a	1	Explosionproof Electromechanical Exhaust Ventilation System
FN-15	D,17,a	1	Lights – Interior Explosionproof with Non EP Exterior Light Switch
FN-15	D,17,l	1	300w light bulb upgrade
FN-16	D,23,a	1	Load Center
FN-25	M,6,a	1	Custom exterior paint color
FN-13	D,8,l	1	Heat sensor – used for fan shut down

***Please note that the buyer is responsible for off-loading, arming the Fire Suppression System, and installation of the locker.**

DRAWING NO. TR9233

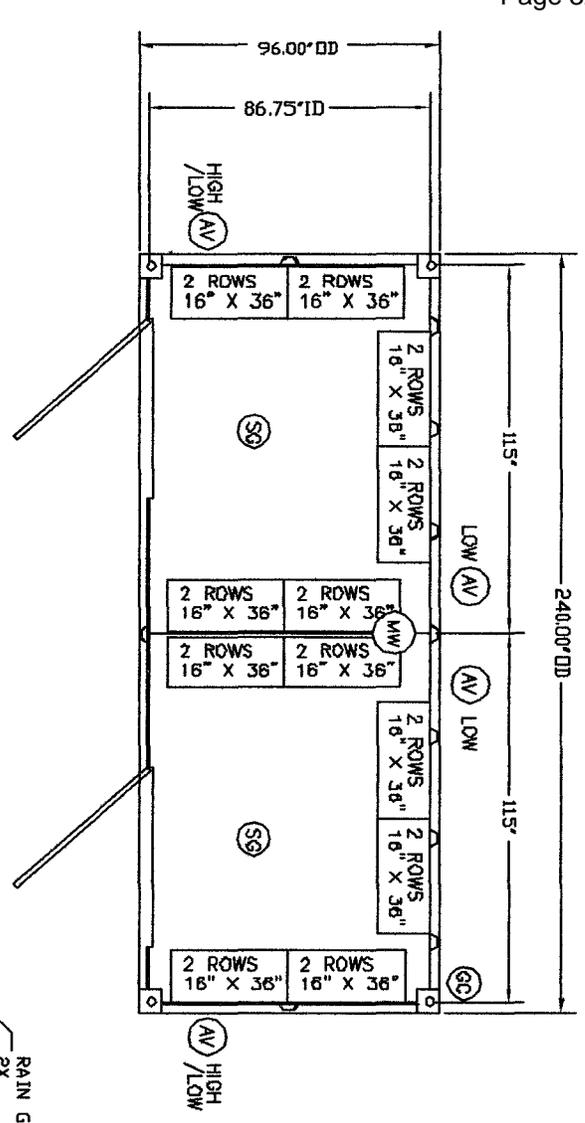
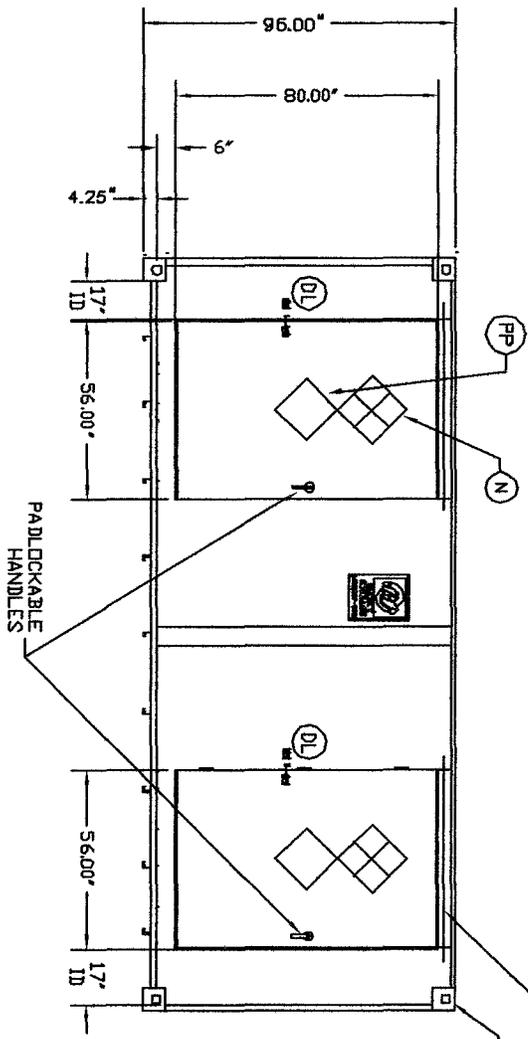
SAFETY STORAGE
 1800 WEST 10TH AVENUE
 DENVER, COLORADO 80202
 (303) 733-7400

MODEL [REDACTED]

20150

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CUSTOM COLOR

LEGEND

- AV: AIR INLET VENT
- DL: DOOR LATCH
- GC: GROUNDING CONNECTION
- MW: FULL HEIGHT METAL WALL
- N: NFPA 704M RATING SIGN
- PP: PERMANENT D.O.T. PLACARD
- SG: STEEL FLOOR GRATING (GALVANIZED)

NOTES:

1. TWO (2) 56"W x 80"H STEEL DOORS
2. PAINT SPECIFICATION:
 PRIMER COAT- EPOXY (EXTERIOR & INTERIOR)
 FINISH COAT- POLYURETHANE (EXTERIOR & INTERIOR)
 CUSTOM COLOR- RT 8205 (EXTERIOR & INTERIOR)
3. TOTAL 18" WIDE ADJUSTABLE STAINLESS STEEL SHELVEING = 72"
4. SLOPED ROOF (1-1/2") WITH NO OVERHANG
5. ISO CORNERS (TOP & BOTTOM) W/NO HOLDDOWNS
6. REMOVABLE RAIN GUARDS OVER DOORS

SIGNATURE _____

NUMBER: [REDACTED]
 CUSTOMER: FORT SILL
 DATE: 7/24/03 PREPARED BY: HJE
 SALES #: _____ PAGE 1 OF 2

TR 10975

DRAWING NO. TR923.32

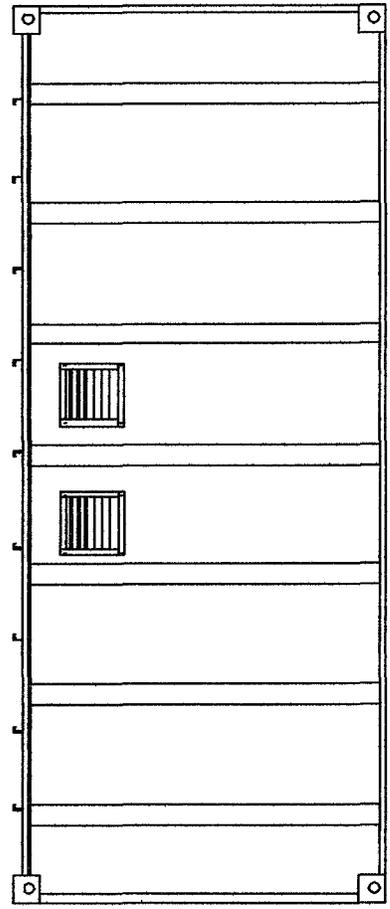

SAFETY STORAGE
 1401 WEST 10TH AVE.
 FORT SILL, OKLAHOMA 73401-7000
 TEL: (405) 951-7000
 FAX: (405) 951-7001

MODEL XXXXXXXXXX

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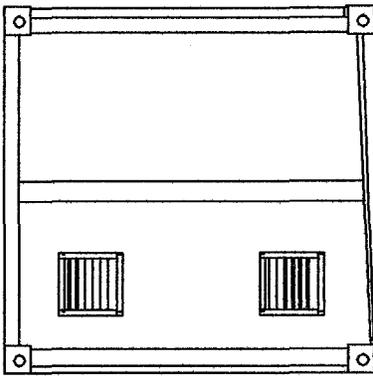
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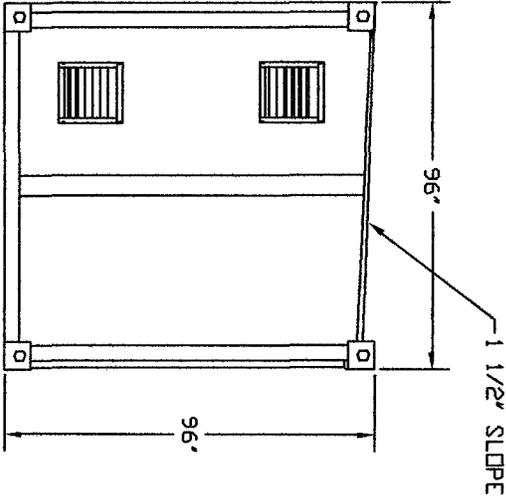


REAR VIEW

CUSTOM COLOR



LEFT END VIEW



RIGHT END VIEW

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NUMBER: _____
 CUSTOMER: FORT SILL XXXXXXXXXX
 DATE: 7/24/03 PREPARED BY: HJF
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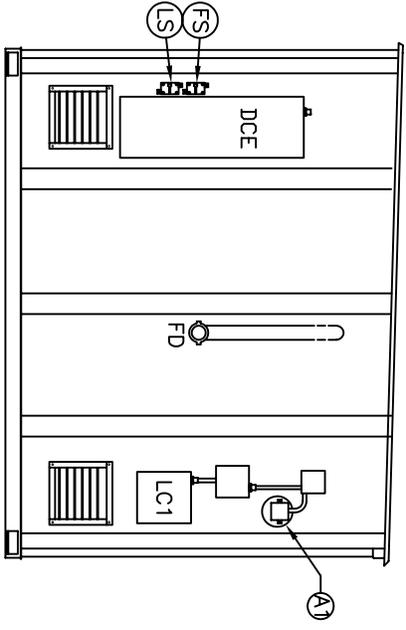
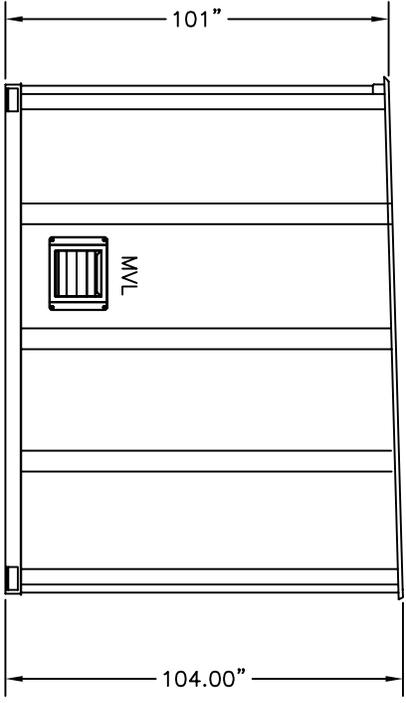
TR 10975

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3201 BERT LANE
HOLLISTER, CA 95033
PHONE: (408)337-5995
FAX: (408)337-7403
MODEL 3412FSE

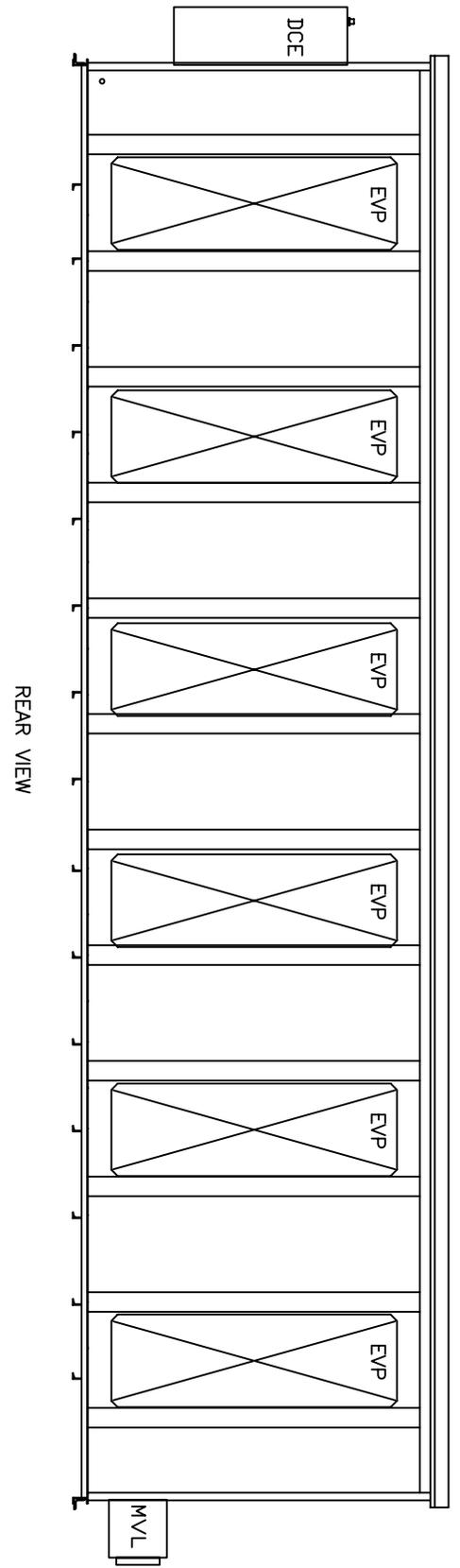
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SIGNATURE _____
PAGE 2 OF 2



CUSTOM COLOR
EXTERIOR



APPENDIX F

CONCEPTUAL AESTHETIC CONSIDERATIONS

ARCHITECTURAL THEME - COLORS

The exterior material colors identified below are recommended to continue the architectural theme reflected by the current projects on the Main Cantonment area (JLENS, Sustainment, and THAAD projects; and the POL Truck Co. COF).

CMU Base: 'Holloman Red' by Del Norte Masonry Products or Equal

Main wall color:

Metal Wall Panel: 'Light Stone', Tuff-Wall by Metl Span or Equal

Accent wall color:

EIFS: 'Champagne' #361 by Synergy or equal

Window Frames: Dark Bronze Anodized Aluminum

Low Slope, Standing Seam Metal Roof: White

**Patriot Battalion Complex (PN 69177)
POL Truck Company UMF (PN 69307)
Area Development Guides**



September 2008
Contract # W9126G-08-D-0001
Fort Bliss, Texas



**US Army Corps
of Engineers**

JACOBS / HUITT-ZOLLARS

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- 1.3 Background..... 1-1
- 1.4 Audience 1-1

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Table 3.1 POL Trucking Facility Types 3-2

Section One: Introduction

1.1 Purpose and Project Scope

The Patriot Battalion Complex and POL Truck Company Unit Maintenance Facility (UMF) Area Development Guide (ADG) outlines an overall development framework, siting parameters, architectural image and character, and utility location guidance for these facilities. The following projects are addressed by this ADG: PN 69177 Patriot Battalion Complex and PN 69307 POL Truck Company Unit Maintenance Facility.

1.2 Organization and Content

This Area Design Guide includes documentation that addresses siting, as well as architectural image and character guidance in the following document components.

Section One: Introduction provides an overall description of the ADG and gives background on purpose, organization, design theme and intended use of the ADG.

Section Two: Patriot Battalion applies the above referenced themes to the Patriot Battalion Complex and addresses the location and layout of utilities serving these facilities.

Section Three: POL Truck Company UMF applies the above referenced themes to the POL Truck Company UMF and addresses the location and layout of utilities serving these facilities.



Figure 1.1 Patriot Battalion Headquarters

1.3 Background

Many real world challenges are associated with the rapid pace of Military Construction Transformation. High among these challenges is how an installation like Fort Bliss can communicate effectively with its design-build contractor partners and establish the high-quality architectural parameters that are so necessary to furthering the military mission without constraining building techniques, materials, or workmanship that are the purview of the contractor. In other words, this issue involves how Fort Bliss can access the best design and construction practices in terms of performance-based criteria, which will make MILCON Transformation the new reality without compromising its mission or the specific implications of community, order, and sense of place that position the installation squarely within the Army's over arching military tradition.

1.4 Audience

The ADG is to be used by firms responding to RFPs for the new product line approach and individuals involved in decision-making, design, construction, and facility maintenance including the following users:

- Department of Public Works (DPW).
- Installation facility planning and design personnel.
- Installation facility maintenance personnel.
- Design-build contractors and consulting planners, architects, engineers, and landscape architects.
- U.S. Army Corps of Engineers project managers, design, construction staff and DPW project managers.

The ultimate success of the ADG is dependent upon the commitment of these individuals and organizations working as a team to apply these standards in a consistent manner.

1.5 Design Theme

The overall design theme for Fort Bliss embraces “A sustainable response to the local environment.” In support of this theme, the architectural style of all buildings shall reflect and reinforce this goal of sustainability for the installation, responding to the intense El Paso sun. Both buildings and sites shall be designed and constructed to incorporate appropriate sustainable strategies, which will reduce energy and maintenance costs in the future through the intelligent application of building forms, details and materials. Each of the facilities fall into various distinct architectural theme areas outlined in the Fort Bliss Installation Design Guide (IDG). The visual image and design of all buildings respond to a “visual hierarchy” that incorporates a range of building design components and El Paso imagery. They are varied in use, but should demonstrate strong relationships to their immediate environment, and should visually tie to each other with a consistent architectural theme established for that area.

The overall architectural theme of Fort Bliss is one of unification, reflecting the architectural heritage of El Paso and the environment in which it is geographically located. The characteristics of the original Fort Bliss style is described as “El Paso Vernacular,” an adaptation of the historical development of European Mediterranean influence in a desert environment. Generally, this



View of the Fort Bliss Main Cantonment Area

style is evidenced by hip/low pitched roofs, deep overhangs, punched window openings, craftsman designed/constructed framing, member detailing, sun-shading devices and column/trellis elements for sun responsiveness and scale. Horizontal banding, reveals, pronounced cornice lines, and a distinct military rhythm are visible components in this style, set against the pristine backdrop of the Franklin Mountain Range. Building colors are also responsive to this environment, taking on the hues and subtlety of indigenous stone, illuminated by the lighting sequence of the sun as it changes throughout the day.

1.6 Design Goals

The overall intent of the ADG is to provide clear, yet comprehensive design standards that establish and also maintain a positive visual image. Overall goals that reinforce this intent include:

- Provide a set of general design standards for design-build contractors that determine color, style, and other aspects of design for all visual elements for new construction.
- Provide structured methods for establishing projects to improve the Cantonment’s visual image.
- Provide standards to design-build contractors and other firms responding to RFPs for each product line.

Design goals that will inform the development of the architectural image and character concept, include the following:

- Provide architectural design standards in the form of visual, functional, and thematic

design imagery to communicate the design intent, image, and character.

- Promote visual continuity while accommodating varying program requirements with design standards that will support strong and consistent design cohesiveness.
- Integrate sustainable design and planning principles to minimize adverse environmental effects and maximize the use of local and regional resources and products.

1.7 Design Objectives

Design objectives that reinforce overall design goals include:

- Enhance the quality of experience for soldiers and civilian personnel .
- Conform to Anti-Terrorism/Force Protection (AT/FP) standards.
- Create a sense of place with a desirable, recognizable identity.
- Provide visual and functional variety.
- Design in flexibility for potential future uses.
- Design for good environmental stewardship.
- Reference local climate, materials, and building traditions.
- Promote energy conservation.
- Incorporate sustainable features.
- Emphasize a pedestrian-friendly, campus-like environment.

Section Two: Patriot Battalion

2.1 Patriot Battalion

The Patriot Battalion Complex is divided into two discrete clusters. Because of their spatial separation, the Headquarters (HQ) and Company Operations Facility (COF) will be addressed separately from the Technical Equipment Maintenance Facility (TEMF) and Deployment Storage.

2.2 Facility Siting

The proposed Patriot Battalion HQ and COF are located on the main cantonment at the intersection of Jeb Stuart Road and Haan Avenue. The HQ and Patriot Battalion COF are to be sited to reinforce a relationship within the development framework of the existing installation. The buildings address the street, holding a presence on the site with the HQ main entry facing Haan Avenue.

The proposed Patriot Battalion TEMF and Deployment Storage facilities are located just down the road at the intersection of Stennis Street and Carrington Road. Taking maximum advantage of this excellent location, the specific siting of these buildings reinforces the urban street network by pulling the building up to a consistent setback with other structures along Stennis Street.

The TEMF should express a strong sense of relationship to adjacent facilities across the street and within this general installation area. This facility will also be related to the POL Truck Company Operations Facility (COF) and set up a relationship in siting placement, form, and material usage.

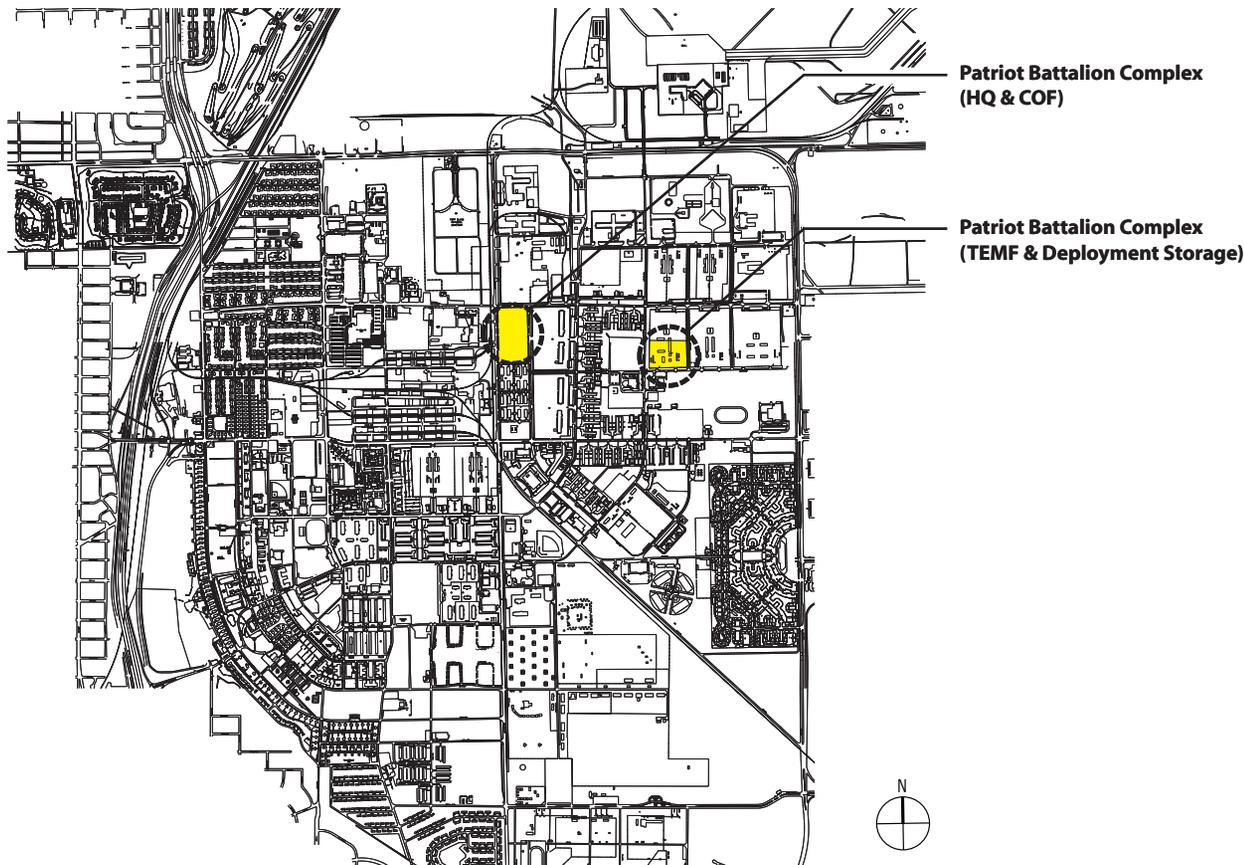


Figure 2.1 Patriot Battalion Vicinity Map

2.3 Architectural Context

It is important that these buildings be designed to fit within a compatible visual framework, also recognizing benefits derived from a similarity of building design imagery. The visual image and design of the buildings comprising the complex respond to a “visual hierarchy” that incorporates a range of building design images. As one of the most visually important and monumental structures, the proposed Headquarters (HQ) building is reinforced by other facilities that collectively contribute to the overall visual image and design character of the area.

Table 2.1 lists all of the building types that make up the complex and also references the section in the document for specific design guidance. Each respective facility section describes the required architectural image and features for each building type.

The buildings that make up the complex shall follow the architectural style and design vocabulary outlined in the corresponding narratives, which have been specifically developed, tested, and selected as appropriate.

Table 2.1 Patriot Battalion Facilities Types

Building Types	Page
Battalion Headquarters (HQ)	2.3
Company Operations Facility (COF)	2.5
Tactical Equipment Maintenance Facility (TEMF)	2.7
Deployment Storage	2.9

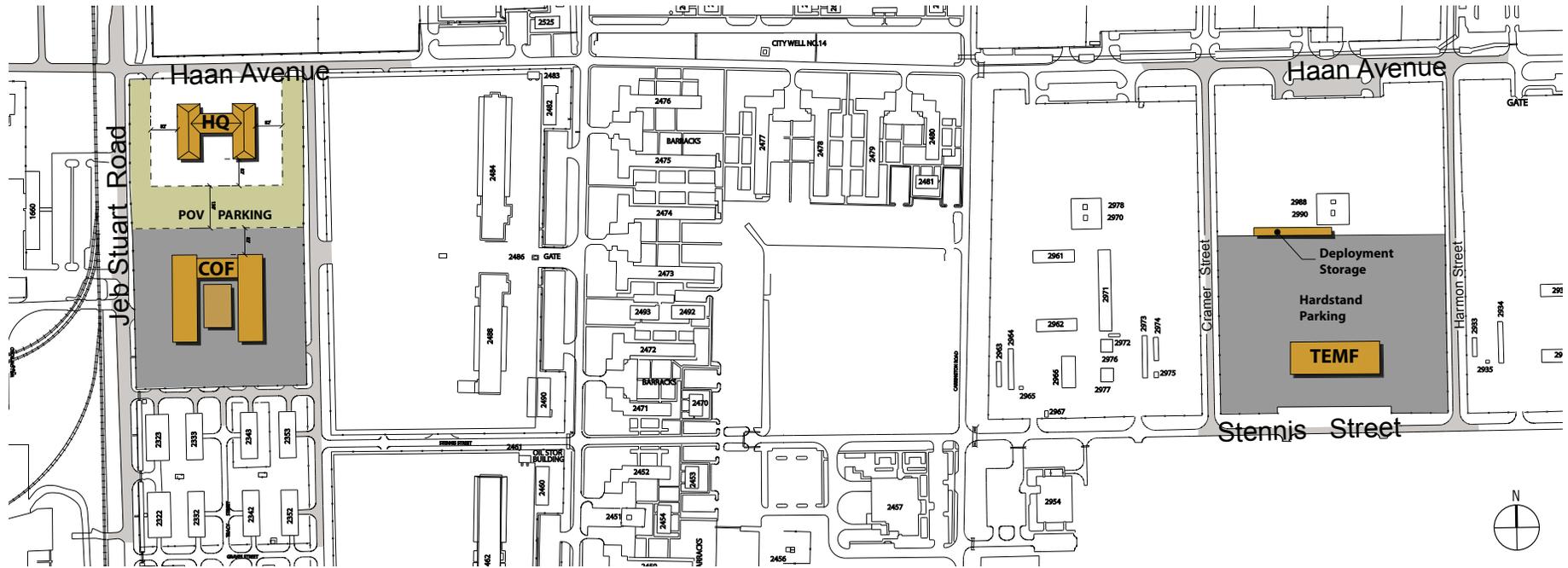


Figure 2.2 Patriot Battalion Site Map

2.4 Headquarters

As the most architecturally significant building within the complex, the character of the Battalion Headquarters (HQ) should express formality and professionalism. HQ facilities should be designed to reflect the Battalion's importance and strength, while unifying the complex with architectural elements and enhancing the context of the setting.

Massing

While the HQ building should inherently be an imposing structure, its design needs to address pedestrians at entries by being sensitive to human scale in its massing. The large volume of three-

story space should have appropriate architectural components and proportion, incorporating design detail in materials, reveals, banding, patterns, and wall textures. Accent bands define the horizontal stratification of the building's floors and bracket window lines.

Form

The form of HQ buildings should relate to the street network, other community facilities, and work centers in a way that unifies the district architecturally, while providing appropriate and convenient access. A vertical element will create visual interest near the entry and will contrast with the horizontal elements of the

front elevation. The central mass of the building should be set back from the vertical element and the lateral wings, creating an entry courtyard for the facility.

Roof Style

Use a visually flat roof behind a parapet wall over all building volumes, with the parapet forming an accent band at the top of each wall. The parapet should be designed to conceal mechanical systems located on the roof. The roof of the central tower mass should rise over the central mass of the building, and step down to the roof over the lateral wings of the building.

Wall Base

Use a base of split-face CMU, sized appropriately to the building volume in order to form a significant element.

Entry Canopy

Use a simple, visually flat canopy at the entry for sun shading and to also create an entry statement. Support the entry canopy on columns that are architecturally related to the building.

Colonnade

Mark the entry by supporting the canopy on columns that are architecturally related to the building, providing shade, shadow, and visual articulation to the building exterior. The colonnade also serves as a further link to the district's architectural theme.

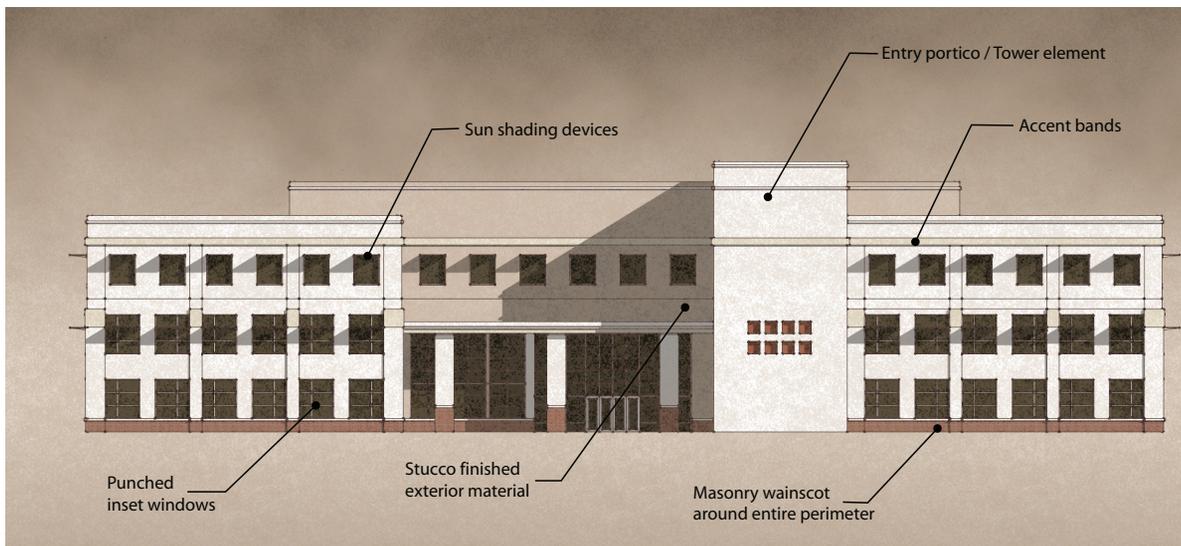


Figure 2.3 Patriot Battalion Headquarters

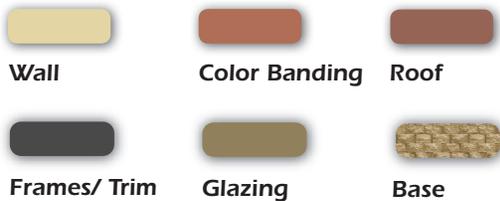
Exterior Building Signage

The standards to apply for exterior building signage font, color, sizing, and material is found in U.S. Army Technical Manual (TM) 5-807-10. Exterior building signage must be visible from all approaching streets to the facility. The location, design, and fabrication of exterior building signage must be reviewed with and approved by Fort Bliss Department of Public Works (DPW) prior to installation.

Color and Material Palette

Use pale, neutral colors as the principal wall colors. Select an accent color or colors on building elements, such as on parapets, parapet caps, column caps, etc., as visual “punctuation.” Vary materials, colors, or textures to distinguish building masses and forms.

- Wall Base: Split-face CMU.
- Walls: Stucco-finish.
- Windows and Frames: Optimize LEED energy efficient design requirements. Glazing and Frames to be brown in color.
- Miscellaneous Metals: Match the adjacent wall color.
- Select an accent color, or colors, on building elements.



Note: Colors depicted are approximate and may vary with color printing method. The final color selection is subject to review and approval of the DPW architect.



Figure 2.4 Conceptual Patriot Battalion HQ Floor-Plan

Note: The floor plan depicted is conceptual in nature. Design-builders should consult Centers for Standardization plans and USACE standards, which will prevail in the event of variance.



Figure 2.5 Patriot Battalion Headquarters

2.5 Company Operations Facility

As an administrative facility, the Company Operations Facility (COF) should have an attractive appearance that reflects the importance of company administration and operations.

Massing

The massing of the COF is horizontal, with lateral wings framing an offset central mass. The central mass of the building is accented by windows and an arcaded portico, which communicates its entry function.

Entry designs should address pedestrians by being sensitive to human scale in its massing. The facility should have appropriate architectural components and proportion, incorporating design detail in materials, reveals, banding, patterns, and wall textures.

Form

Building form should relate to the street network, other community facilities, and work centers in a way that unifies the district architecturally, while providing appropriate and convenient access. Large building volumes should feature functional decoration, including sunshades and offset stairwells, where they are required.

Roof Style

Use a visually flat roof behind a parapet wall over all building volumes, with the parapet forming an accent band at the top of each wall. The parapet should be designed to conceal mechanical systems located on the roof. The roof of all building volumes should be of uniform height.

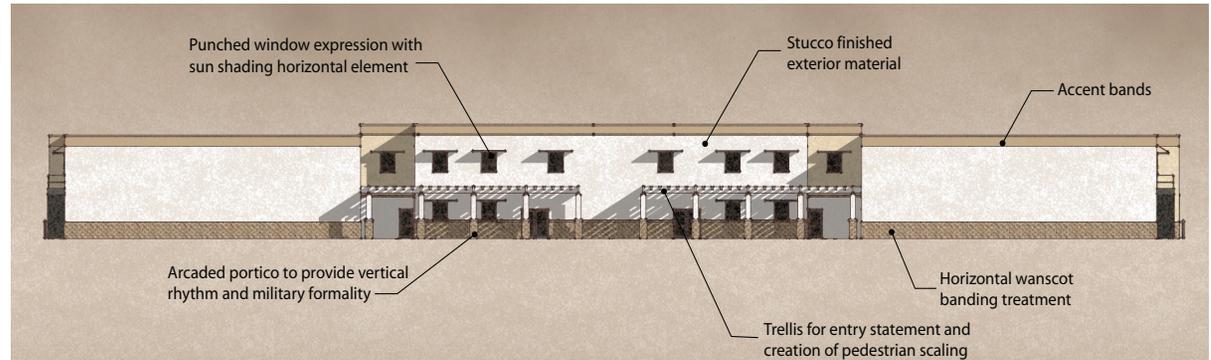


Figure 2.6 Patriot Battalion COF

Wall Treatment

Use blank, asymmetrical massing, and punched fenestration on the central administration facade. Introduce shadow lines and building massing by recessing or bringing forward building planes, spandrels, and window openings. Walls should have an appearance of depth rather than appearing to be a flush, thin “skin.” Use more than one principal wall color to accentuate and articulate the building’s form; provide and differentiate cornices, columns, spandrels, and banding.

Wall Base

Use a base of split-face CMU sized appropriately to the building volume to form a natural “grounding” element.

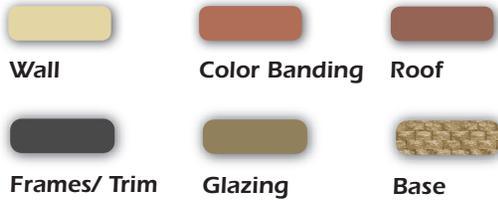
Trellises

Trellises provide shade and sun protection at the entry, while also adding architectural interest with articulation and shadow added to the building’s exterior.

Color and Material Palette

Use pale neutrals as the principal wall colors to match the surrounding structures. Select an accent color, or colors, on building elements such as parapets, parapet caps, and column caps as visual “punctuation.” Vary materials, colors, or textures to distinguish building masses and forms.

- Wall Base: Split-face CMU.
- Walls: Stucco finish.
- Roof: Low slope (flat), light in color.
- Windows and Frames: Optimize LEED energy efficient design requirements. Glazing and Frames to be brown in color.
- Miscellaneous Metals: Match the adjacent wall color.



Note: Colors depicted are approximate and may vary with color printing method. The final color selection is subject to review and approval of the DPW architect.

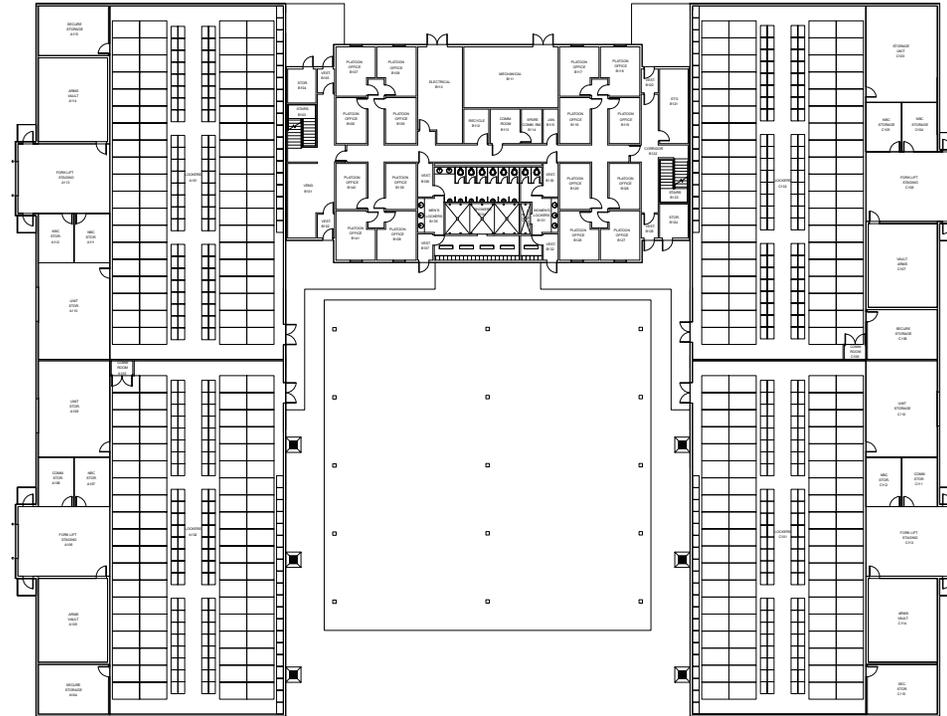


Figure 2.7 Conceptual Patriot Battalion COF Floor-plan

Note: The floor plan depicted is conceptual in nature. Design-builders should consult Centers for Standardization plans and USACE standards, which will prevail in the event of variance.



Figure 2.8 Patriot Battalion Company Operations Facility

2.6 Tactical Equipment Maintenance Facility

Tactical Equipment Maintenance Facility (TEMF) should have an appearance that reflects the orderly process of equipment maintenance and an overall industrial character. Architectural consistency and relationship to neighboring facilities lends a unified image to the district.

Massing

The TEMF is a long, high-bay structure with a large footprint and two-story volumes. The administration portion of the facility is a one-story area scaled to appropriate pedestrian scale, utilizing architectural elements, materials, color, and articulation to match the rhythm and cadence of surrounding structures, such as USASMA, as well as historic installation structures. A tower structure marks the main entrance to the facility and reflects the El Paso style of Architecture.

Form

Building form should relate to the operational/military vehicle parking while being functionally responsive to service aprons for ease of use and maneuverability of vehicles. The administration area generally relates to neighboring structures having a more formal architectural image and detailing.

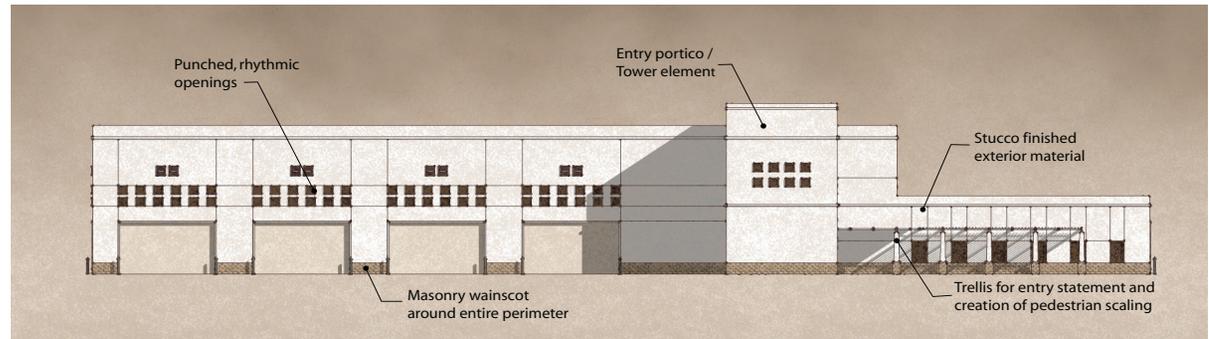


Figure 2.9 Patriot Battalion TEMF

Roof Style

A flat membrane roof behind a parapet wall should shelter the TEMF, including the administration portion of the facility. The parapet should be sufficient to conceal the roof and any mechanical equipment located there. A covered walkway approaching the entry door provides sun-shading and pedestrian scale.

Wall Treatment

Use a formal massing and fenestration. Consistent punched openings provide exterior interest, shadow, and sun-shading in scale to the metal-skinned structure, articulating the exterior walls. Punched openings should be designed to relate directly to the exterior design rhythm of the overhead doors that service the work bays.

Wall Base

The base should be split-face CMU. The entry tower will also have split-face CMU of appropriate scale. Size the base/wainscot with sensitivity to the building volume to form a significant element.

Colonnade

Mark the entry by supporting the canopy on columns that are architecturally related to the theme of the district, providing shade, shadow, and visual articulation to the building exterior. The colonnade also serves as a further link to the overall district architectural theme.

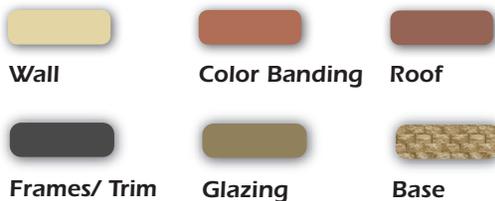
Exterior Building Signage

The standards to apply for exterior building signage font, color, sizing, and material is found in U.S. Army Technical Manual (TM) 5-807-10. Exterior building signage must be visible from all approaching streets to the facility. The location, design, and fabrication of exterior building signage must be reviewed with and approved by Fort Bliss Department of Public Works (DPW) prior to installation.

Color and Materials Palette

Use warm, neutral colors as the principal wall colors. Select an accent color, or colors, on building elements such as parapets, parapet caps, column caps, etc., as visual "punctuation." Vary materials, colors, or textures to distinguish building masses and forms.

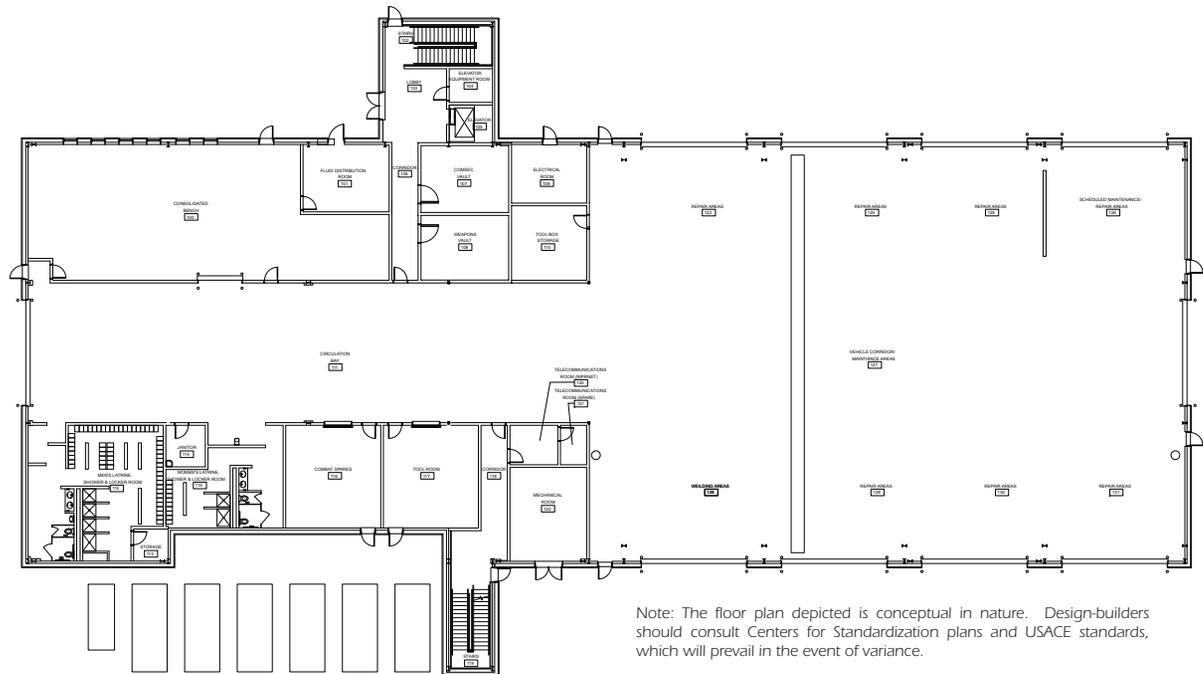
- Wall Base: Split-face CMU.
- Walls: Stucco-finish.
- Roof: Low slope (flat), light in color.
- Windows and Frames: Optimize LEED energy efficient design requirements. Glazing and Frames to be brown in color.
- Miscellaneous Metals: Match the adjacent wall color.



Note: Colors depicted are approximate and may vary with color printing method. The final color selection is subject to review and approval of the DPW architect.



Figure 2.10 Patriot Battalion TEMF Front Detail



Note: The floor plan depicted is conceptual in nature. Design-builders should consult Centers for Standardization plans and USACE standards, which will prevail in the event of variance.

Figure 2.11 Conceptual Patriot Battalion TEMF Floor-plan

2.7 Deployment Storage

The deployment storage facility should achieve a secure, industrial appearance appropriate to its function. Although a pre-engineered building is ideal, the design should be sensitive to preserving the overall theme of the district.

Massing

Deployment storage is typically characterized by large, long, high-bay structures with large footprints and two-story volumes.

Form

Building form should relate to the maintenance facilities, while being functionally responsive to service aprons for ease of use and maneuverability of vehicles and equipment.

Roof Style

A sloped, metal roof should cover Deployment Storage.

Wall Treatment

Wall treatment shall be pre-finished metal panels, consistent with the TEMF.

Wall Base

Use a base of appropriately scaled split-faced CMU to “ground” the building.

Color and Material Palette

Use pale neutral colors as the principal wall colors. Select an accent color, or colors, on building elements such as parapets, parapet caps, and column caps as visual “punctuation.” The roof color may also be used as an accent color. Vary materials, colors, or textures to distinguish building masses and forms.

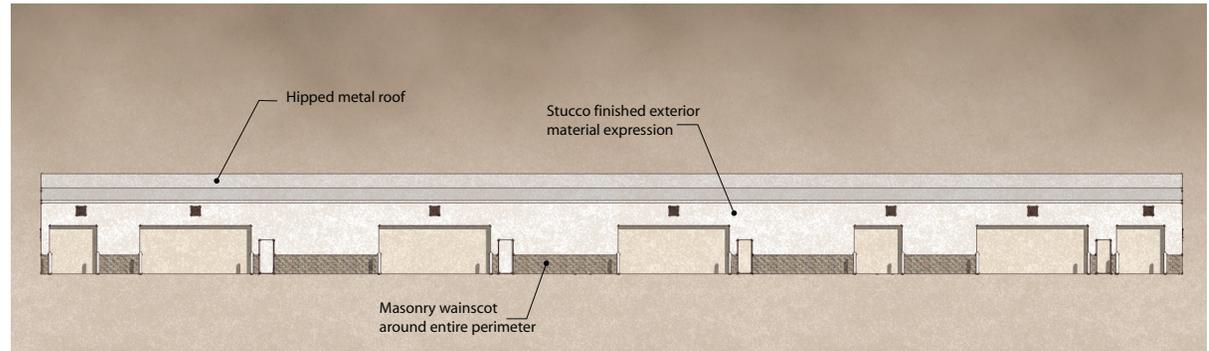


Figure 2.12 Patriot Battalion Deployment Storage

- Wall Base: Split-face CMU
- Walls: Stucco-finish metal panels
- Roof: Metal, light in color
- Windows and Frames: Optimize LEED energy efficient design requirements. Glazing and Frames to be brown in color
- Miscellaneous Metals: Match the adjacent wall color



Note: Colors depicted are approximate and may vary with color printing method. The final color selection is subject to review and approval of the DPW architect.

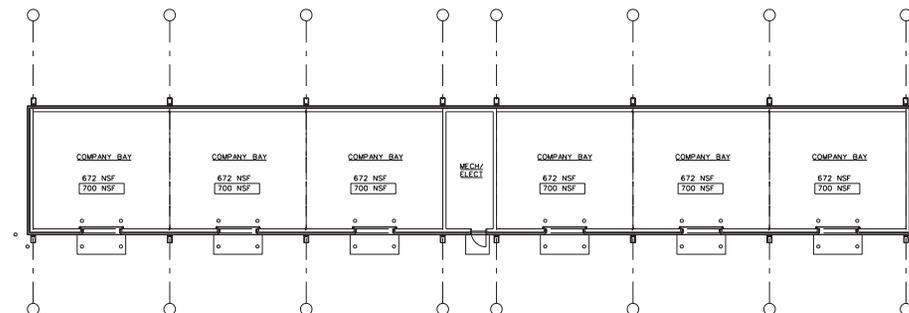


Figure 2.13 Conceptual Patriot Battalion Deployment Storage Floor-Plan

Note: The floor plan depicted is conceptual in nature. Design-builders should consult Centers for Standardization plans and USACE standards, which will prevail in the event of variance.

2.8 Utilities

Utility systems (water, sanitary sewer, electricity, gas, and communications) provide the basic infrastructure necessary for the operation of the Development. Utility system distribution lines will generally follow the roadway corridors. The conceptual/schematic utility routing maps portrayed in Figures 2.14 and 2.15 are based on preliminary design assumptions and are subject to change. In the event that other data is provided in design-build RFP documentation, that information shall govern.

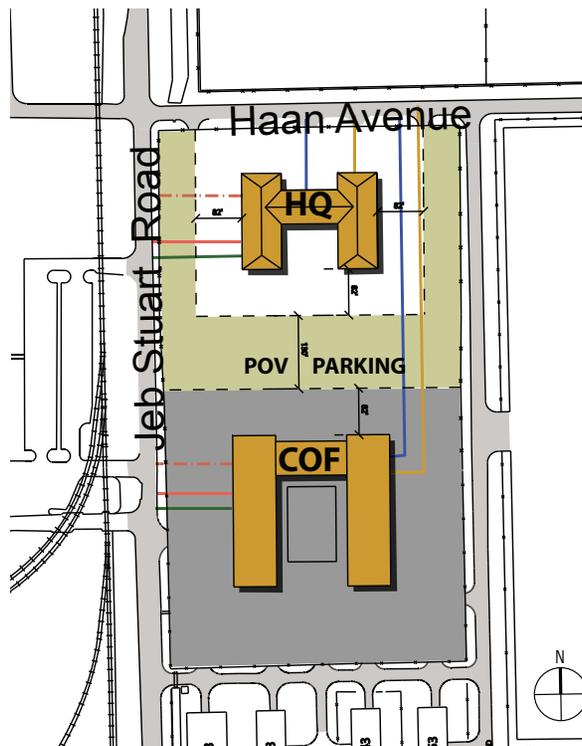


Figure 2.14 Patriot Battalion HQ & COF Utilities

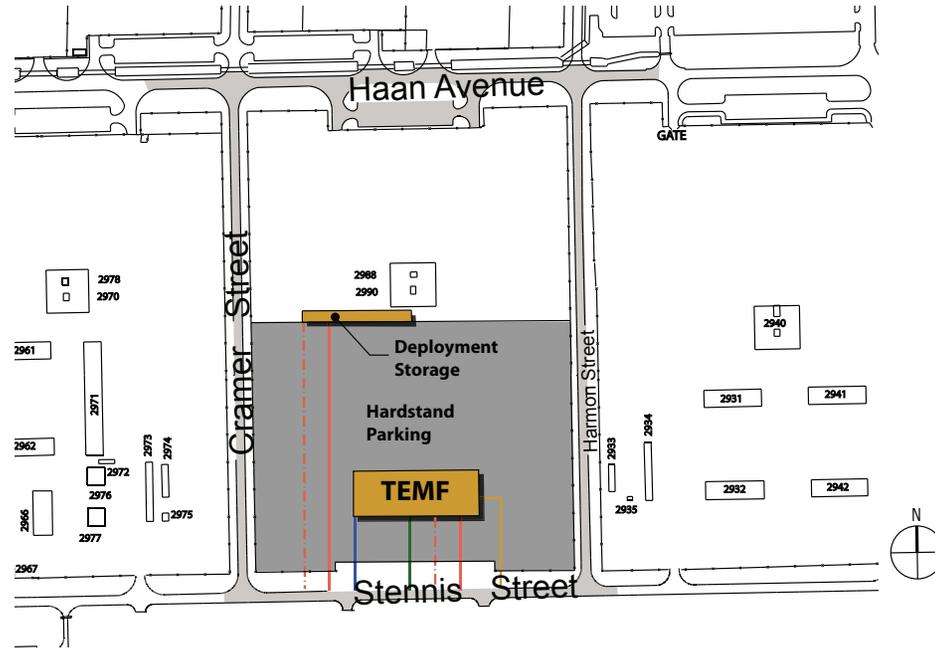


Figure 2.15 Patriot Battalion TEMF & Deployment Storage Utilities

- Overhead Electric
- Underground Electric
- Natural Gas
- Water
- Sanitary Sewer
- Communication Duct Bank
- Communications Manhole

Section Three: POL Truck Company UMF

3.1 POL Truck Company UMF

The POL Truck Company Unit Maintenance Facility (UMF) includes a Company Operations Facility (COF), a Tactical Equipment Maintenance Facility (TEMF) and a Deployment Storage facility.

3.2 Facility Siting

A physical siting relationship exists between the Company Operations Facility (COF) and the Tactical Equipment Maintenance Facility (TEMF). To this end, it is recommended these structures be sited to develop a physical relationship with the massing of the adjacent Engineering Clearance Company Ops complex, which has also been sited and designed to address the surrounding area. The orientation of the building's entrance toward Carrington Road indicates its presence on the site.

Taking maximum advantage of this excellent location, the specific siting of this complex of buildings reinforces the urban street network by pulling the building up to a consistent setback with other structures along Carrington Road.

The Tactical Equipment Maintenance Facility (TEMF) should express a strong sense of relationship to the COF. It should further reflect a sense of unity and place with adjacent facilities such as the Engineering Clearance Company Ops Building in regards to its relationship of siting placement, form, and material usage.

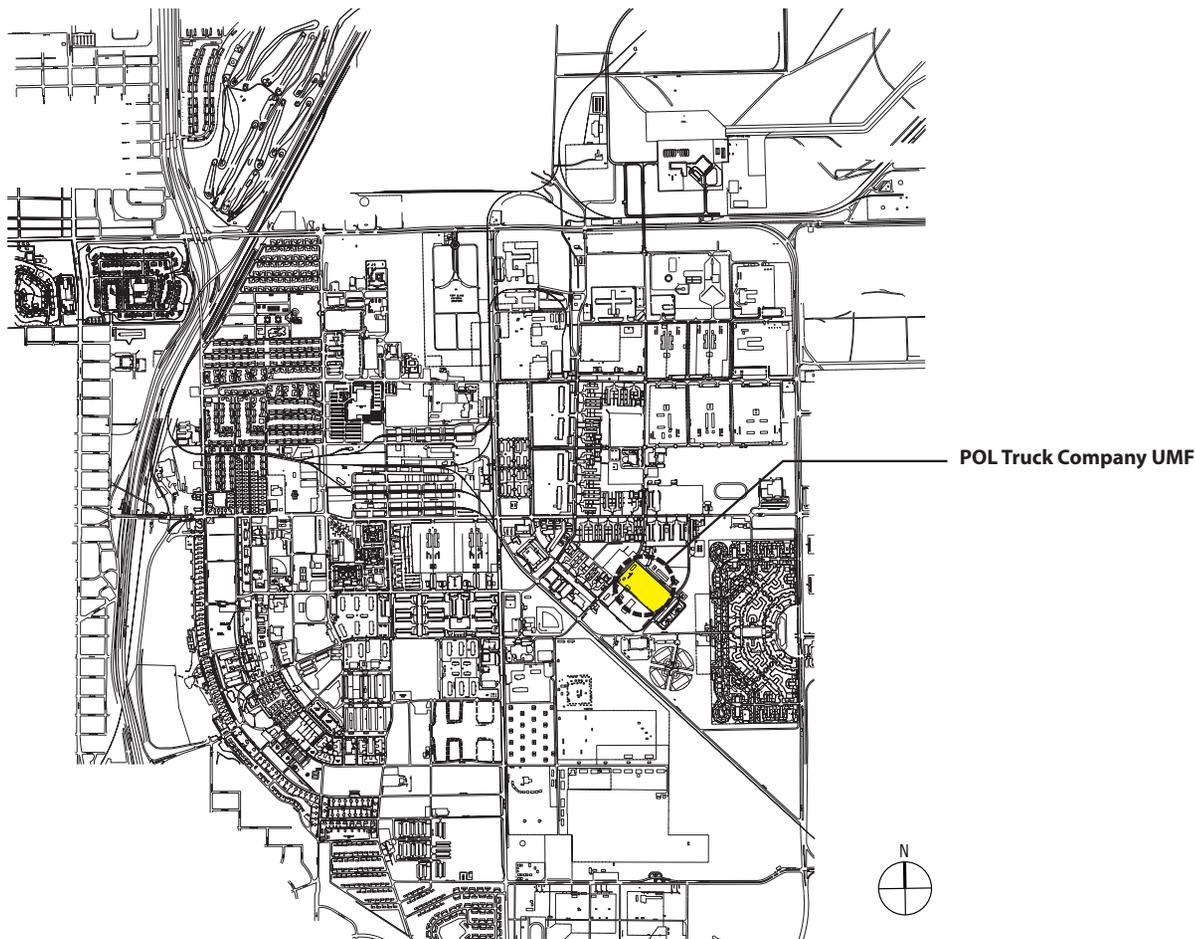


Figure 3.1 POL Truck Company Vicinity Map

3.3 Architectural Themes

It is important that these buildings be designed to fit within a compatible visual framework, also recognizing benefits derived from a similarity of building design imagery. The visual image and design of the buildings comprising the POL Truck Company respond to a “visual hierarchy” that incorporates a range of building design images. The COF and TEMF should reflect the importance of company operations and reinforce other facilities that collectively contribute to the overall visual image and design character of the POL Truck Company area. Table 3.1 lists all of the building types that make up the POL area and also references the section in the document for specific design guidance. Each respective facility section describes in detail the required architectural image and features for each building type.

The buildings that make up the POL Truck Company shall follow the architectural style and design vocabulary outlined in the corresponding narratives, which have been specifically developed, tested, and selected as appropriate.

Table 3.1 POL Trucking Facility Types

Building Types	Page
Company Operations Facility (COF)	3.3
Tactical Equipment Maintenance Facility (TEMF)	3.5
Deployment Storage	3.7

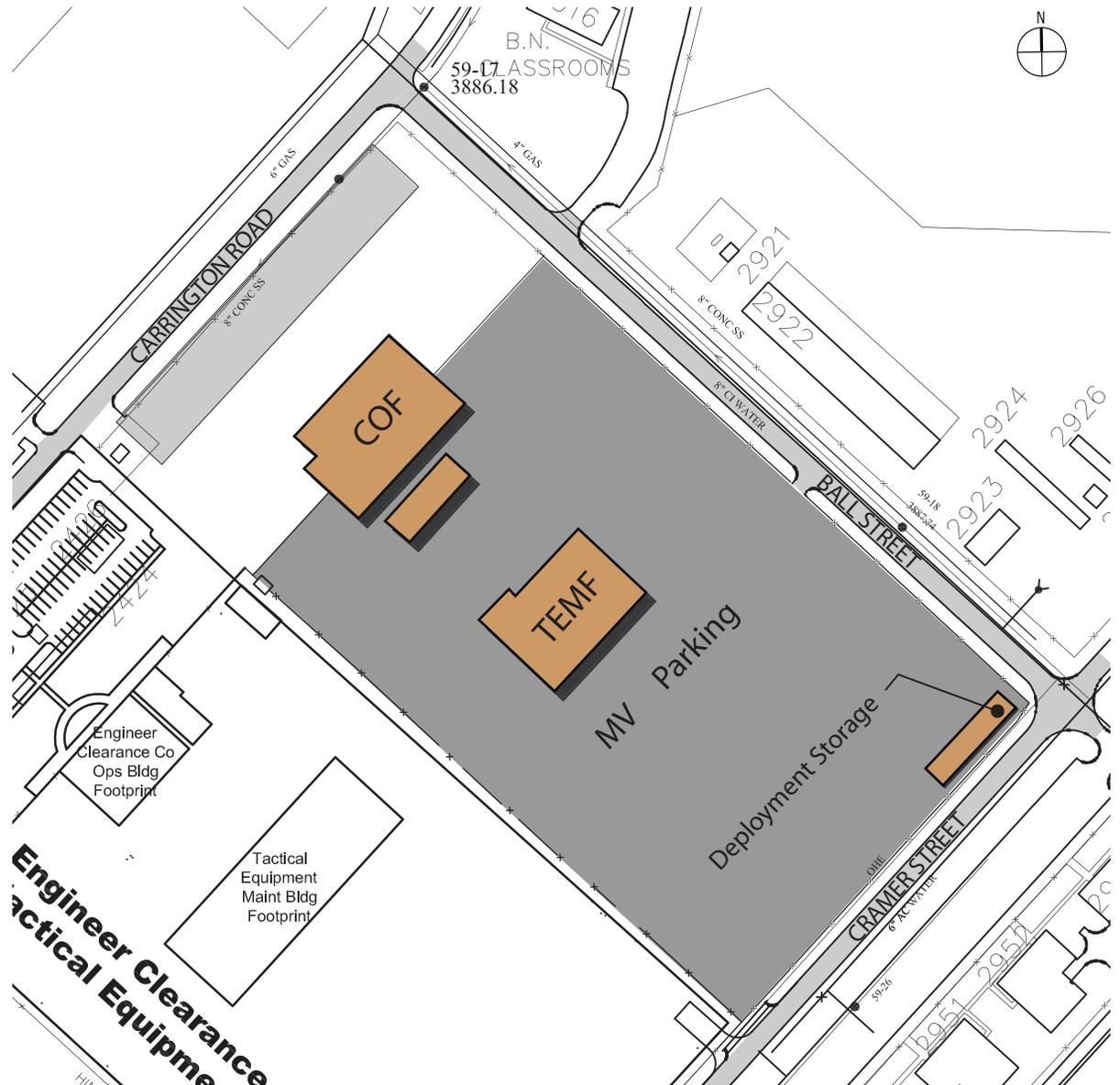


Figure 3.2 POL Truck Company UMF Site Plan

3.4 Company Operations Facility

As an administrative facility, the Company Operations Facility (COF) should have an attractive appearance that reflects the importance of company administration and operations.

Massing

Entry designs need to address pedestrians by being sensitive to human scale in its massing. The facility should have appropriate architectural components and proportion, incorporating design detail in materials, reveals, banding, patterns, and wall textures.

Form

Building form should relate to the street network, other community facilities and work centers in a way that unifies the district architecturally, while providing appropriate and convenient access. A higher central building area marks the entry, articulated with glazing for transparency and light in the interior.

Roof Style

Use a sloped, hipped, low-pitch, metal roof over the primary building volume, with eave overhangs projecting at least five feet for enhanced shade and shadow. Recessed banding at the roof line provides additional scale and detail. Beyond the primary building volume, use a visually flat roof behind a parapet wall and avoid conflicting roof forms and a cluttered appearance. Scale the height of the roof appropriately to the size of the building providing “human scale” design elements.

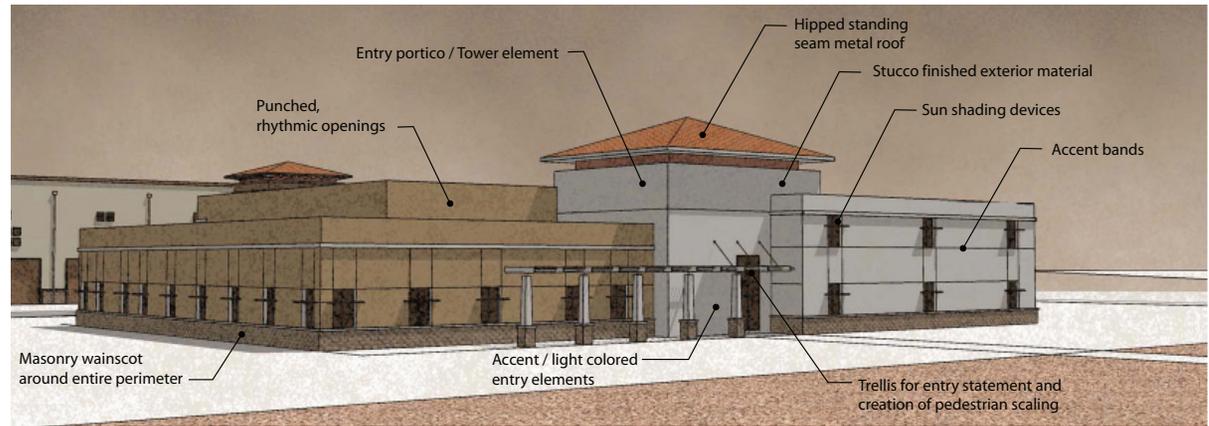


Figure 3.3 POL Company Operations Facility

Wall Treatment

Use a formal, symmetrical massing, and punched fenestration on the administration facade. Introduce shadow lines and building massing by recessing or bringing forward building planes, spandrels, and window openings. Walls should have an appearance of depth rather than appearing to be a flush, thin “skin.” Use more than one principal wall color to accentuate and articulate the building’s form. Provide and differentiate cornices, columns, spandrels, and banding. Use a clerestory in the rear building areas to introduce light to the interior spaces.

Wall Base

The base should be split-face CMU. Size the base/wainscot with sensitivity to the building volume to form a significant element.

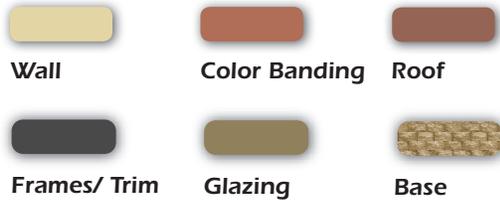
Trellises

Trellises provide shade and sun protection at the entry while also adding architectural interest with articulation and shadow added to the building’s exterior.

Color and Materials Palette

Use warm, neutral colors as the principal wall colors. Select an accent color, or colors, on building elements such as parapets, parapet caps, column caps, etc. as visual “punctuation.” The roof color may also be used as an accent color. Vary materials, colors, or textures to distinguish building masses and forms.

- Wall Base: Split-face CMU
- Walls: Stucco-finish
- Roof: Metal, Terra Cotta in color
- Windows and Frames: Optimize LEED energy efficient design requirements / Glazing and Frames to be brown in color
- Miscellaneous Metals: Match the adjacent wall color



Note: Colors depicted are approximate and may vary with color printing method. The final color selection is subject to review and approval of the DPW architect.

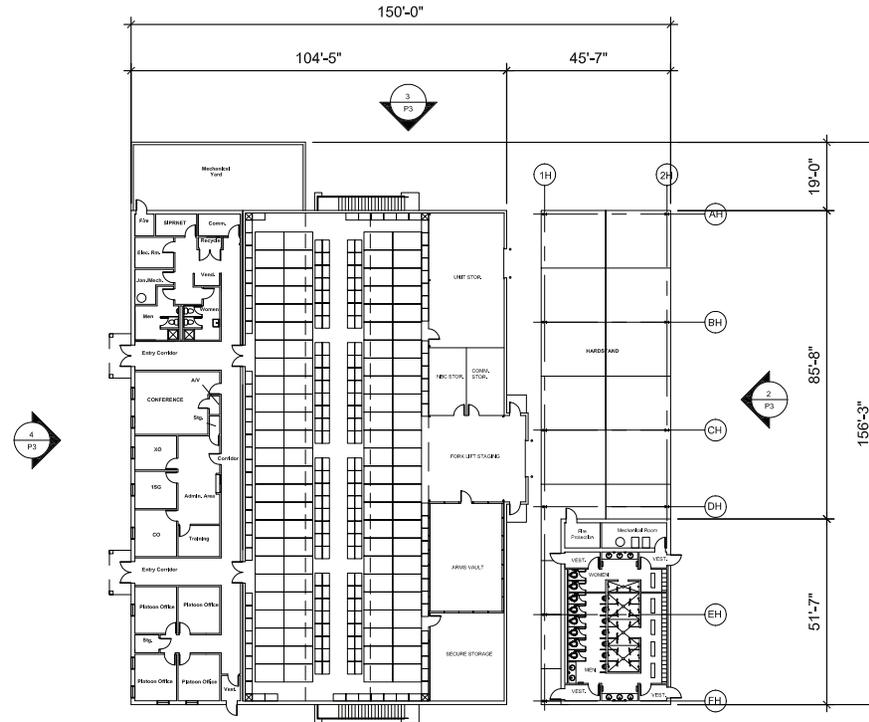


Figure 3.5 Conceptual POL COF Floor Plan

Note: The floor plan depicted is conceptual in nature. Design-builders should consult Centers for Standardization plans and USACE standards, which will prevail in the event of variance.



Figure 3.4 POL Company Operations Facility

3.5 Tactical Equipment Maintenance Facility

The Tactical Equipment Maintenance Facility (TEMF) should have an appearance that reflects the orderly process of equipment maintenance and an overall industrial character. Architectural consistency and relationship to neighboring COF facilities lends a unified image to the district. The TEMF should relate to surrounding facilities in terms of design style and architectural finishes.

Massing

The TEMF is a long, high-bay structure with a large footprint and two-story volumes. The design of the TEMF requires an architectural relationship to the COF in particular, due to their proximity. The administration portion of the facility is a one-story area scaled to appropriate pedestrian scale, utilizing architectural elements, materials, color, and articulation to match the rhythm and cadence of the COF, USASMA, and historic installation structures. A tower structure marks the main entrance to the facility and reflects the unifying thematic elements of the district.

Form

Building form should relate to the operational/military vehicle parking while being functionally responsive to service aprons for ease of use and maneuverability of vehicles. The administration area relates to the COF and the neighboring structures having a more formal architectural image and detailing.

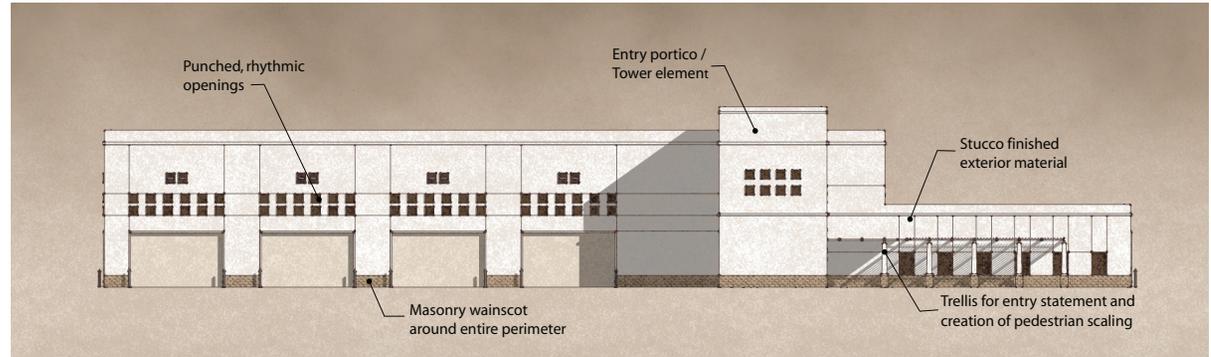


Figure 3.6 POL Tactical Equipment Maintenance Facility

Roof Style

A flat membrane roof should cover the TEMF, including the administration portion of the facility. The elevated roof provided at the main entry tower punctuates its location and ties into the architectural theme of the district, while adding a formal element to an otherwise industrial-style building. A covered walkway approaching the entry door provides sun-shading.

Wall Treatment

Use a formal, symmetrical massing, and fenestration. Consistent punched openings provide exterior interest, shadow, and sun-shading in scale to the metal-skinned structure, articulating the exterior walls. Punched openings should be designed to relate directly to the exterior design rhythm of the overhead doors that service the work bays.

Wall Base

The base should be metal, but designed as separate wainscot treatment with a horizontal metal channel. This metal will be a contrasting color to the main field color of the exterior walls. The entry tower will have a brown brick base of appropriate scale. Size the base/wainscot with sensitivity to the building volume to form a significant element.

Colonnade

Mark the entry by supporting the canopy on columns that are architecturally related to the theme of the district, providing shade, shadow, and visual articulation to the building exterior. The colonnade also serves as a further link to the overall district architectural theme.

Exterior Building Signage

The standards to apply for exterior building signage font, color, sizing, and material is found in U.S. Army Technical Manual (TM) 5-807-10. Exterior building signage must be visible from all approaching streets to the facility. The location, design, and fabrication of exterior building signage must be reviewed with and approved by Fort Bliss Department of Public Works (DPW) prior to installation.

Color and Materials Palette

Use warm, neutral colors as the principal wall colors. Select an accent color, or colors, on building elements such as parapets, parapet caps, column caps, etc. as visual "punctuation." The roof color may also be used as an accent color. Vary materials, colors, or textures to distinguish building masses and forms.

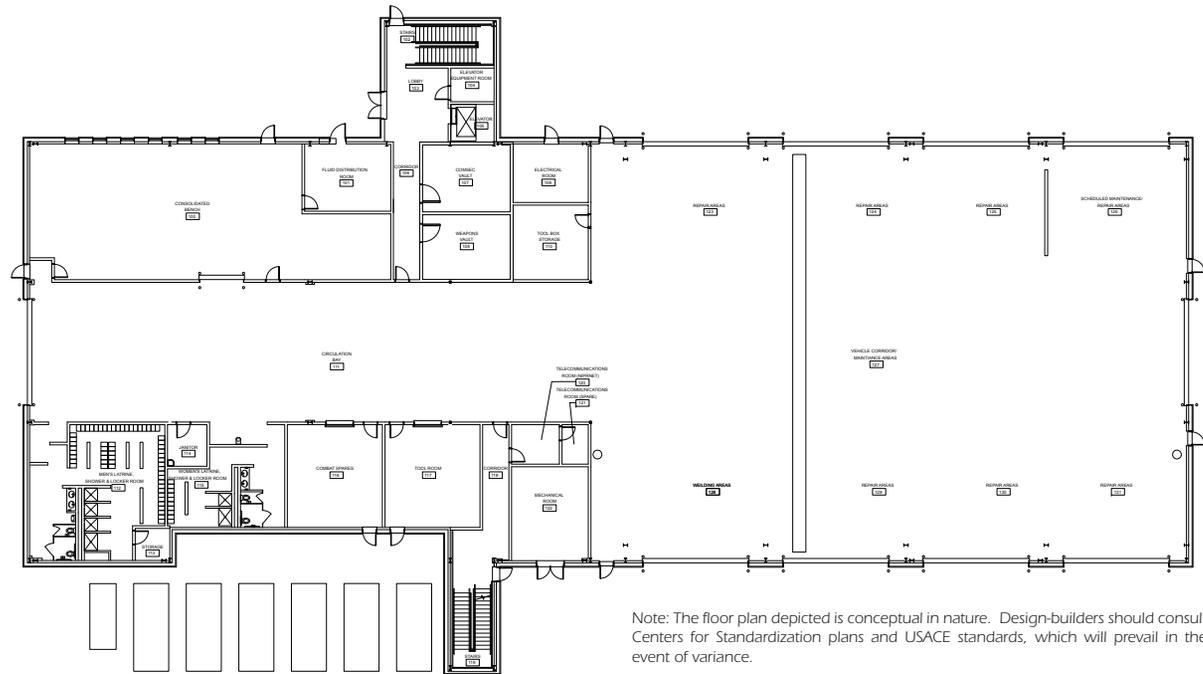
- Wall Base: Split-face CMU
- Walls: Stucco-finish
- Roof: Metal, Terra Cotta in color
- Windows and Frames: Optimize LEED energy efficient design requirements / Glazing and Frames to be brown in color
- Miscellaneous Metals: Match the adjacent wall color



Note: Colors depicted are approximate and may vary with color printing method. The final color selection is subject to review and approval of the DPW architect.



Figure 3.7 POL Tactical Maintenance Facility



Note: The floor plan depicted is conceptual in nature. Design-builders should consult Centers for Standardization plans and USACE standards, which will prevail in the event of variance.

Figure 3.8 Conceptual POL TEMF Floor-plan

3.6 Deployment Storage

The deployment storage facility should achieve a secure, industrial appearance appropriate to its function. Although a pre-engineered building is ideal, the design should be sensitive to preserving the overall theme of the district.

Massing

Deployment storage is typically characterized by large, long, high-bay structures with large footprints and two-story volumes.

Form

Building form should relate to the maintenance facilities, while being functionally responsive to service aprons for ease of use and maneuverability of vehicles and equipment.

Roof Style

A sloped, metal roof should cover Deployment Storage.

Wall Treatment

Wall treatment shall be pre-finished metal panels, consistent with the TEMF.

Wall Base

Use a base of appropriately scaled split-faced CMU to “ground” the building.

Color and Materials Palette

Use pale neutral colors as the principal wall colors. Select an accent color, or colors, on building elements such as parapets, parapet caps, and column caps as visual “punctuation.” The roof color may also be used as an accent color. Vary materials, colors, or textures to distinguish building masses and forms.

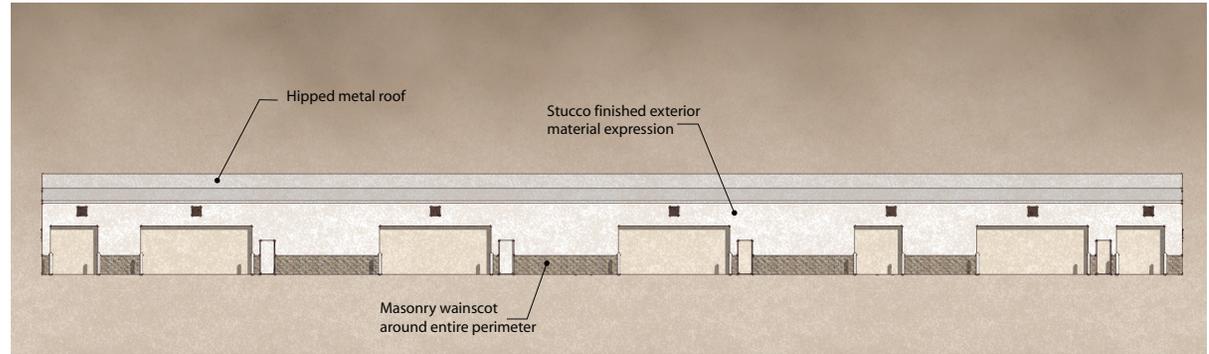
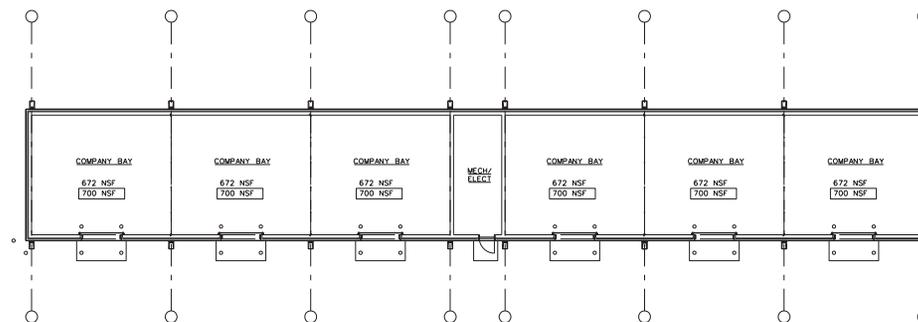


Figure 3.9 POL Deployment Storage Facility

- Wall Base: Split-face CMU.
- Walls: Stucco-finish metal panels.
- Roof: Metal, Terra Cotta in color.
- Windows and Frames: Optimize LEED energy efficient design requirements/ Glazing and Frames to be brown in color.
- Miscellaneous Metals: Match the adjacent wall color.



Note: Colors depicted are approximate and may vary with color printing method. The final color selection is subject to review and approval of the DPW architect.



Note: The floor plan depicted is conceptual in nature. Design-builders should consult Centers for Standardization plans and USACE standards, which will prevail in the event of variance.

Figure 3.10 Conceptual POL Deployment Storage Floor-Plan

3.7 Utilities

Utility systems (water, sanitary sewer, electricity, gas, and communications) provide the basic infrastructure necessary for the operation of the Development. Utility system distribution lines will generally follow the roadway corridors. The conceptual/schematic utility routing maps portrayed in Figure 3.11 are based on preliminary design assumptions and are subject to change. In the event that other data is provided in design-build RFP documentation, that information shall govern.

-  Overhead Electric
-  Underground Electric
-  Natural Gas
-  Water
-  Sanitary Sewer
-  Communication Duct Bank
-  Communications Manhole

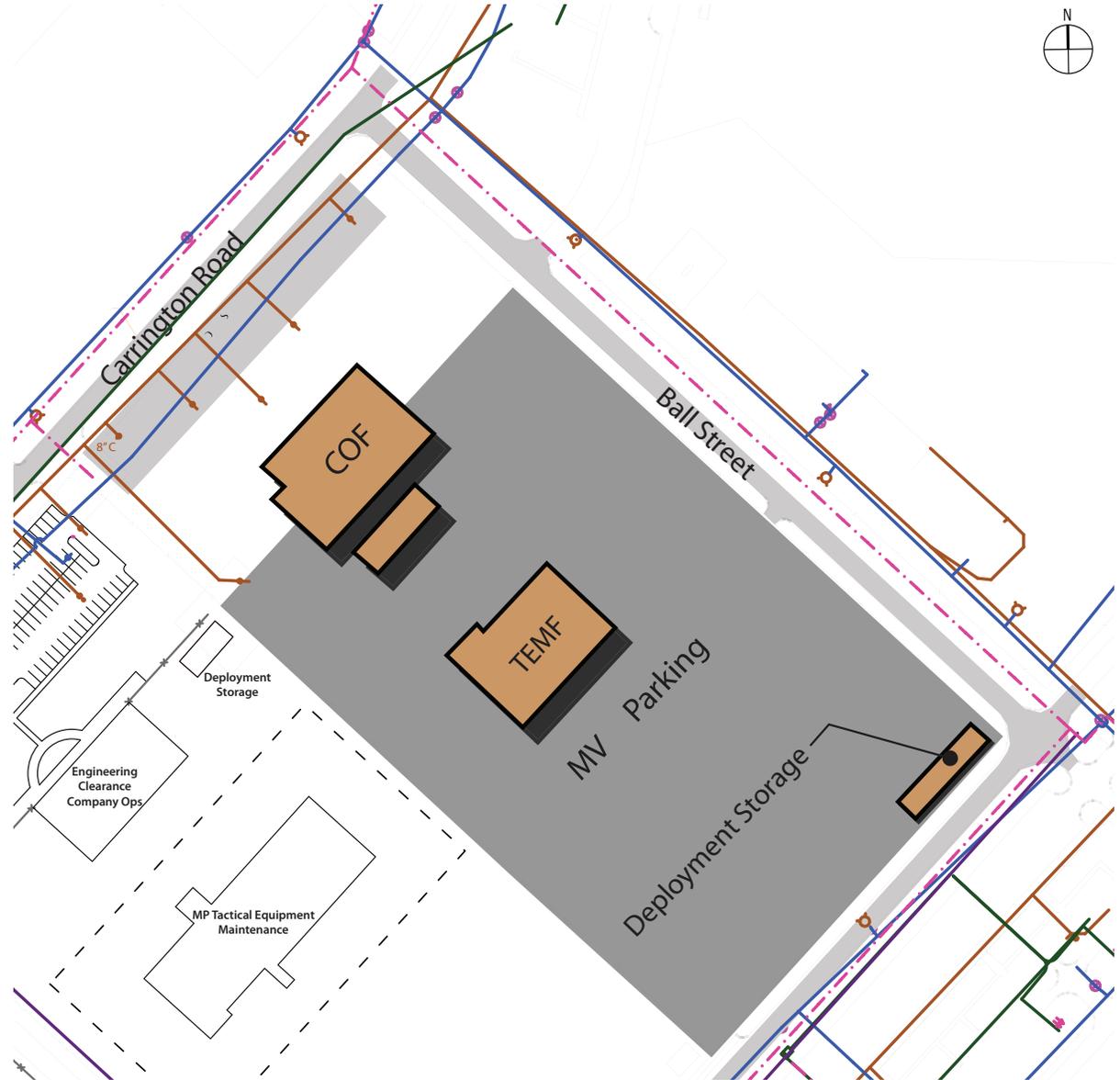


Figure 3.11 POL Truck Company UMF Site Utilities

**Patriot Battalion Complex (PN 69177)
POL Truck Company UMF (PN 69307)
Area Development Guides**



**US Army Corps
of Engineers®**

JACOBS / HUITT-ZOLLARS

APPENDIX G

GIS DATA

NOT USED

APPENDIX H

EXTERIOR SIGNAGE

Exterior Signage

All signs will either be pre-manufactured from materials meeting or exceeding the EPA required minimum recycled content or fabricated by DPW. Low quality and “homemade” signs are prohibited.

Locate signs where they are visible and unobstructed.

All signs use Helvetica. Exceptions to be approved by DPW.

Traffic signs will follow guidelines in the Federal Highway Administration’s “Standard Alphabets for Highway Signs and Pavement Markings” standards.

Sign Mounting and Location

Locate identification signs typically at building entrances and/or other parts of the building visible from the main access street. Building signs should be visible from the main circulation paths to the building (vehicular or pedestrian).

Place building and/or facility identification signs within the first 20 percent of the distance closest to the road between the road and the building. These signs shall be placed so as not to obscure any other identification, information or vehicular regulatory signs.

The minimum distance between sign and driveway or intersection should normally be 100 feet.

Mounting Signs on Buildings.

No sign may be mounted on the outside of the door, except small signs (one square foot or less) that indicate required use of an alternate entrance.

No sign may be attached or mounted to roofs and parapets.

No sign shall be painted or applied directly onto the surface of a building.

No permanent signs shall obstruct any window, door, fire escape, ladder, or opening intended for light, air, or egress.

No sign shall interrupt the vertical and horizontal features of the façade.

No sign may be attached to utility poles except for pole identification or warning.

Sign Descriptions:

Building Number: 30-inch by 10-inch reflective white metal panel with 8-inch black Helvetica Regular letters.

Identification Signs shall be per Technical Manual (TM) 5-807-10, Signage. Type B and Type C shall be brown metal mounted on brown metal posts. Colors shall be white letters and numbers on standard brown background. Include the Building Number and Street address such as “2475 Defense Av”.

No Smoking Signs

Provide and install No Smoking Signs (as shown in Figure 1) at all exterior doors.

Provide and Install “DESIGNATED SMOKING AREA” signs at Designated Smoking Areas. Designated Smoking Areas are to be located no less than 50 feet from any point of ingress / egress or any outside air intake.

(Figure 1 follows on next page.)

NO SMOKING



**Except in
Designated
Smoking Areas**

Sign should be posted *ONLY* at entrance(s) to Department of the Army owned or controlled buildings/facilities.

DA FORM 5560, APR 2007

APD v1.00

APPENDIX I

ACCEPTABLE PLANTS LIST

NOT USED – NO REQUIREMENTS

APPENDIX J

DRAWINGS

GENERAL NOTES

NOTE: These requirements supersede those listed in Sections 01 10 00.6.3 and 01 10 00.6.4 of the RFP

6.3 **SITE PLANNING AND DESIGN**

- 6.3.1. THAAD Battery II Infrastructure & Hardstand LDE DP 104" drawings and specifications, hereinafter referred to as "Infrastructure Package," included in Appendix MM. Limits of construction are as shown in the Infrastructure Package.
- 6.3.1.1. The Contractor is responsible for any specific site preparation required to accommodate the proposed foundation design.
- 6.3.1.2. Do not waste excess soil within the project site limits; deposit waste material as indicated in the Infrastructure Package.
- 6.3.1.3. The THAAD COF building, COF POV parking, landscaping, and COF utility installation past the points of demarcation will be installed by another contractor working under a separate contract. This work will be performed within the THAAD COF Site Limits as indicated in Appendix J. Prior to or on the date indicated in the Project Schedule in Appendix ZZ, complete and turn over to the Government all work within the THAAD COF Site Limits as indicated in Appendix J.
- 6.3.1.4. Coordination. Coordinate between the Land Development Engineer (LDE), THAAD COF Contractor, and USACE regarding issues relating to site and facility design and functionality. Provide and maintain access to the area enclosed by the THAAD COF Site Limits at all times.
- 6.3.2. Site Structures and Amenities
Provide site structures and amenities as shown on the Infrastructure Package.

See Appendices AA and GG for additional requirements for Site Structures and Amenities.
- 6.3.2.1. Construct all utilities as shown in the Infrastructure Package. Connect all utilities from the service connection points to the buildings.
- 6.3.3. Site Functional Requirements
- 6.3.3.1. Stormwater Management (SWM) System
(a) Storm Water Management - Provide construction storm water management for the overall project or area. Upon turnover of the THAAD COF Site Limits to the Government, the COF Contractor shall assume responsibility for the SWPPP for that area. Coordinate the laydown spaces, haul roads, and fabrication areas with the overall site SWPPP with the LDE, USACE, and the COF Contractor.
- (b) Fort Bliss maintains a TCEQ Multi-Sector General Storm Water Permit (TXR050000) for industrial activities at the post and a Phase II Small (MS4) General Permit (TXR040000) for operation of the installation urban MS4.
- (c) Graded Slope and Fills: The angle for graded slopes and fills shall be no greater than the angle that can be retained by vegetative cover or other adequate erosion control devices or structures generally not to exceed 4:1 slope. In any event, slopes left exposed will, within 21 calendar days of completion of any phase of grading, be planted or otherwise provided with temporary or permanent groundcover, devices, or structures sufficient to restrain erosion. The angle for graded slopes and fills must be demonstrated to be stable. Stable is the condition where the soil remains in its original configuration, with or without mechanical constraints.
- (d) Ground Cover: Whenever land-disturbing activity is undertaken on a tract, the person conducting the land-disturbing activity shall install plant or otherwise provide a permanent ground cover per Fort Bliss seeding specification or Blue Grama, 11.25 Kg/ha of Pure Live Seed, unhulled, for erosion control.
- (e) Final Inspection. When all construction on the project is complete, the Erosion and Sediment Control Inspector will evaluate the site and all permanent erosion control features, permanent ground cover and off-site impacts to other properties. If found to be in compliance, a close-out letter will be issued.
- 6.3.3.2. Erosion and Sediment Control

The Texas Pollutant Discharge Elimination System (TPDES) oversees the Stormwater Sediment and Erosion Control Management Plan for the post. Comply with requirement general permit number TXR150000. Provide and maintain the SWPPP over the life of the project. Qualifying construction activities (greater than 1 acre) in the Texas portion of the installation are conducted under the TCEQ Construction General Permit (TXR150000) or, in New Mexico, under the EPA Region VI Construction General Permit (FRL-8690-8; EPA-HQ-OW-2008-0238). Construction site operators on Fort Bliss meeting the definition in the permits of primary or secondary operator must comply with the appropriate state construction general permit. Depending on the execution mechanism of the project, the construction site operator may be all, or a combination of the Directorate of Public Works, US Army Corps of Engineers, the Land Development Engineer, Design Build contractor or other entities meeting the definition.
- 6.3.3.3. Vehicular Circulation

Not used.

GENERAL NOTES (CONTINUED)

6.4. **SITE ENGINEERING**

- 6.4.1. The existing site survey for the THAAD II Development is included in Appendix J.
- 6.4.1.1. Borings, a boring location map, and the raw data on the subsurface conditions at an adjacent site as described in Section 01 10 00, Section 5.2.2 are furnished as part of the RFP. Appendix A shows the boring locations overlaid on the rough grading plan. Geotechnical data and boring logs are provided for informational purposes only.
- 6.4.2. Fire Flow Tests. See Appendix D for the "AM1 THAAD, JLENS, and Sustainment Brigade Fire Protection Automatic Sprinkler Fire Systems Study" to use for basis of design for Fire Flow and Domestic Water Supply.
- 6.4.3. Pavement Engineering and Traffic Estimates
- 6.4.3.1. Not used
- 6.4.4. Traffic Signage
- 6.4.4.1. Not used.
- 6.4.5. Base Utility Information
- 6.4.5.1. Temporary Utilities: Existing and permanent utility systems are shown in the Infrastructure Package. Coordinate temporary utilities on site as needed. Truck water to the project site until new utilities are constructed. Temporary hydrants may be used as a water point source for construction. Until electrical utilities are constructed to the project site, provide generators and any required permits for each generator for on-site electrical service. Once utilities are constructed to the project site, arrange for and bear the cost of temporary electrical power and water service. Make requests for temporary electrical power and water service, including installation of construction meters, through DPW, not directly to the utility.
- 6.4.5.2. Permanent Utilities:

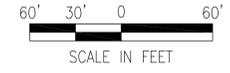
Typically The existing Fort Bliss Main Post Utility Systems are privately owned. This scope of work includes coordinating project utility requirements with the owners of the privatized utility systems. utility owners will remove existing utilities, install new primary utility systems and make final connections between the new systems and existing. However, contractors shall be responsible for negotiating and finalizing utility system work with the utility providers. The Contractor will include all associated efforts with the utilities, including all Privatized Utility Providers requirements, in the cost proposal. The successful Offeror will enter into a service agreement with the respective utility provider for all work between the points of demarcation as shown in Appendix J and the connection to the existing system.
- The points of contact for the respective Private Utility Providers are:
- Loren C. Washington
Project Manger
Rio Grande Electric Cooperative
915-778-0152
LWashington@rgec.coop
- Daniel Monteros
Project Manager
Fort Bliss Water Services Company
915-568-2317
dmonteros@fbliss.asusinc.com
- Mike Chavez
Project Manager
Texas Gas Service
915-680-7280
mchavez@txgas.com

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THAAD II BATTERY TEMF
FORT BLISS, TEXAS
RFP EXHIBIT - A
GENERAL NOTES

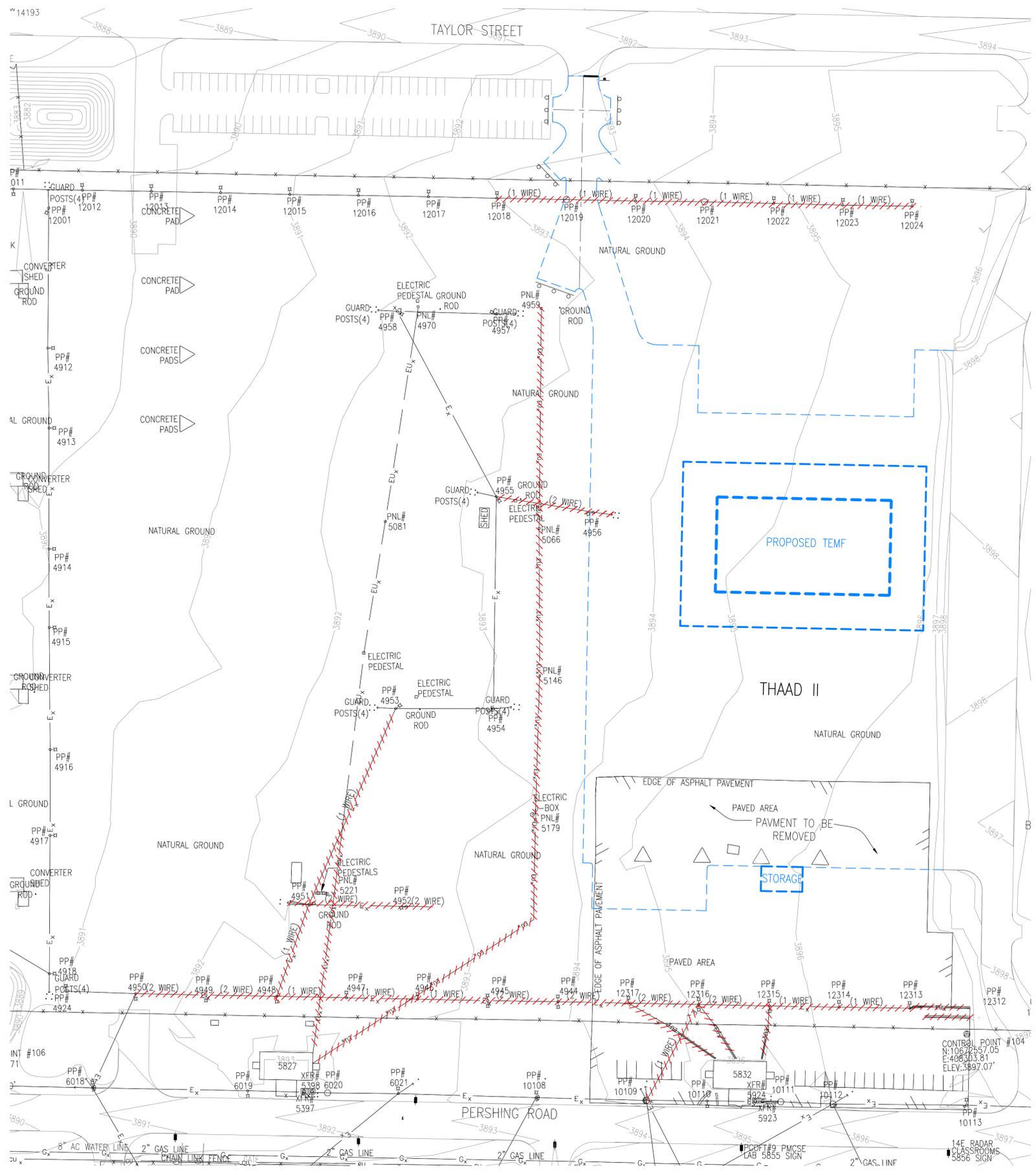
DATE: SEPTEMBER 28, 2010
JACOBS / HUITT-ZOLIARS

Sheet
reference
number:
EX-A



LEGEND:

- SSx — EX. SANITARY SEWER MAIN
- Wx — EX. WATER MAIN
- Gx — EX. GAS MAIN
- Ex — EX. OVERHEAD ELECTRIC
- Eu_x — EX. UNDERGROUND ELECTRIC
- ////// UTILITY TO BE REMOVED OR ABANDONED



DATE: SEPTEMBER 28, 2010

JACOBS / HUITT-ZOLLARS

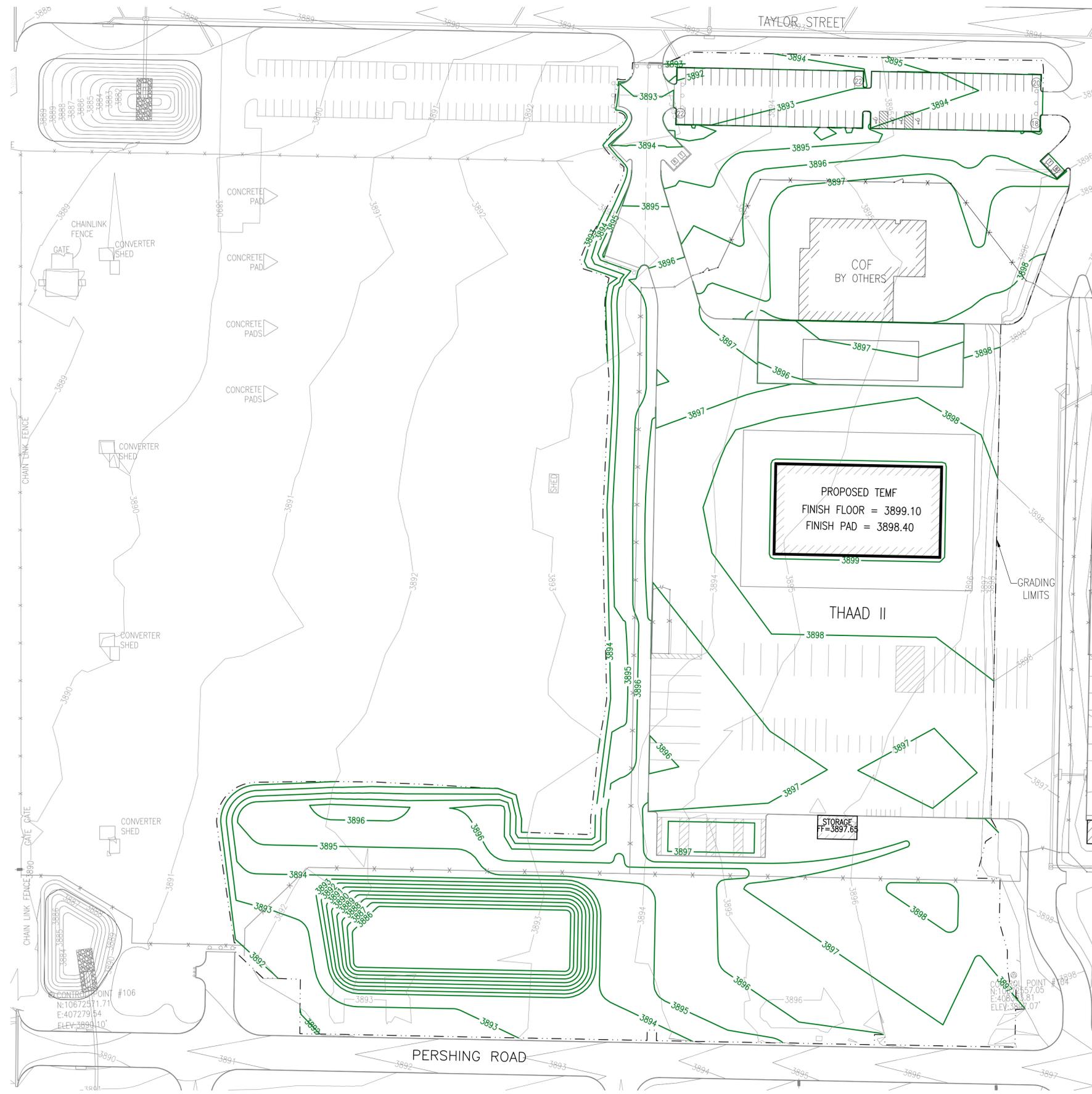
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FORT BLISS, TEXAS
RFP EXHIBIT - D
SITE SURVEY

Sheet
reference
number:
EX-D

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- LEGEND:
- 3898 PROPOSED CONTOUR
 - 3898 EXISTING CONTOUR



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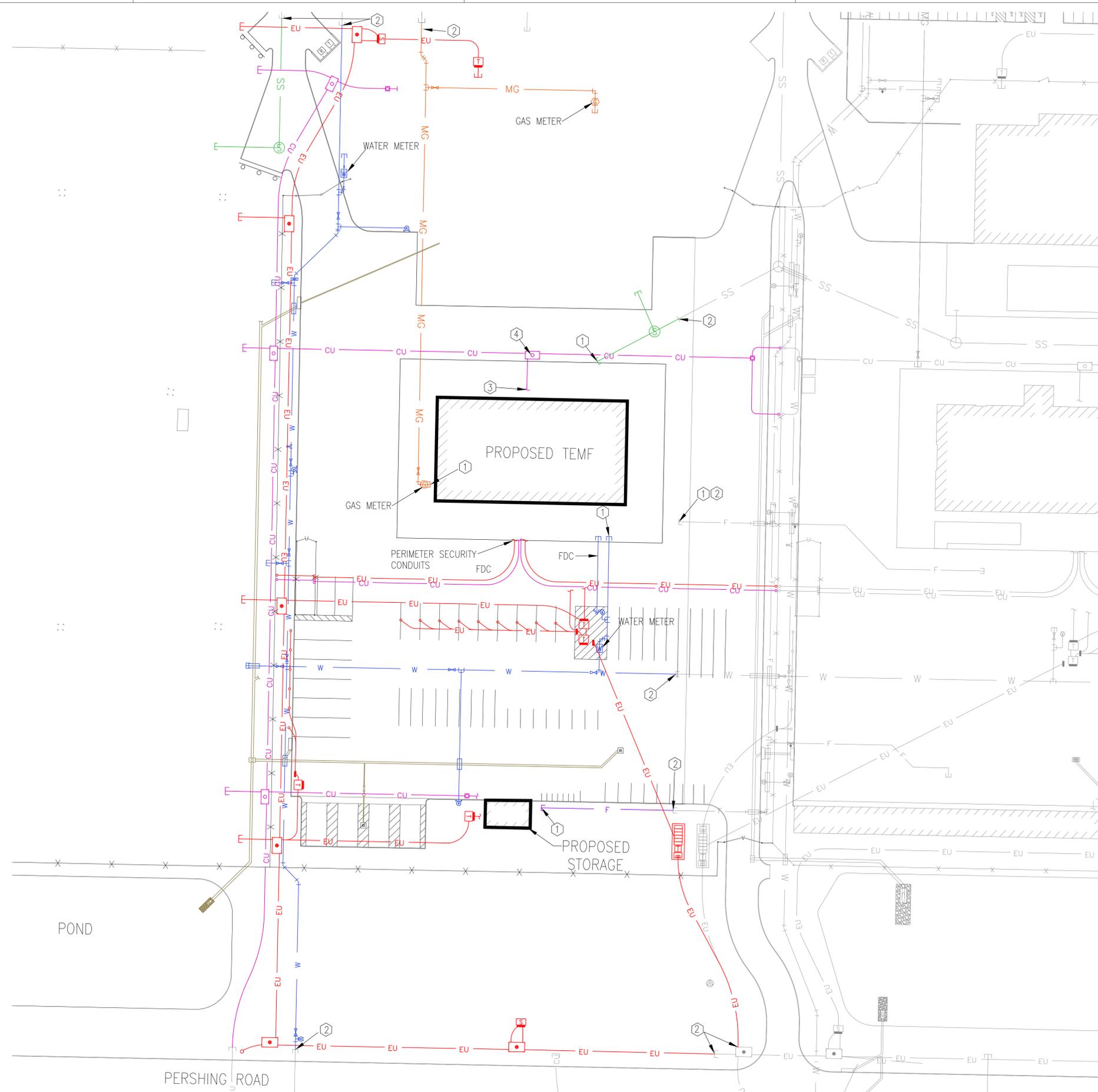
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E: 407279.54
ELEV: 3893.10'

CONTROL POINT #107
N: 10672311.71
E: 406518.81
ELEV: 3892.07'

DATE: SEPTEMBER 28, 2010
JACOBS / HUITT-ZOLLARS

THAAD II BATTERY TEMF
FORT BLISS, TEXAS
RFP EXHIBIT - E
PROPOSED GRADES

Sheet
reference
number:
EX-E



- LEGEND:**
- SS_x — EX. SANITARY SEWER MAIN
 - W_x — EX. WATER MAIN
 - G_x — EX. GAS MAIN
 - EU_x — EX. ELECTRIC
 - CU_x — EX. COMMUNICATIONS
 - SS — PROP. SANITARY SEWER MAIN
 - F — PROP. FIRE
 - W — PROP. WATER MAIN
 - MG — PROP. GAS MAIN
 - EU — PROP. ELECTRIC
 - CU — PROP. COMMUNICATIONS
 - — — PROP. STORM DRAIN

- ① POINT OF DEMARCATION CONNECTION BY BLDG CONTRACTOR.
- ② POINT OF DEMARCATION CONNECTION BY UTILITY PROVIDER.
- ③ POINT OF DEMARCATION DUCT BANK CONNECTION BY BLDG CONTRACTOR.
- ④ POINT OF DEMARCATION CABLE SPLICE CONNECTION POINT.

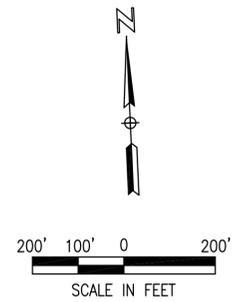
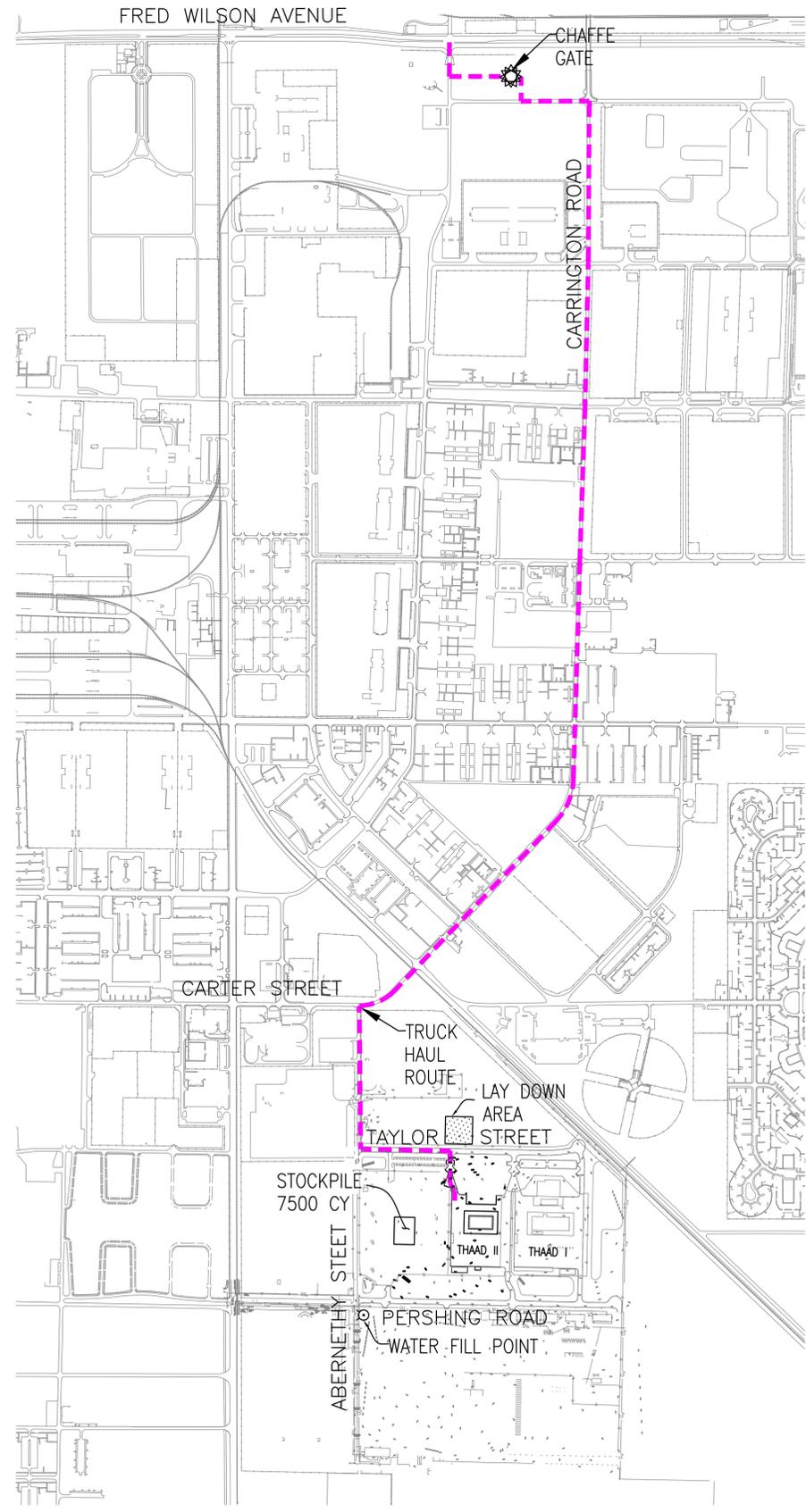
- NOTES:**
1. CONTRACTOR RESPONSIBLE FOR CONSTRUCTION OF ALL UTILITY WORK TO BUILDING INCLUDING (BUT NOT LIMITED TO) ALL DUCT BANK, ELECTRICAL WIRING TO TRANSFORMER, WATER, SEWER, GAS AND STORM PIPING, AND GAS METER.
 2. CONTRACTOR RESPONSIBLE FOR DESIGN AND CONSTRUCTION OF UTILITIES BETWEEN BUILDING AND POINT OF DEMARCATION.
 3. ALL NEW UTILITIES MUST BE IN PLACE PRIOR TO DEMOLITION OF EXISTING UTILITIES. CUTTING AND CAPPING EXISTING LINES, AND FINAL TIE-INS OF NEW UTILITIES TO EXISTING SYSTEMS OWNED BY THE PRIVATIZED UTILITY PROVIDERS (UP'S) SHALL BE PERFORMED BY THE UP'S. COORDINATE 30 DAYS PRIOR TO NEEDING CONNECTION OR CUT-OFF WITH USACE CONTRACTING OFFICER'S REPRESENTATIVE.

DATE: SEPTEMBER 28, 2010
JACOBS / HUITT-ZOLIARS

THAAD BATTERY TEMF
FORT BLISS, TEXAS
RFP EXHIBIT - F
UTILITIES

Sheet
reference
number:
EX-F

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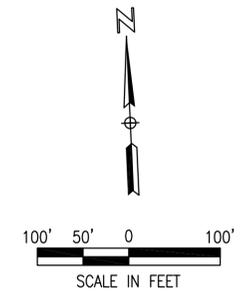
LEGEND:

 SECURITY CHECK POINT

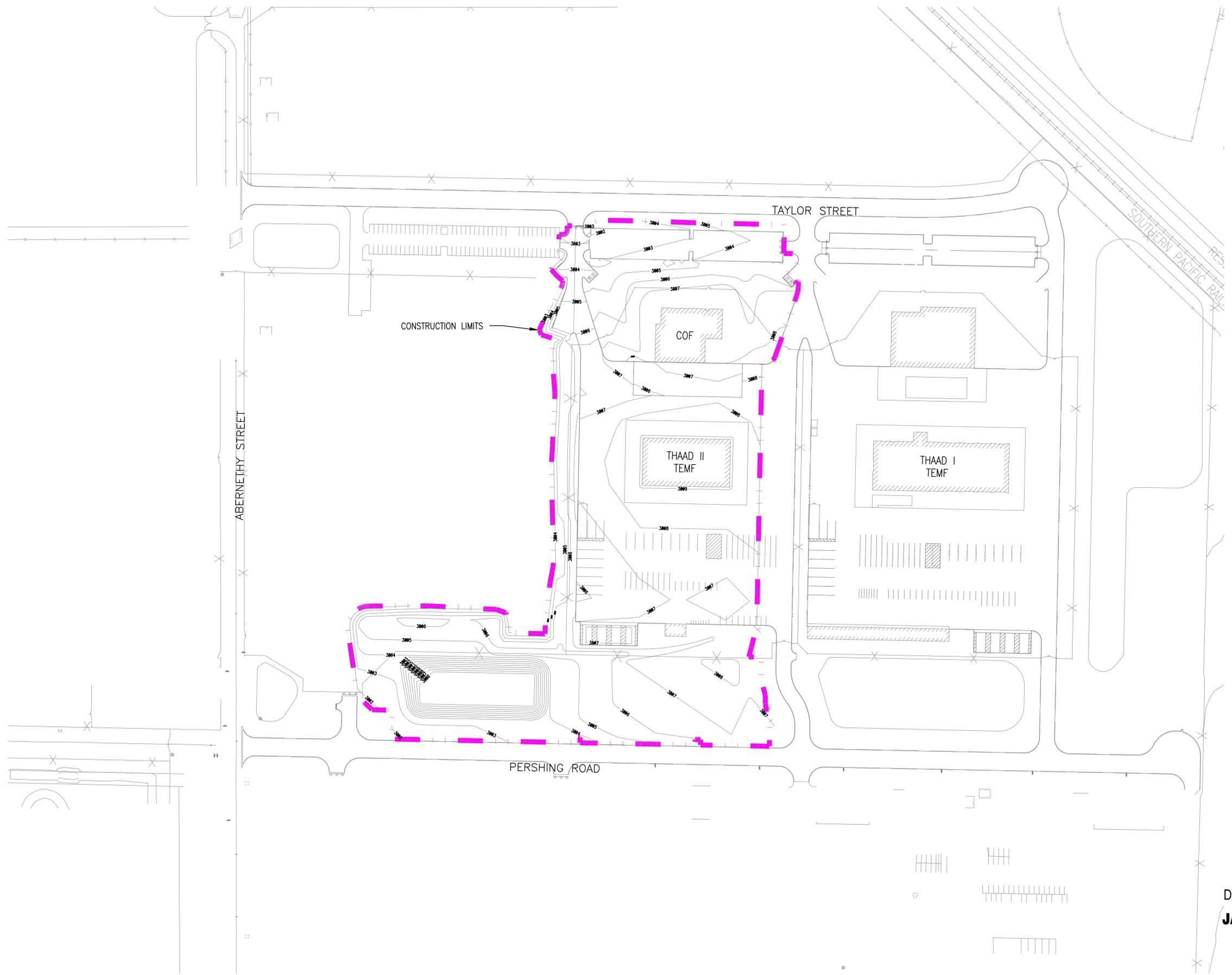
DATE: SEPTEMBER 28, 2010
JACOBS / HUITT-ZOLLARS

THAAD II BATTERY TEMF
FORT BLISS, TEXAS
RFP EXHIBIT - G
HAUL ROUTE AND STAGING AREA

Sheet
reference
number:
EX-G



- NOTE:
1. REFERENCE APPENDIX J, EX-A, PARAGRAPH 6.3.1.3 FOR INFORMATION REGARDING THAAD COF SITE LIMITS.
 2. LIMITS OF CONSTRUCTION ARE ALSO LEED SITE BOUNDARY.



DATE: SEPTEMBER 28, 2010
JACOBS / HUITT-ZOLLARS

THAAD II BATTERY TEMF
FORT BLISS, TEXAS
RFP EXHIBIT - H
CONSTRUCTION LIMITS

Sheet
reference
number:
EX-H

APPENDIX K
LIFE CYCLE COST ANALYSIS
UTILITY RATES



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT BLISS
1 PERSHING ROAD
FORT BLISS, TX 79916-3803

SEP 03 2008

IMSW-BLS-PWF

MEMORANDUM FOR All Reimbursable Fort Bliss Utilities Customers

SUBJECT: New Natural Gas Rates

1. New utility rates are determined in accordance with HQ USACE Installation Support Division Policies, as spelled out in Technical Note Number 420-41 (Revision 1).
2. Natural gas prices have increased 43 percent higher than last year's price. Effective 1 October 2008, the new natural gas rates provided below will apply. Category "A" represents the rates for sales to Federal Government and Non-Appropriated Fund (NAF) activities. Category "B" represents the rates for private or commercial organizations. **NOTE:** PROPANE and STEAM will be handled on a case by case basis. The following rates shown are for metered facilities.

	Unit	A	B
Natural Gas	CCF	\$1.3810	\$1.5606

3. The following rates are for unmetered facilities whose cost is determined by the area.

	Unit	A	B
Natural Gas	SF/mo	\$0.1315	\$0.1690

4. Point of Contact for this action is Mr. Anthony Nitkowski, Utilities Sales Officer, Business Operation Integration Division, Directorate of Public Works, DSN 978-5465, email anthony.nitkowski@conus.army.mil.

David N. Shafii

DAVID N. SHAFII, P.E.
Director of Public Works

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
 US ARMY INSTALLATION MANAGEMENT COMMAND
 HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT BLISS
 1 PERSHING ROAD
 FORT BLISS, TX 79916-3803

IMSW-BLS-PWF

9 JUNE 2008

MEMORANDUM FOR All Fort Bliss Utilities Customers

SUBJECT: New Utility Rates Effective 1 January 2008

1. New utility rates were determined in accordance with HQ USACE Installation Support Division Policies, as spelled out in Technical Note Number 420-41 (Revision 1).
2. The new rates are listed below. Category "A" represents the rates for sales to Federal Government and Non-Appropriated Fund (NAF) activities. Category "B" represents the rates for sales to private or commercial organizations. **NOTE:** PROPANE and STEAM will be handled on a case by case basis. The following rates shown are for metered facilities.

	Unit	A	B
Electricity	KWh	\$0.1352	\$0.1489
Natural Gas	CCF	\$1.1328	\$1.2801
Water	KGal	\$2.9280	\$3.9409
Sewage	KGal	\$2.1410	\$2.5197

3. The following rates are for unmetered facilities whose cost is determined by the area.

	Unit	A	B
Electricity	SF/mo	\$0.3851	\$0.4351
Natural Gas	SF/mo	\$0.0920	\$0.1183
Water	SF/mo	\$0.0288	\$0.0325
Sewage	SF/mo	\$0.0289	\$0.0327

4. Point of Contact for this action is Mr. Anthony Nitkowski, Utilities Sales Officer, Business Operation Integration Division, Directorate of Public Works, DSN 979-5470, email anthony.nitkowski@conus.army.mil.

FOR THE COMMANDER:

DAVID N. SHAFII, P.E.
 Director of Public Works

APPENDIX L

LEED PROJECT CREDIT GUIDANCE

APPENDIX L

LEED Project Credit Guidance (MAY 10)

This spreadsheet indicates Army required credits, Army preferred credits, project-specific ranking of individual point preferences, assumptions guidance for individual credits, and references to related language in the RFP for individual credits.

LEED Credit Paragraph	LEED Project Credit Guidance	Army Guidance: Required - Preferred - Avoid		Project Preference Ranking: (1=most preferred, blank=no preference, X=preference not applicable to this credit, Rqd=required)
PAR	FEATURE			REMARKS
SUSTAINABLE SITES				
SSPR1	Construction Activity Pollution Prevention (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
SS1	Site Selection		X	See paragraph LEED CREDITS COORDINATION.

SS2	Development Density & Community Connectivity - OPTION 1 DENSITY		X	See paragraph LEED CREDITS COORDINATION.
	Development Density & Community Connectivity - OPTION 2 CONNECTIVITY		X	See paragraph LEED CREDITS COORDINATION.
SS3	Brownfield Redevelopment		X	See paragraph LEED CREDITS COORDINATION.
SS4.1	Alternative Transportation: Public Transportation Access		X	See paragraph LEED CREDITS COORDINATION.
SS4.2	Alternative Transportation: Bicycle Storage & Changing Rooms	Pref		Assume that non-transient building occupants are NOT housed on Post unless indicated otherwise.
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 1			Requires provision of vehicles, which cannot be purchased with construction funds. Assume Government will not provide vehicles unless indicated otherwise. Assume that 50% of GOV fleet is NOT alternative fuel vehicles unless indicated otherwise.
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 2	Pref		
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 3			Requires provision of vehicle refueling stations. Installation must support type of fuel and commit to maintaining/supporting refueling stations.
SS4.4	Alternative Transportation: Parking Capacity	Pref		

SS5.1	Site Development: Protect or Restore Habitat			
SS5.2	Site Development: Maximize Open Space	Pref		Assume AGMBC option for aggregated open space at another location on the installation is not available to the project unless indicated otherwise.
SS6.1	Stormwater Design: Quantity Control	Pref		See paragraph STORMWATER MANAGEMENT.
SS6.2	Stormwater Design: Quality Control	Pref		See paragraph STORMWATER MANAGEMENT.
SS7.1	Heat Island Effect: Non-Roof			
SS7.2	Heat Island Effect: Roof	Pref		Coordinate with nearby airfield requirements, which may preclude this credit.
SS8	Light Pollution Reduction	Pref		
<u>WATER EFFICIENCY</u>				
WEPR1	Water Use Reduction (Version 3 only)	Rqd	Rqd	All LEED prerequisites are required to be met.
WE1.1	Water Efficient Landscaping: Reduce by 50%	Pref		See paragraph IRRIGATION. Project must include landscaping to be eligible for this credit.
WE1.2	Water Efficient Landscaping: No Potable Water Use or No Irrigation	Pref		Project must include landscaping to be eligible for this credit.
WE2	Innovative Wastewater Technologies - OPTION 1			
WE2	Innovative Wastewater Technologies - OPTION 2			
WE3	Water Use Reduction	Pref		See paragraph BUILDING WATER USE REDUCTION.

ENERGY AND ATMOSPHERE				
EAPR1	Fundamental Commissioning of the Building Energy Systems (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
EAPR2	Minimum Energy Performance (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
EAPR3	Fundamental Refrigerant Management (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
EA1	Optimize Energy Performance	Rqd	1	Earning of LEED EA1 points as indicated in paragraph ENERGY CONSERVATION , as a minimum, is required.
EA2.1	On-Site Renewable Energy	Pref		See paragraph ENERGY CONSERVATION .
EA3	Enhanced Commissioning	Rqd		See paragraph COMMISSIONING . The Commissioning Authority may be provided through the Design-Build Contractor only if in accordance with USGBC Credit Interpretation Ruling (CIR) dated 9/15/06. Commissioning Authority activities begin during design phase and continue well beyond beneficial occupancy. Assume Government will not provide CxA post-occupancy activities unless indicated otherwise.
EA4	Enhanced Refrigerant Management			
EA5	Measurement & Verification			Assume Government will not provide post-occupancy activities unless indicated otherwise.
EA6	Green Power		X	See paragraph LEED CREDITS COORDINATION .

MATERIALS AND RESOURCES				
MRPR1	Storage & Collection of Recyclables (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met. Coordinate with Installation during design development on collection service and receptacles.
MR1	Building Reuse			
MR2.1	Construction Waste Management: Divert 50% From Disposal	Pref		See paragraph CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT.
MR2.2	Construction Waste Management: Divert 75% From Disposal	Pref		
MR3	Materials Reuse			
MR4.1	Recycled Content: 10% (post-consumer + 1/2 pre-consumer)	Pref		See paragraph RECYCLED CONTENT.
MR4.2	Recycled Content: 20% (post-consumer + 1/2 pre-consumer)	Pref		
MR5.1	Regional Materials:10% Extracted, Processed & Manufactured Regionally			
MR5.2	Regional Materials:20% Extracted, Processed & Manufactured Regionally			

MR6	Rapidly Renewable Materials	Pref		See paragraph BIOBASED AND ENVIRONMENTALLY PREFERABLE MATERIALS and paragraph FEDERAL BIOBASED PRODUCTS PREFERRED PROCUREMENT PROGRAM.
MR7	Certified Wood	Pref		See paragraph BIOBASED AND ENVIRONMENTALLY PREFERABLE MATERIALS.
INDOOR ENVIRONMENTAL QUALITY				
EQPR1	Minimum IAQ Performance (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
EQPR2	Environmental Tobacco Smoke (ETS) Control (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met. Assume all buildings are smoke free unless indicated otherwise (family housing, barracks and other lodging are facility types where smoking may be permitted in some cases).
EQ1	Outdoor Air Delivery Monitoring			
EQ2	Increased Ventilation			
EQ3.1	Construction IAQ Management Plan: During Construction	Pref		See paragraph CONSTRUCTION IAQ MANAGEMENT.
EQ3.2	Construction IAQ Management Plan: Before Occupancy	Pref		See paragraph CONSTRUCTION IAQ MANAGEMENT.
EQ4.1	Low Emitting Materials: Adhesives & Sealants	Pref		See paragraph LOW-EMITTING MATERIALS.
EQ4.2	Low Emitting Materials: Paints & Coatings	Pref		See paragraph LOW-EMITTING MATERIALS.
EQ4.3	Low Emitting Materials: Carpet/Flooring Systems	Pref		See paragraph LOW-EMITTING MATERIALS.

EQ4.4	Low Emitting Materials: Composite Wood & Agrifiber Products	Pref		See paragraph LOW-EMITTING MATERIALS.
EQ5	Indoor Chemical & Pollutant Source Control	Pref		System requiring weekly cleaning to earn this credit is not a permitted option unless indicated otherwise.
EQ6.1	Controllability of Systems: Lighting			
EQ6.2	Controllability of Systems: Thermal Comfort			
EQ7.1	Thermal Comfort: Design	Rqd		See paragraph HEATING, VENTILATING AND AIR CONDITIONING.
EQ7.2	Thermal Comfort: Verification			Project must earn credit EQ7.1 to be eligible for this credit. Assume Government will not provide post-occupancy activities unless indicated otherwise.
EQ8.1	Daylight & Views: Daylight 75% of Spaces	Pref		See paragraph DAYLIGHTING.
EQ8.2	Daylight & Views: Views for 90% of Spaces	Pref		
INNOVATION & DESIGN PROCESS				
IDc1.1	Innovation in Design			See paragraph INNOVATION AND DESIGN CREDITS. Assume Government will not provide any activities associated with ID credits.
IDc1.2	Innovation in Design			
IDc1.3	Innovation in Design			
IDc1.4	Innovation in Design			
IDc2	LEED Accredited Professional	Rqd	Rqd	LEED AP during design and construction is required.
REGIONAL PRIORITY CREDITS (Version 3 only)				See paragraph LEED CREDITS COORDINATION.

APPENDIX M

LEED OWNER'S PROJECT REQUIREMENTS

APPENDIX N

LEED REQUIREMENTS FOR MULTIPLE CONTRACTOR COMBINED PROJECTS

APPENDIX N

LEED Requirements for Multiple Contractor Combined Projects

When site work and building(s) for a project are accomplished by separate contractors, it is referred to as a Combined Project for purposes of LEED scoring and documentation and the following is required:

- LEED points relating to site work must be combined with the LEED points for each building to arrive at a single LEED Combined Project score.
- LEED points having both building requirements and site requirements (combined bldg/site points) must be coordinated between the contractors.
- LEED aggregate materials points must be coordinated between the contractors and a division of responsibilities for each contractor's required contribution to the point must be developed.
- LEED Project documentation from separate contractors must be combined.

Multiple Contractor Combined Project Definition. See paragraph MULTIPLE CONTRACTOR COMBINED PROJECT in paragraph PROJECT SPECIFIC REQUIREMENTS of the Statement of Work to see if this project is part of a Multiple Contractor Combined Project. A summary of the separate projects that constitute the Combined Project may be provided at paragraph SUSTAINABLE DESIGN – ADDITIONAL INFORMATION or may be obtained from the Contracting Officer's Representative. Typical Multiple Contractor Combined Projects are comprised of the site work contract and all the building-only contracts for buildings that the site work is provided for in the separate site work contract.

LEED Points Coordination. See Appendix LEED Strategy Table(s) for the total number of points each contractor is responsible for obtaining, for special requirements relating to combined building/site points and for each contractor's requirement relating to aggregate materials points each portion of this Multiple Contractor Combined Project. Each contractor providing a building is referred to as Building CTR and Site CTR refers to the contractor providing the site development. For each building included in the site work contract, the site work contractor is both Building CTR and Site CTR for that building. Aggregate materials percentages indicated in the table(s) are percentage of that contractor's materials total.

Point Substitutions. During preparation of the Proposal, each contractor is free to substitute other LEED points for those indicated in the LEED Strategy Table(s), except points marked "NO" in the "Building CTR Substitutions Permitted" column may not be deleted or added by substitution by building contractor and points marked "NO" in the "Site CTR Substitutions Permitted" column may not be deleted or added by substitution by site contractor. Credit substitutions after award are not permitted except with the advance approval of the Contracting Officer.

LEED Documentation. Each contractor is responsible for developing all project LEED documentation demonstrating compliance for their portion of the work and must utilize the LEED Letter Templates. Each contractor is responsible for updating construction phase LEED documentation at least monthly until construction closeout. No CTR will duplicate the data of another CTR within their own documentation. Each contractor will include the contractor name, project name and number and individual building description as applicable on each Letter Template. The LEED Letter Templates are copyright protected and shall be used only for this specific contract and this registered project.

Compiling LEED Documentation from Multiple Contractors. At completion and acceptance of final design submittals the completed design phase letter templates and their attachments from all CTRs in the Multiple Contractor Combined Project will be compiled at the registered site project. All CTRs will furnish electronic copies of their completed letter templates and their attachments for this purpose. Monthly during construction and at construction closeout all CTRs current construction phase letter templates and their attachments will be compiled at the registered site project. Summary letter templates for all

aggregate credits (see AGMBC for which credits are aggregate credits) will be created and maintained monthly with summary data from all from all CTRs in the Multiple Contractor Combined Project at the registered site project. All CTRs will furnish electronic copies of the current updated templates and their attachments for this purpose monthly and at closeout.

Site Work Portion of Multiple Contractor Combined Project, Administration by the Government. If paragraph 16.4.2 CREDIT VALIDATION indicates this is the site work portion of a Multiple Contractor Combined Project and that administration of the online project is by the Government, the Government will provide access to blank Letter Templates for site CTRs use and the Government will perform the compiling indicated in paragraph Compiling LEED Documentation from Multiple Contractors above.

Site Work Portion of Multiple Contractor Combined Project, Shared Administration. If paragraph 16.4.2 CREDIT VALIDATION indicates this is the site work portion of a Multiple Contractor Combined Project and that administration of the online project is shared between Contractor and Government, the Contractor will administer the registered site project until final design acceptance, at which point administration will be transferred to the Government. The Government will administer the project during construction and the Government will perform the compiling indicated in paragraph Compiling LEED Documentation from Multiple Contractors above.

Site Work Portion of Multiple Contractor Combined Project, Administration by the Contractor. If paragraph 16.4.2 CREDIT VALIDATION indicates this is the site work portion of a Multiple Contractor Combined Project and that administration of the online project is by the Contractor, the Contractor will administer the project and **the Contractor will perform the compiling indicated in paragraph Compiling LEED Documentation from Multiple Contractors above.**

Standard Design Building(s) portion of Multiple Contractor Combined Project, Administration by the Government. If paragraph 16.4.2 CREDIT VALIDATION indicates this is a standard design building(s) portion of a Multiple Contractor Combined Project and that administration of the online project is by the Government, the Government will provide access to blank Letter Templates for standard design building CTRs use as follows:

Instructions for Obtaining LEED Letter Templates for Registered Army Standard Designs

General. Contractors providing Army standard design buildings only (site work by another contractor) in a Multiple Contractor Combined project obtain their LEED Letter Templates for the project from the Center of Standardization (COS) for that standard design.

Information You Need to Provide. After award, contact the COS POC indicated below requesting LEED Letter Templates for your project. In your request, indicate the following:

- Project name, location, Contractor name, PN number and contract number
- Description of building(s) you are responsible for (example: S/ML/L COF w/detached admin)
- LEED Documentation Responsible Party name, phone number, email contact info
- Responsible party certification of understanding that Letter Templates furnished by the Government for this project are copyright protected and will not be used for any purposes other than for this project documentation.

Attach the LEED Registered Project Checklist from conformed proposal which indicates the points the project will earn/contribute to.

SAMPLE EMAIL REQUEST:

To: (COS POC below)
CC: (Contracting Officer's Representative (COR) for your contract)
Subject: COS LEED Letter Templates Request

We have an awarded contract and request COS LEED Letter Templates for:

Project: 4th BCT Complex
Location: Fort Bragg, NC
Contractor: Great Design Builder Inc.
Project Number/Contract Number: PN 65555, W912HN-08-C-0001
Standard Design Building Type(s): Large Brigade HQ, Medium Battalion HQ

Our **Responsible Party** for LEED Documentation for this project is (name, phone number, email).

Certification: I, (sender name), certify that the LEED Letter Templates furnished by the Government for this project are copyright protected and I will ensure that they are not used for any purpose other than project documentation for this project only.

Attached Checklist: Please see attached LEED Project Checklist, which indicates the points this project will earn.

Salutation,
Name

*

COS Points of Contact for Obtaining Letter Templates. Email your request to the applicable POC indicated below. If there is no POC indicated for the standard design you are providing, contact your project COR for direction.

Army Standard Design

Army Family Housing
Battalion Headquarters
Brigade Headquarters
Company Operations Facilities (COF)
Criminal Investigation Facilities
Enlisted Personnel Dining Facilities
General Instruction Buildings/Classroom XXI
Military Entrance Processing Stations
Tactical Equipment Maintenance Facilities (TEMF)
Transient Officer's Quarters (part of ORTC)

Point of Contact

Lisa.A.Bobotas@usace.army.mil
judith.f.milton@usace.army.mil
judith.f.milton@usace.army.mil
judith.f.milton@usace.army.mil
Matthew.C.Scanlon@usace.army.mil
David.A.Gary@usace.army.mil
Huong.M.Huynh@usace.army.mil
Lisa.A.Bobotas@usace.army.mil
judith.f.milton@usace.army.mil
paul.m.kai@usace.army.mil

Furnishing Completed Documentation to COS Letter Template Library. Certain completed design phase letter templates with attachments may be requested by the COS for future use as part of the standard design. If requested, provide an electronic copy to the COS Point of Contact indicated above. The Center of Standardization (COS) for individual Army standard designs may maintain a library of completed LEED documentation for that standard design. The Government will make the completed templates available to subsequent standard design projects in order to reduce duplication of documentation effort to the extent possible. To inquire about reviewing or obtaining completed LEED documentation that may be applicable to a particular project, contact the Center of Standardization POC.

APPENDIX O
LEED STRATEGY TABLES
NOT USED

APPENDIX P

USGBC REGISTRATION

APPENDIX Q
REV 2.1 – 30 SEP 2010
AREA COMPUTATIONS

Computation of Areas: Compute the “gross area” and “net area” of facilities (excluding family housing) in accordance with the following subparagraphs:

(1) Enclosed Spaces: The “gross area” is the sum of all floor spaces with an average clear height $\geq 6'-11"$ (as measured to the underside of the structural system) and having perimeter walls which are $\geq 4'-11"$. The area is calculated by measuring to the exterior dimensions of surfaces and walls.

(2) Half-Scope Spaces: Areas of the following spaces shall count as one-half scope when calculating “gross area”:

- Balconies
- Porches
- Covered exterior loading platforms or facilities
- **Covered but not enclosed spaces, canopies, training, and assembly areas**
- Covered but not enclosed passageways and walks
- Open stairways (both covered and uncovered)
- Covered ramps
- Interior corridors (Unaccompanied Enlisted Personnel Housing Only)

(3) Excluded Spaces: The following spaces shall be excluded from the “gross area” calculation:

- Crawl spaces
- Uncovered exterior loading platforms or facilities
- Exterior insulation applied to existing buildings
- Open courtyards
- Open paved terraces
- Uncovered ramps
- Uncovered stoops
- Utility tunnels and raceways
- Roof overhangs and soffits measuring less than 3'-0" from the exterior face of the building to the fascia

(4) Net Floor Area: Where required, “net area” is calculated by measuring the inside clear dimensions from the finish surfaces of walls. If required, overall “assignable net area” is determined by subtracting the following spaces from the “gross area”:

- Basements not suited as office, special mechanical, or storage space
- Elevator shafts and machinery space
- Exterior walls
- Interior partitions
- Mechanical equipment and water supply equipment space
- Permanent corridors and hallways
- Stairs and stair towers
- Janitor closets
- Electrical equipment space
- Electronic/communications equipment space

APPENDIX R

SUBMITTAL REGISTER SAMPLE PAGE

RMS SUBMITTAL REGISTER INPUT FORM			CONTRACT NUMBER		DELIVERY ORDER																				
TITLE AND LOCATION																									
Button	<-----Right click for Instructions		TYPE OF SUBMITTAL							CLASSIFICATION				REVIEWING OFFICE											
SECTION	PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	01 - PRECON SUBMITTALS	02 - SHOP DRAWINGS	03 - PRODUCT DATA	04 - SAMPLES	05 - DESIGN DATA	06 - TEST REPORTS	07 - CERTIFICATES	08 - MFRS INSTRUCTIONS	09 - MFRS FIELD REPORT	10 - O&M DATA	11 - CLOSEOUT SUBMITTALS	FO - FOR INFORMATION ONLY	GA - GOVERNMENT APPROVED	DA - DESIGNER OF RECORD APPROVAL	CR - CONFORMANCE REVIEW	DA / CR	DA / GA	DO - DISTRICT OFFICE	AO - AREA OFFICE	RO - RESIDENT OFFICE	PO - PROJECT OFFICE	DR - DESIGNER OF RECORD	AE - ARCHITECT / ENGINEER
00 72 00	52.236-13	Accident Prevention Plan	X													X				X					
00 73 00	1.11	Dev. From Accept. Design. No Deviation from Contract					X										X			X				X	
00 73 00	1.11	Dev. From Accepted Design - Deviates from Contract					X											X		X				X	
00 73 00	1.17	Supplemental Price Breakdown	X										X							X					
00 73 00	1.18	SSHO Qualifications	X											X						X					
01 10 00	5.2.3.1	(if concrete pavement) Joint Layout Plan with design drawings					X									X									
01 10 00	5.5.2	Building Envelope Sealing Performance Testing						X					X							X					
01 10 10	***	Tests as Req by Codes - DOR Develops Test Program						X					X							X				X	
01 10 00	5.8.3	BAS Review Informatior	X														X		X	X				X	
01 10 00	5.8.3	BAS Performance Verification Tes					X						X						X	X				X	
01 10 00	5.8.4	Testing Adjusting and Balancing						X					X						X	X				X	
01 10 00	5.8.5	Commissioning						X					X						X	X				X	
01 10 00	6.15	Environmental As Required for Site Specific					X									X			X	X				X	
01 10 00	6.16	Permits as required for Site specific					X									X			X	X				X	
01 10 00	5.10.2	Fire Protection Tests						X	X				X						X	X				X	
01 32 01.00 1C	3.4.1	Preliminary Project Schedule	X											X					X	X					
01 32 01.00 1C	3.4.2	Initial Project Schedule	X											X					X	X					
01 32 01.00 1C	3.4.3	Design Package Schedule	X											X					X	X					
01 32 01.00 1C	3.6.1	Periodic schedule updates from the Contractor	X											X					X	X					
01 32 01.00 1C	3.7	Time Extension Request (Schedule)	X											X					X	X					
01 33 00	1.8	Submittal Register - DOR Input Required	X											X					X	X				X	
01 33 00	1.8	Submittal Register Updates (Design Packages, etc.)	X											X					X	X				X	
01 33 00	1.3.1	Substitution of Manuf or Model Named in Proposa		X	X												X		X	X				X	
01 33 16	1.2	Identify Designer(s) of Record	X											X					X	X					
01 33 16	1.1.2 / 3.2.4	Fast Track Design Package(s)					X									X			X	X					
01 33 16	1.2	Identification of all Designers of Record	X													X			X	X					
01 33 16	3.2.1	Site and Utility Des Package, incl. Substantiator					X									X			X	X					
01 33 16	3.2.2/3.5	Interim Des Subm Package(s), incl. Substantiation					X									X			X	X					
01 33 16	3.5.1	Drawings					X									X			X	X					
01 33 16	3.5.2.2	Sitework Design Analyses					X									X			X	X					
01 33 16	3.5.2.3	Structural Design Analyses					X									X			X	X					
01 33 16	3.5.2.4	Security Design Analyses					X									X			X	X					
01 33 16	3.5.2.5	Architectural Design Analyses					X									X			X	X					
01 33 16	3.5.2.6	Mechanical Design Analyses					X									X			X	X					
01 33 16	3.5.2.7	Life Safety Design Analyses					X									X			X	X					
01 33 16	3.5.2.8	Plumbing Design Analyses					X									X			X	X					
01 33 16	3.5.2.9	Elevator Design Analyses (as Applicable)					X									X			X	X					
01 33 16	3.5.2.10	Electrical Design Analyses					X									X			X	X					
01 33 16	3.5.2.11	Telecommunications Design Analyses					X									X			X	X					
01 33 16	3.5.2.12	Cathodic Protection Design Analyses					X									X			X	X					
01 33 16	3.5.3	Geotechnical Investigations and Reports					X									X			X	X					
01 33 16	3.5.4	LEED Submittals					X									X			X	X					
01 33 16	3.5.5	Energy Conservation Documentation					X									X			X	X					
01 33 16	3.5.6	Specifications					X									X			X	X					
01 33 16	3.5.7	Building Rendering					X									X			X	X					
01 33 16	3.2.4/3.7	Final Des Submittal Package(s), incl. Substantiator					X									X			X	X					
01 33 16	3.7.5	DD Form 1354 (Transfer of Real Property)										X				X			X	X					
01 33 16	3.2.5/3.8	Design Complete Submittal Package(s)					X									X			X	X					
01 33 16	3.3.3	Design and Code Review Checklists					X									X			X	X					
01 33 16	A-2.0	SID - Interim and Final (as applicable)		X	X										X				X	X					
01 33 16	B-2.0	FFE (as Applicable)					X								X				X	X					
01 45 04.00 1C	3.2	Design and Construction QC Plan	X													X			X	X					
01 57 20.00.10	1.2	Environmental Protection Plan	X													X			X	X					
01 78 02.00 1C	1.2.1	Final as-Built Drawings											X		X				X	X					
01 78 02.00 1C	1.2.7	Provide final as-built CADD and BIM Model files											X		X				X	X					
01 78 02.00 1C	1.2.9	Provide scans of all other docs in Adobe.pdf format											X		X				X	X					
01 78 02.00 1C	1.3.1	Equip-in-Place list of all installed equip and cost											X		X				X	X					
01 78 02.00 1C	1.3.2	Data on equip not addressed in O&M manuals											X		X				X	X					
01 78 02.00 1C	1.3.3	Final as-built specs - electronic files											X		X				X	X					
01 78 02.00 1C	1.4.2.1	Warranty management plan - FAR 52.246-21											X		X				X	X					
01 78 02.00 1C	1.4.2.1	Certificates of Warranty for extended warranty items											X		X				X	X					
01 78 02.00 1C	1.4.2.1	Contractor's POCs for implementing warranty process											X		X				X	X					
01 78 02.00 1C	1.4.2.1	List of each warranted equip, item, feature or system											X		X				X	X					
01 78 02.00 1C	1.5	See also Section 01 10 00 par. 5.8.4 and 5.8.:											X		X				X	X					
01 78 02.00 10	1.6.1.2	Equipment O&M Manuals - 1 electronic / 2 hard copies											X		X				X	X					
01 78 02.00 10	1.7	Field Training DVD Videos									X		X		X				X	X					
01 78 02.00 10	1.8	Pricing of CF/CI and GF/CI Property											X		X				X	X					
01 78 02.00 1C	1.11	List of Completed Cleanup Items											X		X				X	X					

APPENDIX AA
FORT BLISS IDG EXCERPTS

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4.1.3 Environmental Setting

The arid southwest ecoregion is comprised of essentially two provinces, the Chihuahuan Desert Province and the American Semi-desert and Desert Province (Fig. 4.4). Both provinces share similar climatic conditions of extreme aridity as well as extremely high air and soil temperatures, which are characteristics of tropical/subtropical deserts. Direct sun radiation is strong, as is outgoing radiation at night, causing extreme variations between night and day temperatures (35-45° F), and rare nocturnal frosts. Annual precipitation is typically less than 9 inches and vegetation is xeriphytic, widely dispersed and providing negligible groundcover. Many annual species are present but only appear with heavy rains that saturate the soil. The dominant soil formation process is salinization, which produces areas of salt crust. Calcification also occurs in well-drained uplands and forms caliche (calcium carbonate) layers at soil depths of at least 12 inches below the surface. Humus in the soil is lacking (except along riparian areas) and soils are mostly Aridisols (soils formed in very dry conditions) and dry Entisols (recently developed soils).

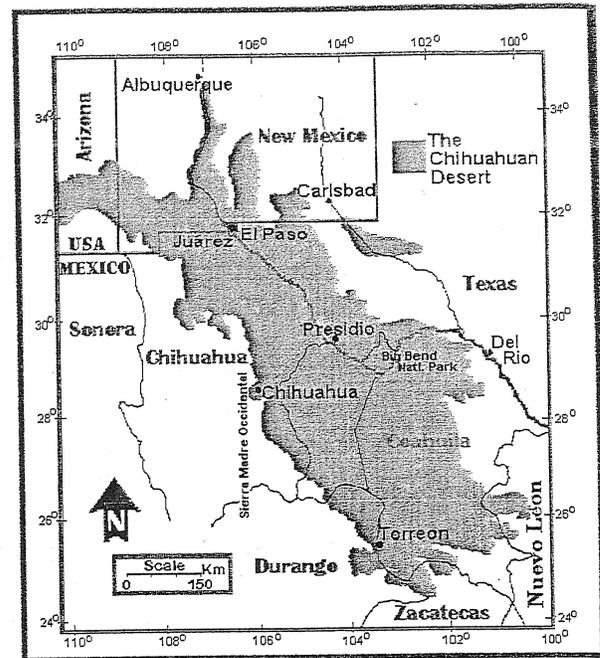


Fig. 4.4 - Chihuahuan Desert (map from UTEP website)

4.1.3.1 Topography

Fort Bliss is located partially within the Chihuahuan Desert Province and the American Semi-desert and Desert Province of the southwest region of the United States. The Chihuahuan Desert consists of southeastern Arizona, southern New Mexico and western Texas, encompassing approximately 85,200 square miles. The high desert consists of undulating plains, elevations near 4,000 feet and isolated mountains rising 2,000 to 5,000 feet. The American Semi-desert and Desert Province consists of southwestern California, southwestern Arizona, and southern Nevada and includes the Mojave, Colorado, and Sonoran deserts. (87,700 sq. mi.) The topography is characterized by gently undulating plains, isolated mountains, and buttes. Elevations range from 280 feet below sea level to 4,000 feet in valleys and basins. Some mountain ranges reach as high as 11,000 feet. Most of the province drains to the sea via dry washes or through underground seepage. The Colorado River is the largest and principal river through the province.

4.1.3.2 Geology

The Rio Grande Drainage Basin's geologic history generally ranges from Precambrian to late Cretaceous. During this time, the area experienced folding, broad regional uplifting, and inundations by continental seas. The current topography in the area reflects Cenozoic structural deformation.

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Fault patterns in the area indicate that extension in the southwestern United States was the result of both broad regional uplift and differential drift within the North American Plate. These forces combined to form a physiographic province characterized by dropped basins (called grabens) bounded by tilted fault block ridges (called horsts). More simply stated, grabens and horsts are formed when rock layers move upward along a fault line creating a ridge (horsts) and/or rock layers subside along a fault line creating a basin (graben). A structural trough was created by mid-Tertiary high-angle extension faults running north south in front of the Franklin Mountains (Fig. 4.5). This represents both the approximate combined throw along two identified fault planes and the subsequent thickest Hueco bolson unconsolidated fill deposits.

Minor faulting continues in the area affecting Pleistocene and early Holocene bolson deposits. Evidence of the faulting is seen in the fault-scarp of the alluvial fan (created by sediments carried down from the mountains in a fan shape) that parallels the bedrock front of the Franklin Mountains. Movement along this fault was normal, with the basinwood blocks subsiding approximately 200-300 feet relative to the mountain front. Smaller displacement faults (trending north-south) extend eastward across the Hueco bolson. These faults cut bolson deposits, Holocene alluviums, Pleistocene gravels, and the subsurface caliche layer. These Quaternary faults may uplift/basin-subsidence episodes. The proximity of the area to the eastern edge of the Rio Grande Rift Zone accounts for the extensive presence of various volcanic dikes and sills that crosscut existing structures.

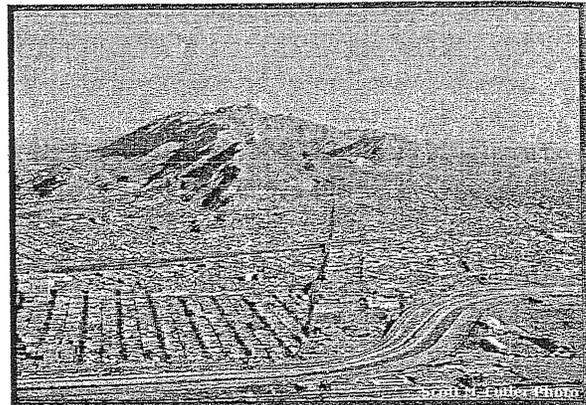


Fig. 4.5 - Franklin Mountains

4.1.3.3 Soils

Soils are mostly aridisols in the western and northern portions of the province. Entisols and aridisols are found in the southern areas of the province. Alkaline conditions are present and salt crusting at the surface and caliche below the surface are typical. Soils are shallow and well drained, and gravelly or sandy in texture. Primary soil type is aridisols but entisols occur on older alluvial fans and terraces. Gravel or bare rock covers much of the ground near the bases of some mountains due to strong desert rainstorms that allow little soil development to occur.

4.1.3.4 Climate

Climate within the Chihuahuan Desert is distinctly arid with long hot summers, brief cold winters and occasional hard freezes (mean temp. 10-20°F) There are approximately 230-245 frost-free days but freezes are common and can last up to 72 hours. Spring and early summer are extremely dry; three quarters of the rainfall comes in summer monsoons, the rest as gentle rains in winter. **Eight inches of rain falls in the desert and up to 20 inches in the mountains.** Severe droughts occur about every 20 years have been recorded since 1890's.

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7.5.3.1 Hot Arid Regions. Design and site development to minimize solar heat gain and maximize shade and encourage humidity in outdoor spaces (Fig. 7.5).

7.5.4 Views and Vistas. The installation will be designed to preserve and enhance scenic and other attractive views and vistas, and to screen unattractive views and vistas. Visual extensions through open spaces provide a sense of orientation, relief, and enjoyment.

7.5.5 Vegetation. The installation will be designed to protect and preserve existing native vegetation. This preservation reduces maintenance and enhances sustainability. A preferred plant matrix (Appendix O, Plant Palette) is included in this Installation Design Guide. (Also, see Section 10 – Landscape Design Component).

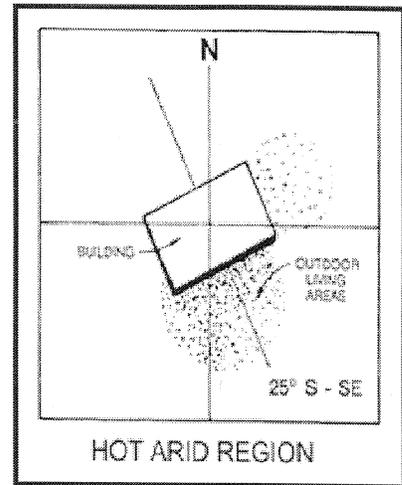


Fig. 7.5 – Building Orientation Minimizes Solar Heat Gain

7.6 MANMADE SITE CONDITIONS

7.6.1 The site plan provides the locations of the manmade development that will occur on site. It establishes the spatial relationships as well as the relationships between manmade and existing natural features. Manmade site conditions include all development on the installation to include buildings, roadways, parking lots, walkways, walls, fences, utilities, and other facilities. Buildings, roadways, parking lots and above ground utilities are the primary manmade visual determinants.

7.6.2 The following site planning guidelines will be used in the visual and spatial review of the installation:

7.6.2.1 Cluster buildings to reduce impact on the natural environment, and reduce roadways and utility corridors needed to serve the development; at the same time, give full consideration to antiterrorism and force protection requirements.

7.6.2.2 Locate large buildings in relatively flat areas to reduce cut and fill, preserve natural vegetation and drainage, and orient to topography (Fig. 7.6).

7.6.2.3 Minimize solar heat gain for cooling.

7.6.2.4 Site buildings with consideration for the microclimate conditions of the site that result in variances in wind or light because of adjacent land forms, structures, or trees.

7.6.2.5 Orient outdoor pedestrian areas for most comfortable exposure.

7.6.2.6 Utilize lighter colored building surfaces exposed to the sun and darker colors on recessed surfaces to absorb radiation.

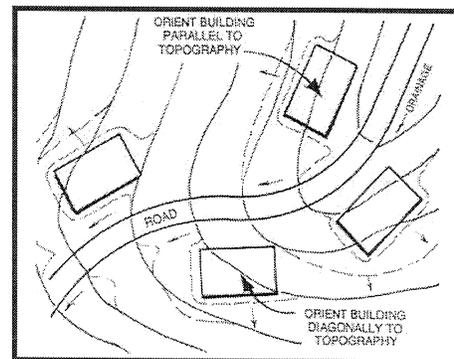


Fig. 7.6 - Orient Buildings and Roads to Topography

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- 7.6.2.7 Orient windows according to impact of climatic conditions.
- 7.6.2.8 Locate development on leeward side of hills.
- 7.6.2.9 Design and locate roads to provide a hierarchy of traffic carrying capacities.
- 7.6.2.10 Locate roads to blend with topography and vegetation.
- 7.6.2.11 Design and locate parking lots to minimize visual impact of broad expanses of pavement and vehicles.
- 7.6.2.12 Design and locate pedestrian walkways and bicycle paths to fit the physical environment; and, provide a comfortable pedestrian experience, limiting conflicts with vehicular traffic.
- 7.6.2.13 Locate trees and shrubs to buffer harsh natural conditions (Fig. 7.7).

7.6.2.14 Deciduous material allows for sun in the winter and provides shade in the summer. Evergreen material provides windbreaks for cold north winds.

7.6.2.15 Design and locate site elements to blend with and enhance the physical environment.

7.6.2.16 Force Protection requirements should be designed and located to blend with the physical environment.

7.7 SPECIFIC SITE PLANNING CONSIDERATIONS

7.7.1 Site planning considerations must adhere to the physical historic context, or setting, of a historic district. The setting of a historic district is the area or environment in which a historic property is found. The elements of setting, such as the relationship of buildings to each other, setbacks, views, driveways and walkways, and street trees collectively create the character of a district. In instances, such as at Fort Bliss, buildings themselves form a neighborhood or setting that create the character of the district.

New site planning and new construction in Fort Bliss historic districts or in a historic district's view shed shall be physically compatible with the visual and spatial character of the historic district. Site planning considerations shall take into account the historical planning of the installation. This includes: location and orientation of buildings, spaces between

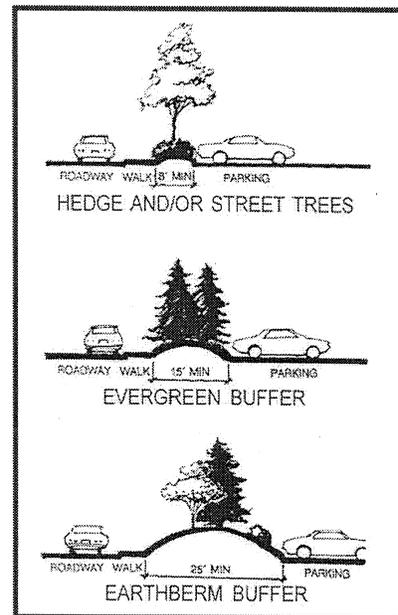


Fig. 7.7 - Screen Parking Areas

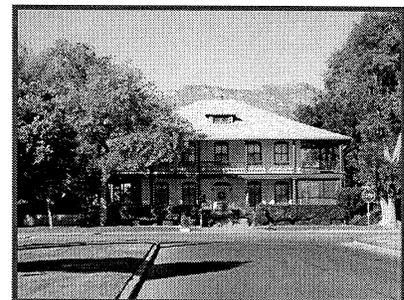


Fig. 7.8 - Pershing House –
Historic District

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SECTION 8 BUILDINGS DESIGN STANDARDS

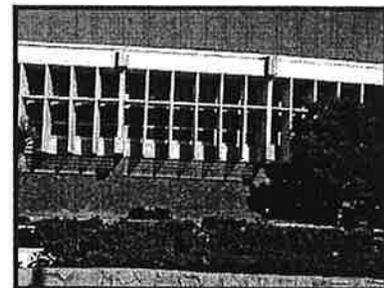
8.1 INTRODUCTION

8.1.1 The design character of an installation's buildings affects the installation's overall image. The visual analysis of buildings and related structures helps define visual zones and themes and is an important part of an installation's assets and liabilities assessment.

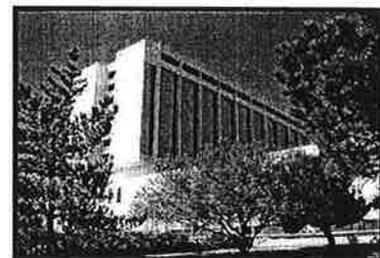
8.1.2 The building design component encompasses the character of the buildings as well as the arrangement of buildings relative to one another and to their environment. In general, use architectural style, materials, and colors indigenous to the region. The preservation of historically and culturally significant structures adds to an installation's character and provides the sense of a heritage.

8.1.3 The visual analysis of structures also includes concerns for accessibility, use of materials, placement of entrances, incorporation of additions and renovations, the incorporation of plazas and courtyards, interior design and the appropriateness and quality of building maintenance.

8.1.4 This section provides the objectives and visual determinants that should be utilized to identify and assess the building design quality of the installation. The section also provides standards and guidance pertaining to the development and maintenance of the various interiors and exteriors of buildings on the installation.



**Fig. 8.1 – Architectural Detail
of USASMA Building**



**Fig. 8.2 – The Medical Center
Main Building**

8.2 BUILDING OBJECTIVES

8.2.1 Sustainability. The architectural style of existing and future buildings should reflect and reinforce the sustainability of the installation. Sustainable design reduces construction and maintenance cost and conserves energy through proper construction and materials selection. See [Appendix D](#) for a

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more complete discussion on Sustainable Design.

8.2.2 Building Design Objectives:

8.2.2.1 Adapt building designs to natural site conditions (Fig. 8.3).

8.2.2.2 Design buildings in clusters to preserve land and reduce construction and maintenance costs.

8.2.2.3 Develop a coherent architectural style that results in the blending of new and old structures. However, when considering historical buildings, one should be able to differentiate between the historic fabric and the new material.

8.2.2.4 Design buildings to include more floors in a vertical structure that results in a smaller footprint and more efficiently utilizes limited installation land areas.

8.2.2.5 Combine multiple activities in one building to reduce the number of buildings required and more efficiently utilize limited installation land areas.

8.2.2.6 Design multiple use facilities with the capability to quickly change interior layouts to accommodate changing requirements.

8.2.2.7 Use indigenous construction materials and practices that require less energy to produce and transport and may be recycled at the end of their usefulness.

8.2.2.8 Locate windows to maximize natural light, ventilation and outward views.

- a) All windows and other glazed areas exposed to the sun, including all glass within 20 degrees east or west of true south, shall be completely shaded on the exterior no less than 50 percent of the time between 0900 and 1730 (solar time) daily during the period from 30 April through 1 October. Partial shading all the time is an acceptable alternative provided the total solar gain does not exceed the amount permitted above, based on actual solar studies. Shading may be achieved by building projections (either horizontal or vertical), by a deep reveal, or any combination of these measures or other architectural design.
- b) True South: Magnetic declination for Fort Bliss is 12 degrees east; that is, a compass reads 12 degrees east of True North or 12 degrees west of True South.
- c) Optimum Direct Gain Aperture Range (percent range of glazed opening to floor area): 11.6 percent.
- d) Minimum profile angle for fixed shade design (may declination): 65.5 degrees.
- e) Recommended shade devices (East and West): Trees and shrubs.

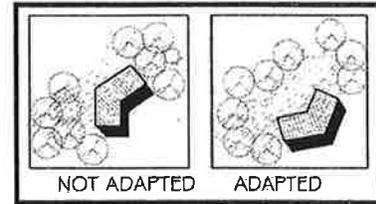


Fig. 8.3 - Adapt Building Design To Site Conditions

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- f) Optimum orientation of facility for passive solar and topo conditions: Within 20 degrees east or west of True South.

8.2.2.9 Consider adaptive reuse of buildings once their initial use is no longer required.

8.3 STRUCTURAL CHARACTER

8.3.1 The character of installation architecture varies according to the use of the structure and when it was built. This use and age variation can result in character incompatibilities.

8.3.2 The difference in character may also result when the designer ignores the character and scale of adjacent buildings or uses an imitative technique unsuccessfully.

8.3.3 The coordination of structural character on an installation provides a consistent and coherent “sense of order” and “sense of place”. This relationship of design comes from using compatible scales, massing, form, color, texture, materials, and fenestration. These design techniques can be utilized in the visual review and analysis of the installation. They are further explained below:

8.3.3.1 Scale. Scale refers to the size of a building facade in relation to humans. Buildings that include predominant vertical facades, which dwarf the individual, are defined as monumental in scale. Buildings with more horizontal facades designed to relate more to the size of the human figure are defined as human scale (Fig. 8.4). The scale of most buildings on installations should be more human than monumental. All new construction should be compatible in scale with adjacent buildings. Monumental architectural design is typically utilized for more ceremonial buildings, such as worship centers, headquarters complexes, and hotel facilities. These buildings make use of large, glazed areas at entrances and oversized fenestration elements to create a scale appropriate to the building’s use. Scale and relief should be provided through roof form, fenestration, building articulation and landscape plantings.

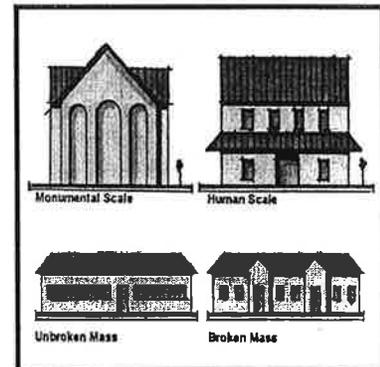


Fig. 8.4 - Structure Scale and Massing

8.3.3.2 Massing. Massing refers to the overall bulk or volume of a building or buildings (Fig. 8.4). The size and proportion of the individual buildings in a grouping of buildings should be designed to be proportionally compatible with the adjacent structures.

8.3.3.3 Form. The form of a building is determined by its size, mass, shape and proportions. The use of similar building forms provides continuity to the installation architectural image.

8.3.3.4 Color. The use of a color scheme that is consistent throughout the installation, where possible, results in a continuity of buildings and contributes to a sense of place



Fig. 8.5 - Color and Form Contribute to a Sense of Place.

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(Fig. 8.5). However, color schemes throughout the installation often vary according to the visual zone and visual theme in which the structure is located.

8.3.3.5 Texture. The use of building materials of similar texture provides visual continuity for the installation.

8.3.3.6 Materials. The use of similar building exterior finish and trim materials provides visual continuity.

8.3.3.7 Fenestration. Building fenestration includes features such as doors, windows, and decorative details. These features should be similar in arrangement, design, size, and proportion for architectural compatibility and visual consistency (Fig. 8.6).

8.3.3.7.1 Discourage Bird Habitat. When designing new construction, consider the use of design components that discourage birds from nesting on buildings. Birds and bird droppings are a nuisance, damaging to buildings and unhealthy to the human work environment. The following architectural features are attractive to birds and should not be used unless proper measures are taken to discourage their attractiveness to birds:

- Deep, uninhabited porches
- Flat architectural relief that projects from buildings or structures at least 4 inches
- Deep window sills
- Exposed gutters
- Flat and accessible areas under open stairs
- HVAC equipment that provide a water source for birds

8.4 BUILDING ENTRANCES

8.4.1 The building entrance is a primary feature of any building design. It should be defined and recognizable as the point of entry regardless of the size or importance of the building (Fig. 8.7).

8.4.2 The entrance to a building should be in a prominent location and should be oriented toward the primary adjacent public spaces such as a courtyard, lawn, parking lot, or street.

8.4.3 The details of an entrance should be designed to

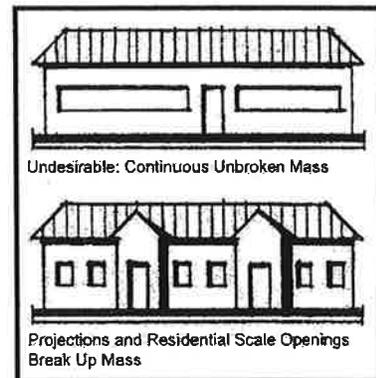


Fig. 8.6 - Fenestration Breaks Up Mass.

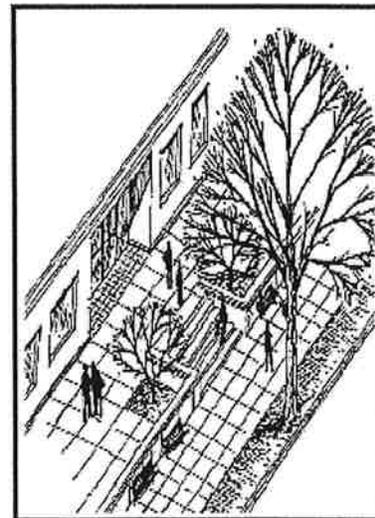


Fig. 8.7 - Entrance is Positive Visual Experience

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provide continuity with other entrances to the building and the entrances of adjacent buildings.

8.5 SERVICE AREAS

8.5.1 Service areas, such as loading docks and trash dumpsters, should be screened from the views of primary use areas such as entrances, courtyards, gathering areas, streets, and parking lots.

8.5.2 Service areas should be enclosed by masonry or rock walls. Screen walls should be between six and eight feet high and should be in harmony with the adjacent building.

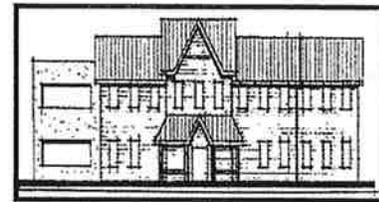
(Fig. 8.8)

8.5.3 Trash and garbage collection areas must be located a minimum of 25 meters (82 feet) from troop billeting, family housing areas (containing more than 12 units), and stand-alone retail facilities (UFC 4-010-01, Table B-1).

8.6 NOT USED



Fig. 8.8 – Screened Loading Dock



Not This This
Fig. 8.10 – Renovation/ Additions
should be Compatible.

8.7 NOT USED

8.8 INDIGENOUS STRUCTURES

Sustainability in the design and construction of buildings includes incorporating time-proven building designs that are indigenous to the region. Indigenous design elements should be utilized in the design of new buildings (Fig. 8.11).

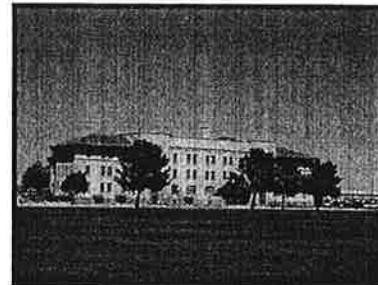


Fig. 8.11 – Building with Stucco Finish

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8.14.1.2 Use the following guidelines when selecting exterior building materials.

8.14.1.2.1 Choose materials for their longevity and maintenance characteristics.

8.14.1.2.2 Use materials with integral colors - avoid painting exterior colors.

8.14.1.2.3 Use installation standard colors for exterior walls. Add accent colors sparingly. Accent colors can be used in recesses and to accent certain portions of a buildings façade.



Fig. 8.21 – The Medical Center at WBAMC

8.14.1.2.4 Exposed exterior materials shall not require periodic repainting. Preferred materials are factory prefinished, integrally colored, or have similarly intrinsic weathering finishes. Ferrous metals shall not be exposed to the weather unless prefinished with a protective coating that has a minimum 20-year warranty.

8.14.1.2.5 Use dark bronze anodized aluminum for exterior windows. Use dark bronze anodized aluminum storefront doors for Main Entrance doors.

8.14.1.2.6 ~~Use blended colors, T lock type, on shingle pitched roofs;~~ fully adhered white 45 mil chlorosulfonated polyethylene (CSPE) or 60 mil Thermo Plastic Olefin (TPO), ¼” to 12” slope for “flat” roofs.

8.14.1.2.7 If a stucco look is desired, more durable materials such as EIFS or stucco-like finish on prefabricated metal panels or concrete panels shall be used. If EIFS is used a heavy duty reinforcing mesh shall be used around all doors and window openings, and extend a minimum 8’0” above finished floor elevation on all exterior walls. The heavy duty reinforcing mesh used on the EIFS shall have a minimum combined weight of 20 ounces per square yard and this standard can be met by using two layers. Use high impact mesh on all other surfaces.

8.14.1.2.8 NOT USED

8.14.1.2.9 Metal, wood, or vinyl siding should not be used. Vinyl or wood trim should not be used.

8.14.1.2.10 Satellite dishes, whether roof mounted or ground mounted, are not allowed. This requirement does not apply to Family Housing, nor to McGregor Range.

8.14.1.2.11 Not Used.

8.14.2 Appendix K, Exterior Materials Charts list the building materials applicable to the visual zones listed. – Under Development

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8.14.3 Exterior Building Color

8.14.3.1 Color charts have been developed for specific geographical areas giving consideration to climate, geography, culture, facility function, historical context, architectural character, etc. Color changes will be implemented during normally scheduled paint cycles (see [Appendix L, Exterior Color Charts – Under Development](#)).

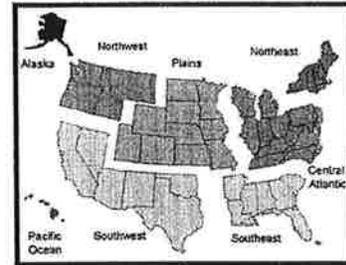


Fig. 8.22 - The Geographical Areas for Exterior Colors.

8.14.3.2 Color is closely linked to the appropriate selection of exterior building materials and is a critical design element in relating adjacent buildings and creating a compatible visual environment within an installation.

8.14.3.3 Overhead doors color shall be light beige or white.

8.14.3.4 Historic Buildings. Repaint the building or structure to match the existing colors or colors that can be documented to have been used on that building.

8.15 KEY FACILITY TYPES STANDARDIZATION

8.15.1 The Assistant Chief of Staff for Installation Management (ACSIM) establishes Army facility standards and approves deviations from the standards.

8.15.2 Residential Communities Initiative

8.15.2.1 The intent of the Residential Communities Initiative (RCI) is to improve the housing for military families by providing quality housing in attractive neighborhoods.

8.15.2.2 The Military Housing Privatization Initiative (MHPI) legislation allows developers to build and renovate housing to local standards. In those areas where local standards do not meet the quality of life requirements of soldiers, the Community Development and Management Plan (CDMP) process allows a negotiated determination of those standards. To ensure a uniform level of quality throughout RCI, Headquarters, Department of the Army has developed new construction and renovation standards for RCI family housing to be used as reference points during CDMP preparation. These standards are routinely updated. Revisions apply to CDMP collaboration contracts awarded within specific time frames and are not retroactive to previous projects.

8.15.2.3 All RCI projects planned or under design will meet the "Gold" SPiRiT rating (as of 18 March 2003). See [Assistant Secretary of the Army Memorandum Subject: Sustainable Design and Development Requirements, dated 18 March 2003](#).

8.15.3 Not Used

8.15.5 Army Lodging.

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SECTION 10

LANDSCAPE DESIGN STANDARDS

10.1 INTRODUCTION

10.1.1 The Landscape Design Standards includes selection, placement, and maintenance of plant material on the installation. Landscape plantings provide a simple and cost effective enhancement to the general appearance of the installation.

10.1.2 The visual image conveyed by a military installation is defined not just by architectural character and site organization, but also by an attractive, organized landscape design. The presence of plant material on the installation greatly enhances the visual character and environmental quality of the installation.

10.1.3 Plantings add an element of human scale to open spaces and can be used functionally to screen undesirable views, buffer winds, reinforce the hierarchy of the circulation system, or provide a visual transition between dissimilar land uses.

10.2 LANDSCAPE OBJECTIVES

10.2.1 The overall objective of the use of plant material within the installation is to improve the physical and psychological well being of the people who live and work on the installation. This is achieved through the following objectives:

10.2.1.1 Preserve and enhance natural desert terrain where applicable.

10.2.1.2 Because trees are the largest and most visible vertical elements in the landscape, the most benefit to the appearance and physical environment of the Fort Bliss is achieved through the addition of trees. Trees must be the primary element and type of plant material in the Fort Bliss landscape to conserve water and minimize maintenance. Use shrubs and ground cover primarily as accent elements to delineate building entrances and special outdoor spaces such as plazas and patios, and at vehicular entryways.



Fig. 10.1 -Use Locally Adapted Plants to Improve Visual Quality

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Improve the overall visual quality of the installation through the use of native or locally adapted plant material to (Fig. 10.1):

- 10.2.1.2.1 Blend built environment with the natural environment.
- 10.2.1.2.2 Provide scale and comfort to pedestrian environments (Fig. 10.2).
- 10.2.1.2.3 Reinforce the hierarchy of the circulation system (Fig. 10.3).
- 10.2.1.2.4 Screen unsightly views or elements.
- 10.2.1.2.5 Buffer incompatible land uses.
- 10.2.1.2.6 Minimize maintenance through the use of native plant materials that require less maintenance to survive.
- 10.2.1.2.7 Enhance antiterrorism capabilities.

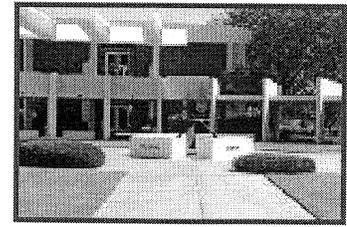


Fig. 10.2 – Provide Comfort to Pedestrians



Fig. 10.3 - Landscaping Reinforces Circulation Hierarchy.

10.3 PRINCIPLES OF LANDSCAPE DEVELOPMENT

10.3.1 Landscape design is based on the following principles.

10.3.1.1 **Unity.** The selection and placement of plant material can blend, screen, and soften incompatible architectural or other unattractive visual impacts. Plant material as a unifying element can be placed in front of a building or view to frame and enhance the visual impact.

10.3.1.2 **Balance.** Except in some historic areas, informal planting designs which utilize masses of plant materials rather than rows and hedges are most desirable. Not only do such designs offer more visual interest, but, generally, they require less maintenance. Also in an informal design, when one or a few plants die, the design intent is less likely to be lost than in a formal design.

10.3.1.3 **Contrast.** Plant material can be selected and placed to provide differences in size and shape that add interest to the environment. Plants can be located to provide a backdrop for other plants such as by placing a hedge behind a bed of annuals or perennials.

10.3.1.4 **Rhythm.** Repetition of a single plant or a mass of plants provides visual interest and formality to the landscape. Rhythm

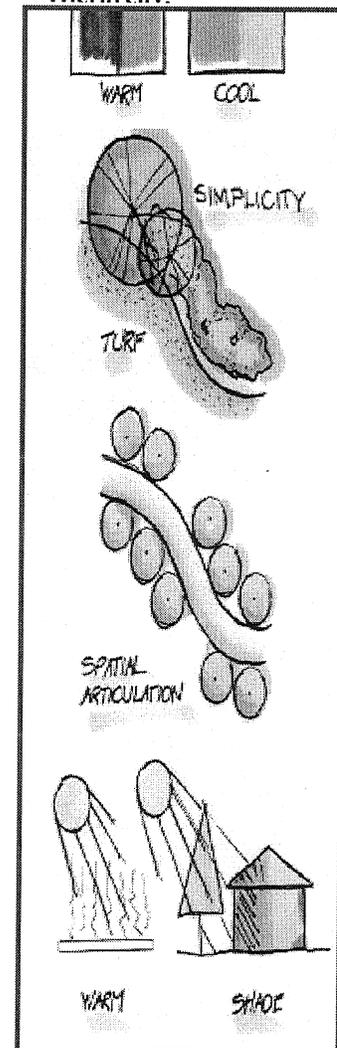


Fig. 10.4 - Principles of Design

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produces emphasis and unity and is especially effective in articulating main circulation routes.

10.3.1.5 Color and Texture. Plants can be selected and placed to provide visual interest according to their color and texture. Colors are classified as either warm (red, orange, yellow) or cool (violet, blue, green). Texture is classified as either coarse or fine.

10.3.1.6 Simplicity. Landscape plans should be broad and simple in form to limit excessive maintenance. Plants usually look better and achieve more impact when massed than when used alone. When groups of seven or less plants are used, odd numbers of plants make the most pleasing masses. Groups or clusters of plant materials should also be visually connected to successfully delineate space. Overspacing causes the composition to appear disjointed and is likely to increase maintenance.

10.3.1.7 Ultimate Effect. The landscape plan should be prepared with consideration for the mature size of all plants. The spacing of all material should utilize nursery industrial standards for mature material to account for spread as well as height. The ultimate height of the material should also be considered in relation to windows and other visual concerns.

10.3.1.8 Spatial Articulation. Plants can be selected and placed to create enclosed spaces or to separate spaces from one another. They can also be used to direct people by visually defining and reinforcing patterns of movement. The degree of enclosure, separation, or movement is dependent upon the density, form, and type of plants used.

10.4 SUSTAINABLE LANDSCAPE DEVELOPMENT

10.4.1 The use of plant material on the installation promotes the sustainability. Trees, shrubs, groundcover, and vines provide aesthetic appeal, energy conservation, climate modification, erosion control, air purification, wind/dust mitigation, reduction of glare and noise abatement (Fig. 10.5).

10.5 LANDSCAPE DESIGN GUIDELINES

10.5.1 Proposed plantings must be reviewed to ensure that site conditions (soil, topography, adjacent uses, and architecture) and climatic criteria (sun, shade, and moisture requirements) are considered in the desired plant design and selection (i.e., form, texture, color, size). The uses and users of the site must also be considered. Landscape planting plans should be approved by qualified personnel to provide quality assurance and promote design consistency within each visual zone.

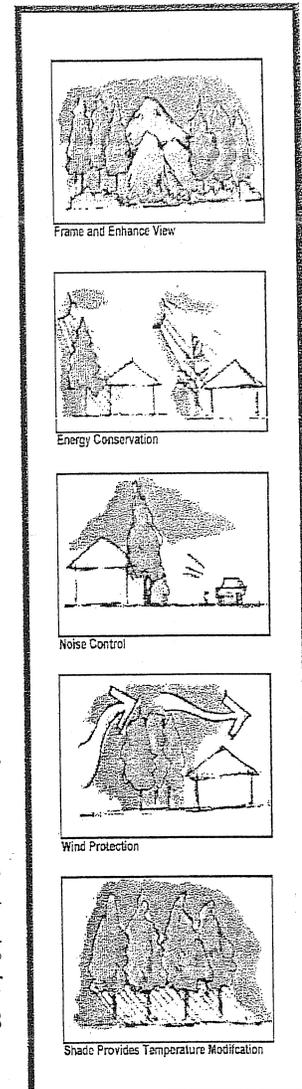


Fig. 10.5 - Plant Material Promotes Sustainability

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10.5.2 The following paragraphs present landscaping guidelines for the various locations of plant material use.

10.5.2.1 **Foundation Planting.** To conserve water and minimize maintenance, trees must be the primary element and type of plant material in the Fort Bliss landscape. Because trees are the largest and most visible vertical elements in the landscape, the most benefit to the appearance and physical environment of the post is achieved through the addition of trees (Fig. 10.6).

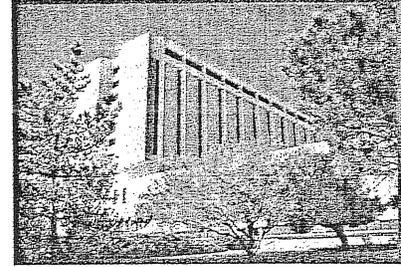


Fig. 10.6 – The Medical Center at WBAMC

10.5.2.1.1 Focal and seasonal plantings should be located at building entries for pedestrian interest.

10.5.2.1.2 Use the architecture of the building to evaluate the planting design and selection of plants.

10.5.2.1.3 Plant materials should not block windows and views from interior spaces.

10.5.2.1.4 Trees shall be set back from the building walls to provide space for mature growth and to prevent root systems from damaging the foundation.

10.5.2.1.5 Except in some historic areas, informal planting designs which utilize masses of plant materials rather than rows are most desirable.

10.5.2.1.6 Due to the possibility of insect problems (bee stings, etc.), do not plant flowering plants near entrances.

10.5.2.2 **Screening.**

10.5.2.2.1 **Windscreens.** Measures to mitigate high winds and blowing dust must be considered for very large open areas such as parking lots, perimeter open space areas and recreational areas. Plant materials can be used for wind control by breaking, directing or filtering the wind. Use a combination of evergreen and deciduous trees to provide windbreak protection from prevailing winds. Windbreak plantings should be irregular in form, rather than straight and evenly spaced, in order to provide more effective wind control and to visually blend with the natural character of the installation.

10.5.2.2.2 Not Used.

10.5.2.3 **Buffer Planting.** Use a mixture of evergreen and deciduous trees and shrubs to visually separate land uses and to help separate visual zones or to screen unpleasant views or noises (Fig. 10.7).

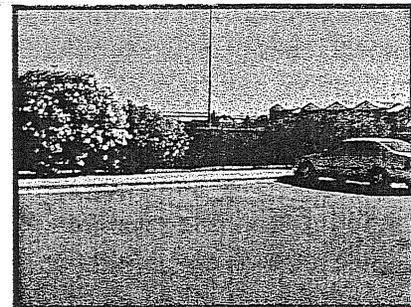


Fig. 10.7 – Buffer Planting

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10.5.2.4 Open Space Planting / Natural Recovery Areas. The preservation and enhancement of existing landscape is encouraged (Fig. 10.8).

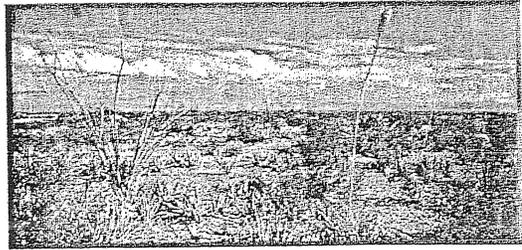


Fig. 10.8 – Desert Vegetation

A program directed to allow natural recovery in almost 100 large open areas on Fort Bliss is ongoing (Fig. 10.9). The main objective is to suppress dust emissions from these areas during wind events that are common in the region. Dust is a nuisance for people in many ways: it increases the need for cleaning inside homes and working spaces, creates accumulation of soil around buildings and against walls, and commonly produces a safety risk factor as visibility is greatly reduced for motorists (Fig. 10.10).



Fig. 10.9 - Natural Recovery Area

There are more than 40 locally adapted plants that are able to get established naturally in open soil, including native and exotic species, which can live with natural rainfall. This eliminates the need for maintenance.

The following is a list of recommended actions to promote both natural vegetation recovery and aesthetics in these open areas. This approach is applicable to any open areas where the soil has been disturbed.

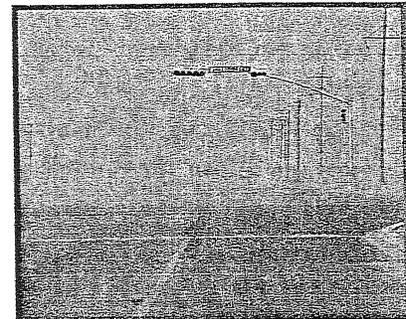


Fig. 10.10 – Dust Problem

Initial preparations. Level soil to desired grade, leaving a rough surface so it traps seeds and retains moisture. Do not disturb ground except to conduct the maintenance described below. Soils left alone, even without vegetation, produce less dust than disturbed surfaces.

Year 1 and 2. Conduct bush-hogging at 8 inches in August and November to cut off the tops of taller vegetation and protect low-growing plants. This will allow them to grow and produce new seeds. Any undesirable tumbleweeds that proliferate during this period will be gradually outcompeted by other native vegetation and can be controlled by bush-hogging.

Year 3. If tumbleweeds are still present, mow at 8 inches in August and November. If these plants are nearly absent, mowing may be optional to improve area appearance. Do not mow less than 6 inches high.

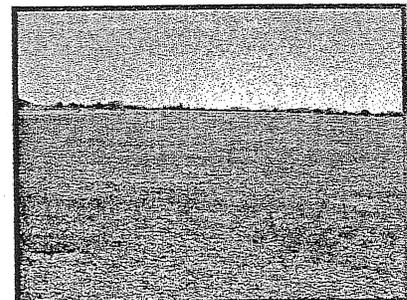


Fig. 10.11 - Ground Covered by Natural Vegetation in a Natural Recovery Area

Year 4 and on. Areas may be left undisturbed to protect vegetation cover and soil. Dust emissions should be greatly reduced or eliminated by this time. To improve appearance in highly visible areas mowing to 6 inches may be conducted in June or November.

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It is not recommended to clean the edges of areas with weed-eater machines that re-expose the soil. This promotes the establishment of tumbleweeds along the perimeters, creating more work to remove them, as they are a source for seeds that may invade recently-recovered areas.

10.5.2.5 Street Trees. Street tree plantings should be used to reinforce vehicular hierarchy, orient and direct traffic, upgrade views, and to visually de-emphasize on-street parking (Fig. 10.12). Also, in the design of a street tree planting, separate plant species may be used to identify distinctive details or areas of the installation, for example, a particular land use relationship, historical district, community area, or other similar entity.

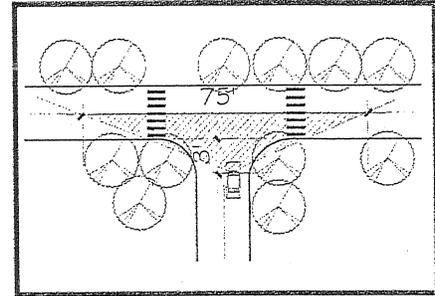


Fig. 10.12 – Use Street Trees to Visually Reinforce Road Hierarchy

10.5.2.5.1 Except in some historical areas, where specific landscape guidelines apply, use Mondel Pine, Afgan Pine, Honey Mesquite, Washingtonia Palm Tree, and Desert Willow street trees in clusters to visually reinforce primary and secondary roads (Fig. 10.13).

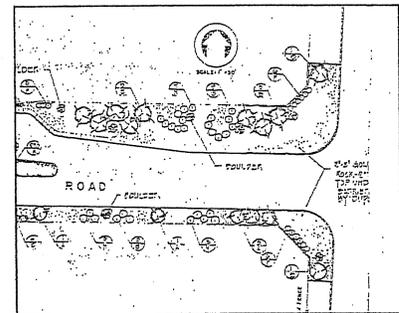


Fig. 10.13 - Trees and Plants in Clusters.

10.5.2.5.2 Except in some historic areas (where specific landscape guidelines apply), use informal groupings of street trees along tertiary routes. Utilize medium size trees to screen on-street parking along roadways. Set trees 1 to 2 meters (3 to 6 feet) from the back of curbs.

10.5.2.5.3 As a general rule, street trees should be resistant to salt and root pressure, and should have a 10' to 12' high clearance between the street pavement and branch height to allow adequate clearance for pedestrian and vehicle traffic to pass unimpeded by lower branches.

10.5.2.5.4 The street tree layout should be coordinated with the layout of proposed street lighting.

10.5.2.5.5 Appropriate plant heights should be used within sight triangles to ensure safe views from intersections.

10.5.2.5.6 Weeping trees should not be used where they may hang over roadways or block views.

10.5.2.6 Parking Lot Planting. Parking lots are often the least attractive elements on a military installation. The use of landscape plant material and earth berms can greatly improve the appearance of these areas, while helping to define circulation and reduce heat gain during summer months (Fig. 10.14).

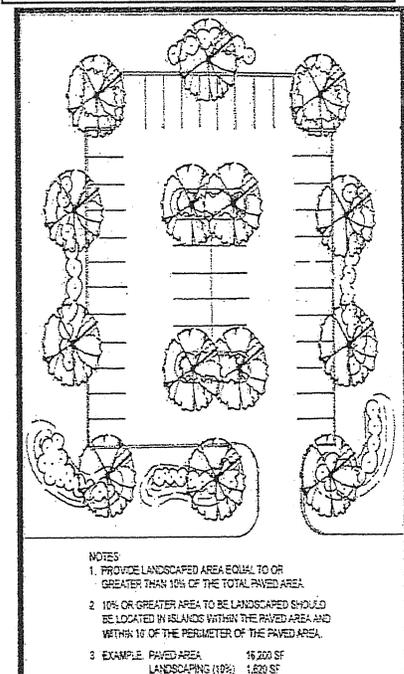


Fig. 10.14 - Provide Parking lot Planting to Reduce Heat Gain

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10.5.2.6.1 Use shade tree plantings at parking lots to reduce glare and moderate ambient air temperatures on the lot. Optimum spacing of parking lot shade trees is 10 to 12 meters (35 to 40 feet) on center.

10.5.2.6.2 Choose trees and shrubs that require minimum maintenance and will not litter the parking area with leaves, fruit, or nuts.

10.5.2.6.3 Consider sight distances near entrances and exits when selecting and placing plant material.

10.5.2.6.4 Select trees, shrubs, and ground covers that can withstand harsher conditions, such as sun, glare, heat, and reduced water supply.

10.5.5.6.5 Use a mix of evergreen and deciduous plant material to screen parking areas from adjacent uses.

10.5.2.7 Environmental Control Planting. When properly placed, plants can provide environmental benefits, as well as address visual concerns.

10.5.2.7.1 Use deciduous trees and shrubs at courtyards, buildings and along streets to provide shade, moderate temperatures and reduce glare during the summer months while allowing solar exposure in the winter.

10.5.2.7.2 Locate deciduous plantings on the southeast and southwest corner of buildings or courtyards to mitigate solar radiation and glare due to heat build-up and lower sun angles in the mid-morning and late afternoon hours.

10.5.2.7.3 Use mixed massings of deciduous shrubs and evergreen trees and shrubs to provide sound control along primary and secondary roads.

10.5.2.8 Image Planting. The image of the installation is formed by the visual impressions that exist within the installation. The primary locations of highly visible images are the main gate, along primary circulation systems, and at areas of high concentrations of people. Features such as signs, statues, static displays, and other primary visual images can be improved by the use of trees, shrubs, and ground cover.

10.5.2.9 Entrances to the Installation. The entrances and streetscapes into the installation are areas to place landscaping that will develop a strong visual image and provide visual interest during all four seasons. The entrance to the installation creates the first visual impression for the visitor.

10.5.2.9.1 The landscape materials and planting areas should be proportional in scale to the hierarchy of the street on which they are located.

10.5.2.9.2 Landscaping must be integrated with the Force Protection requirements of Section 12. Low shrubs, groundcover, annual/perennial plants and canopy trees provide

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seasonal interest as well as maintain views required to ensure force protection measures. Adequate lines of sight must be maintained for guard personnel to observe vehicular and pedestrian traffic approaching the gate.

10.5.2.10 **Zeroscaping.** Zeroscaping is the use of only inert materials such as rock, gravel, bricks and pavement. When absolutely necessary, zerospacing may be the only option. For a zeroscape installation, landscape rock or gravel will be underlaid with 6-mil plastic. Finished surface is to be 1" below top of curbs and paving. Landscape rock will be 1" – 1.5" and approximately 2" deep. 1" fines will be placed on the plastic to keep the rock from tearing it. Pea gravel is not desirable in areas where pedestrians walk. (Note: Zeroscaping is not the same as "Open Space Planting and Treatment Management" described in 10.5.2.4.)

10.5.2.11 **Xeriscape.** Xeriscape is the use of water-saving landscape designs incorporating desert-adapted plants. It may also include sections of rock landscapes that are typical of zeroscaping (para 10.5.2.10). Instead of 6-mil plastic use woven polypropylene weed barrier. Creative xeriscapes not only look attractive, but also save money, water and maintenance. All tree/plants in a xeriscape installation will be provided with automatic drip irrigation.

10.6 PLANT MATERIAL SELECTION

10.6.1 Trees, shrubs, ground cover and turf are the major elements of a planting composition. Basic plant selection criteria should consider creating a unified composition utilizing native materials for low maintenance and sustainability, avoiding incompatible colors, textures and forms, and matching the appropriate plant to the land use, situation, and environmental condition. Also, plantings in designated historic areas only should follow the Fort Bliss Landscape Handbook for Historic Residences.

10.6.2 The ability of plant material to provide lasting benefit is dependent upon the plant's hardiness and its appropriateness to the site use. Major factors affecting plant hardiness are soil type and organic content, temperature, moisture and light. These climatic conditions can be modified to an extent by specific site conditions, such as wind protection, solar orientation, and planting design, to create microclimates.

10.6.3 Selecting appropriate plants for a given condition is only one aspect of planting design. Compositional arrangement to provide texture variety and to accent site and building features is another. The selection and composition of a planting design requires an understanding of each plant's characteristics, form, and environmental needs as well as how each plant can relate to and complement other plants in the design. Plants are used in four basic design categories (Fig. 10.15):

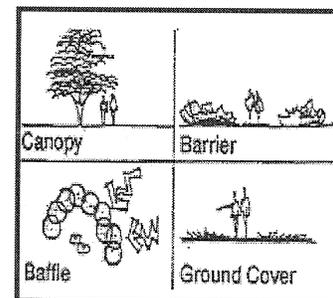


Fig. 10.15 - Four Basic Design Categories

- Canopy
- Barrier
- Screen (or Baffle)

APPENDIX BB

Utility Meter Specifications and Details

Transformer and Electric Meter Specification

Abbreviations:

LDE Land Development Engineer

D/B Design Build Contractor

The following items shall be furnished and installed by the D/B contractor:

1. Structural concrete pad for transformer as detailed on drawing U-837 with the following:
 - Extend secondary conduit duct bank to facility service equipment and metering conduit to communications room, furnish and install secondary service conductors and terminate secondary conductors at transformer.
 - Add secondary conduits, if required, to match facility service entrance requirements.
 - Eight bolts to fasten transformer pad to the vaults

Clarifications—The transformer pad shall be set on concrete vaults furnished and installed by the LDE. The transformer pad is identified as "LID L2" on the attached drawing U-837. The two "LID L1" and the compacted gravel under the transformer pad shall be furnished and installed by the LDE. Secondary and metering conduit ductbank stub-out from vault shall be furnished and installed by the LDE.

2. Outdoor pad-mounted oil-filled transformer with the following ratings and accessories:
 - 13.8kV-3Ø-3W Delta primary and 3Ø-4W secondary
 - Insulating liquid—Mineral oil: ASTM D 3487, Type II, tested in accordance with ASTM D 117. Provide identification of transformer as "non-PCB" and "Type II mineral oil" on the nameplate.
 - High voltage compartment minimum 24" deep from tank to inside of hinged door to accommodate elbow surge arrester connected to 600A dead-break elbow.
 - Radial feed with oil immersed primary load-break switch
 - Three 600A dead-break bushings with parking stands
 - Surge arresters IEEE C62.11, rated 18 kV, 15.3 MCOV, fully shielded, dead-front, metal-oxide-varistor, elbow type with resistance-graded gap, suitable for plugging into inserts. Provide three arresters for radial feed circuits. Surge arresters shall be delivered to Contracting Officer for installation by LDE.
 - Ground pads
 - Factory installed secondary electronic metering (See item 3 below)
 - Tap changer, no-load, externally operable with four 2.5% taps—two above and two below rated primary voltage.

Clarifications—the transformer shall be set on the transformer pad by the D/B contractor. LDE shall furnish and install the 13.8kV conductors, 600A dead-break elbow connectors and connect ground ring ground wires to the ground pads. The LDE shall

install the surge arresters furnished by the D/B contractor. The 13.8kV electrical distribution system is a low-resistance neutral grounded system.

3. Socket mounted electronic programmable outdoor watt-hour meter, surface mounted flush against the side of the low voltage compartment with the following ratings and accessories:
 - Meter shall be designed for use on a 3Ø-4W system with current transformers. Current transformer shorting terminal strips shall be furnished.
 - Include necessary KYZ pulse initiation hardware for Energy Monitoring and Control System (EMCS).
 - The meter shall be Class 20, Form 9S with an accuracy of +/- 1.0 percent
 - Meter fusing—provide a fuse block mounted in the secondary compartment containing one fuse per phase to protect the voltage input to the watt-hour meter. Size fuses as recommended by the meter manufacturer.
 - The meter cover shall be polycarbonate and lockable.
 - The kilowatt-hour register shall be 5 digit electronic type with a solid state demand register and meter reading multiplier. Demand intervals shall be 15 minutes with rolling demand up to 6 subintervals per interval.
 - The meter socket shall be NEMA 3R, box mounted and have automatic circuit closing bypass and having jaws compatible with requirements of the meter. Paint to match transformer.

WATER METER SPECIFICATIONS

1.1. Displacement Type Meters

Meters 2" in size and smaller shall be displacement type meters. Displacement type meters shall conform to AWWA C700. Registers shall be straight-reading and shall read in U.S. gallons. Meters in sizes 1/2 through 1 shall be frost-protection design. Connections shall be suitable to the type of pipe and conditions encountered. Register type shall be an encoder type remote register designed in accordance with AWWA C707. Meters shall comply with the accuracy and capacity requirements of AWWA C700.

1.2. Turbine Type Meters

All meters 2.5" and larger shall be turbine type meters. Turbine type meters shall conform to AWWA C701 Class I. The main casing shall be bronze with stainless steel external fasteners. Registers shall be straight-reading type, shall be permanently sealed and shall read in U.S. gallons. Connections shall be suitable to the type of pipe and conditions encountered. Register type shall be an encoder type remote register designed in accordance with AWWA C707. Meters shall comply with the accuracy and capacity requirements of AWWA C701.

1.3. Compound Type Meters

Compound type meters shall conform to AWWA C702 and shall be furnished with strainers. The main casing shall be bronze with stainless steel external fasteners. The main casing shall be tapped for field testing purposes. Registers shall be straight-reading type, shall be permanently sealed and shall read in U.S. gallons. The meter shall be equipped with a coordinating register. Connections shall be suitable to the type of pipe and conditions encountered. Register type shall be an encoder type remote register designed in accordance with AWWA C707. Meters shall comply with the accuracy and capacity requirements of AWWA C702.

1.4. Meter Vaults

Meters 2.5" and larger in size shall be installed in reinforced concrete vaults in accordance with the El Paso Water Utilities Public Service Board Detail No. 290-3 and Detail No. 294. Meter vaults and covers within roadways and POV paved areas shall be rated for H-20 loading. Meter vaults and covers within GOV areas and access drives shall be rated for the heaviest proposed loading in the parking area.

1.5. Meter Boxes

Meters 2" in size and smaller shall be set in reinforced concrete meter boxes in accordance with the El Paso Water Utilities Public Service Board Detail No. 290-2 and Detail No. 293. The boxes shall be of sufficient size to completely enclose the meter and shutoff valve or service stop. Meter boxes set in paved areas subject to vehicular traffic shall be concrete with cast iron lid and cast iron meter reader lid. Boxes set in sidewalks, not subject to vehicular traffic, shall use concrete covers with cast iron meter reader lids. Plastic boxes and lids shall not be used in any area. Box height shall

extend from invert of the meter to final grade at the meter location. The lid shall have the word "WATER" cast in it.

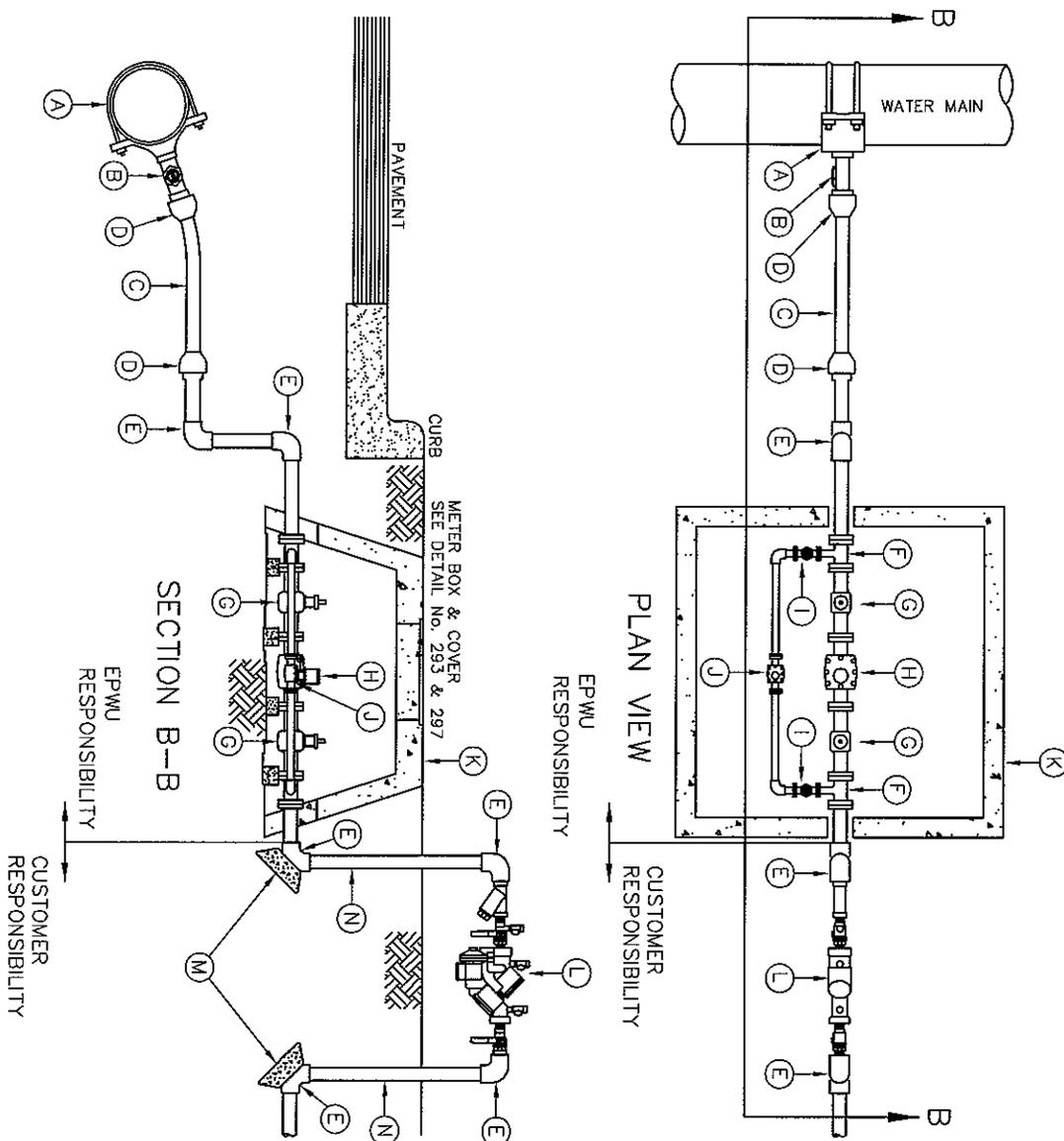
1.6 Accessories

Provide a 1" conduit from each meter vault or meter box to the building mechanical room. Provide an accumulator and data pulse logger for each building complying with the following:

The Pulse Logger must be web-enabled and be capable of recording pulses from gas or water meters. It must be able to accept at least 4 pulse inputs. The logger must have Ethernet communication capabilities. Consumption data must be transmitted either via email and/or ftp in XML formats. The Pulse Logger's features and capabilities must include:

- ⇒ View Load Profile data using the built in Web Server.
- ⇒ Transmits reports via email or ftp or both.
- ⇒ CC a secondary email recipient.
- ⇒ Open Protocols XML, HTTP, SMTP, SNTP, FTP, DHCP, DNS.
- ⇒ Compact size 3.0" X 3.25" X 1.25".
- ⇒ Comes with a 110~220 VAC to 12VDC power supply.
- ⇒ RJ45 Ethernet Network jack.
- ⇒ ROHS Compliant for Europe.
- ⇒ Safe log-in to the Web Server via password authentication.
- ⇒ Secure data storage in non volatile memory with Lithium Ion Battery backup.
- ⇒ Lithium Ion Battery backup for storing data during power outages.
- ⇒ Recharging of Lithium Ion battery occurs automatically.
- ⇒ High measurement rate of up to 100 pulses per second.
- ⇒ Compatible with any network using DHCP or static IP Addressing.
- ⇒ Uses SNTP for highly accurate time stamping.
- ⇒ Day Time client integrated if SNTP server is not accessible.
- ⇒ International Time Zone support.
- ⇒ User Configurable
 - Logging interval from 5 minutes to 60 minutes.
 - Reporting interval from 5 minutes to hourly, daily, or weekly.
 - 16 character alpha numeric ID.
 - 20 character alpha numeric Serial Number.
 - 80 character Location / Address.
 - User configurable SNTP server.
 - Time Stamps can be in USA or European format.

Connection to the base wide EMCS system will be by others and is not included in this scope of work.



GENERAL NOTES:

1. DETAIL SHOWN FOR 1 1/2" SERVICE. INSTALLATION SIMILAR FOR 2" SERVICE EXCEPT FOR SIZES OF PIPE, FITTINGS AND METER. WHEN SPECIFIED A 1" BY-PASS METER SHALL BE INSTALLED WITH A 1 1/2" SERVICE, A 2" SERVICE SHALL INCLUDE A 1" BY-PASS METER
2. WHERE NO CURB EXISTS, METER IS TO BE SET NEAR PROPERTY LINE OR AT DESIGNATED LOCATION.
3. THE EPWU WILL FURNISH AND INSTALL ALL NECESSARY PIPE, FITTINGS, METER BOXES, AND METERS REQUIRED. IT SHALL BE THE RESPONSIBILITY OF THE PRIVATE OWNER TO HAVE A CERTIFIED PLUMBER INSTALL A BACKFLOW PREVENTER AND EXTEND SERVICE LINE ON DISCHARGE SIDE OF METER.

CONSTRUCTION KEY NOTES:

- A. SERVICE SADDLE
- B. 1 1/2" TAP WITH CORPORATION STOP
- C. 1 1/2" COPPER PIPE FOR 1 1/2" & 2" SERVICE INSTALLATIONS, ALL PIPING SHALL BE COPPER AND ALL FITTINGS SHALL BE BRONZE UNLESS OTHERWISE SPECIFIED.
- D. UNION
- E. BEND 90°
- F. TEE
- G. 1 1/2" GATE VALVE
- H. 1 1/2" TURBINE METER
- I. CURB VALVE
- J. 1" BY-PASS METER
- K. STANDARD METER BOX TYPE "C"
- L. BACKFLOW PREVENTER WHEN REQUIRED BY EPWU
- M. THRUST BLOCKING AS REQUIRED
- N. 1 1/2" BRASS PIPE-LENGTH AS REQUIRED



STANDARD
DETAIL

DATE: 12/12/1996
REV: 7/24/2001

TYPICAL 1 1/2" SERVICE LINE
INSTALLATION BY PSB
N.T.S.



DETAIL No.
290-2



STANDARD
DETAIL

DATE: 1/29/1997
REV: 7/25/2001

TYPICAL 3" AND LARGER
SERVICE LINE INSTALLATION BY PSB
N.T.S.

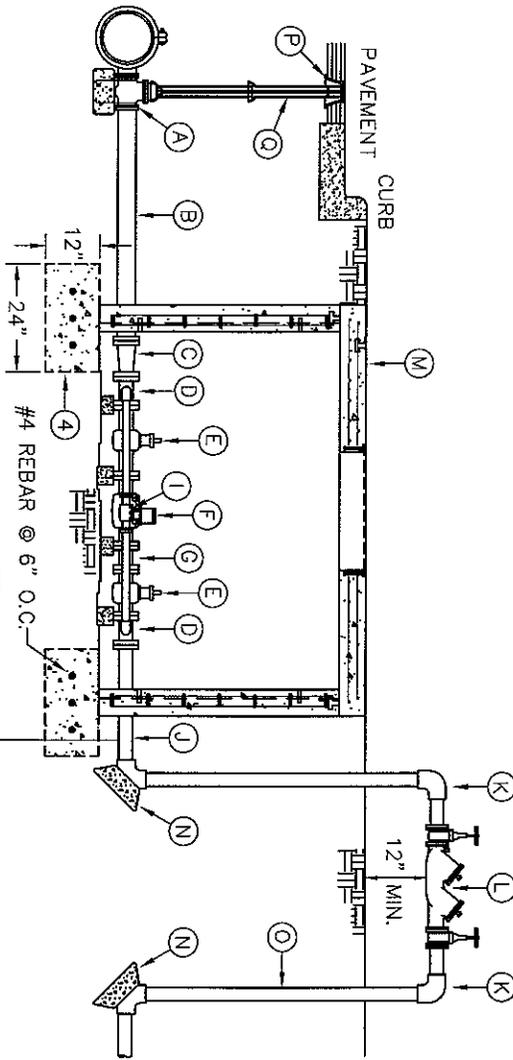


DETAIL No.
290-3

SECTION A-A

CUSTOMER
RESPONSIBILITY

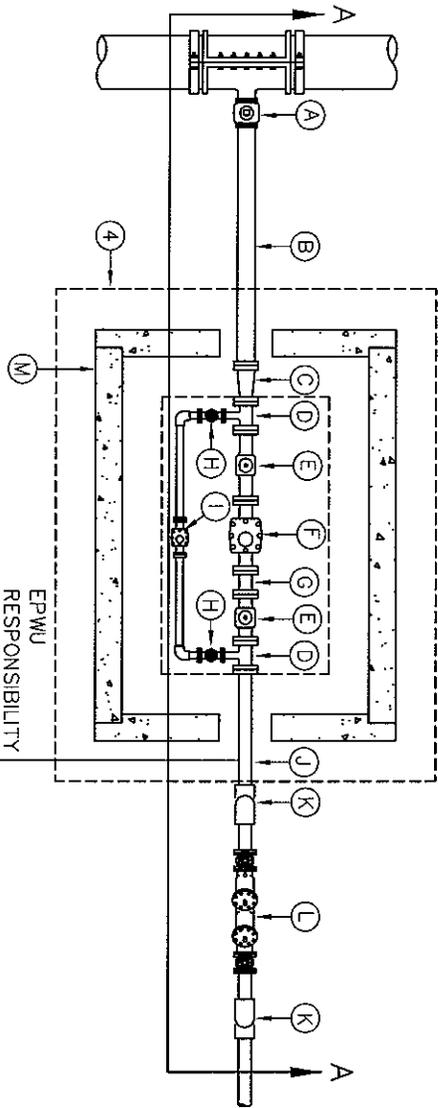
EPWU
RESPONSIBILITY



PLAN VIEW

CUSTOMER
RESPONSIBILITY

EPWU
RESPONSIBILITY



GENERAL NOTES:

1. DETAIL SHOWN FOR 3" SERVICE. INSTALLATION SIMILAR FOR LARGER SERVICES EXCEPT FOR SIZE OF PIPE, FITTINGS AND METER.
2. WHERE NO CURB EXISTS, METER IS TO BE SET NEAR PROPERTY LINE OR AT DESIGNATED LOCATION.
3. THE EPWU WILL FURNISH AND INSTALL ALL NECESSARY PIPE, FITTINGS, METER BOXES, AND METERS REQUIRED. IT SHALL BE THE RESPONSIBILITY OF THE PRIVATE OWNER TO HAVE A CERTIFIED PLUMBER INSTALL A BACKFLOW PREVENTER AND EXTEND SERVICE LINE ON DISCHARGE SIDE OF METER.
4. FOOTING REQUIRED WHEN PLACED UNDER EXISTING OR PROPOSED STREET PAVING.

CONSTRUCTION KEY NOTES:

- A. 4" TAPPING SLEEVE AND VALVE
- B. 4" P.V.C.
- C. 4"x3" REDUCER
- D. 3"x2" TEE
- E. 3" GATE VALVE
- F. 3" METER
- G. 3" TEST PLUG D.I.P.
- H. 2" GATE VALVE
- I. 2" BY-PASS METER
- J. 3" SPOOL D.I.P.
- K. 3" BEND 90°
- L. 3" BACKFLOW PREVENTER
- M. STANDARD METER BOX TYPE "D"
- N. THRUST BLOCKING AS REQUIRED
- O. 3" FLANGED D.I.P. - LENGTH AS REQUIRED
- P. BONNET BOX AND COVER IN ACCORDANCE WITH DET 269.
- Q. PIPE AS PER EPWU STANDARD DET. 260.



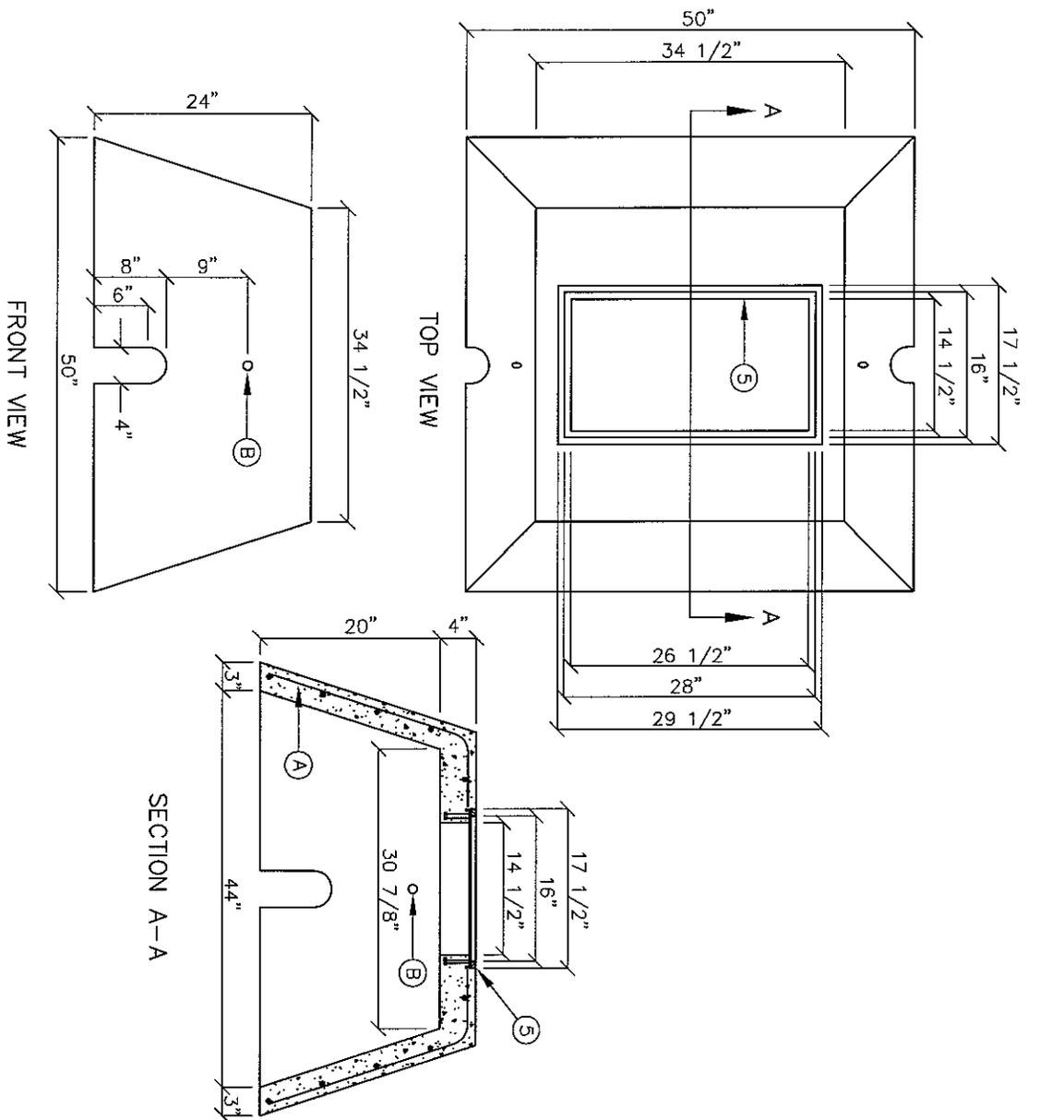
STANDARD
DETAIL

APR. 1994
REV. OCT. 1994

METER BOX TYPE "C"
1 1/2" TO 2" SERVICE INSTALLATION
N.T.S.



DETAIL No.
293



GENERAL NOTES:

1. INSTALL TO GRADE MATCHING TOP OF CURB.
2. ANGLE VALVE SHALL BE IN LINE WITH THE INLET/OUTLET PORTS OF THE METER BOX.
3. METER BOXES SHALL NOT BE INSTALLED UNDER SIDEWALKS, DRIVEWAYS, OR PROPOSED ABOVE GROUND STRUCTURES.
4. WHERE NO CURBING EXIST, INSTALL BOXES IN ACCESSIBLE LOCATIONS BEYOND LIMITS OF STREET SURFACING, WALKS AND DRIVEWAYS.
5. STANDARD METER BOX FRAME AND COVER PER EPWU STANDARD DETAIL 297.

CONSTRUCTION KEY NOTES:

- A. No. 4 REBAR AT 6" ON CENTER, EACH WAY
- B. 1" DIAMETER HOLE
- C. SINGLE UNIT



STANDARD
DETAIL

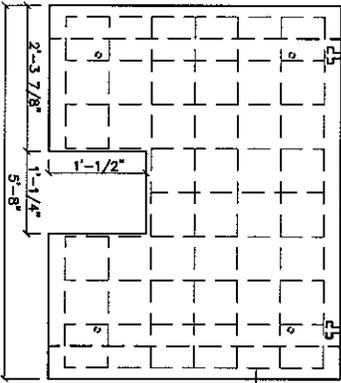
SEPT. 1994
REV. OCT. 1994

METER BOX TYPE "D"
3" AND LARGER SERVICE INSTALLATION
N.T.S.

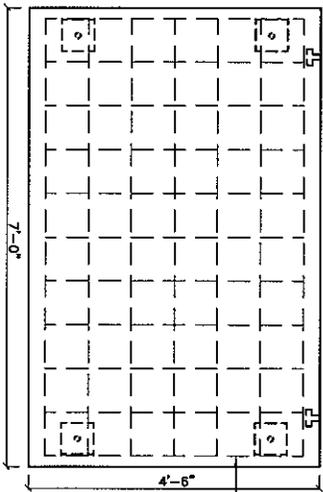


DETAIL No.
294

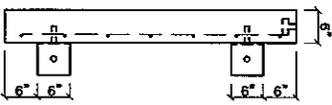
FRONT VIEW OF PANEL C SIDE VIEW



FRONT VIEW OF PANEL D



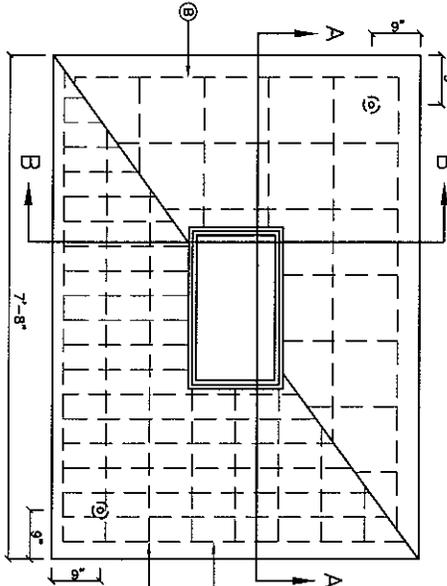
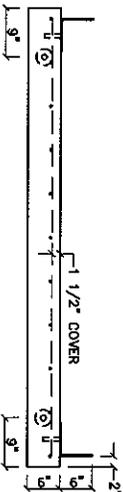
SIDE VIEW



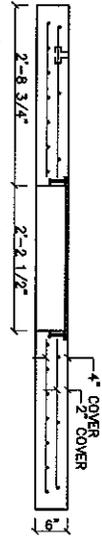
TOP VIEW OF PANEL C



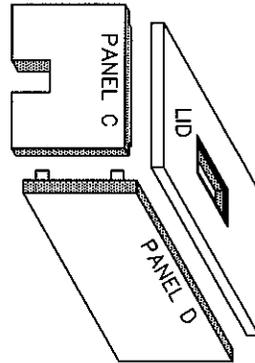
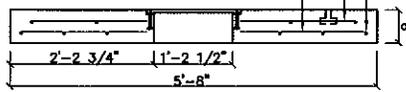
TOP VIEW OF PANEL D



(SECTION A-A) TOP VIEW OF LID



SECTION B-B



GENERAL NOTES:

1. WATER CEMENT RATIO 0.5 OR LESS BY WEIGHT OR NOT MORE THAN 5.5 GALLONS PER SACK.
2. REINFORCING SHALL COMPLY WITH ASTM A615 GRADE 60 STEEL F_y=60000 PSI.
3. BAR BENDING AND PLACEMENT TO COMPLY WITH LATEST ACI STANDARDS.
4. LIFTERS FOR HANDLING SHALL BE INSTALLED PER MANUFACTURER'S REQUIREMENTS AND RATED TO HANDLE THE WEIGHT.
5. CONCRETE TO HAVE A MINIMUM 28 DAYS COMPRESSIVE STRENGTH OF 4000 PSI.
6. STANDARD METER BOX FRAME AND COVER PER EPWU STANDARD DETAIL 297.

CONSTRUCTION KEY NOTES:

- A. No. 4 REBAR AT 8" ON CENTER, BOTH WAYS.
- B. No. 4 REBAR AT 12" ON CENTER, BOTH WAYS (TOP LAYER).
- C. No. 4 REBAR AT 8" ON CENTER, LONG SPAN (BOTTOM LAYER).
- D. No. 5 REBAR AT 4 1/2" ON CENTER, SHORT SPAN (BOTTOM LAYER).
- E. MODULAR



STANDARD
DETAIL

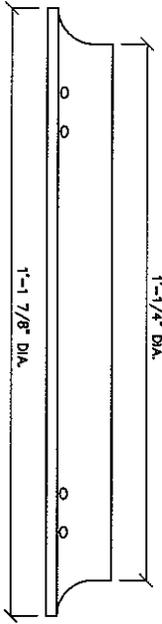
JAN. 1995
REV.

METER BOX RING
N.T.S.

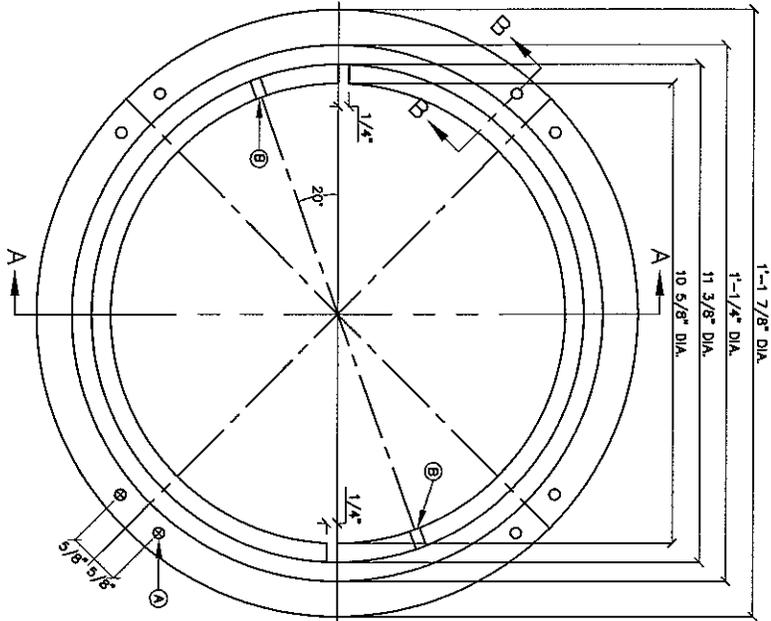


DETAIL No.
295

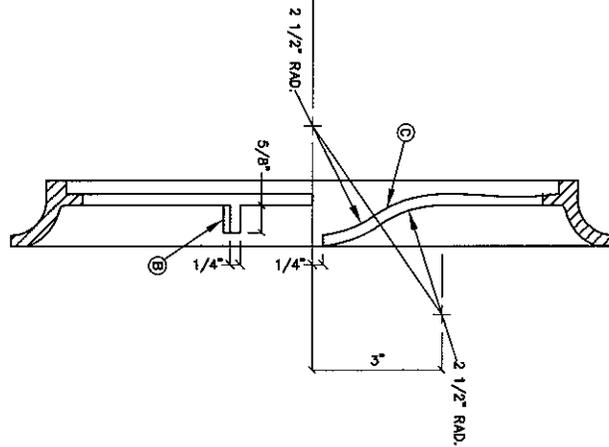
SIDE VIEW



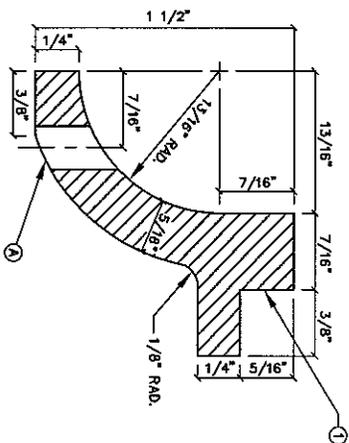
TOP VIEW



SECTION A-A



SECTION B-B



GENERAL NOTES:

1. MATCHING SURFACES TO BE FINISHED OF ANY IRREGULARITIES THAT WOULD PREVENT A SNUG FIT.
2. CASTING TO BE SMOOTH AND VOID OF AIR HOLES.
3. METER BOX RING WEIGHT = 7 LBS.
4. METER BOX RING MADE OF CAST IRON.

CONSTRUCTION KEY NOTES:

- A. 1/4" DIAMETER HOLES FOR ANCHORING RING TO CONCRETE METER BOX.
- B. LUG STOP
- C. LOCKING LUG SLIDE



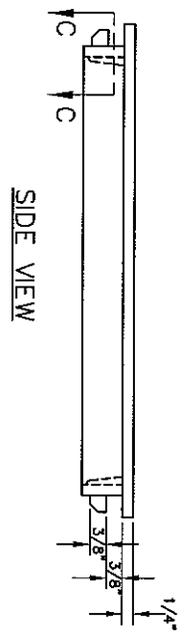
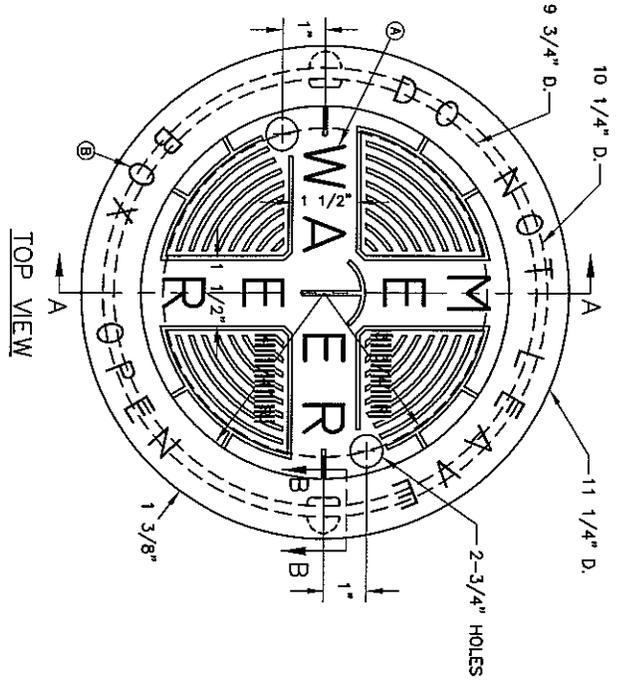
STANDARD
DETAIL

APR. 1994
REV. 08-06-97

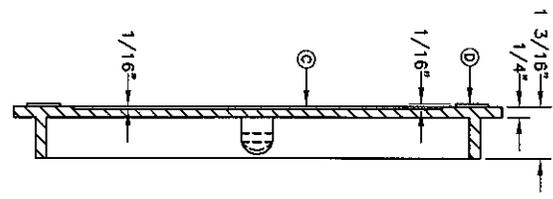
METER BOX COVER
N.T.S.



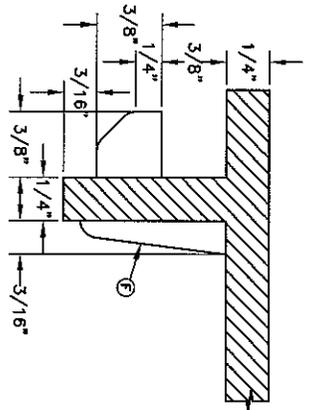
DETAIL No.
296



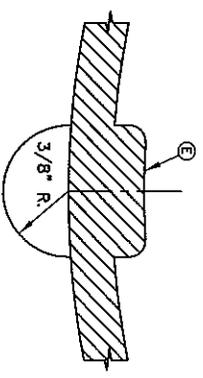
SECTION A-A



SECTION B-B



SECTION C-C



- GENERAL NOTES:**
1. MATCHING SURFACES TO BE ROUGH GROUND OF ANY IRREGULARITIES THAT WOULD PREVENT A SNUG FIT.
 2. CASTING TO BE SMOOTH AND VOID OF AIR
 3. METER BOX COVER WEIGHT= 1 1/4 lbs.

CONSTRUCTION KEY NOTES

- A. LETTERS TO BE 1" HIGH, 3/4" WIDE, 1/8" THICK
- B. LETTERS TO BE 3/4" HIGH, 5/8" WIDE, 1/8" THICK
- C. INSIDE LETTERS & RIBS 1/16" TALL
- D. OUTSIDE LETTERS 1/16" TALL
- E. REINFORCE BACK OF LUG
- F. REINFORCEMENT

APPENDIX CC

Waste Management Documents

El Paso and Regional Recyclers

<http://www.yellow.com/>

http://www.cleantexas.org/index.cfm?fuseaction=public.memberprofiles_bymembername_rtolquery1

<http://www.tceq.state.tx.us/assistance/P2Recycle/renew/renew.html>

Company	Address	Phone	Notes
Acoustic Tile			
WeRecycle, Inc.	500 South Broad St., Meriden, CT 06450	203-630-0344	carpet, ceiling tiles, pallets
Cardboard/Paper/Fiber			
Durango McKinley Paper Co	1520 Myrtle Ave., El Paso	915-351-7970	drop off services available
Master Fibers Inc.	1710 East Paisano Dr., El Paso	915-544-2299	drop off services available, top prices paid for cardboard, customized recycling program
Twin Cities Recyclers Co., Inc.	3230 Durazno Ave., El Paso	915-543-3000	top prices paid for paper, industrial plastics, metal, wood pallets, Customized recycling programs available
The UPS Stores	955 North Resler Dr., El Paso	915-842-8075	packing peanuts, cardboard, other packing material
Bryan Drive-In Recycling Center	2202 Briarcrest Dr., Bryan, TX 77802	979-209-5675	
Carpet/Carpet Tile			
Sunshine Padding and Foam	8172 Elder Creek Rd, Sacramento, CA 95824	916-383-5213	accepts carpet, padding, foam, mail in program
WeRecycle, Inc.	500 South Broad St., Meriden, CT 06450	203-630-0344	carpet, ceiling tiles, pallets
Landfill/Hauling/Collection			
Duncan Disposal/Alpine	3001 Old Marathon Hwy., Alpine, TX 79830	432-837-1244	Hauling, Collection, Landfill (approx 200 miles from El Paso)
Charter Landfill	12035 West Murphy St., Odessa, TX 79763	432-381-4722	landfill (approx 240 miles from El Paso)
Duncan Disposal/Midland	8220 West Hwy. 80, Midland, TX 79706	432-563-5060	Hauling, Collection (approx 260 miles from El Paso)
Saguaro Environmental Svcs	5055 South Swan Rd, Tucson, AZ 85706	520-745-8820	Hauling/Collection (approx 260 miles from El Paso)
Duncan Disposal/Lubbock	1408 N. Martin Luther King Blvd., Lubbock, TX 79403	806-762-6464	Hauling, Collection (approx 300 miles from El Paso)

Company	Address	Phone	Notes
San Angelo Landfill	1422 Hughes Ave., San Angelo, TX 76903	325-655-6869	landfill (approx 360 miles from El Paso)
TrashAway Svcs Duncan San Angelo	1422 Hughes Ave., San Angelo, TX 76903	325-653-6957	Hauling, Collection (approx 36 miles from El Paso)
Metal			
American Metal Recycling	11201 Alameda Ave., Socorro, TX	915-859-4916	
Asa Recycling	1042 Eastside Road, El Paso	915-779-3326	drop off services available
Discover Recycling	3845 Durazno Ave., El Paso	915-544-8414	drop off services available
El Paso Iron and Metal	1535 East San Antonio Ave., El Paso	915-532-6981	
Lopez Scap Metal, Inc.	351 North Nevarez Rd., El Paso	915-859-0770	drop off services available
Lucero Scrap	10717 Alameda Ave., Socorro, TX	915-872-9880	pick-up services available, provide containers
M&M Metal Inc.	12751 Pellicano Dr., El Paso	915-852-2080	
Shapiro Sales Co	206 Dodge Rd., El Paso	915-881-1991	drop off services available
Twin Cities Recyclers Co., Inc.	3230 Durazno Ave., El Paso	915-543-3000	top prices paid for paper, industrial plastics, metal, wood pallets, Customized recycling programs available
W Silver Recycling, Inc.	1720 Magoffin Ave., El Paso	915-532-5643	Container and trailer service available
Environmental Center	800 South Piedras, El Paso	915-593-2784	
Bryan Drive-In Recycling Center	2202 Briarcrest Dr., Bryan, TX 77802	979-209-5675	
Plastics			
Discover Recycling	3845 Durazno Ave., El Paso	915-544-8414	drop off services available
National Recycling, Inc.	10400 Griffin Rd., Suite 101, Cooper City, FL, 33328	954-680-8802	buy, sell, offers waste stream solutions,
Twin Cities Recyclers Co., Inc.	3230 Durazno Ave., El Paso	915-543-3000	top prices paid for paper, industrial plastics, metal, wood pallets, Customized recycling programs available
United Plastics Services	12572 Darrington Rd., Suite 10, Horizon City, TX	915-851-9460	
Environmental Center	800 South Piedras, El Paso	915-593-2784	#1, #2
FDA Packaging	2355 Nevada St., Las Cruces, NM 88001	505-524-1997	#6
The UPS Stores	955 North Resler Dr., El Paso	915-842-8075	packing peanuts, cardboard, other packing material
The Alliance of Foam Packaging Recyclers	2128 Esprey Court, Crofton, MD 21114	800-944-8448	packing peanuts, other forms of packing material, foam
Bryan Drive-In Recycling Center	2202 Briarcrest Dr., Bryan, TX 77802	979-209-5675	#1, #2
Diversified Plastics Recycling	7340 State Road 245 East, North Lewisburg, OH 43060	937-747-3040	#1, #2, #4, #5, #6, #7

Company	Address	Phone	Notes
Propoly	Marlboro, NJ 07746	732-431-2200	#1, #2, #3, #4, #5, #6, #7
Wood			
Custom Crates and Pallets	1501 Westway Blvd., Canutillo, TX	915-892-2660	
Forproducts Corp	3624 East Gateway, El Paso	915-532-6710	pulpwood
Kastro's Wood Pallets, Inc.	13781 Davidson Blvd., El Paso	915-855-8011	
Twin Cities Recyclers Co., Inc.	3230 Durazno Ave., El Paso	915-543-3000	top prices paid for paper, industrial plastics, metal, wood pallets, Customized recycling programs available
WeRecycle, Inc.	500 South Broad St., Meriden, CT 06450	203-630-0344	carpet, ceiling tiles, pallets
Unknown Material			
Alpha Recycling	1820 East Mills Ave., El Paso	915-313-0333	drop off services available
Border Trading, Inc.	6940 Commerce Ave., El Paso	915-775-2546	drop off services available
Gandara's Recycling	10721 North Loop Dr., Socorro, TX	915-860-9596	drop off services available
Haro's Company, Inc.	11369 Alameda Ave., Socorro, TX	915-851-2028	drop off services available
Newell Recycling of El Paso	6800 Market Ave., El Paso	915-772-2728	
RG&M	11309 Alameda Ave., Socorro, TX	915-851-0995	drop off services available



US Army Corps
of Engineers.

New Construction Waste Management

Plans and Methods



US Army Corps
of Engineers

Army Policy on Waste Management

- 50% diversion (by weight) from landfill of construction and demolition waste for all Army projects.
- Waste type and quantities must be tracked, documented, and upward reported (SWAR)



US Army Corps
of Engineers

Contract Requirements for Waste Management

- 50% diversion (by weight) from landfill of construction and demolition waste
(01010, Section 6)
- A Waste Management Plan is required
(01355 Environmental Protection Plan)



US Army Corps
of Engineers

Added Bonus

- **The two easiest LEED credit points:**
 - Automatically pick up LEED Credit MR 2.1
(Achieve 50% diversion of C&D waste from landfill)
 - With little effort, pick up LEED Credit MR 2.2
(Achieve 75% diversion of C&D waste from landfill)



Management Plan

- Section 1 – Company Philosophy
- Section 2 – Project Waste Management Goals
- Section 3 – Communication Plan
- Section 4 – Expected Waste Streams, Disposal, and Handling



How to Meet Army and USACE Waste Management Goals (WMP Section 2)

- Prevent – don't create/promote the waste in the first place
- Reduce – reduce the amount of waste generated for a given material/element
- Reuse – reuse scrap
- Recycle – send back to the company for remanufacturing or to a recycling facility



Prevention

- Pre-fabrication/Pre-cut – manufacture to exact dimensions
- Accurately order the amount of material needed
- Measure carefully to avoid end cuts
- Store materials so they are not damaged



Reduce

- Order and ship in bulk where possible, avoiding excess packaging
- To encourage efficient use of materials, avoid paying installers on the basis of smaller units of measure (i.e. sq. ft. instead of sheet)
- GCs include similar recycling/diversion requirements in subcontracts (incl. Mgmt Plans, monitoring, and documentation).



Reuse

- Save sizeable pieces for use elsewhere
 - carpet tiles piece from one edge may fit at the edge of another location
 - wallboard pieces can be used around doors and windows
 - lumber pieces can be used as spacers or blocking
 - Reuse PVC cut-offs for use as stubs for wall drains
- Optimum Value Engineering for wood construction



Recycle

- Concrete/Asphalt/Masonry
- Drywall/Gypsum
- Metal
- Plastics
- Cardboard/paper/fibers
- Site/Landclearing Debris
(vegetation, soils)
- Wood
- Glass
- Carpet/Carpet
Tile
- Paints
- Floor Tile
- Acoustical Tile



Ft. Bliss Resources

- Now
 - Cardboard/paper – Ft. Bliss can accept small quantities of paper and cardboard for recycling
- Future
 - Clean wood – Ft. Bliss owns a shredder, but no end use of shredded material is currently identified.
 - Soil – provide native fill material, accept native soil
 - Concrete/Aggregate/Asphalt/Masonry



Site Handling

- Interior collection containers in centralized convenient locations for the trades.
- Exterior recycling containers clearly labeled and located in convenient locations for the trades.
- For pieces of materials to be reused – make sure the trades know where they can find these materials.



Site Handling

- Keep garbage out of interior and recycling containers.
- Provide frequent and well labeled garbage containers, both interior and exterior.
- Training and Communication
- Whole Building Design Guide Construction Waste Management Resource Page (www.wbdg.org/design/cwm.php)



Keeping Track

- Collect and organize documentation from receiving facilities (weight tickets, reports)
- Obtain/Estimate weights for those items not taken to a facility (elements returned to manufacture, wood taken to Ft. Bliss for mulching, etc.)
- Organize incoming information daily (DCQCRs, Excel spreadsheet)
- Keep quarterly (Dec, March, June, and Oct) and final (end of project) reports in mind
 - keeping track daily/regularly will make the final report easy.



Government Oversight

- Plan-Do-Check-Act
- Review and approval of Waste Mgmt Plan prior to start of construction.
- QAR will check regularly interior and exterior collection bins to confirm appropriate use.
- QAR will ask regularly to see your tracking document/notebook/file.
- QAR will conduct periodic quick calculations to confirm that waste diversion is on track.
- Final waste report – diversion calculation must be verifiable (values easily matched to waste documentation)



US Army Corps
of Engineers.

Questions?



US Army Corps
of Engineers.

Need Help?

Elizabeth Chien

206-764-6718

206-499-6119 cell

Elizabeth.A.Chien@usace.army.mil

Tom Napier

217-373-3497

Thomas.R.Napier@usace.army.mil

Tips to improve Reduce, Reuse, and Recycle

Material	Planning	On-Site
General	<ul style="list-style-type: none"> > Order products with recycled content. > To reduce waste and cost, accurately order in the amount of material needed. > Request suppliers to limit packaging. > Ask your vendors to take non-recyclable packaging back for reuse. > Use larger pieces elsewhere on the project (fillers and shorter pieces can be used to fill in). 	<ul style="list-style-type: none"> > Make sure both interior collection containers and exterior recycling dumpsters are convenient and clearly labeled. > Store materials so they are not damaged. > Measure carefully to avoid end cuts.
Concrete	<ul style="list-style-type: none"> > Use concrete mix containing fly ash as part of the cementitious content of the concrete. > Request CMUs that contain recycled content from your supplier. 	<ul style="list-style-type: none"> > Separate and recycle asphalt and concrete. > Use reusable forms and supports to the maximum extent possible. > Reuse removed crushed concrete and asphalt as aggregate, sub-base material or fill. > Designate a location for excess concrete for use in paving, post footing anchorage, reinforcement, etc. > Store materials so that they are not damaged or discolored.
Drywall	<ul style="list-style-type: none"> > Order drywall with recycled content gypsum. > To reduce waste and cost, accurately order in the amount of material needed. > To encourage efficient use of materials, avoid paying installers on the basis of sheets of material installed (try using sq. ft. installed instead). 	<ul style="list-style-type: none"> > Store materials so they are not damaged. > Measure carefully to avoid end cuts. > Separate and recycle waste drywall. > Make sure both interior collection containers and exterior recycling dumpsters are convenient and clearly labeled. > Save sizeable pieces of drywall for use around doors, windows, or built-ins, or for reuse on another job.
Electrical	<ul style="list-style-type: none"> > Order plumbing and other mechanical supplies with recycled content. > To reduce waste and cost, accurately order the amount of material needed. > Ask your vendors to reduce the amount of packaging (pallets, cardboard, plastic shrink wrap, metal bands) that is delivered to the job-site. > Ask your vendors to take non-recyclable packaging back for reuse. 	<ul style="list-style-type: none"> > Separate and recycle cardboard. > Separate and recycle metals and wire. > Separate and recycle plastics, such as PVC pipe. > Make sure both interior collection containers and exterior recycling dumpsters are convenient and clearly labeled. > Store materials so they are not damaged. > Measure carefully to avoid end cuts.

Material	Planning	On-Site
Mechanical	<ul style="list-style-type: none"> > Order electrical, plumbing, and other mechanical supplies with recycled content. > To reduce waste and cost, accurately order the amount of material needed. > Ask your vendors to reduce the amount of packaging (pallets, cardboard, plastic shrink wrap, metal bands) that is delivered to the job-site. > Try precut and prefabricated components such as commercial heating and cooling ductwork or commercial sprinkler systems. > Ask your vendors to take non-recyclable packaging back for reuse. 	<ul style="list-style-type: none"> > Separate and recycle cardboard. > Separate and recycle plastics, such as PVC pipe. > Make sure both interior collection containers and exterior recycling dumpsters are convenient and clearly labeled. > Store materials so they are not damaged. > Measure carefully to avoid end cuts.
Plumbing	<ul style="list-style-type: none"> > Order plumbing and other mechanical supplies with recycled content. > To reduce waste and cost, accurately order the amount of material needed. > Ask your vendors to reduce the amount of packaging (pallets, cardboard, plastic shrink wrap, metal bands) that is delivered to the job-site. > Ask your vendors to take non-recyclable packaging back for reuse. 	<ul style="list-style-type: none"> > Retain PVC cut-offs for use as stubs for wall drains. > Properly clean joints to prevent leaking. > Separate and recycle plastic, including PVC, if possible. > Separate and recycle cardboard. > Make sure both interior collection containers and exterior recycling dumpsters are convenient and clearly labeled. > Store materials so they are not damaged. > Measure carefully to avoid end cuts.
Site/Landclearing	<ul style="list-style-type: none"> > shred vegetation for reuse in project landscaping. > design landscaping that reuses stone. 	<ul style="list-style-type: none"> > Separate and recycle asphalt and concrete/masonry. > Sell all marketable trees designated for removal. > Grind, chip, or shred other vegetation for mulching and composting. > Separate stumps, brush, and other wood waste for recycling. > Separate and recycle rebar and other metals. > Reuse removed crushed concrete and asphalt as aggregate, sub-base material or fill. > Provide on-site locations for as much excavated rock, soil, and vegetation as possible.

Material	Planning	On-Site
Wood	<ul style="list-style-type: none"> > To reduce waste and cost, accurately order the amount of material needed. > Use larger pieces elsewhere on the project (fillers and shorter pieces can be used to fill in). > Use building systems such as modular systems or foam-core panels that minimize the use of wood (systems that contain recycled wood chips or wood from small diameter secondary trees). 	<ul style="list-style-type: none"> > Segregate bits and ends for recycling from useable pieces to be used elsewhere. > Make sure both interior collection containers and exterior recycling dumpsters are convenient and clearly labeled. > Store materials so they are not damaged. > Measure carefully to avoid end cuts. > Save sizeable pieces of wood in a central area for use as spacers, blocking, kindling, or for use on another job. > Designate a central area for end-cuts and damaged wood, making it convenient for carpenters to find and use scrap wood.

CONSTRUCTION / DEMOLITION SWARWeb PICKLIST		
MAJOR CATEGORY	SUB-CATEGORY	DEFINITION
Wood		
	Structural	TBD
	Finished	TBD
	Treated	TBD
	Other (C/D Wood)	TBD
Metal		
	Steel	TBD
	Copper	TBD
	Aluminum	TBD
	Mixed Metal	TBD
	Other (C/D Metal)	TBD
Masonry/Asphalt/Concrete/ Stone		
	Asphalt	TBD
	Brick	TBD
	Concrete	TBD
	Concrete Block Unit	TBD
	Stone	TBD
	Other (C/D Masonry/Asphalt)	TBD
Land Clearing Debris		
	Top Soil	TBD
	Sub Soil	TBD
	Petroleum-Contaminated Soil	TBD
	Non-Hazardous Lead-Contaminated Soil	TBD
	Vegetation/Timber (tree trunks & limbs)	TBD
	Crushed Stone/Base	TBD
	Other (C/D Land Clearing)	TBD
Other		
	Siding	TBD
	Composition Roof	TBD
	Insulation	TBD
	Doors/Windows/Stairs/Cabinets	TBD
	Ceiling Tile	TBD
	Gypsum/Plaster	TBD
	Plastic	TBD
	Glass	TBD
	Paper	TBD
	Other (C/D Other)	TBD
Additional Information		
Project Number		
Building Number(s)		
Reuse (Installation)		
Reuse (Off-Site)		
Recycle (Installation)		
Recycle (Off-Site)		
Bury (Installation)		
Bury (Off-Site)		
Dispose (Installation)		
Dispose (Off-Site)		
Other		
Source: Army Environmental Center, Charles Harris, (410) 436-1224, charles.harris2@us.army.mil		

Non- Hazardous Waste Management Plan

- a. Name of individuals on the Contractor's staff responsible for waste prevention and management.
- b. Specific actions that will be taken to reduce solid waste generation.
- c. Description of the specific approaches to be used in salvage/reuse/recycling/other diversion of the various materials generated, including the areas and equipment to be used for processing, sorting, and temporary storage of wastes.
- d. Identification of waste streams, including estimated types and quantities, of the waste to be generated.
- e. Identification of local and regional salvage/reuse programs, including non-profit organizations such as schools, local housing agencies, and organizations that accept used materials such as materials exchange networks and Habitat for Humanity.
- f. List of specific waste materials that will be salvaged for resale, salvaged for reuse, or recycled. Recycling facilities that will be used shall be identified. If a recycling facility (public or private) exists within a 50 mile radius of the project site, its use is required for all materials that facility accepts and that cannot be otherwise reused.
- g. Identification of materials that cannot be recycled/reused with an explanation or justification.
- h. Name of landfill and/or incinerator to be used for waste that are not diverted and the estimated costs for disposal.
- i. Anticipated net cost savings determined by subtracting Contractor program management costs and the cost of disposal from the revenue generated by sale of the materials and the incineration and/or landfill cost avoidance.

Hazardous Waste Management Plan (in addition to the requirements above)

- a. Types of wastes anticipated to be managed. This should include a discussion of processes which are generating the waste, the volumes anticipated, and the EPA/state waste codes associated with the waste (40 CFR 261, Subpart C and D).
- b. The regulatory status of the waste. In other words, whether the waste is subject to large quantity generator, small quantity generator, or conditionally exempt small quantity generator standards (40 CFR 262.34).
- c. The locations in which wastes will be accumulated will be discussed. This should discuss whether these are 90/180 day accumulation areas, satellite accumulation points,

or permitted storage areas. Preferably a map indicating the precise location should be included (40 CFR 262.34).

d. Inspection requirements. This should discuss what will be inspected, how often it will be inspected, who will conduct the inspection, what the inspection log will contain, and where the inspection records will be retained (40 CFR 262.34, 40 CFR 265.174, and 40 CFR 265.195).

e. Contingency Planning. Large quantity generators are required to have a contingency plan. Small quantity generators are required to post certain information (40 CFR 262.34 and 40 CFR 265 Subparts C and D).

f. Marking requirements. This should discuss what type of hazardous waste markings are to be utilized during accumulation (40 CFR 262.32).

g. Container types. Types of containers used to accumulate hazardous wastes should be identified. Compatibility with the waste being stored should be considered as well as whether the containers will meet packaging requirements for off-site transport (49 CFR 171.178).

h. Treatment requirements. How will wastes be treated to meet land disposal restrictions (40 CFR 268.40). If elementary neutralization is being performed to render waste non-hazardous, a statement should be included which indicates the activity is being performed under a permit exclusion (40 CFR 270.1(c)(2)(v)).

i. Disposal requirements. This should discuss whether wastes and/or treatment residues will be disposed in a Subtitle C, hazardous waste disposal facility or in a Subtitle D, nonhazardous waste facility.

j. Proposed treatment, storage, or disposal facilities (TSDFs). This should provide the name, address, telephone number, and EPA ID number of the TSDFs proposed to be utilized for the waste.

k. LDR forms. This should provide copies of the LDR forms from the proposed receiving facilities.

l. Recycling Facilities. This should discuss how the waste is to be salvaged, reused, and/or recycled. The name, address, and phone number of the facilities proposed for waste diversion should be provided.

Waste Management Plan Template

Section 1. Company Mission Statement/Company Philosophy and Organization

- a. Philosophy – basic company approach to waste management (i.e.: prevent, reduce, reuse, recycle, dispose)

Section 2. Project Waste Management Goal

- a. Contract required goal.
- b. Specific actions that will be taken to prevent or reduce solid waste generation. This includes identifying those companies providing material and equipment that are willing to accept the return of the resulting waste product after installation (floor tiles, ceiling/acoustical tiles, carpet tiles, etc.). Also identify material/companies willing to send large quantities of items in bulk, rather than individually wrapped (box of 200 door knobs instead of individually wrapped door knobs, pallets of stacked floor tiles instead of box of 12 floor tiles).
- c. Description of the specific approaches to be used in salvage/reuse/recycling/other diversion of the various materials generated, including the areas and equipment to be used for processing, sorting, and temporary storage of wastes.
- d. List of specific waste materials that will be salvaged for resale, salvaged for reuse, or recycled.
- e. Identification of materials that cannot be recycled/reused with an explanation or justification.

Generally, it's better (more resourceful) to reduce, than to reuse, and better to reuse than to recycle. However, it's not realistic to eliminate all waste, or salvage all materials not used on a particular job. Following is our Waste Management Plan.

Reduce means to prevent waste before it happens. You can reduce waste significantly on a construction project by “tweaking” your practices a bit; this means designing in less waste to begin with and minimizing damage and inefficient material use.

Reuse means to reuse materials as much as possible in your construction project. This includes:

- Materials removed during demolition
- Scrap generated on site
- Used materials or scraps from other jobs

Recycle means to separate recyclable materials from non-recyclable materials and supply them to a hauler or business so they can be processed and used to make new products. Another aspect of recycling is to Buy Recycled. Buying building materials with recycled content helps develop a market for the waste materials you recycle from your job site and “closes the loop.”

Section 3. Communication Plan

- a. Name of individuals on the Contractor's staff responsible for waste prevention and management.
- b. Specific actions that will be taken to communicate waste management issues throughout the project.
- c. Specific actions that will be taken to communicate the waste management plan and procedures to new employees/subs.
- d. Specify where containers will be placed, how they will be labeled, how waste management practices will be enforced (acceptable and unacceptable items and practices), and how this information will be communicated to the site staff.
- e. Specific procedures and details on how the waste information (what where, how much, who, how) will be documented, organized, and tracked. This includes all waste streams that are returned, salvaged, reused, recycled, and landfilled.
- f. Specific details on how the waste information will be reported to the government (routinely – weekly? monthly? quarterly? and at project closeout – final total details).

Section 4. Expected Waste Streams, Disposal, and Handling (non-hazardous only)

- a. Identification of waste stream (both diverted and landfilled).
- b. Quantity of each type of waste stream identified.
- c. Receiving facility or entity.
 - o Identification of local and regional salvage/reuse programs, including non-profit organizations such as schools, local housing agencies, and organizations that accept used materials such as materials exchange networks and Habitat for Humanity.
 - o Name of landfill and/or incinerator to be used for waste that are not diverted and the estimated costs for disposal.
- d. Specific site handling procedures.
- e. Identification of transportation method or company.

Example Table Identifying Possible Waste Streams, Quantity, Disposal/Diversion Method, and Handling Procedures

Material	Qty.	Disposal Method (where applicable)	Handling and Transportation Procedure
<i>New Construction</i>			
Concrete	15 cy		Break up concrete onsite with an excavator, load in trucks and haul to Echo Park Recycle
Forming Boards	6 tons	Reused as many times as possible then recycled to Renu Recycling	Stack next to supply of new form boards for reuse. Recycle clean unusable form in "clean wood" recycling dumpster
Clean Wood Scrap	3 tons	Scraps reused for form work, fire-breaks, etc., then recycled by Renu Recycling	Stack reusable pieces next to dumpster for Reuse. Separate unusable clean wood into "clean wood" recycling dumpster (including wood pallets)
CMUs	75 yds	Henson Masonry to recycle and submit report to recycling coordinator	Will request CMUs that contain recycled Content from supplier
Scrap Metal	5 tons	Renu Recycling Service	Deposit all metals in "metal" dumpster
Acoustical Tile			
Floor Tile			
Carpet Tile			
Gypsum/Wall board			
Cardboard			
Plastic			
Etc.			

Section 5. Hazardous Waste Management Plan (in addition to the requirements above)

Be sure to coordinate Hazmat procedures with Tom Curcio (FL DPW) 253-966-6458.

- a. Types of wastes anticipated to be managed. This should include a discussion of processes which are generating the waste, the volumes anticipated, and the EPA/state waste codes associated with the waste (40 CFR 261, Subpart C and D).
- b. The regulatory status of the waste. In other words, whether the waste is subject to large quantity generator, small quantity generator, or conditionally exempt small quantity generator standards (40 CFR 262.34).
- c. The locations in which wastes will be accumulated will be discussed. This should discuss whether these are 90/180 day accumulation areas, satellite accumulation points, or permitted storage areas. Preferably a map indicating the precise location should be included (40 CFR 262.34).
- d. Inspection requirements. This should discuss what will be inspected, how often it will be inspected, who will conduct the inspection, what the inspection log will contain, and where the inspection records will be retained (40 CFR 262.34, 40 CFR 265.174, and 40 CFR 265.195).
- e. Contingency Planning. Large quantity generators are required to have a contingency plan. Small quantity generators are required to post certain information (40 CFR 262.34 and 40 CFR 265 Subparts C and D).
- f. Marking requirements. This should discuss what type of hazardous waste markings are to be utilized during accumulation (40 CFR 262.32).
- g. Container types. Types of containers used to accumulate hazardous wastes should be identified. Compatibility with the waste being stored should be considered as well as whether the containers will meet packaging requirements for off-site transport (49 CFR 171.178).
- h. Treatment requirements. How will wastes be treated to meet land disposal restrictions (40 CFR 268.40). If elementary neutralization is being performed to render waste non-hazardous, a statement should be included which indicates the activity is being performed under a permit exclusion (40 CFR 270.1(c)(2)(v)).
- i. Disposal requirements. This should discuss whether wastes and/or treatment residues will be disposed in a Subtitle C, hazardous waste disposal facility or in a Subtitle D, nonhazardous waste facility.
- j. Proposed treatment, storage, or disposal facilities (TSDFs). This should provide the name, address, telephone number, and EPA ID number of the TSDFs proposed to be utilized for the waste.
- k. LDR forms, if required. This should provide copies of the LDR forms from the proposed receiving facilities.

<i>Hazardous Material</i>			
ACM	1500 cyds	XYZ Landfill	Abatement by XXX Abatement Co., transported to landfill by XXX Transport
PCB Ballasts			Stored in drums provided by Ft. Lewis hazmat office at location building XYZ
Flourescent Lamps			
Mercury Switches			
Ozone-Depleting Substances			
Lo-level Rad elements			
Etc.			
Etc.			

APPENDIX DD

Water Quality

Action Level (AL) - the concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

Highest Detected - maximum laboratory analytical result for a contaminant; this value is evaluated against an MCL or AL to determine compliance.

Maximum Contaminant Level (MCL) - the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

Maximum Contaminant Level Goal (MCLG) - the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

Maximum Residual Disinfection Level (MRDL) - the highest level of disinfection allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

Maximum Residual Disinfection Level Goal (MRDLG) - the level of drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of use of disinfectants to control microbial contamination.

ABBREVIATIONS

NTU - nephelometric turbidity unit; a measure of turbidity in water.

pci/l - picocuries per liter; a measure of radioactivity in water.

ppb - parts per billion; a unit of measure equivalent to a single penny in \$10,000,000 or another example is one packet of artificial sweetener sprinkled into an Olympic-size swimming pool full of water.

ppm - parts per million; a unit of measure equivalent to a single penny in \$10,000.

Range - the range of the highest and lowest analytical values of a reported contaminant.

Treatment Technique - a required process intended to reduce the level of a contaminant in drinking water. disinfection.

Other Substances

Unregulated Initial Distribution System Evaluation for Disinfection Byproducts: Waived or Not Yet Sampled.

Turbidity: Not Required

Total Coliform: Reported Monthly Testing Found No Coliform Bacteria

Fecal Coliform: Reported Monthly Tests Found No Fecal Coliform Bacteria.

Organic chemical contaminants: Testing Waived, Not Reported or None Detected

Required Additional Health Information for Lead

“If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. This water supply is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at <http://www.epa.gov/safewater/lead>.”

RESULTS TABLES — DETECTED SUBSTANCES

The tables that follows list all of the federally regulated or monitored constituents which have been found in your drinking water. The U.S. EPA requires water systems to test up to 97 constituents.

Inorganic Contaminants

Year	Contaminant	Average Level	Minimum Level	Maximum Level	MCL	MCLG	Unit of Measure	Source of Contaminant
2008	Arsenic	4	3	5	10	0	ppb	Erosion of natural deposits
2008	Barium	.077	0.054	0.1	2	2	ppm	Erosion of natural deposits
2008	Chromium	3.6	1.6	5.7	100	100	ppb	Erosion of natural deposits
2008	Fluoride	0.91	0.8	1.02	4	4	ppm	Erosion of natural deposits; water additive which promotes strong teeth
2009	Nitrate	3.31	2.06	4.56	10	10	ppm	Fertilizer use runoff; septic tank leaching, sewage, erosion from natural deposits.
2005	Gross alpha	3.15	2.9	3.4	15	0	pCi/L	Erosion of natural deposits
2005	Gross beta emitters	8.5	7.4-9.6		50	0	pCi/L	Decay of natural and man-made deposits

Secondary and Other Constituents Not Regulated (No associated adverse health effects)

Year	Constituent	Average Level	Minimum Levels	Maximum Level	Secondary Limit	Unit of Measure	Likely Source of Constituent
2008	Aluminum	0.013	0.011	0.014	0.05	ppm	Abundant naturally occurring element.
2008	Bicarbonate	143	126	160	NA	ppm	Corrosion of carbonate rocks such as limestone.
2008	Calcium	42.2	22.7	61.7	NA	ppm	Abundant naturally occurring element.
2008	Chloride	89	70	109	300	ppm	Abundant naturally occurring element
2008	Hardness as Ca/Mg	169	87	251	NA	ppm	Naturally occurring calcium and magnesium.
2008	Magnesium	15.5	7.4	23.6	NA	ppm	Abundant naturally occurring element.
2008	Nickel	0.001	0	0.002	NA	ppm	Erosion of natural deposits
2008	pH	8.1	8	8.1	>7.0	units	Measure of corrosivity of water
2008	Sodium	80	72	88	NA	ppm	Erosion of natural deposits.
2008	Sulfate	76	60	93	300	ppm	Naturally occurring, industrial by-product
2008	Total Alkalinity as CaCO3	143	126	160	NA	ppm	Natural occurring soluble mineral salts
2008	Total Dissolved Solids	454	377	531	1000	ppm	Total dissolved mineral constituents in water
2008	Zinc	0.006	0.005	0.006	5	ppm	Moderately abundant naturally occurring element; used in metal industry.

Maximum Residual Disinfectant Level

Year	Disinfectant	Average Level	Minimum Level	Maximum Level	MRDL	MRDLG	Unit of Measure	Source of Disinfectant
2009	Chlorine Residual, Free	0.78	0.2	3	4	4	ppm	Disinfectant used to control microbes

Disinfection Byproducts

Year	Contaminant	Average Level	Minimum Level	Maximum Level	MCL	Unit of Measure	Source of Contaminant
2009	Total Haloacetic Acids	21.6	< 6.0	33.9	60	ppb	Byproduct of drinking water disinfection
2009	Total Trihalomethanes	55.2	< 4.0	92 ⁽¹⁾	80	ppb	Byproduct of drinking water disinfection

(1) The system average meets the current drinking water requirements

Unregulated Contaminants

Year	Contaminant	Average Level	Minimum Level	Maximum Level	Unit of Measure	Source of Contaminant
2009	Bromoform	1.9	1.9	1.9	ppb	Byproduct of drinking water disinfection
2009	Dibromochloromethane	1.2	1.2	1.2	ppb	Byproduct of drinking water disinfection

Lead and Copper

Year	Contaminant	90th Percentile	Number of Sites Exceeding Action Level	Action Level	Unit of Measure	Source of Contaminant
2009	Lead	7.1	0	15	ppb	Corrosion of household plumbing systems; erosion of natural deposits
2009	Copper	0.773	0	1.3	ppm	Corrosion of household plumbing systems; erosion of natural deposits, leaching from wood preservatives



Texas Department of Health

BUREAU OF LABORATORIES
 CLIA #45D0660644

CONFIDENTIAL LABORATORY REPORT
WATER ANALYSIS REPORT
METALS -

Submitter Identification Number: 0710078

FORT BLISS BIGGS ARMY AIRFIELD
 -SDWA PROGRAM MANAGER
 ATZC-DOE BLDG 622
 FORT BLISS, TX 79916

Laboratory Number: EP216501

Date Collected: 10/17/2002
 Date Received: 10/18/2002
 Date Reported: 11/12/2002

Sample Type:
 Sample Source:
 Entry Points: 001
 Collector Remarks:

Constituent Name	Result	Units	+/-
Aluminum	<	0.0200	mg/l
Arsenic	<	0.0068	mg/l
Barium	<	0.0492	mg/l
Cadmium	<	0.0010	mg/l
Calcium	<	18.80	mg/l
Chromium	<	0.0100	mg/l
Copper	<	0.0809	mg/l
Iron	<	0.011	mg/l
Lead	<	0.0054	mg/l
Magnesium	<	6.20	mg/l
Manganese	<	0.0020	mg/l
Mercury	<	0.0004	mg/l
Nickel	<	0.0010	mg/l
Selenium	<	0.0032	mg/l
Silver	<	0.0100	mg/l
Sodium	<	110.00	mg/l
Antimony	<	0.0030	mg/l
Beryllium	<	0.0010	mg/l
Thallium	<	0.0010	mg/l
Zinc	<	0.0321	mg/l
Total Hardness as CaCO3	<	72.4	mg/l



Texas Department of Health

BUREAU OF LABORATORIES
 CLIA #45D0660644

CONFIDENTIAL LABORATORY REPORT
WATER ANALYSIS REPORT
MINERALS

Submitter Identification Number: 0710078

FORT BLISS BIGGS ARMY AIRFIELD

ATZC-DOE BLDG 622
 EL PASO, TX 79916

Laboratory Number: EP216498
 Sample Type:
 Sample Source:
 Entry Points: 001
 Collector Remarks:

Date Collected: 10/17/2002
 Date Received: 10/18/2002
 Date Reported: 12/19/2002

Constituent Name	Result	Units	+/-
Chloride	70	mg/l	
Fluoride	0.9	mg/l	
Nitrate	1.40	mg/l	
Sulfate	66	mg/l	
pH	7.1		
Dil. Conduct (umhos/cm)	720		
Tot. Alka. as CaCO3	134	mg/l	
Bicarbonate	163	mg/l	
Carbonate	0	mg/l	
Dissolved solids	353	mg/l	
P. Alkalinity as CaCO3	0	mg/l	

Texas Department of Health

BUREAU OF LABORATORIES
CLIA #45D0660644

CONFIDENTIAL LABORATORY REPORT WATER ANALYSIS REPORT MINERALS

Submitter Identification Number: 0710078

FORT BLISS BIGGS ARMY AIRFIELD

ATZC-DOE BLDG 622
FORT BLISS, TX 79916-0000

Laboratory Number: EP411262
Sample Type:
Sample Source: CMO 1C
Entry Points: 001
Collector Remarks: NITRATE

Date Collected: 05/13/2004
Date Received: 05/14/2004
Date Reported: 05/19/2004

Constituent Name

Nitrate

Nitrite

NOT TESTED - OTHER

Result Units

1.56 mg/l

Thursday, November 18, 2010

+/-

1100 W. 49th Street
Austin, TX 78758

Texas Department of Health Trihalomethanes by GC-ELCD

Contact: Gary Fest
(512)458-7552

Submitter ID: 0710078
TDH Lab ID: EP04-11271
Method: EPA 502.2 Rev. 2.1 (THM)
Data File: 05170019.D
QC File: D:\HPCHEM\1\DATA\IO01G0517
Sample Type: Water

Date Collected: 05/13/2004
Date Prepared: 05/17/2004
Date Analyzed: 05/17/2004 8:50
Analyst: M. Gerlach
Dilution Factor: 1
Concentration Units: µg/l

Compound:

Result:

Chloroform	
Bromodichloromethane	< 2.0
Dibromochloromethane	< 2.0
Bromoform	< 2.0
Total THM's	< 2.0
	< 8.0

COMMENTS:

Approval:



Thursday, November 18, 2010

MAY 19 2004

Texas Department of Health Haloacetic Acids GC Results

Contact: Gary Fest

(512) 458-7552

Submitter Sample Number 0710078
 TDH Sample Name EP4-11294
 Method 552.2
 Data File Name 0519023.D
 QC File C:\MSDCHEM\2\DATA\O18P0519\
 Sample Type Water

Date Collected 5/13/2004
 Date Extracted 5/18/2004
 Date Analyzed 5/20/2004 4:17
 Analyst M. Kabay
 Dilution Factor 1
 Concentration Units µg/L

Regulated Compounds:	Result:
Monochloroacetic acid	<2.0
Dichloroacetic acid	<1.0
Trichloroacetic acid	<1.0
Monobromoacetic acid	<1.0
Dibromoacetic acid	<1.0
<u>Total:</u>	<u><6.0</u>

Monitor Compounds:	Result:
Bromochloroacetic acid	<1.0
Dalapon	<1.0

Comments:

Approval: 

Thursday, November 18, 2010

MAY 21 2004



Texas Department of Health

W912HN-07-X-101B-002

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1100 WEST 49TH STREET

AUSTIN, TEXAS 78756-3194

(512) 458-7318

BUREAU OF LABORATORIES
CLIA #45D0660644

CONFIDENTIAL LABORATORY REPORT
WATER ANALYSIS REPORT
RADIOCHEMICALS

Submitter Identification Number: 0710078

FORT BLISS BIGGS ARMY AIRFIELD

ATZC-DOE BLDG 622
EL PASO, TX 79916

Laboratory Number: EP216503

Sample Type:

Sample Source:

Entry Points: 001

Collector Remarks:

Date Collected: 10/17/2002
Date Received: 10/18/2002
Date Reported: 04/01/2003

Constituent Name	Result	Units	+/-
Radium 226	< 0.2	pCi/l	
Radium 228	1.5	pCi/l	
Gross Beta	9.3	pCi/l	0.9
Gross Alpha Particle Activity	4.6	pCi/l	1.3
			1.4

Thursday, November 18, 2010

APPENDIX EE
CorrShield NT 402



GE Betz

GE Betz, Inc.
4636 Somerton Road
Trevose, PA 19053
Business telephone: (215) 355-3300

Material Safety Data Sheet

Issue Date: 01-SEP-2004

EMERGENCY TELEPHONE (Health/Accident): (800) 877-1940

1 PRODUCT IDENTIFICATION

PRODUCT NAME:

CORRSHIELD NT402

PRODUCT APPLICATION AREA:

CORROSION INHIBITOR.

2 COMPOSITION / INFORMATION ON INGREDIENTS

Information for specific product ingredients as required by the U.S. OSHA HAZARD COMMUNICATION STANDARD is listed. Refer to additional sections of this MSDS for our assessment of the potential hazards of this formulation.

HAZARDOUS INGREDIENTS:

CAS#	CHEMICAL NAME
7632-00-0	SODIUM NITRITE Oxidizer; toxic (by ingestion); potential blood toxin
12179-04-3	BORIC ACID,DISODIUM SALT,PENTAHYDRATE Irritant (abraded skin); slight irritant (respiratory)

No component is considered to be a carcinogen by the National Toxicology Program, the International Agency for Research on Cancer, or the Occupational Safety and Health Administration at OSHA thresholds for carcinogens.

3 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

WARNING

May cause moderate irritation to the skin. Severe irritant to the eyes. Mists/aerosols cause irritation to the upper respiratory tract.

DOT hazard: Toxic Liquid, RQ
Emergency Response Guide #151
Odor: Slight; Appearance: Yellow, Liquid

Fire fighters should wear positive pressure self-contained breathing apparatus (full face-piece type). Proper fire-extinguishing media: Flood with water. Use of CO2 or foam may not be effective.

POTENTIAL HEALTH EFFECTS

ACUTE SKIN EFFECTS:

Primary route of exposure; May cause moderate irritation to the skin.

ACUTE EYE EFFECTS:

Severe irritant to the eyes.

ACUTE RESPIRATORY EFFECTS:

Mists/aerosols cause irritation to the upper respiratory tract.

INGESTION EFFECTS:

Toxic;
May cause gastrointestinal irritation with possible nausea, vomiting, headache, dizziness, unconsciousness and injury to the kidneys and liver.

TARGET ORGANS:

Prolonged or repeated exposures may cause CNS depression and/or toxicity to the liver, kidney, and blood system.

MEDICAL CONDITIONS AGGRAVATED:

Not known.

SYMPTOMS OF EXPOSURE:

May cause redness or itching of skin.

4 FIRST AID MEASURES

SKIN CONTACT:

Wash thoroughly with soap and water. Remove contaminated clothing. Thoroughly wash clothing before reuse. Get medical attention if irritation develops or persists.

EYE CONTACT:

Remove contact lenses. Hold eyelids apart. Immediately flush eyes with plenty of low-pressure water for at least 15 minutes. Get immediate medical attention.

INHALATION:

If nasal, throat or lung irritation develops - remove to fresh air and get medical attention.

INGESTION:

Do not feed anything by mouth to an unconscious or convulsive victim. Dilute contents of stomach. Induce vomiting by one of the standard methods. Immediately contact a physician.

NOTES TO PHYSICIANS:

No special instructions

5 FIRE FIGHTING MEASURES

FIRE FIGHTING INSTRUCTIONS:

Fire fighters should wear positive pressure self-contained breathing apparatus (full face-piece type).

EXTINGUISHING MEDIA:

Flood with water. Use of CO2 or foam may not be effective.

HAZARDOUS DECOMPOSITION PRODUCTS:

Thermal decomposition (destructive fires) yields elemental oxides.

FLASH POINT:

> 200F > 93C P-M(CC)

MISCELLANEOUS:

Toxic Liquid, RQ
UN3287;Emergency Response Guide #151

6 ACCIDENTAL RELEASE MEASURES

PROTECTION AND SPILL CONTAINMENT:

Ventilate area. Use specified protective equipment. Contain and absorb on absorbent material. Place in waste disposal container. Flush area with water. Wet area may be slippery. Spread sand/grit.

DISPOSAL INSTRUCTIONS:

Water contaminated with this product may be sent to a sanitary sewer treatment facility, in accordance with any local agreement, a permitted waste treatment facility or discharged under a permit. Product as is - Incinerate or land dispose in an approved landfill.

7 HANDLING & STORAGE

HANDLING:

Contains an oxidizer. Avoid all contact with reducing agents, oils, greases, organics and acids. Do not allow to dry.

STORAGE:

Keep containers closed when not in use. Protect from freezing.

8 EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMITS**CHEMICAL NAME****SODIUM NITRITE**

PEL (OSHA): NOT DETERMINED
TLV (ACGIH): NOT DETERMINED

BORIC ACID, DISODIUM SALT, PENTAHYDRATE

PEL (OSHA): NOT DETERMINED
TLV (ACGIH): 1 MG/M3

ENGINEERING CONTROLS:

Adequate ventilation to maintain air contaminants below exposure limits.

PERSONAL PROTECTIVE EQUIPMENT:

Use protective equipment in accordance with 29CFR 1910 Subpart I

RESPIRATORY PROTECTION:

A RESPIRATORY PROTECTION PROGRAM THAT MEETS OSHA'S 29 CFR 1910.134 AND ANSI Z88.2 REQUIREMENTS MUST BE FOLLOWED WHENEVER WORKPLACE CONDITIONS WARRANT A RESPIRATOR'S USE.
USE AIR PURIFYING RESPIRATORS WITHIN USE LIMITATIONS ASSOCIATED WITH THE EQUIPMENT OR ELSE USE SUPPLIED AIR-RESPIRATORS.
If air-purifying respirator use is appropriate, use a respirator with dust/mist filters.

SKIN PROTECTION:

rubber gloves-- Wash off after each use. Replace as necessary.

EYE PROTECTION:

splash proof chemical goggles

9 PHYSICAL & CHEMICAL PROPERTIES

Specific Grav.(70F,21C)	1.250	Vapor Pressure (mmHG)	~ 18.0
Freeze Point (F)	< < 0	Vapor Density (air=1)	< 1.00
Freeze Point (C)	< -18		
Viscosity(cps 70F,21C)	12	% Solubility (water)	100.0

Odor	Slight
Appearance	Yellow
Physical State	Liquid
Flash Point	P-M(CC) > 200F > 93C
pH As Is (approx.)	11.6
Evaporation Rate (Ether=1)	< 1.00

NA = not applicable ND = not determined

10 STABILITY & REACTIVITY**STABILITY:**

Stable under normal storage conditions.

HAZARDOUS POLYMERIZATION:

Will not occur.

INCOMPATIBILITIES:

May react with strong oxidizers.

DECOMPOSITION PRODUCTS:

Thermal decomposition (destructive fires) yields elemental oxides.

INTERNAL PUMPOUT/CLEANOUT CATEGORIES:

"B"

11 TOXICOLOGICAL INFORMATION

Oral LD50 RAT:	~275 mg/kg
NOTE - Estimated value	
Dermal LD50 RABBIT:	>5,000 mg/kg
NOTE - Estimated value	

12 ECOLOGICAL INFORMATION**AQUATIC TOXICOLOGY**

Ceriodaphnia 48 Hour Static Renewal Bioassay
 LC50= 61; No Effect Level= 15.6 mg/L
 Daphnia magna 48 Hour Static Renewal Bioassay pH of test solutions was adjusted to a level of 6-9.
 LC50= 100; No Effect Level= 38 mg/L
 Fathead Minnow 96 Hour Static Renewal Bioassay
 LC50= 1072; No Effect Level= 500 mg/L
 Rainbow Trout 96 Hour Static Acute Bioassay
 LC50= 180; No Effect Level= 100 mg/L

BIODEGRADATION

BOD-28 (mg/g): 1
 BOD-5 (mg/g): 0
 COD (mg/g): 79
 TOC (mg/g): 4

13 DISPOSAL CONSIDERATIONS

If this undiluted product is discarded as a waste, the US RCRA hazardous waste identification number is :
 Not applicable.

Please be advised; however, that state and local requirements for waste disposal may be more restrictive or otherwise different from federal regulations. Consult state and local regulations regarding the proper disposal of this material.

14 TRANSPORT INFORMATION

DOT HAZARD: Toxic Liquid, RQ
 UN / NA NUMBER: UN3287
 DOT EMERGENCY RESPONSE GUIDE #: 151

15 REGULATORY INFORMATION

TSCA:

All components of this product are listed in the TSCA inventory.

CERCLA AND/OR SARA REPORTABLE QUANTITY (RQ):

32 gallons due to SODIUM NITRITE;

SARA SECTION 312 HAZARD CLASS:

Immediate(acute);Delayed(Chronic)

SARA SECTION 302 CHEMICALS:

No regulated constituent present at OSHA thresholds

SARA SECTION 313 CHEMICALS:

CAS#	CHEMICAL NAME	RANGE
7632-00-0	SODIUM NITRITE	21.0-30.0%

CALIFORNIA REGULATORY INFORMATION

CALIFORNIA SAFE DRINKING WATER AND TOXIC

ENFORCEMENT ACT (PROPOSITION 65) CHEMICALS PRESENT:

No regulated constituents present

MICHIGAN REGULATORY INFORMATION

No regulated constituent present at OSHA thresholds

16 OTHER INFORMATION

NFPA/HMIS		CODE TRANSLATION
Health	2	Moderate Hazard
Fire	0	Minimal Hazard
Reactivity	0	Minimal Hazard
Special	NONE	No special Hazard
(1) Protective Equipment	B	Goggles,Gloves

(1) refer to section 8 of MSDS for additional protective equipment recommendations.

CHANGE LOG

	EFFECTIVE DATE	REVISIONS TO SECTION:	SUPERCEDES
	-----	-----	-----
MSDS status:	13-FEB-1997		** NEW **
	23-JUN-1997		13-FEB-1997
	16-NOV-2001	15	23-JUN-1997
	09-OCT-2002	12	16-NOV-2001
	10-OCT-2002	4,16	09-OCT-2002
	26-NOV-2002	12	10-OCT-2002
	01-SEP-2004	3,5,14	26-NOV-2002

APPENDIX FF

FORT BLISS ACCESS CONTROL POLICY



DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT BLISS
1 PERSHING ROAD
FORT BLISS, TX 79916-3803

December 27, 2006

REPLY TO
ATTENTION OF:

Office of the Garrison Commander

Dear Fort Bliss Business Partner:

Fort Bliss continues to take steps to ensure the safety of our personnel, facilities, vendors, suppliers, contractors, service providers and visitors on our post. Effective February 1, 2007, Fort Bliss is instituting a new standardized entry protocol called the *RAPIDGate*[™] Program for all new and existing vendors, suppliers, contractors and service providers (companies) who require routine access to Fort Bliss. The *RAPIDGate* Program is one of several steps Fort Bliss is undertaking to comply with Homeland Security Presidential Directive 12 (HSPD-12). The *RAPIDGate* Program, provided by Eid Passport, Inc., will provide a standardized background check, an identification badge and entry procedure that improves security while at the same time significantly speeding up entry for participating companies.

Companies participating in the *RAPIDGate* Program will be able to enter Fort Bliss through any of the 8 currently open gates (Cassidy, Sheridan, Marshal, Chaffee, Remagan, Robert E. Lee, Jeb Stuart South, and Pershing) without having to stop and obtain a day pass. Of course, due to the size constriction of some vehicles, larger vehicles in the size of semi-truck or larger will be only allowed to enter through the Cassidy, Sheridan, Chaffee, and Robert E. Lee access points. Companies can enroll in the *RAPIDGate* Program by calling 1-877 *RAPIDGATE* (1-877-727-4342). Once enrolled, employees can register at the self-service Registration Stations located at the Chaffee Gate, Bldg. 505 (Vehicle Registration) or the BAAF Main Gate. Based on the information collected at the self-service Registration Station, the *RAPIDGate* Program runs a 10-year felony background screen, other criminal screens, and validates the social security number. The *RAPIDGate* Program also verifies that the individual is either a U.S. Citizen or is legally eligible to work in the United States. Upon passing the screening process, participants will be issued a personalized *RAPIDGate* identification badge that when verified by a security officer will allow the participant to enter Fort Bliss without having to sign in for a day pass. The *RAPIDGate* identification badge will be valid for a period of twelve (12) months. Your company will be given an opportunity at the end of the 12 month period to renew enrollment in the program. Fort Bliss will no longer accept background checks from other sources beginning February 1, 2007.

Companies that chose not to participate in the *RAPIDGate* Program will be allowed access only through the Fort Bliss Chaffee (Commercial) Gate where, before entering the installation, these personnel will be required to obtain a day pass at the Chaffee Pass Office. To receive the one day pass, you will need to park your vehicle and have all occupants enter the gate pass office to sign in, individually, for the day pass. All vehicle occupants must be prepared to provide a government issued photo ID, and the driver of the vehicle will be required to provide proof of

vehicle registration, proof of insurance, and a state issued drivers license. Extended Passes will no longer be available beginning February 1, 2007 while currently issued extended passes will be honored until their expiration date.

The *RAPIDGate* Program not only saves you time, but also increases the safety and security for Fort Bliss and all personnel who work on the base. We encourage your participation in the *RAPIDGate* Program. Please note, *RAPIDGate* participants are still subject to random inspections.

To enroll, please follow the guidelines on the attached document (*RAPIDGate* Program Enrollment Information). Questions about the Fort Bliss *RAPIDGate* program should be addressed to info@rapidgate.com with the subject line RE: *RAPIDGate* Program.

Sincerely,



Robert T. Burns
Colonel, US Army
Commanding

Forms of Acceptable Identification

List A – One Needed

- U.S. Passport (unexpired or expired)
- Certificate of U.S. Citizenship (Form N-560 or N-561)
- Certificate of Naturalization (Form N-550 or N-570)
- Unexpired foreign passport, with I-551 stamp or attached Form I-94 indicating unexpired employment authorization
- Permanent Resident Card or Alien Registration Receipt Card with photograph (Form I-151 or I-551)
- Unexpired Temporary Resident Card (form I-688)
- Unexpired Employment Authorization Card (Form I-688A)
- Unexpired Reentry Permit (Form I-327)
- Unexpired Refugee Travel Document (Form I-571)
- Unexpired Employment Authorization Document issued by DHS that contains a photograph (Form I-688B)

List B – Two Needed

- Driver's license or ID card issued by a state
- ID Card issued by federal, state or local government agencies or entities
- School ID card with a photograph
- Voter's registration card
- U.S. Military card or draft record
- Military Dependent's ID card
- U.S. Coast Guard Merchant Mariner Card
- Native American tribal document
- Driver's license issued by a Canadian government authority
- U.S. Social Security card issued by the Social Security Administration
- Certification of Birth Abroad issued by the Department of State (Form FS-545 or Form DS-1350)
- Original or certified copy of a birth certificate issued by a state, county, municipal authority or outlying possession of the United States bearing an official seal
- Native American tribal document
- U.S. Citizen ID Card (Form I-197)
- ID Card for use of Resident Citizen in the United States (Form I-179)
- Unexpired employment authorization document issued by DHS (other than those listed under List A)

RAPIDGate Program Enrollment Information

Enroll your company by calling Eid Passport at 1-877-*RAPIDGATE* (1-877-727-4342) and provide a Fort Bliss sponsor point of contact that includes a name, phone number, and e-mail address. Once your request is received, final authorization to participate in the *RAPIDGate* Program will be granted by the Fort Bliss Office of the Provost Marshal.

Once your company has been approved for enrollment and paid the enrollment fee, instruct your employees who need access to Fort Bliss to register for the *RAPIDGate* Program using the self-service Registration Station located within the Chaffee Gate Pass Office, Bldg. 505 (Vehicle Registration Office) or the BAAF Main Gate Pass Office. Each employee should be ready to provide your company's *RAPIDGate* company code, his or her address, phone number, date of birth, and Social Security number for proof of identification and background screening. The Registration Station will capture the employees photograph and fingerprints for identity verification and badging during the application process.

Once your company has approved each employee for participation, and paid the registration fee, the employee will undergo a background screen. Upon passing the screen, your company will be notified to send the employee to pickup their personalized *RAPIDGate* Badge at the Fort Bliss Vehicle Registration Office located within bldg. 505. The employee will be required to show identification at the time of badge pickup. The employees can show one form of identification from List A, or two forms of identification from List B. Please see last page for listing.

Once a *RAPIDGate* Badge is issued, employees will be required to present their Badge to gain entry to Fort Bliss, and must wear and display the Badge at all times while on the premises. Questions about the Fort Bliss *RAPIDGate* program should be addressed to info@rapidgate.com with the subject line RE: *RAPIDGate* Program.

Continuation -

Due to ongoing construction on Fort Bliss, Biggs AAF, and WBAMC several temporary access gates have been constructed to facilitate entry onto the cantonments. The additional access gates are not included within the Letter To Vendors due to their temp status and their construction after the letter was issued. The additional access gates, located on Biggs AAF, are Global Reach ACP, General Harmon ACP and IBCT ACP. These listed temp access gates will follow the same access control procedures as outlined for all members of the Rapid Gate system. Please be advised that, due to their temporary construction status, care should be taken when attempting access with larger than standard sized vehicles. These temp access gates are constructed with 10' to 12' in width paved traffic lanes and an overhead clearance of no less than 14.5'. Traffic speed limits upon approaching, entering, and leaving the temp access gates are listed as 15mph.

APPENDIX GG

Site Structures and Amenities

Update
February 2009

- Walls and Fences
- Trash Receptacles
- Dumpsters
- Flagpoles
- Movable Planters
- Bicycle Racks
- Tree Grates
- Bollards
- Play Equipment
- Mailboxes
- Monuments, Memorials, Military Equipment Static Displays
- Drinking Fountains

11.3.3 Seating

Seating includes benches and walls, as well as tables and movable chairs.

11.3.3.1 Benches

11.3.3.1.1 Bench Location. Benches should be located in areas of high pedestrian use, and arranged to encourage socialization within a pleasant outdoor setting. This includes pedestrian nodes along primary walkways, at major building entryways, courtyards, and at bus stops.

11.3.3.1.2 Bench Siting. Benches should be sited on concrete pads adjacent to walkways. Provide proper clearance around benches, a minimum 2'0" setback from adjacent sidewalks and a minimum of 5'0" between front of bench and any stationary obstacle. Provide appropriate planting treatment for visual definition and seasonal shade.

11.3.3.1.3 Bench Design. Pre-Cast Concrete or Metal Benches. Pre-cast concrete or metal benches, with or without backs, are appropriate for the informal gathering, resting, eating and waiting uses characteristic of community facility areas. Standard bench size should be 6'-0" long. Metal support base should have a dark brown factory finish to match standard trim color. Wall mounted benches should be similar in style and color to free standing benches.

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February 2009

11.3.3.2 Seating Walls

11.3.3.2.1 Seating Walls Location. Wherever possible, seating should be incorporated into planter boxes (Fig. 11.4) or retaining walls, particularly at building entrance areas. Seating walls should be integrated into the overall area design and the pedestrian circulation system.

11.3.3.2.2 Seating Wall Design. Seating walls should generally be between 18" and 22" high, 12" to 18" wide, and constructed of rock wall, textured concrete, or brick in a manner to complement or match the materials of the adjacent buildings.

11.3.3.3 Tables.

11.3.3.3.1 Locate tables together with seating that is oriented to the user needs of socializing, relaxing, or eating in less formal spaces with a pleasant setting and attractive view.

11.3.3.3.2 Table Location. Small groupings of tables in high visibility areas should be placed within proximity of recreation or food service facilities. These groupings should be located on hard pavement areas adjacent to walkways. Pavement should be constructed of exposed aggregate, broom finish concrete, or pavers. Incorporate tree plantings and overhead trellis structures within these areas to provide shade and spatial definition.

11.3.4 Telephone Booths

Telephone booths should be incorporated into building architecture, utilizing building recesses and overhangs, or integrated into bus or other shelters. Provide a minimum 3'0" clearance between booths and the edge of walkways. All service line wiring should be underground or concealed. Booths should be equipped with lighting for nighttime use. In sheltered areas, use standard wall-mounted phone enclosures.

11.3.5 Shelters

11.3.5.1 There are many different types of shelters on military installations. Shelters are provided for those waiting for buses, and in areas where people congregate to socialize or eat such as in courtyards or picnic areas.

11.3.5.1.1 Bus Shelters

11.3.5.1.1.1 Bus Shelter Location. Bus shelters should be located at major facilities along the bus route such as Commissary/Post Exchange areas, barracks areas, hospital, and library. Bus stops should relate to major pedestrian walkways, and be placed on concrete pads. Provide a minimum 3'0" clearance between shelters and the edge of walks.

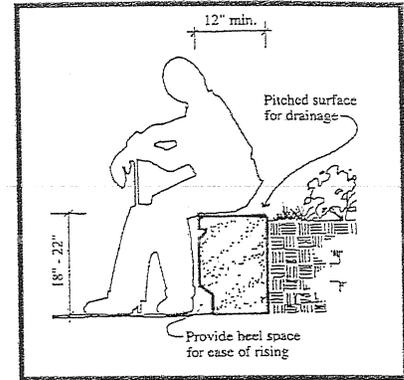


Figure 11.4 - Retaining Wall / Seating.

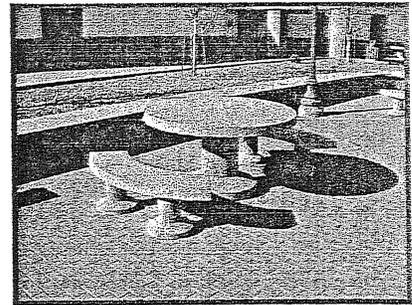


Fig. 11.5 – Seating Incorporated Into Planter Box at Dining Facility

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11.3.5.1.1.2 Bus Shelter Design. Bus shelter design typically should be simple and consistent throughout the post, matching the existing units in terms of materials, scale, and detail (Fig. 11.6). The shelters should include an integral bench, and trash receptacle.

11.3.5.1.2 Picnic Shelters

11.3.5.1.2.1 Picnic Shelter Location. Picnic shelters should be strategically located and sized for shared use to discourage the proliferation of small shelters scattered throughout the installation.

11.3.5.1.2.2 Picnic Shelter Design. Picnic shelters can be open on all sides. The minimum size should be 20 feet square with a minimum 8-foot vertical clearance.

11.3.6 Kiosks

11.3.6.1 Kiosk Location

Kiosks can be used as information centers at pedestrian nodes within the town center. Provide kiosks only where they are needed on a concrete base adjacent to walkways. Allow a minimum of 3' clearance on all sides.

11.3.6.2 Kiosk Design

Kiosk design should blend compatibly with other site furnishings and with the architectural character of the zone in terms of form, scale, and materials. A similar design treatment should be established for kiosks and shelters.

11.3.7 Walls and Fences

11.3.7.1 Location and Use

Walls and fencing should be used to provide visual screening, define pedestrian plaza areas, wind screening, pedestrian and vehicular control, security, and to retain soil. The design of walls and fences should fulfill their function in harmony with the character and appearance of their setting.

11.3.7.2 Walls

Low walls should be used to define pedestrian courtyard areas and provide informal seating. Screening walls can be used where appropriate to screen building service areas. Walls adjacent to walkways should be free of any projections, such as signs or drain pipes that

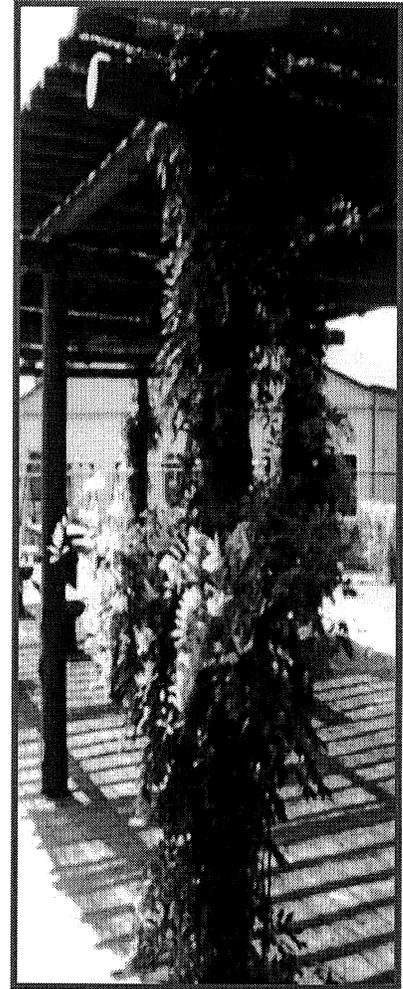


Fig. 11.6 - Trellis and Vines Provide Shelter.

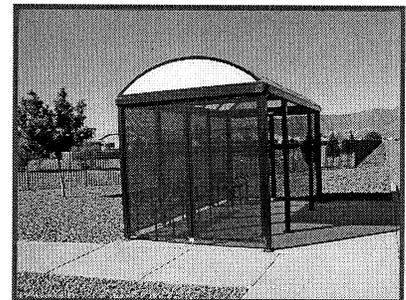


Fig. 11.7 – Typical Fort Bliss Bus Shelter.

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February 2009

would pose a hazard to passing pedestrians. Construction of walls should incorporate either rock wall, brick to match adjacent buildings, with stone or concrete cap, or concrete with a textured finish and stone or concrete cap. Retaining walls (Fig. 11.8) may be constructed of native stone, brick, versa-lock modular stone with a light tan finish, or concrete block with a light tan stucco finish, concrete block planters, or other appropriate material.

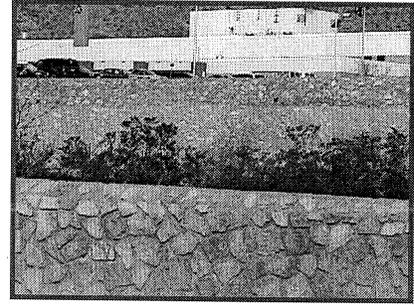


Fig. 11.8 - Indigenous Stone Retaining Wall

11.3.7.3 Fences

Rock wall or other masonry fences should be utilized for screening of service areas and site utilities, particularly dumpsters. Chain link fences should be screened with trees and shrubs. The use of chain link fence should be held to a minimum in the cantonment area.

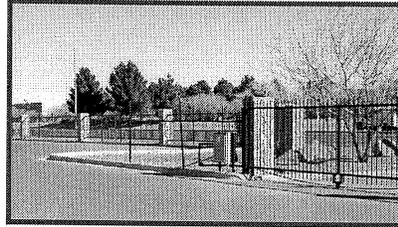


Fig. 11.9 - Wrought Iron Fence

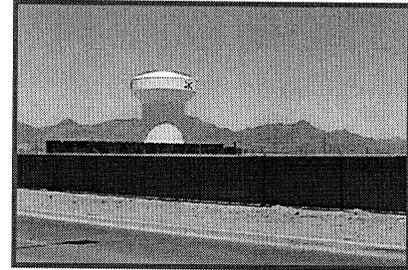


Fig. 11-10 - Chain Link Fence With Green Fabric Screening

11.3.7.3.1 Use of wrought iron fence where appropriate (Fig. 11.9).

11.3.7.3.2 Use chain link with green color fabric for storage yards and other appropriate areas (Fig. 11.10).

11.3.8 Trash Receptacles

11.3.8.1 Trash Receptacle Location

Trash containers should be highly visible and accessible for effective litter control. Containers should be located conveniently along walkways, near major pedestrian intersections, near building entrances and near seating and eating areas. Antiterrorism/force protection requirements restrict the location of dumpsters to a minimum of 10 meters (33 feet) from inhabited buildings and 25 meters (82 feet) from billeting and primary gathering areas (*Unified Facilities Criteria (UFC) 4-010-01, DoD Minimum Antiterrorism Standards for Buildings*, Table B-1).

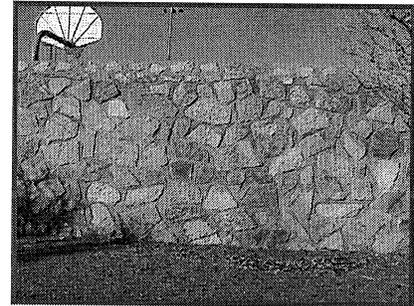


Fig. 11.11 - Six Foot Rock Wall

11.3.8.2 Trash Receptacle Design – Not Used

11.3.8.3 Trash Receptacle Type - Not Used

11.3.8.4 Dumpsters

11.3.8.4.1 Dumpster Location

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The location of dumpsters can have a significant visual impact, and should therefore be addressed as part of an overall building design and incorporated in site planning. To the greatest extent possible, incorporate dumpster placement into areas screened with walls. Avoid locating dumpsters along major circulation routes or use areas. Dumpsters should be directly accessible by way of a paved service drive or parking lot with adequate overhead clearance for collection vehicles. Antiterrorism/force protection requirements restrict the location of dumpsters to a minimum of 10 meters (33 feet) from inhabited buildings and 25 meters (82 feet) from billeting and primary gathering areas (Unified Facilities Criteria (UFC) 4-010-01, DoD Minimum Antiterrorism Standards for Buildings, Table B-1).

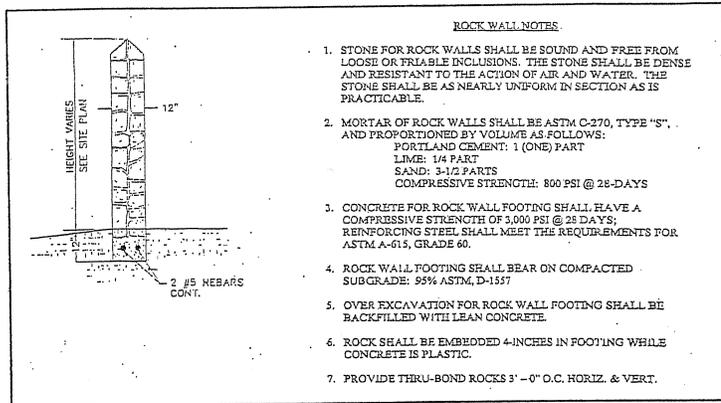


Fig. 11.12 – Construction Detail for Six Foot Rock Wall

11.3.8.4.2 Dumpster Site Design

Rock walls shall be 6' in height. All dumpsters should be placed on 12' x 12' concrete pads with aprons large enough to encompass the bearing points of the service vehicle (Fig. 11.12).

11.3.9 Flagpoles

The standard flagpole for Fort Bliss shall be tapered mill finish aluminum, fitted with a gold anodized finish "ball" finial (Fig. 11.13). The mounting detail should be simple with a concrete base flush at grade. A concrete pad should be used when poles are located in lawn areas. In plaza areas, flagpole locations and mounting detail should be integrated into the paving pattern. Flagpoles should include lighting and may be accented with planting beds around the base of the flagpole.

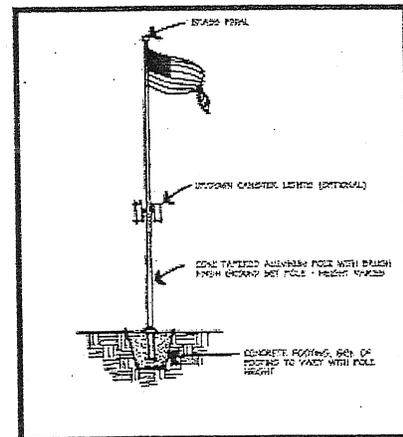


Fig. 11.13 – Standard Flagpole

11.3.10 Planters

11.3.10.1 Movable pre-cast concrete planters may be used outside building entrances to provide seasonal color and interest and function as security threat barriers (Fig. 11.14). Planters should be located so they impede vehicular access to a building, but not so they excessively impede pedestrian movement. Several planters of various sizes may be grouped together to produce an aesthetically pleasing display.

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11.3.11 Bicycle Racks

Bicycle racks should be provided at key destination locations. They should be located on a concrete surface where they will not impede pedestrian movement or block building entrances.

A ribbon type tubular aluminum bike rack with an anodized dark bronze finish is the post standard (Fig. 11.15). Bicycle storage areas near barracks should be covered.

11.3.12 Tree Grates

Tree grates should be used when installing trees in large paved areas such as pedestrian plazas, walks, and ceremonial entrance courts. Tree grates and planting pits should be a minimum of 5' x 5'.

11.3.13 Bollards

Bollards are utilized to separate vehicular and pedestrian traffic, to direct access, or as decorative elements in pedestrian areas.

11.3.14 Playgrounds/Tot Lots

11.3.14.1 Installation playgrounds and tot lots should use equipment that is consistent throughout the installation or that meets specific criteria of materials, color, and design (Fig 11.16).

11.3.14.2 Playground Planning and Design

Guidance for planning and designing unsupervised outdoor play areas that meet child safety and child development requirements is found in Unified Facilities Criteria (UFC) 3-210-04, Design: Children's Outdoor Play Areas. The guidance given in this publication meets the needs of children with and without disabilities.

11.3.14.3 Playground Inspection and Maintenance

A play area inspection and maintenance program for Child Development Centers can be found in Technical Manual (TM) 5-663, Child Development Center, Play Area Inspection and Maintenance Program.

11.3.14.4 Recalled and Banned Playground Equipment

For updates on banned or recalled playground equipment consult the Consumer Product Safety Commission Press Releases and Recalls web site.

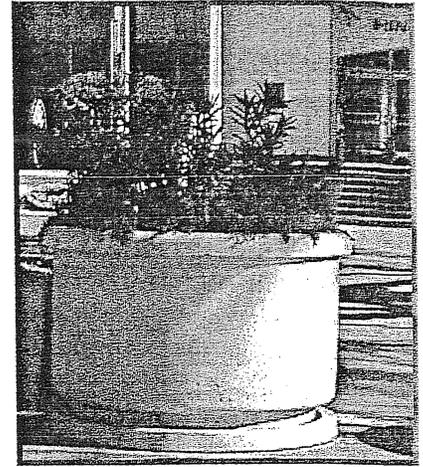


Fig. 11-14 – Movable Precast Concrete Planter

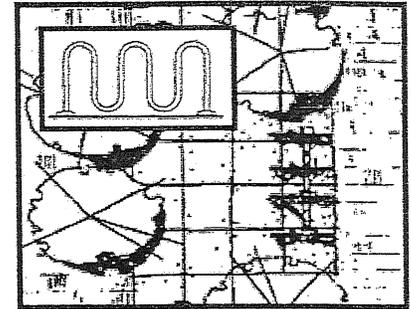


Fig. 11.15 – Bicycle Rack System

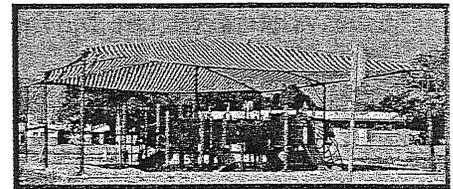


Fig. 11.16 - Playground and Tot Lot With Canopy For Shade

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Table 11.5.4 Lighting Design Matrix

		TYPICAL AREAS OF LIGHTING USE																		
		Entry Gates	Primary Roadways	Secondary Roadways	Tertiary Roadways	Primary Walkways/Bikeways	Secondary Walkways/Bikeways	Tertiary Walkways/Bikeways	Courtyards	Playgrounds	Ball fields	Basketball Courts	Tennis Courts	Buildings	Landscaping	Fence Perimeters	Signs & Monuments	Large Parking Lots	Small Parking Lots	Training areas
TYPE	Compact Fluorescent	•												•	•		•			
	Metal Halide	•						•	•	•	•	•		•	•	•				•
	High Pressure Sodium	•	•	•	•	•	•	•	•					•		•		•	•	•
LEVEL	Lux (lx)		20	15	10	10	2		50		200	200	50							
	Foot-candles (fc)		2	1.4	0.9	0.9	0.2		5		10	20	5.6			0.2		1	1	1
HEIGHT	30' Max	•	•	•	•									•	•			•		
	25' Max					•	•	•											•	
	15' Max																			
	Varies								•	•	•	•	•			•	•			•
FIXTURE	Cutoff	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Utility													•		•				•
	Bollard																			
	Spot																•			
	Wall Mount													•						
POLE	Metal	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Wood															•				•
SPACING	120' Max		•	•	•											•		•		
	90' Max																		•	
	Varies													•			•			•

• = Appropriate usage

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11.6.6.4 Fire hydrants should be highly visible and free of any screening. They shall be nutmeg brown in color with luminous paint. Cap color shall indicate tested water pressure (Fig. 11.37).

Each fire hydrant shall include an antiterrorism check valve (ATV) designed to protect against accidental backflow and intentional contamination of drinking water via the hydrant. The ATV shall be a stealth check valve located internal to the upper barrel of the hydrant and shall consist of four main parts:

- A sleeve-insert valve seat, made of E coated or fusion bonded epoxy steel. The top of the valve seat shall have a machined slot to accommodate an EPDM quad ring which will provide an impenetrable seal between the seat and the valve.
- A valve made of brass with machined slots to accommodate an o-ring between the valve and the upper stem.
- A stainless steel machined upper stem will replace the original upper stem. The brass valve shall be attached to the upper stem in such a manner as to provide free vertical movement along the shaft.
- A stainless steel spring that shall fit around the upper stem and be of adequate compression strength and length that sufficient pressure is placed on the valve to provide an impenetrable seal when the hydrant is not in use and yet allow water to flow freely when the hydrant is flowed.
- The ATV shall be installed by a manufacturer certified technician.



Fig. 11.37 - Fire Hydrants Shall Be Nutmeg Brown. Cap Color Shall Indicate Tested Water Pressure.

11.6.7 Storm Drainage

11.6.7.1 Installation storm drainage systems should be appropriate to the character of development they serve. Storm drainage systems in densely developed areas require curbs, gutters, and underground lines. Storm drainage systems in low-density areas can utilize drainage swales and ditches that are contoured to be compatible with the natural landform. Where retention ponds are required, they should be designed to appear as a natural amenity that is part of the natural contour of the land, rather than a square or rectangular hole in the ground. Retention ponds that are designed to be dry most of the time can be utilized for recreational purposes or as open space. In either case, the areas should be designed to conform to the natural contours of the land. A recreational field that is an integral part of a Primary Facility, however, cannot be used as a retention pond.

11.6.7.2 Large hard surfaced parking lots should have covered drainage at the entry to prevent water draining into adjacent streets.

APPENDIX HH

SUBMITTAL DISTRIBUTION MATRIX

Activity & Address	Drawing Size		Design Analysis	Specs	CD - D.A , specs .pdf & CADD,.dwg	Furniture, Furnishings & Equipment Submittal	Structural Interior Design Submittal
	Full	Half Size					
US Army Corps of Engineers ATTN: Kevin S. Weber CESWT-PP-M 1645 S. 101st E Ave. Tulsa, OK 74128 918-669-7060	1	8	8	8	8	2	2
US Army Corps of Engineers ATTN: Frank Covington, PM CESWF-PM-J 819 Taylor Street Ft. Worth, TX 76102 817-338-8668	0	0	0	0	2	0	0
US Army Corps of Engineers ATTN: Rogelio Torres, Resident Engineer Bldg , Office Street Address Ft. Bliss, TX 79916 915- -	0	4	4	4	4	2	2
Directorate of Public Works IMSW-BLS-DPW-MP ATTN: Miguel Cheng-Guajardo Bldg 777, Office 114 Pleasanton Rd. Ft. Bliss, TX 79916 915-568-5949	0	1	1	1	3	2	2
IMSW-BLS-Z ATTN: John Barrera Bldg 624 Pleasanton Ave. Ft. Bliss, TX 79916-6816 (915) 568-3908	0	1	0	1	1	0	0
Physical Security Office ATZC-PM ATTN: Thomas Cain Bldg 116, Pershing Road Ft. Bliss, TX 79916	0	1	1	1	1	0	0
NEC ATTN: Thomas Hopkins Bldg 58, Doniphan Road Ft. Bliss, TX 79916 (915) 568-8194	0	1	1	1	1	0	0
FESD, DES ATTN: James L. Narlock Building 11211 Wright Street Ft. Bliss, TX 79916 (915) 744-9896	0	0	0	0	3	0	0
IMWE-BLS-PWM ATTN: Ricardo Cortez Bldg 777, Rm 319 Pleasanton Ave.Fort Bliss, TX 79916-6812 (915) 568-5201	0	3	1	1	7	0	0

Activity & Address	Full	Half Size	Design Analysis	Specs	CD - D.A , specs .pdf & CADD,.dwg	Furniture, Furnishings & Equipment Submittal	Structural Interior Design Submittal
Installation Safety Office ATZC-CSS Attn: Dennis I. Ostrander Bldg 515-B 1733 Pleasonton Road Ft. Bliss, TX 79916-6812	0	1	1	1	1	0	0
DPTMS, P&O (IOC) ATTN: Ron Wells AT/FP Antiterrorism Officer 2 Sheridan Road Fort Bliss, TX 79916 (915)569-8663	0	1	1	1	2	0	0
THAAD End User TRADOC Capability Mgr, Upper Tier, ATTN: Mike Bearce, Bldg 12, 2nd Flr 12 Pershing Rd Ft. Bliss, TX 79916-3802 915-568-7242	0	2	0	0	3	0	0
USACE, SW Area Office ATTN: Brad Hartell, CESWF- FB-SWB 6380 Morgan Ave., Suite. A Ft. Bliss, TX 79906 915-568-7854	0	1	0	0	1	0	0
Public Works Division IMA, SW Region ATTN: Patrick Caraway 2450 Stanley Road, Suite 101 Ft. Sam Houston, TX 78234- 6102 210-295-2287	0	1	0	1	1	0	0
USAISEC-FDED ATTN: AMSEL-IE-DE-IN-OP George Gaffney 1435 Porter St, Suite 230 Fort Dietrick, MD 21702 301-619-6501	0	1	1	1	1	0	0
US Army Corps of Engineers ATTN: Phil Brinson CESAS-EN-DA 100 W. Oglethorpe Ave.Pleasanton Rd. Savannah, GA 31401-3640 912-652-5566	0	1	1	1	3	0	0
Jacobs ATTN: Cecil Penn 777 Main Street Ft Worth, TX 76102 817-735-7018	0	2	2	2	3	1	1
Huitt Zollars ATTN: Blanca Berumen 3131 McKinney Ave, Suite 600 Dallas, TX 75204-2489 214-871-3311	0	1	1	1	1	0	0

Activity & Address	Full	Half Size	Design Analysis	Specs	CD - D.A , specs .pdf & CADD,.dwg	Furniture, Furnishings & Equipment Submittal	Structural Interior Design Submittal
Jacobs-Huitt Zollars ATTN: Catherine Zultner P140A - Annex Corner of Velez St & Sapper St Ft. Bliss, TX 79906 214-708-2845	0	1	1	1	1	1	1

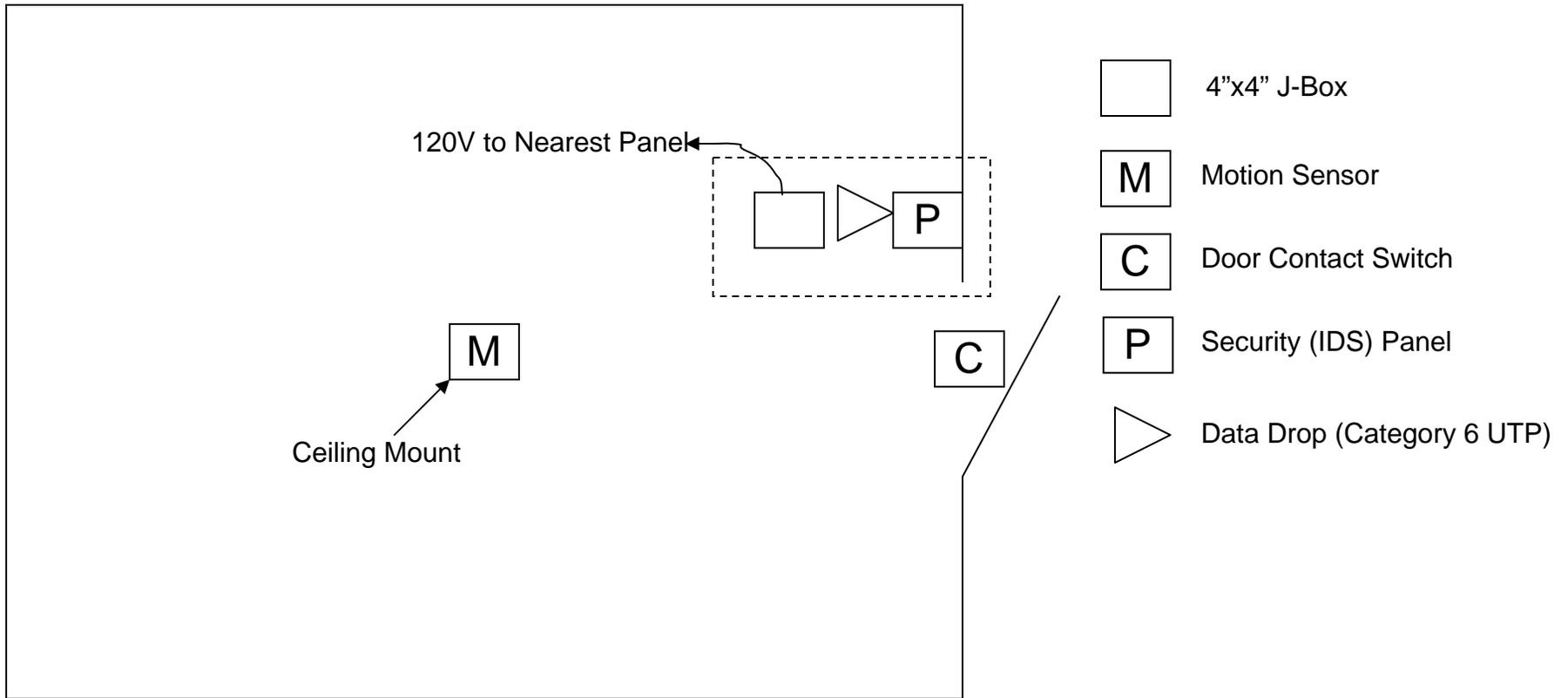
APPENDIX II

Intrusion Detection System Schematic

Typical Arms or Comsec Vault

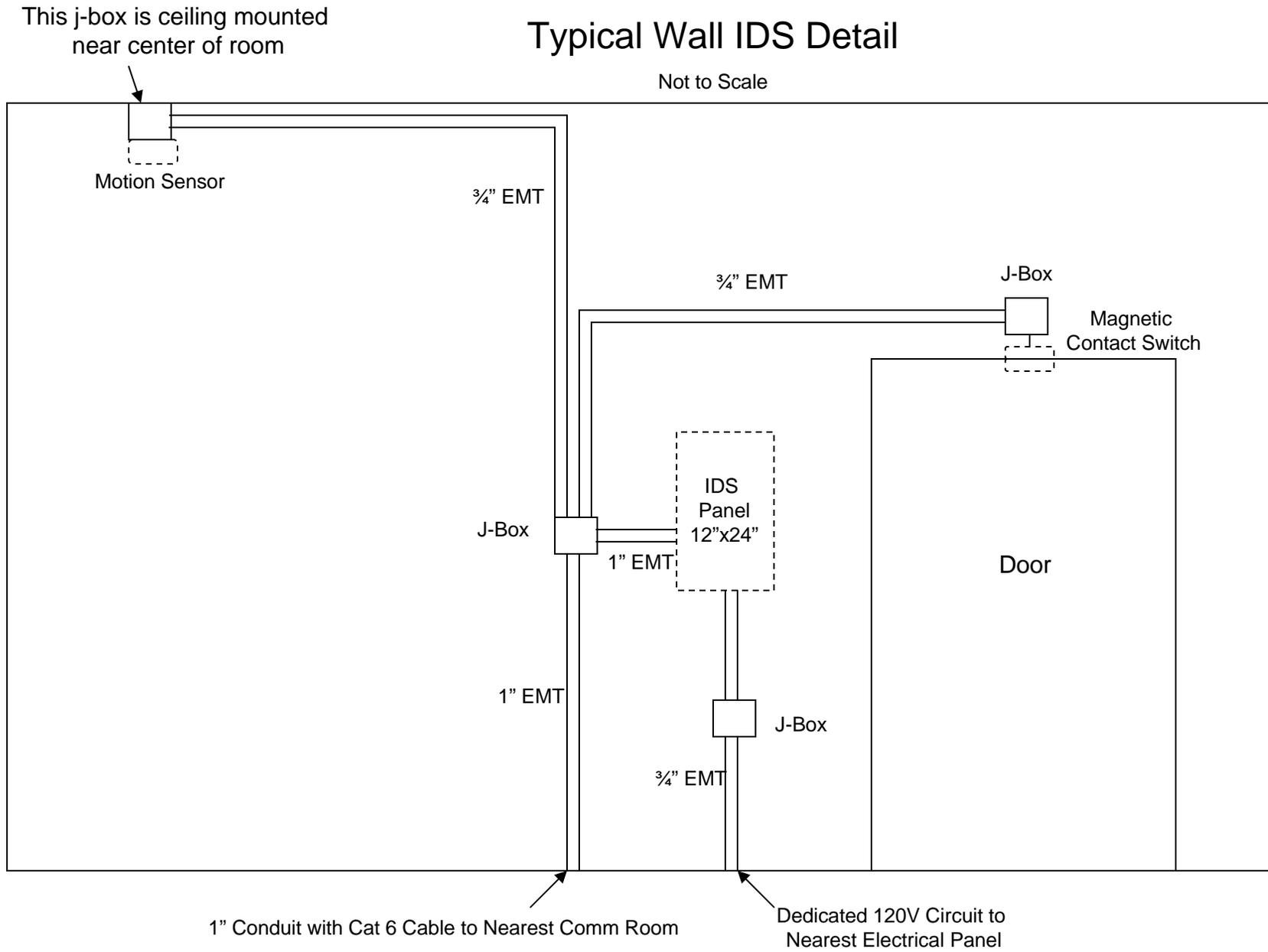
IDS Layout

Not to Scale



Typical Wall IDS Detail

Not to Scale



APPENDIX JJ

SITE SURVEY - SEE APPENDIX J

APPENDIX KK

SUPPLEMENTAL REQUIREMENTS

THAAD II PROJECT SPECIFIC REQUIREMENTS

FORT BLISS, TX

This appendix contains supplemental requirements to Section 01 10 00 STATEMENT OF WORK, Paragraphs 3, *AM2 5,* and 6 in addition to Appendix MM, that must be included in the project design and construction.

***AM2 Add the following paragraph 3.1.2 (3)(d):**

(d) Provide separate consolidated bench repair space for sensitive electronics within the overall consolidated bench repair space as identified in this standard.*

The following paragraph supersedes paragraph 3.1.5 (3):

3.1.5 Architecture

(3) Natural Lighting. Repair and maintenance bays, storage and admin areas shall be illuminated using innovative solutions of hybrid lighting systems which includes electric lighting with electronic daylight controls in combination with daylighting. The daylighting should maintain the intent of the Area Development Guide and consist of translucent panels above overhead doors and skylights with reflective tube that channels the light into the work area and a lens that diffuses the light and/or combination of skylights and clerestory windows. Open maintenance and storage sheds shall use hybrid lighting systems with a dome-shape skylights. Provide operable windows for natural lighting and ventilation in administration and shop control, training room, break/training/conference room, and consolidated bench repair shop. Preference will be given for designs providing vision panels in overhead doors.

***AM1 The following paragraph supersedes paragraph 3.1.8 (4):**

3.1.8. Plumbing

(4) Sump Pump. Provide sump pump in maintenance pit and elevator pit. Determine if maintenance pit sump pump shall be explosion-proof type and provide explosion-proof type, if required. Sump pump shall be submersible type and shall be capable of handling small amounts of oil and antifreeze.*

***AM2 The following paragraph supersedes paragraph 5.11.1:**

5.11.1. STANDARDS AND CODES: Sustainable design shall conform to APPLICABLE CRITERIA. See paragraph 6, PROJECT-SPECIFIC REQUIREMENTS for which version of LEED applies to this project.*

APPROVED DEVIATIONS

Provide rough grading, infrastructure trunk mains (water, sewer, communications, gas and electric) and Organizational Vehicle Parking, etc. following a design developed by the Land Development Engineer (LDE) shown in Appendices MM. Coordinate work with LDE and COE Representative. Provide rough grading to entire site, including adjacent COF site, as shown in Appendix J.

Design will be in accordance with the POL Truck Company Area Development Guide in Appendix F. The use of the term "Guide" in titles such as "POL Truck Company Area Development Guide" and "Technical Guide for Information Infrastructure Architecture" does not imply that the requirements of these guides are optional. The requirements of all Guides and standards are mandatory; deviations must be approved by Fort Bliss and the Contracting Officer.

SITE PLANNING AND DESIGN

Plan, design, and construct all functional and technical site requirements listed in this project, including erosion control measures, underground conduit, piping, utility service lines and connections (electrical, communications, cable, water, sewer, stormwater, gas, mechanical), etc. within the project limits. The project limits are shown on the drawings. Base the site design upon conceptual site layouts in Appendix J. The D/B Contractor will be allotted an area as shown in the Access and Haul Route Plans in Appendix J for the placement of a construction trailer complex and storage for the D/B Contractor and all Sub-Contractors. Additional trailer space will not be allocated for Sub-contractors and therefore must be contained within the D/B Contractors' complex/building envelope. Permanent Trailers will not be permitted within the building envelope work areas. Trailers within the work area may be required to be relocated at no additional cost to the Government to accommodate other site activities. D/B Contractor shall be responsible for the site preparation, fencing, access drives, and maintenance of his complex at all times. D/B Contractor shall be responsible for the site preparation and access drives for the adjacent COF complex at all times. An access path shall be provided for emergency response vehicles and jobsite access for the construction trailer complex, building envelope work area, and adjacent COF building envelope work area and shall be clear in the event of fire or medical emergency as per NFPA 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations.

Confine construction limits to the construction site boundaries for the specific facility location for the project. Construction limits shall be confined to the construction site boundaries as shown in Appendix J.

Demarcation: Verify and coordinate demarcation lines for design and demarcation lines for construction as shown in Appendix J, with the Government. The additional cost, if any, resulting from DB Contractor-requested deviations outside the design demarcation lines will be borne by the DB Contractor. Any such deviations must be reviewed and approved by the Government.

SITE ENGINEERING

The following supersedes paragraph 6.4.2:

6.4.2. Geotechnical borings, a boring location map, and raw data on the subsurface conditions described in 5.2.2 are furnished as part of the RFP in Appendix A. Offerors shall note that information provided is for the FY10 THAAD TEMF site which is located adjacent to the FY11 THAAD site. Offerors shall use this data for proposal purposes. After contract award, the successful Contractor shall perform additional subsurface investigations and laboratory analysis to better characterize the site and develop the final design. Investigations and laboratory analysis shall be performed under the direction of a licensed geotechnical engineer and shall be the full responsibility of the Contractor. Changes from the information presented in Appendix A

will be handled in accordance with Clause 52.236-2 DIFFERING SITE CONDITIONS. Refer to Section 01 33 16 DESIGN AFTER AWARD for additional requirements.

Site Structures and Amenities

See Appendix AA, GG, J and MM for additional requirements for Site Structures and Amenities.

ARCHITECTURAL THEME

The architectural theme is identified in the POL Truck Company Area Design Guide. Site and Architectural conceptual drawings that meet this objective are shown in Appendix J, F and AA.

Additional Installation Architectural Requirements:

Standing Seam Metal Roof (SSMR) system with a non-reflective, factory applied color finish is the recommended roof system. Roof systems shall comply with UFC 3-600-01 for applicable fire rating. Roof systems shall be UL 90 rated or Factory Mutual Global (FM) I-90 rated.

Exterior Door Finish Hardware: Provide AR-1 keyways.

Exterior Windows: All operable windows must be lockable.

Exterior Signage: All buildings constructed under this Task Order shall have exterior building identification signs in accordance with Appendix H, Exterior Signage. Exterior building identification signage shall also be provided for Hazardous Waste Storage Buildings and POL Storage Buildings even if providing pre-fabricated, fire-rated, self-contained, movable steel safety storage buildings.

Interior Partitions and Walls:

- a. Walls in areas with direct contact with automotive liquids, such as the Fluid Distribution Room shall be finished with gloss paint for ease of maintenance and cleaning.
- b. Walls in areas with direct contact with water, such as Latrines and Break, Training and Conference Rooms, shall be finished with a semi-gloss paint for ease of maintenance and cleaning.

Interior Door Finish Hardware: Provide AR-1 keyways.

PLUMBING

Automatic infrared metered-flow faucets shall not be used.

Provide low-flow cut-off valves for each automotive lubricant air driven pump assembly identified for the Fluid Distribution Room in Section 01 10 00, paragraph 3.1.2 (12) (h).

SITE ELECTRICAL SYSTEMS

Exterior Communications: Install communications infrastructure as required by the drawings in Appendix J and MM. Cable TV is to be included in the site communications duct bank. Coordinate with Ft Bliss DOIM/NEC Plans Office. Underground conduit and copper voice/data cables extending to any building shall be routed to a specific manhole or hand hole .The buildings shall not be daisy chained together.

FACILITY ELECTRICAL SYSTEMS

Provide one 3-phase, 480V receptacle and one 3-phase, 208V receptacle for radar in one of the repair bay areas as directed by the Government.

Landscaping and irrigation controls – Not Required for TEMFS.

Provide weather-tight through-roof conduit from Comm. Room to roof for installation of communication cable and Government installed roof mounted antenna. Provide accommodations for user-provided VSAT antenna exterior to the TEMF. VSAT antenna shall be adjacent to an interior space capable of supporting the associated user-provided modem case (approximately the size of a medium suitcase). Provide a 3-inch sealable penetration through the exterior wall to allow a cable connection between the VSAT antenna and modem. Provide two (2), 1-inch diameter rigid conduit runs with eight (8), Cat 6 cables (4 per conduit) from the modem case location to above the lay-in ceiling in the Administration and Shop Control space. The eight Cat 6 cables shall be provided with adequate length above the lay-in ceiling to reach any cubical in the Administration and Shop Control space. The D/B Contractor shall also provide design and construction of a steel stand to support the VSAT antenna including appropriate grounding for the antenna, mounting hardware and stand. Provide two (2) bollards of the same size and type identified in the TEMF Standard Design, UFC 4-214-02 to protect the VSAT antenna. Antenna must have a clear line-of-sight to the southwest.

In stairwells with exterior windows, any lighting that is not on an emergency circuit shall be controlled by a switch and photocell.

Arms Rooms / Vaults: A tamper-proof light fixture on a separate switch is to be provided outside the entrance to each Arms Room / Vault. Switch is to be positioned so that unauthorized personnel may not have access.

There shall be a minimum of one telephone outlet/jack for wall mount telephone connected to the telecommunications room with Category 6 cable in all common areas, mechanical rooms, communication rooms, and electrical rooms.

Provide two, 4-inch conduits with pull wires for hardstand security CCTV cabling from demarcation shown on the infrastructure site plans at Appendix MM to a location in the Consolidated Bench Repair to be determined during design. Allow space for end unit/controller cabinet and provide LAN data connection at cabinet location.

HEATING, VENTILATING AND AIR CONDITIONING

Evaporative cooling shall not be used for the TEMF or associated buildings under this Task Order.

Repair, Maintenance and Circulation Bays: Exhaust makeup and ventilation air for all the bays shall be provided by makeup air handling units. Makeup air may be minimally tempered by natural gas although it is not mandatory as other heating media may be used. Continuous mechanical ventilation of the bays to provide makeup air (for all vehicle exhausts, etc.) and people ventilation shall be provided. It is preferred that all mechanical equipment is installed inside the facility. In general, coordination of overhead space with cranes, heating equipment, lighting, etc. is very important.

MECHANICAL

The following paragraph supersedes paragraph 6.11.6:

6.11.6 Integration of Buildings and Facilities into the Existing Fort Bliss Post-wide Energy and Utility Monitoring and Control Systems (EMCS, aka UMCS).

1. The existing post-wide UMCS is an Open Lonworks system; specifically, the system is a Johnson Controls Metasys Utility Monitoring and Control System.

2. All Building and Facility Controls Systems shall be fully integrated into the existing post-wide UMCS. This will include fully testing, commissioning and Government acceptance in all cases.

3. All utility meters shall be connected to the postwide UMCS to enable metering and all other available data to be centrally tracked, monitored and utilized. All meter data shall be mapped and integrated to be fully available at the UMCS; for electric "smart" meters, the number of data points and types of data are significant.

4. All points available to the UMCS from building controls and metering shall be fully trendable.

5. To hookup and integrate the building or facility, the Contractor shall provide all conduit (for instance, from DDC control panel to comm. room for connection and from DDC panel(s) to meters), wiring and comm. cabling to all connected points and devices, power, backup power (as necessary), communications devices (routers, etc.), programming, labor, installation hardware, testing, commissioning, etc. to ensure full integration and complete Government acceptance.

6. The UMCS shall provide supervisory and as desired by the post direct control for energy savings and all normal and available energy savings software routines shall be instrumented and fully implemented in the UMCS integration and local controls. Energy saving controls by UMCS shall include but not be limited to, Scheduled and Optimal Start/Stop, Duty Cycling, Economization, Selection of plant equipment for best efficiency, Trending, Reset of Supply Air and Water Temperatures based upon Loads and space conditions, Reset of space control temperatures. UMCS shall be able to see and control all zone/space temperatures and humidities, where applicable and monitor, log, etc. all building and equipment alarms. UMCS shall be able to control (start/stop, enable) all HVAC equipment. Additionally, UMCS shall be able to do demand limiting control.

7. Specific Requirements:

a. Provide a 3/4" conduit with CAT 6 cable from the UMCS router to the Communication Room for connection to the building LAN.

- b. Main DDC building controls panels, all UMCS, equipment, etc. shall be installed in facility/building mechanical room. Any DDC controls sub-panels shall be installed next to or near the equipment controlled, unless there is an environment problem.
- c. DDC panels and all UMCS and control equipment shall be designed or equipped to handle temperature or humidity conditions in the installed locations for long life.

ENVIRONMENTAL

Add the following paragraph:

6.15.3 Building demolition will involve lead-based paint. Refer to Appendices E and MM.

DEMOLITION

The following supersedes Section 01 10 00, paragraph 6.17.1:

6.17.1 See Appendix E and Appendix MM.

APPENDIX MM
INFRASTRUCTURE PACKAGE
(PROVIDED UNDER SEPARATE COVER)

APPENDIX NN

VEHICLE LISTS

LIN	ERC	MDUIC	NOMENCLATURE	REQ100	AUTH100
G11966	A		GEN SET: DED SKID MTD 5KW 60HZ	1	1
G36237	A		GENERATOR SET DIESEL: 60HZ AC MEP-531A	1	1
G42170	A		GEN SET DED TM: 10KW 60HZ MTD ONM116A2 PU-798	1	1
G74711	A		GEN SET: DED SKID MTD 10KW 60HZ	1	1
L28351	A		KITCHEN FIELD TRAILER MOUNTED: MTD ON M103A3 TRAILER	1	1
P27819	A		POWER PLANT ELEC TM: 30KW 60HZ 2EA PU-406 W/DIST BOX AN/MJQ-10	2	2
S25681	A		SHOP EQUIPMENT: CONTACT MAINTENANCE ORD/ENG TRUCK MOUNTING	1	1
S25885	A		SHOP EQUIPMENT: AUTOMOTIVE VEHICLE	1	1
T41135	A		TRUCK CARGO: MTV W/E W/W	5	5
T58161	A		TRUCK TANK: FUEL SERVICING 2500 GALLON 8X8 HEAVY EXP MOB W/WINCH	3	3
T60081	A		TRUCK CARGO: 4X4 LMTV W/E	1	1
T61239	A		TRUCK TRACTOR: MTV W/E	5	5
T61494	A		TRUCK UTILITY: CARGO/TROOP CARRIER 1-1/4 TON 4X4 W/E (HMMWV)	4	4
T61630	A		TRUCK UTILITY: EXPANDED CAPACITY 4X4 W/E HMMWV M1113	10	10
T61704	A		TRUCK CARGO: MTV LWB W/E	4	4
T61908	A		TRUCK CARGO: MTV W/E	1	1
T63093	A		TRUCK WRECKER: TACTICAL 8X8 HEAVY EXPANDED MOBILITY W/WINCH	1	1
T64618	A		TRAILER: FLAT BED	4	4
T95555	A		TRAILER CARGO: MTV W/DROPSIDES M1095	1	1
T95924	A		TRAILER CARGO: HIGH MOBILITY 1-1/4 TON	4	4
T95992	A		LIGHT TACTICAL TRAILER: 3/4 TON	1	1
V12141	A		TANK AND PUMP UNIT LIQUID DISPENSING TRUCKMOUNTING:	1	1
V19950	A		TANK UNIT LIQUID DISPENSING TRAILER MOUNTING:	1	1
W98825	A		TRAILER TANK: WATER 400 GALLON 1-1/2 TON 2 WHEEL W/E	1	1
Z00825	A		SPARES TRANSPORT STATION (STS): THAAD	6	6
Z05702	P		ANTENNA EQUIPMENT UNIT: (AEU) RADAR	1	1
Z19584	A		COOLING EQUIPMENT UNIT: (CEU) RADAR	1	1
Z35461	A		BATTERY LOGISTICS OPERATIONS CENTER (BLOC): THAAD	2	2
Z38235	A		ELECTRONIC EQUIPMENT UNIT: (EEU) RADAR	1	1
Z75894	A		PRIME POWER UNIT: (PPU) RADAR	2	2
Z82646	P		THAAD TRANSPORTER: (THAAD)	9	9

***AM 2 APPENDIX OO
PRIVATIZED UTILITY SERVICE AGREEMENTS**

**Rio Grande Electric Co-op
Fort Bliss Water Services Co.
Texas Gas Service Company***

Added by Amendment 002

Thursday, November 18, 2010

APPLICATION FOR ELECTRIC CONNECTION/COOPERATIVE SERVICE AGREEMENT

Consumer Information:

(Please list name(s) as you wish them to appear on your account.)

Type of Service Requested:

Corporation (s) *(Please Print)*: _____

Residential

Mailing Address: _____

Industrial

Office

School

Other _____

Corporate Project POC: _____ Alternate POC: _____

Telephone #: _____ TPIN: _____

Government Entity Requesting Service: _____

Government POC: _____ Telephone # of POC: _____

Physical Address/Location of Requested Service: _____

Government Contract Number: _____

GPS Coordinates of Service Requested: _____

Other Contact Information (email address, etc.): _____

Payment Options:

Full Payment Prior to Beginning Work (Required for Temporary Connections)

Purchase Order

Partial Payments (Required for Work >\$100,000)



Application for Service

Name: _____

Type of Facility: _____
 (Restaurant, office bldg, store, irrigation)

Total Bldg. Sq. Footage: _____

1-Phase

3-Phase

Service Requirements: _____ 120 / 240 volts
 _____ 120 / 208 volts
 _____ 277 / 480 volts
 _____ Other (Subject to RGEC Review)

Meter Required: Yes No

Type of Service Requested: Overhead Underground
 Secondary Riser Other _____

Service Entrance Equipment: _____ amps
 (Panel rating in amps)

Total Connected Load:	<u>kW</u>	<u>kva</u>
Lighting Loads		
Indoor	_____	_____
Outdoor	_____	_____
Receptalce Loads	_____	_____
Kitchen Equipment	_____	_____
Air Conditioning	_____	_____
Heating	_____	_____
Other	_____	_____

Motors Description	Full Load HP	Rated Voltage	Single Phase	Three Phase
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Customer Signature: _____ Date: _____

SERVICE AGREEMENT

The undersigned (hereinafter called the "Consumer") hereby applies for electrical service in, and agrees to electrical service connection from RIO GRANDE ELECTRIC COOPERATIVE, INC., (hereinafter called "RGEC") upon the following terms and conditions:

1. SERVICE. RGEC agrees to provide electric service (including but not limited to the supply of electric power) to Consumer at the point of delivery above specified, being the secondary spades of the pad mounted transformer or the weatherhead of an overhead service connection , the point where the electric energy first leaves the line or equipment owned by RGEC and enters the line or equipment owned by Consumer. The point of delivery shall be the point at which RGEC's legal responsibility ends and the Consumer's legal responsibility commences. Consumer understands that the electric energy provided may have reasonable variation in frequency and voltage. Consumer agrees to take and use electric energy exclusively for the operations of Consumer's equipment as specified above; however, if no equipment is specified, then Consumer agrees to take and use electricity exclusively for the type of service indicated above.

2. PAYMENT. Consumer agrees to pay for electric service in accordance with RGEC's above stated schedules in effect for like conditions of service to the class of service furnished hereunder. Should the specifications furnished under this Agreement require amendment or revision by RGEC, or by order or consent of any relevant Authority, such change will require applicable change order and consideration of associated cost. Consumer agrees to pay the total amount shown on the Work Order Payment Agreement, including any applicable use, sales, or excise taxes on or before the due date set out on the statement. The Consumer is responsible for paying their bill by the due date , and if the payment is not received by RGEC on time, the Consumer will be charged a late fee of 5% of the amount due.

3. ADDITIONAL TERMS. The electrical service contracted for in this Agreement is to be provided and taken in accordance with the provisions of this Agreement for electric service, all applicable laws and Regulations, the provisions of any supplemental Agreement for a particular class of service required by RGEC, and RGEC's service Regulations and Tariffs on file with the Public Utility Commission of Texas including any and all amendments that may be approved or ordered in the future by the relevant Regulatory Authority. THE SERVICE REGULATIONS AND TARIFFS ARE INCORPORATED BY REFERENCE IN AND ARE A PART OF THIS AGREEMENT TO THE SAME EXTENT AS IF SET OUT IN THIS AGREEMENT AND ARE ON FILE AND AVAILABLE AT RGEC'S AREA OFFICES.

4. RESALE. Consumer understands and agrees that the electric service provided under this Agreement is not to be resold, except with RGEC's written consent.

5. EASEMENTS, RIGHTS OF ACCESS. Consumer shall, at Consumer's expense, upon being requested to do so by RGEC, execute and deliver to RGEC, in form and content acceptable to RGEC, one or more grants of easement or rights-of-way over, on and under such lands owned or leased to or by or mortgaged to or otherwise controlled by Consumer, and in accordance with such reasonable terms and conditions including as to the location of such easement, as are necessary for the furnishing of electric service to Consumer. Consumer agrees that RGEC's employees are hereby granted rights of ingress and egress to facilities providing service and otherwise in order to carry out the provisions of this Agreement. RGEC must have access to facilities at all times and if RGEC facilities are within a fence, RGEC shall place its lock on gate. Consumer likewise agrees that non-employee representatives and assigns of RGEC are hereby granted such rights of ingress and egress, subject to the consent of Consumer, which consent shall not be unreasonably withheld.

6. CONTINUITY OF SERVICE. RGEC shall use reasonable diligence to provide constant and uninterrupted electric power; however, if electric power or service should fail or be interrupted, or become defective, or be reduced through act of God, governmental authority, action of the elements, public enemy, accident, strikes, labor trouble, maintenance, repair or upgrading work, or any cause beyond the reasonable control of RGEC, RGEC shall not be liable under the provisions of this Agreement.

7. TERM. The acceptance of this instrument by RGEC shall constitute an Agreement between Consumer and RGEC. The contract for electric service shall continue in force (i) from the date service contract is agreed upon electrical service is made available by RGEC to the Consumer, or (ii) in the event of a contract for temporary service, for a specified shorter period. The monthly billing period shall start when the installation of electrical facilities begins and end on the official end of calendar month, but shall not start later than 30 days after service described in this Agreement is made available to the Consumer.

8. BREACH/DISCONTINUANCE OF SERVICE. Notwithstanding any other provisions of this Agreement, RGEC may discontinue service if Consumer has breached any portion of this Agreement by failure to make timely payment or otherwise, provided RGEC has given Consumer notice in accordance with the applicable Rules of the Regulatory Authority regarding discontinuance of service.

9. NOTICE. All notice required to be given under the terms and provisions of the Agreement may be given by mailing the notice to the other party by United States mail addressed to: (i) the mailing address indicated above, as such address may be changed from time to time by either party by means of written notice given to the other party or (ii) by notice given by RGEC to Consumer at the mailing address given to RGEC through U.S. Postal Service in the event notice to a Consumer's mailing address provided for pursuant to this Application is not deliverable. The notice shall bear the date of its mailing, and shall be effective on and after that date or such other date as is specified in the notice.

10. EFFECTIVE DATE/NOTIFICATION. Notwithstanding anything contained in this Agreement, this Agreement shall not become effective and is not binding until executed by RGEC and Consumer. No modification or alteration of this Agreement, except as specifically provided for in this Agreement shall be binding on either party unless reduced to writing and signed by the parties.

Initials
of
applicant(s)

11. WAIVER. No waiver, expressed or implied, of any breach of any one or more of the covenants or Agreements set out in this Agreement shall be deemed to be a waiver of any subsequent breach.

12. CONSUMER'S EQUIPMENT. The Consumer shall have the status of bailee of RGEC's equipment and facilities located on Consumer's premises. "Status of bailee" means the consumer is the "custodian" of the equipment, and as such, is responsible for seeing that no harm comes to it while on the consumer's property. Commencing with equipment at the uppermost portion of the meter pole, Consumer will be responsible for obtaining, installing and maintaining in good condition all switches, protective equipment adequate to protect operations and facilities of RGEC and of Consumer from adverse physical effects of power furnished to Consumer, and wiring, including three-phase protective equipment. Such equipment must meet standards equal to or higher than those of the National Electric Safety Code or American National Standards Institute. Consumer agrees to indemnify and hold harmless RGEC from and against any and all costs, claims, death or injury to any person, injury or destruction to any property or damages of any kind arising in whole or in part from Consumer's facilities, switches, protective equipment or wiring.

13. ENTIRE AGREEMENT/LAW GOVERNING. Except to the extent of any supplemental Agreement duly executed between Consumer and RGEC for the described service, RGEC, its agents and employees have made no representations, promises, nor made any inducements, written or verbal, which are not contained in this Agreement. Consumer agrees that it is not relying on any statements not contained in this Agreement. This Agreement shall be construed and governed in accordance with the laws of the State of Texas.

14. ASSIGNMENT. This Agreement shall not be assigned by Consumer, except in accordance with the Articles of Incorporation, Bylaws, and Rules and Regulations of RGEC. This Agreement shall inure to the benefit of RGEC's assigns.

15. LIMITATIONS OF LIABILITY AND INDEMNITY OF RGEC FOR INJURIES AND DAMAGE. RGEC shall not be liable for injuries and/or damage caused by or resulting from failure to furnish electric energy and services of any kind and amount contracted for, to the extent such liability is limited by the provisions of RGEC's Service Regulations. Consumer agrees to indemnify RGEC from and against claims arising from RGEC's furnishing of electric energy to Consumer to the extent provided for by the provisions of RGEC's Service Regulations contained in its Tariff. Under no circumstances will RGEC be liable for consequential damages.

16. METER TAMPERING. In the event RGEC reasonably determines that its meters or equipment have been tampered with or bypassed, Consumer agrees to pay RGEC's statement or statements reflecting the highest estimated usage of electricity by Consumer for the longest period of time such tampering or bypassing may have continued consistent with relevant Rules of the Regulatory Authority. RGEC's statement or statements estimating usage of electricity shall be presumed accurate.

Signature of Applicant _____ **Date:** _____

Signature of Joint Applicant, if any: _____ **Date:** _____

Initials of applicant(s)

Acknowledgement

I have read the materials contained in Service Application Packet and

1. I have received a copy of the meter loop specifications, and I am aware that I am responsible for having my contractor/electrician build my meter loop to the exact specifications outlined and illustrated in this Application for Electric Service/Cooperative Service Packet, if new structure, or that I may obtain a meter loop directly from RGEC. If service is to an existing structure, I am responsible for assuring that meter loop construction meets RGEC specifications. I further agree that the minimum and maximum pole specifications, pertaining to height and type outlined in this document will be observed.
2. I am aware that if service has to be constructed, the billing is required immediately , regardless of whether a meter has been connected.
3. I acknowledge that I have received a copy of the Easement form included with this Application for Service packet, that I agree to said easement, and will strictly abide by the terms and conditions expressed therein.

I HEREBY VERIFY THAT I HAVE READ AND UNDERSTAND EACH OF THE ABOVE CONDITIONS FOR SERVICE.

Applicant Signature

Date

Applicant Signature

Date

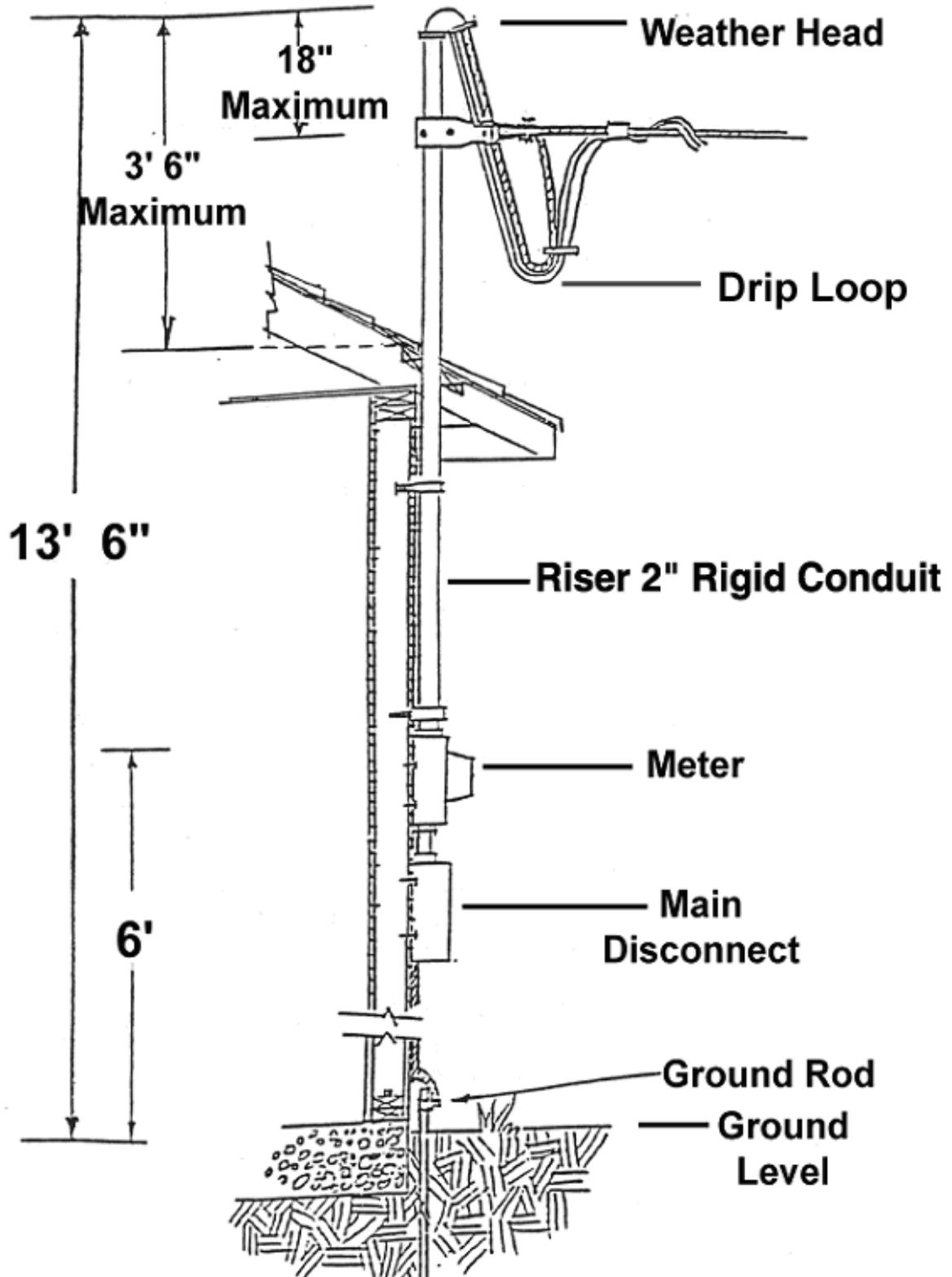
Initials of applicant(s)

METER LOOP SPECIFICATIONS HOUSE OR STRUCTURE MOUNTED

1. Construction and installation of meter loop is consumer's responsibility.
2. Weather head shall be no less than 13 ½ feet above ground level.
3. Position of meter loop and weather head on building shall be as per applicable drawing attached hereto.
4. Conductor (wire) shall extend out of weather head 18 inches. Neutral wire shall be marked.
5. Top of meter base shall be 6 feet above ground level.
6. Meter loop mast shall be rigid conduit or steel pipe as per applicable drawing attached hereto.
7. Conductor (wire) size will be in accordance with service load. Minimum size shall be number 6 copper. Aluminum wire is not acceptable in meter loop.
8. Any meter loop delivering power out the bottom of the main disconnect switch to underground service or utility outlet shall have a covered neutral at top of pole and connected to the center lug on the meter base.
9. Consumer/ Member will provide a driven ground rod at meter loop location. Ground rod shall not extend over three inches above ground level.
10. Consumer/Member shall connect grounding lug of meter base to the driven ground rod with number 6 copper wire.
11. Center lug of meter base shall be connected to the neutral bar of the main disconnect switch with a minimum number 6 copper conductor.
12. Main disconnect switch box or breaker panel shall be rain tight. (weather proof)
13. Meter loop must conform to applicable National Electrical Safety Code Requirements and National Electric Code.
14. Meter loop must be on site at time of construction; if not a trip fee of \$20.00 will be assessed to connect meter loop. If meter loop does not meet specifications contained herein and a return trip is necessary, member will be assessed a \$20.00 fee.

Please see diagram on following page.

Rio Grande Electric Cooperative, Inc. METER LOOP SPECIFICATIONS



Rev. 07/09

EPFB-13

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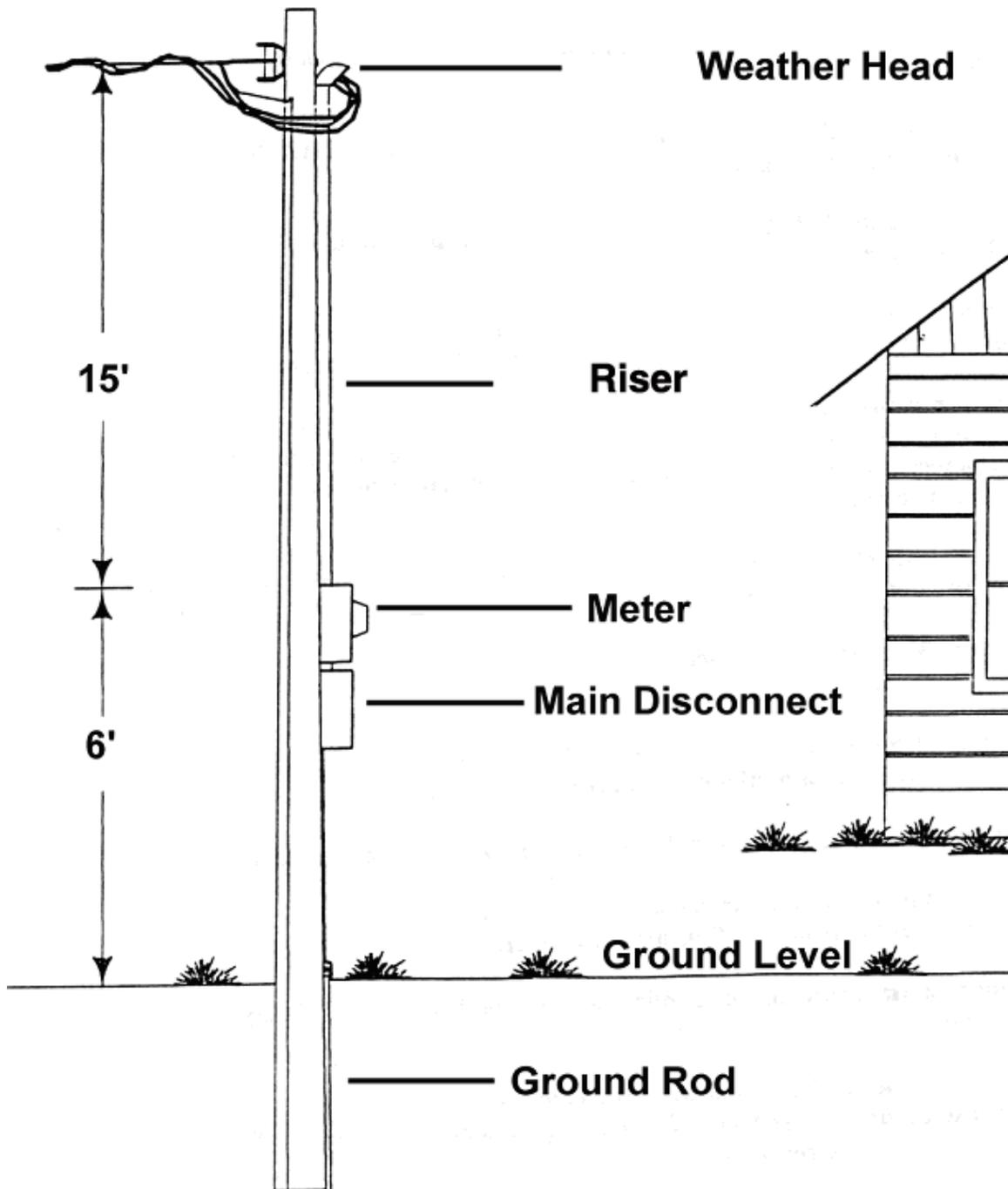
Thursday, November 18, 2010

POLE MOUNTED METER LOOP SPECIFICATIONS

1. Construction and installation of meter loop is consumer's responsibility.
2. Length of meter loop riser from top of meter base to weather head shall be 15 feet.
3. Wire shall be extended out of weather head 18 inches. Neutral wire shall be marked.
4. Top of meter base shall be 6 feet above ground level. Meter base will be provided by the Cooperative.
5. Meter loop riser shall be metal conduit or steel pipe, minimum 1 ¼ inch.
6. Conductor (wire) sizes will be in accordance with service load. Minimum size shall be number 6 copper. Aluminum wire is not acceptable in meter loop.
7. Any meter loop delivering power overhead shall have a separate conduit from the breaker box for the load side conductor.
8. Consumer/Member will provide a driven ground rod at meter loop location. Ground rod shall not extend above ground level.
9. Consumer/Member shall connect grounding lug of meter base to pole ground with number 6 copper conductor (wire).
10. Center lug of meter base shall be connected to the neutral bar of the main disconnect switch with a minimum number 6 copper conductor.
11. Main disconnect switch box or breaker panel shall be rain tight. (weather-proof)
12. Meter loop must be secured to meter pole with no less than three (3) clamps. Clamps, nails/screws to be furnished by Consumer/Member.
13. Meter loop must conform to applicable National Electrical Safety Code Requirements and National Electric Code.
14. Meter loop must be on site at time of construction; if not, a trip fee of \$20.00 will be assessed to connect meter loop. If meter loop does not meet specifications contained herein and a return trip is necessary, Member will be assessed a \$20.00 fee.

Please see diagram on following page.

POLE MOUNTED METER LOOP SPECIFICATIONS



*** Pole Furnished By RGEN**



WORK ORDER PAYMENT AGREEMENT

Line Extension Type _____

Consumer: _____ Area: _____

WORK ORDER DESCRIPTION

Estimated Cost: \$ _____ Allowance: \$ _____ CIAC: \$ _____

The Consumer hereby agrees to pay the actual cost of this Work Order less any applicable allowance. Consumer agrees to pay in advance the CIAC (Contribution In Aid of Construction) amount shown above. Consumer understands that the Actual Cost of this Work Order may be more or less than the Estimated Cost shown above. If the Actual Cost of this Work Order is less than the Estimated Cost shown above the Consumer will be refunded the difference. Conversely, if the Actual Cost of this Work Order exceeds the Estimated Cost shown above the Consumer will be required to pay the difference.

Consumer agrees that all payments received from the Consumer and applied to the actual cost of this project shall be considered Contribution in Aid of Construction and are not refundable.

The Consumer further agrees that Rio Grande Electric Cooperative, Inc. shall retain ownership of all facilities constructed under this Work Order.

The Estimated Cost shown above is subject to change after a period of 60 days.

CONSUMER'S SIGNATURE Date: _____

NAME AND ADDRESS

For Office Use Only

Invoice #: _____ Received By: _____
Invoice Date: _____ Date: _____
Work Order : _____ *Check #: _____
Amount Paid: \$ _____
Remarks: _____

* Please Attach Copy of Check

For RGEC Office Use Only:

Name of Membership: _____

Work Order # _____

Map # _____

Rate Class Requested:

- Residential
- Industrial
- Office
- School
- Other _____

Frequency: 60 Cycle/Sec.

Delivery Voltage: _____

Phase: Single
 Three

Primary 480 Volts
 120/240 Other (Specify) _____

Maximum Electrical Load: Amps? _____

Other: _____

=====

Required Attachments – Engineering:

- Cost Estimate with cost detail
- Scope of Work
 - Projected Design
 - Corp of Engineers Drawing Number _____

=====

The above Application for Electric Service/Cooperative Membership is hereby accepted this _____

day of _____, _____.
(month) (year)

By: _____

Title: _____

Service Agreement

This Service Agreement (this "Agreement") is entered into effective as of _____ (the "Effective Date") by and between [insert name of contractor] (the "CONTRACTOR") and Fort Bliss Water Services Company ("COMPANY"). CONTRACTOR and COMPANY shall sometimes be referred to herein as each a Party or together the Parties.

WHEREAS, COMPANY entered into Contract No. SP0600-04-C-8265 with the United States Government (the "Government") to furnish all services required for the complete ownership, operation, maintenance, repair, upgrade and improvement of water distribution and /or wastewater systems (the "Utilities Privatization Contract") at Fort Bliss, TX (the "Post");

WHEREAS, pursuant to the Utilities Privatization Contract and the associated Bill of Sale and Easement, COMPANY owns the existing water and/or wastewater systems at the Post (the "Privatized Systems");

WHEREAS, the CONTRACTOR has entered into a contract with the US Army Corps of Engineers for the construction of [insert name of project] (the "Project");

WHEREAS, [insert name of design firm] (the "Designer") has entered into a contract with the US Army Corps of Engineers for the design of the Project;

WHEREAS, the CONTRACTOR requires construction of certain modifications and improvements to the Privatized Systems (the "Improvements") necessary for the supply of [insert water or wastewater or water and wastewater] to the Project;

WHEREAS, the CONTRACTOR desires to have COMPANY perform certain services as further described in this Agreement (the "Services") and relating to the construction of the Improvements; and

WHEREAS, the Parties recognize that it is in their mutual best interests to reach agreement concerning the terms and conditions of their cooperation in connection with the Project.

NOW, THEREFORE, the undersigned, for good and valuable consideration consisting of the mutual promises, covenants and agreements set forth herein, the receipt and sufficiency of which are hereby acknowledged, agree as follows:

1. Term

The term of this Agreement shall commence on the Effective Date and shall terminate upon COMPANY's receipt of final payment (the "Term"). The Term may be extended or renewed by mutual agreement of the parties in writing.

2. Compensation

The compensation to be paid to COMPANY for the Services during the Term shall be in accordance with Exhibit A to this Agreement.

3. Payment

Detailed invoices for payment shall be submitted on a monthly basis, no later than the 23rd of the month, by COMPANY to CONTRACTOR at the address set forth below. Invoices shall contain an itemization of the work performed for the payment period covered by the invoice. CONTRACTOR will pay COMPANY's invoices within thirty (30) calendar days of receipt and thereafter be subject to late fees on any delinquent

SERVICE AGREEMENT
ASUS T-250 (JUL 10)
PROPRIETARY AND CONFIDENTIAL

amount at the rate of 12% per year compounded monthly or the maximum rate allowed by law, whichever is lower.

[insert address for submission of invoices]

4. Pre-construction Meetings and Project Progress Review Meetings

CONTRACTOR for the Project will confer with COMPANY concerning any proposed changes in the schedule for the Improvements. COMPANY' engineer and (or) inspector ("Inspector") shall be invited to attend pre-construction meetings, project progress meetings and job conferences where the purpose of such meetings/conferences will include discussion of the development and construction of the Improvements.

5. COMPANY Review of Construction Documents

- a. CONTRACTOR and COMPANY have reviewed and approved copies of the construction plans and specifications for the construction of the Improvements (the "Plans and Specifications"). In the event that any modifications to Plans and Specifications are required to be made, then within Twenty-One (21) calendar days after COMPANY's receipt of such proposed modifications to the Plans and Specifications (the "Approval Period"), COMPANY shall, utilizing COMPANY's engineer, review such Plans and Specifications and notify CONTRACTOR of COMPANY's approval of such modifications in order to ensure that the proposed modifications to the Plans and Specifications comply with the applicable COMPANY Standards and Specifications (as defined in Exhibit "B" hereto) and military, state and local standards. The COMPANY Standards and Specifications and military, state and local standards are referred to herein collectively as (the "Applicable Standards").
- b. COMPANY shall not be responsible for the design of the Improvements by virtue of COMPANY's review and approval of the Plans and Specifications, Shop Drawings, RFDs or other documents (hereinafter collectively and individually the "Documents"). Such reviews and approvals shall in no way be considered a certification by COMPANY and shall not relieve Designer or the CONTRACTOR of any responsibility for errors or omissions contained therein, nor shall such review operate to waive or modify any provision contained in the Documents.
- c. CONTRACTOR will: (i) ensure that the Designer understands the requirement to design the Improvements to meet all capacity/load requirements; (ii) obtain all necessary permits, approvals and licenses from applicable federal, state or local agencies and COMPANY, including Texas Commission on Environmental Quality permits (submitted in COMPANY name under the signature of the COMPANY Utility Manager) and COMPANY connection permits; and (iii) ensure that all requirements for transfer of the Improvements to COMPANY in accordance with this Agreement have been met.

6. Cutting, Capping and Reconnection Work

The "Cutting, Capping and Reconnection Work" means the cutting and capping of the pipes and installation of line stops and new or replacement valves on the Existing Systems at the point of connection to the Existing System to ensure the integrity of the Utility Systems, as well as the making of the physical connection between the Improvements and the Post Systems. For the purposes of this Agreement, the "Existing Systems" means the existing water distribution and wastewater systems that are presently located on and/or adjoining the Project site, the "Post Systems" means those portions of the Privatized Systems which are not included in the Existing Systems and the "Privatized Systems" means the existing water and wastewater systems at [indicate location]. COMPANY will perform the Cutting, Capping and Reconnection Work in accordance with the Applicable Standards.

SERVICE AGREEMENT
ASUS T-250 (JUL 10)
PROPRIETARY AND CONFIDENTIAL

7. Right to Demolish Existing Systems

COMPANY does not grant CONTRACTOR the right to demolish any parts of the Existing Systems owned by COMPANY. The Parties acknowledge that COMPANY owns title to all Privatized System assets at all times relevant to this Agreement.

8. Construction of the Improvements

The Parties acknowledge that under the Utilities Privatization Contract, COMPANY will be the owner of the Improvements. COMPANY will construct the improvements in accordance with the requirements of Exhibit B.

9. Interruptions of Service

If CONTRACTOR at any time reasonably requires that the Post Systems be shut down (*e.g.*, in connection with any work that COMPANY may be performing as referenced in this Agreement) (the "Shut-Down Work"), then COMPANY shall shut down Post Systems at CONTRACTOR's expense in accordance with COMPANY interruption of service protocols at a time mutually convenient to both CONTRACTOR and COMPANY, subject to COMPANY's consulting with, and obtaining approval from, the Government regarding the Shut-Down Work; it being agreed that COMPANY shall use good faith efforts to expeditiously accommodate Contractor's schedule for the work under this Agreement (including accommodating such required shut down of the Post Systems). COMPANY shall not be responsible for any delays resulting from the Government's failure (or refusal) to approve timely temporary shutdown of the Post Systems during any given time period.

10. Reserved

11. Repairs to Damage to Privatized Systems

To the extent that Privatized Systems are damaged as a result of or in connection with the CONTRACTOR's work on the Project, COMPANY shall be responsible for making the repairs it deems necessary at the sole expense of CONTRACTOR.

12. Work on Post Systems to Accommodate Improvements

If additional equipment and/or services (outside of the Project site) are required to ensure that the Post Systems provide water supply and/or wastewater effluent flow to/from the Improvements which complies with the Applicable Standards (as a result of deficiencies in the Post Systems), then COMPANY and/or its contractors and subcontractors shall procure such additional equipment/materials and services (*e.g.*, additional pumps and related pipes) as shall reasonably be necessary to ensure that the Post Systems provide water supply and wastewater effluent flow which complies with the Applicable Standards (the "Connection Work"). Such procurement of additional equipment and/or performance of additional services shall be performed pursuant to a modification(s) to COMPANY's Utilities Privatization Contract issued by the Government. COMPANY shall not be obligated to perform such Connection Work until the Government has issued such modification(s) to COMPANY's Utilities Privatization Contract regarding same. COMPANY shall request such a modification from the Government within ten (10) business days from receiving written notice from CONTRACTOR concerning the need for Connection Work, assuming that CONTRACTOR provides COMPANY with the requisite information necessary to present its request for such a modification to the Government. COMPANY shall not be responsible for any delays resulting from the Government's failure to issue timely such a modification for such Connection Work (or the Government's refusal to issue such a modification). CONTRACTOR shall not be permitted to perform such Connection Work. Notwithstanding the foregoing, CONTRACTOR, at its option and expense, can redesign the Improvements to avoid the requirement for any additional equipment so long as such redesign complies with the Applicable Standards and all applicable laws and regulations. Moreover, CONTRACTOR may fund the Connection Work pending

SERVICE AGREEMENT
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COMPANY' receipt of the modification from the Government; provided, however, that CONTRACTOR shall have the right to thereafter review and approve the design or construction of such work; and provided, further, that notwithstanding this right of review, the Connection Work will be performed in accordance with Applicable Standards. In the event that CONTRACTOR funds the Connection Work and COMPANY later receives a modification to COMPANY's Utilities Privatization Contract, then COMPANY shall be required to reimburse CONTRACTOR for the costs and expenses otherwise incurred by CONTRACTOR to the extent the modification covers costs funded by CONTRACTOR. In the event that CONTRACTOR funded connection work is non-compliant in any way with the requirements of the Government modification, COMPANY shall have the option to require CONTRACTOR to immediately correct such work to meet the modification requirements. Cost for such rework will not be covered by COMPANY unless previously approved by COMPANY.

13. Risk of Loss

Upon commencement of demolition of Existing Systems or construction of the Improvements, whichever is earlier, risk of loss to the Existing Systems (but not title) shall pass to CONTRACTOR. Notwithstanding any other term in this Agreement, the risk of loss to the Existing Systems and the Improvements shall not transfer to COMPANY until the Government transfers title to the Improvements to COMPANY. All responsibilities for losses or contingencies not otherwise provided for hereunder remain with CONTRACTOR until such transfer to COMPANY, and upon such transfer, COMPANY assumes responsibility only for the duties and obligations imposed by the Utilities Privatization Contract.

14. General Provisions

- a. *Indemnification.* Except to the extent caused by the negligence or willful misconduct of COMPANY or any employee, agent, contractor, subcontractor, invitee, officers, members, directors, affiliates, principals or managers of COMPANY, CONTRACTOR shall indemnify and hold COMPANY and any employee, agent, contractor, subcontractor, invitee, officers, members, directors, affiliates, principals and managers of COMPANY as well as American States Water Company and American States Utilities Services, Inc. and all their affiliates, subsidiaries, contractors and subcontractors, harmless from and against all claims, damages, losses, liabilities and expenses, including but not limited to reasonable attorneys' fees ("Losses"), arising out of or related to negligence or willful misconduct in the demolition of the Existing Systems, the Cutting, Capping and Reconnection Work or the construction of the Improvements by CONTRACTOR or CONTRACTOR's agents, contractors, subcontractors, consultants, engineers, designers, employees, officers, members, directors, affiliates, principals, or managers (the "Indemnification Obligation"). Such Indemnification Obligation shall not be waived or reduced because COMPANY approved, required modification of or did not require modification of any document submitted by or on behalf of CONTRACTOR, or CONTRACTOR's agents, contractors, subcontractors, consultants, engineers, designers, employees, officers, members, directors, affiliates, principals, or managers, concerning or relating to the demolition of the Existing Systems, the Cutting, Capping and Reconnection Work or construction of the Improvements. In the event that COMPANY is subject to any claim or becomes aware of any allegation that is within the scope of the CONTRACTOR's Indemnification Obligation, COMPANY shall give CONTRACTOR timely written notice thereof, and CONTRACTOR shall be responsible for the reasonable costs of COMPANY's defense of the claim, including but not limited to attorney fees, expert and consultant costs, court costs, and the cost of COMPANY's personnel assigned to assist and manage the defense. CONTRACTOR shall also be responsible for complete and active cooperation with COMPANY in the defense of the claim without compensation from COMPANY. At the sole option of COMPANY, COMPANY may give CONTRACTOR the opportunity to control the defense or settlement of such claim, and in such case, COMPANY will reasonably cooperate in CONTRACTOR's defense of any such claim or allegation at CONTRACTOR's expense.

SERVICE AGREEMENT
ASUS T-250 (JUL 10)
PROPRIETARY AND CONFIDENTIAL

- b. *Invalidity.* Whenever possible, each provision of this Agreement will be interpreted in such a manner as to be effective and valid under applicable law, but if any provision of this Agreement is held to be invalid, illegal, or unenforceable in any respect under any applicable law or rule, such invalidity, illegality or unenforceability will not affect any other provision, but this Agreement will be construed and enforced as if such invalid, illegal, or unenforceable provision had never been contained herein, and a new, enforceable provision shall be substituted which accomplishes the intent of the severed provision as nearly as practicable.
- c. *Governing Law.* This Agreement shall be construed, interpreted and governed in accordance with the laws of the State of [insert state in which Project located] without reference to its rules relating to conflict of laws.
- d. *Survival.* The following sections of this Agreement shall survive the expiration or termination of this Agreement: 2, 3, 5.d, 9, 11, 13, 14. The indemnification obligations under this Agreement shall remain in effect following the expiration of this Agreement only with respect to occurrences (to which such obligations apply) that occur during the Term.
- e. *Notices.* All legal notices and other communications required or desired to be given under this Agreement may be affected, either by personal delivery in writing or by certified mail, return receipt requested. Notice shall be deemed to have been given when delivered or mailed to the parties at their respective addresses as set forth below or when mailed to the last address provided in writing to the other party by the addressee.

If to COMPANY:

[insert point of contact and address]

If to CONTRACTOR:

[insert point of contact and address]

- f. *Counterparts.* This Agreement may be executed in separate counterparts, any one of which need not contain signatures of more than one Party, but all of which taken together shall constitute the same agreement.
- g. *Assignment.* Except as expressly indicated herein, this Agreement is intended to bind and inure to the benefit of and be enforceable by COMPANY, the CONTRACTOR and their respective heirs, legal representatives, successors, and permitted assigns. Each Party may assign such Party's interest in this Agreement to any successor or assign of such Party that is an "Affiliate" of such Party, by providing thirty (30) business days' notice to the other Parties (but without any requirement to obtain the other Parties' approval to such assignment). "Affiliate" means, with respect to a Party, a person or entity that controls, is controlled by, or is controlled by a person or entity that also controls, such Party. CONTRACTOR may also, subject to COMPANY's prior written approval (which approval COMPANY agrees not to unreasonably withhold or deny), assign its interests in this Agreement to any person or entity that is not an Affiliate of CONTRACTOR. COMPANY may, subject to CONTRACTOR's prior written approval (which approval CONTRACTOR agrees not to unreasonably withhold or deny), assign its interest in this Agreement to any person or entity that is not an Affiliate of COMPANY. In addition to, and notwithstanding anything in this Agreement to the contrary, no Party shall be permitted to assign such Party's interest in this Agreement unless the proposed successor or assignee (of such Party's interest in this Agreement) assumes all obligations, including indemnification obligations, of the assigning Party under this Agreement and such assignees or successors accept delegation of all duties under this Agreement.
- h. *Dispute Resolution.* Whenever a dispute between the Parties arises concerning this Agreement, the Parties shall attempt to resolve such dispute(s) by discussion and mutual agreement within three (3) business days of receiving written notice of such dispute(s) ("Dispute Notice"). COMPANY shall provide Dispute

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Notices concerning construction of the Improvements within five (5) business days after the day in which COMPANY's Inspector(s) becomes aware of any deficiency(ies). Failing resolution by such mutual agreement, the aggrieved Party shall further document the dispute(s) by notifying the other Party in writing of the relevant facts, identifying unresolved issues, and specifying the clarification or remedy sought. Within five (5) business days after providing such notice to the other Parties, a senior executive of CONTRACTOR and a senior executive of COMPANY, each with authority to resolve the dispute(s), shall meet at a reasonably acceptable location before one (1) mediator, collectively and reasonably chosen by the Parties within five (5) business days of receiving the Dispute Notice, to negotiate, in good faith, a resolution of the dispute(s). Each such executive may be accompanied at such meeting by any engineer, consultant and/or other advisors (including legal counsel) as such executive shall desire. The executive representatives described above shall, at such mediation meeting, conduct a review of the dispute(s) and endeavor, by good faith negotiation with each other, to agree upon a joint decision resolving such dispute(s). Any such joint decision shall be final and binding upon the Parties. Any such joint decision shall be memorialized in writing within one (1) business day after such joint decision is reached. CONTRACTOR and COMPANY shall each pay one-half (1/2) of the fees payable to the mediator for and in connection with such mediation meeting.

If the Parties do not achieve such a joint decision at such mediation meeting, then any Party may elect to resolve such dispute(s) by binding arbitration conducted by the American Arbitration Association ("AAA") in accordance with the AAA Construction Industry Arbitration Rules and utilizing such AAA procedures as may be available to achieve an expedited resolution of the dispute(s). CONTRACTOR and COMPANY shall each pay one-half (1/2) of the fees payable to the AAA for and in connection with such arbitration. The arbitration shall take place in the State of [insert state where Project located], at a location that is reasonably acceptable to the Parties. In addition, the arbitrator is hereby granted discretion to award to any Party(ies) all actual attorney and other professional service fees, investigation costs, and arbitration and/or court costs incurred by such Party(ies) as a result of breach of any provision of this Agreement. The foregoing agreement to arbitrate shall be specifically enforceable in any court of competent jurisdiction. The award rendered by the arbitrator(s) shall be final and judgment may be entered upon it in accordance with applicable law in any court of competent jurisdiction.

In the event of any Dispute in connection with this Agreement, the Courts of [insert state where Project located] shall have sole and exclusive jurisdiction. DUE TO THE SPECIALIZED NATURE OF CONSTRUCTION LITIGATION, EACH PARTY HEREBY WAIVES ITS RIGHT TO A TRIAL BY JURY. Each Party hereby consents to jurisdiction and venue in the State of [insert state where Project located]. This Section shall not apply to any disputes solely between CONTRACTOR and its subcontractors which do not affect COMPANY's rights or interests under this Agreement or the Utilities Privatization Contract. If dispute resolution in accordance with this Section results in a determination that any work performed by CONTRACTOR or its subcontractors fails to comply with applicable documents and/or criteria, CONTRACTOR shall promptly remove and correct such non-compliant work, as applicable, and at its sole expense, in accordance with such determination.

- i. *Insurance.* Each Party shall procure at its own cost and thereafter maintain during the entire period of performance of this Agreement and for at least three (3) years thereafter, the following insurance with an AM Best rated A-VII company or approved substitute:

Type of Insurance	Amount
General Liability	
General Aggregate	\$2,000,000
Products-Completed Operations	\$2,000,000
Personal & Advertising Injury	\$1,000,000
Each Occurrence	\$1,000,000
Auto Liability (any auto)	

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Type of Insurance	Amount
Company owned vehicles Combined Single Limit	\$1,000,000
Hired and non-owned vehicles Combined Single Limit	\$1,000,000
Company owned vehicles Combined Single Limit <i>Applicable to Hazardous Material Transporters</i>	*\$5,000,000
*Note: \$1,000,000 primary and \$4,000,000 in excess liability	
Workers' Compensation	Statutory
Employers' Liability	
Each Accident	\$1,000,000
Disease – Policy Limit	\$1,000,000
Disease – Each Employee	\$1,000,000
Professional Liability (Errors and Omissions)	
Each Claim	\$1,000,000
Annual Aggregate	\$1,000,000

In addition, CONTRACTOR shall, during the Term and for a period of at least three years following completion or termination of this Agreement carry and maintain at its own cost, with such companies as are reasonably acceptable to COMPANY, Commercial Pollution Liability insurance for not less than \$1,000,000 per claim and an annual aggregate of \$2,000,000. Furthermore, CONTRACTOR's General Liability Insurance shall include XCU (explosion, collapse, and underground) hazard coverage and premises operations, independent contractor, and personal injury with employee exclusion deleted coverage. Each Party shall, provide the other Party with certificates of insurance evidencing the coverages and amounts set forth in this Section. The certificates of insurance shall contain a provision that the coverage afforded under the policy(s) will not be cancelled or reduced without thirty (30) days' prior written notice (hand delivered or registered mail) to the other Party. The insurance required under this Section shall contain a waiver of subrogation and a waiver of right of recovery against the other Party and the applicable Indemnitees listed in Section 14.a above in a form satisfactory to the other Party. The other Party and the Indemnitees listed in Section 14.a above shall be included as "additional insureds" with respect to each of the policies described in this Section (other than workers' compensation, employers' liability and professional liability). Each of the policies described in this Section (other than workers' compensation and employers' liability) shall include contractual liability. All policies of insurance procured by the Parties shall be occurrence based and written as primary policies not contributing with, nor in excess of any additional coverages that may be maintained by the other Party or any other Indemnitee listed in Section 14.a. It is understood that insurance coverage described herein does not limit any of the obligations or liabilities under this Agreement. Each Party shall provide renewal or substitute policy certificates not less than thirty (30) days following the renewal or replacement of coverage evidenced on the certificates of insurance. All policies described under this Section shall be issued by licensed carriers acceptable to the other Party and shall contain a provision that coverages afforded under the policies will not be cancelled or not renewed until at least thirty (30) days' prior written notice has been given to the other Party. Each Party agrees to pay any deductible, self insured retention or other amount and to satisfy any condition necessary to allow the other Party to obtain the proceeds of such insurance and any legal defense costs payable under such insurance. Each Party agrees to cooperate in any other way necessary to confer upon the other Party the benefit of being named an additional insured under the Party's insurance policies. Each certificate shall also name the other Party as the "Certificate Holder". COMPANY shall be so named in the following manner:

American States Water Company
 American States Utility Services, Inc,
 Fort Bliss Water Services Company
 630 E. Foothill Blvd.
 San Dimas, CA 91773
 Attn: Risk Services Dept.

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- j. *Termination.* This Agreement shall terminate in the event that the Government terminates the Contractor's construction contract. This Agreement shall terminate in the event that the Government terminates the Utilities Privatization Contract. In the event that termination of the Contractor's construction contract directly results in a material compromise to the integrity of the Privatized Systems, then the CONTRACTOR shall remain liable for re-securing such systems. In the event that termination of the Utilities Privatization Contract directly results in a material compromise of the Improvements, then COMPANY shall remain liable for re-securing such systems.
- k. *Entirety of Agreement.* This document supersedes all prior agreements between the parties, written or oral, and embodies the complete agreement and understanding among the parties written or oral, which may have related to the subject matter hereof in any way, and shall not be amended orally, but only by the mutual agreement of the parties hereto in writing specifically referencing this Agreement. This Agreement sets forth the only agreements pertaining to the Project pursuant to which the CONTRACTOR or any of its Affiliates is obligated to pay money or any other benefit to COMPANY.
- l. *Rights Cumulative.* Except as expressly limited by the terms of this Agreement, all rights, powers and privileges conferred hereunder shall be cumulative and not restrictive of those provided at law or in equity.
- m. *Waiver.* The failure of either Party to seek redress for any violation of, or to insist upon the strict performance of, any term of this Agreement will not prevent a subsequent violation of this Agreement from being actionable by such Party.
- n. *Independent Contractors.* The relationship of COMPANY to CONTRACTOR shall be that of an independent contractor, and COMPANY shall not be an employee or partner of the CONTRACTOR, any entity comprising the CONTRACTOR, or of any of their respective related, subsidiary, co-owned, parent, or affiliated entities ("Affiliates"). COMPANY is not authorized to, and shall not, make or undertake any agreement, understanding, waiver or representation on behalf of CONTRACTOR or its members.
- o. *Headings.* The headings provided herein are inserted for convenience only and shall not be deemed to constitute a part hereof.
- p. *Binding Effect.* This Agreement shall inure to the benefit of and be binding upon the Parties hereto, their heirs, successors, executors and assigns.
- q. *Further Assurances.* On and after the Effective Date, COMPANY and CONTRACTOR shall, at the request of the other, make, execute and deliver or obtain and deliver all such certificates, resolutions and other instruments and documents, and shall do or cause to be done all such other things (including modification of this Agreement) which any Party may reasonably require to effectuate the provisions and the intention of this Agreement.
- r. *Exhibits.* Each and every exhibit referred to or otherwise mentioned in this Agreement is attached to this Agreement and is and shall be construed to be made a part of this Agreement by such reference or other mention at each point at which such reference or other mention occurs, in the same manner and with the same effect as if each exhibit were set forth in full at length every time it is referred to or otherwise mentioned.

IN WITNESS WHEREOF, the Parties have hereby executed this Agreement as of the date first written above.

CONTRACTOR:

By: _____

Name: _____

Title: _____

COMPANY:

By: _____

Name: _____

Title: _____

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Exhibit A

Additional Compensation Provisions

[Insert the following schedules:

Schedule A-1: Price Summary (with separate line items for construction, outside engineering services, COMPANY direct expenses, G&A adder, taxes, profit and Total Project Cost)

Schedule A-2: construction cost break down by unit of work

Schedule A-3: outside engineering services cost breakdown by company

Schedule A-4: COMPANY direct expenses by labor category]

1. Definitions

“Applications for Payment” shall mean the COMPANY’s requests for payments prepared in accordance with this Exhibit A.

“Schedule of Values” shall mean the above information, which allocates the entire Price to the various portions of the Work. The Schedule of Values shall be used in the preparation and review of COMPANY’s Applications for Payment.

“Price” shall mean the “Total Project Cost” shown above.

2. Progress Payments

Applications for Payment for work performed prior to completion of the work (i.e., “Progress Payment Requests”) shall be prepared in the following manner. Progress Payment Requests for the unit price based work set forth on Schedule A-2 above shall be based on the number of units completed. Progress Payment Requests for the engineering services set forth in Schedule A-3 and COMPANY direct expenses set forth in Schedule A-4 above shall be based on COMPANY’s estimate of the percentage completion of the Project. An appropriate pro-rata share of the G&A, Taxes and Profit amounts shown in Schedule A-1 shall be included on each such Application for Payment.

3. Final Payment

3.1 COMPANY’s final Application for Payment shall be for the Price less the cumulative total of previously submitted Progress Payment Requests.

3.2 Contractor and Company shall negotiate appropriate adjustments to the Price to reflect changes to the work described above and elsewhere in this Agreement, including but not limited to changes resulting from concealed or unknown physical conditions that are encountered at the site that differ materially from those indicated in Exhibit B or from those conditions ordinarily found to exist.

4. Exclusions

The following are not included in the Price:

[list all exclusions]

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Exhibit B

Scope of Work

COMPANY shall construct the Improvements in accordance with the Company Standards and Specifications and the attached documents, which are made a part hereof. The “Company Standards and Specifications” shall mean the following documents:

[List]

In the event of any conflict between the COMPANY Standards and Specifications and any other information set forth in this Exhibit B, the COMPANY Standards and Specifications will govern.

Subject to temporary closings of the Post mandated by the installation or the Department of the Army, Contractor agrees that COMPANY's employees are hereby granted rights of ingress and egress to the Project in order to carry out the provisions of this Agreement. CONTRACTOR likewise agrees that non-employee representatives and assigns of COMPANY are hereby granted such rights of ingress and egress, subject to the consent of CONTRACTOR, which consent shall not be unreasonably withheld.

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**AGREEMENT FOR GAS SERVICE INSTALLATION
BY TEXAS GAS SERVICE COMPANY**

This Agreement is made effective as of _____,
by and between Texas Gas Service Company, a division of ONEOK, Inc. ("TGS") and the
following named "Applicant:"

Applicant's Name
Applicant's Address

Service Site
Facilities Requested:

Description	Estimated Cost
Materials, Construction, Design & Inspection	\$
Total	\$

1. Cost of Extension. Applicant agrees to pay to TGS the sum of \$ _____ to install or cause to be installed the above referenced Facilities, as estimated above. Applicant further agrees to install and use gas appliances/services at the Service Site.

2. Delays in Construction. Installation of the Facilities described above shall commence as soon as practicable. TGS shall not be responsible for delays in construction of any facility installation caused by TGS' inability to obtain rights of way, inclement weather, strikes, government actions or any other cause beyond TGS' reasonable control.

In the event the payment described at paragraph 1 above has not been made within 60 days from the date TGS executes this Agreement, or if for any reason beyond TGS' control TGS has not commenced construction of the gas service facilities within 60 days after TGS' execution hereof, TGS may at its sole option: (1) cancel this Agreement by giving Applicant 15 days notice; or (2) redetermine the cost of the facility installation and adjust the amount of payment to be made by Applicant in accordance with such cost; or (3) install the facility pursuant to the terms and conditions set forth herein. In the event TGS cancels this Agreement, TGS shall immediately refund to Applicant all funds paid to TGS pursuant to this Agreement.

3. Ownership of Gas Lines and Equipment. All gas meters, meter loops and yard lines installed by TGS pursuant to this Agreement shall be the sole property of TGS, and Applicant shall have no lien or other property interest therein.

4. **Additional Terms and Conditions.** This Agreement shall contain the terms and conditions set forth in the following attachments:

- Addendum 1: New Construction
- Addendum 2: Applicant’s Certification of Exclusive Gas Usage
- Exhibit “A”: Description of Facilities
- Exhibit “B”: Construction Plans

5. **Entire Agreement.** This Agreement, together with the Addenda and Exhibits attached hereto, constitutes the entire agreement between the parties and supersedes all previous agreements, promises, and representations, whether written or oral, between the parties with respect to the subject matter of the Agreement. No modification, amendment, supplement to or waiver of this Agreement or any of its provisions shall be binding upon the parties unless made in writing and duly signed by authorized representatives of both parties.

IN WITNESS WHEREOF, the parties have caused this Agreement to be effective on the date first written above, notwithstanding any later dates of execution appearing below.

**TEXAS GAS SERVICE COMPANY,
a division of ONEOK, Inc.**

By: _____
Krystal Parker, Regional Vice President

Date Signed: _____

By: _____
signature

printed name title

Date Signed: _____

ADDENDUM 1

NEW CONSTRUCTION

- 1. Coordination of Construction Activities.** Applicant shall perform or cause to be performed the following acts:

Notice. Applicant shall notify TGS at least 15 calendar days in advance of the date Applicant desires to have TGS commence installation of the gas distribution facilities described at Exhibit "A".

Plans. Prior to the commencement of such installation, Applicant shall provide to TGS a site plan reflecting the location of any structures thereon, along with the location at which the yard line is to be connected to the internal piping of such structures and an easement for the transmission line and the right to make additional connections to the line at any given time of the subject Service Site

Grading and Staking. Prior to commencement of installation of the gas distribution system, Applicant shall either (a) grade to subgrade, $\pm .50$ feet (6 inches) all streets, alleys, roadways or easements in which the services shall be installed, or (b) place reference grade stakes and supply to TGS completed cut and fill plans for such locations. In the event Applicant elects to provide cut and fill plans, Applicant shall advance to TGS prior to the commencement of installation the cost, as determined by TGS at its sole discretion, of any additional depth to be excavated pursuant to such cut and fill plans.

Water/Wastewater Systems. All water, wastewater and sewer construction shall be completed and tested prior to commencement of work on the gas distribution system.

Other Installations. Applicant shall not permit the installation of any underground electrical, telephone, cable television or other wiring or conduit systems within the area to be used for the gas distribution system until the gas distribution system has been installed and tested.

Coordination of Trenching. All required preblasting of utility trenches, including natural gas trenches, shall be coordinated by Applicant prior to the commencement of installation of any underground utility systems.

Soil Density. Applicant shall be responsible for all testing of soil densities and required compactions.

Pavement Repairs. Applicant shall be responsible for the replacement or repair of asphalt and concrete removed by TGS on private property.

- 2. Depth of Installations.** Installation of natural gas facilities shall conform to the following depth requirements:

2.1 Mains. Mains shall be installed at a depth which provides for a minimum of 24 inches of cover. When this depth is not attainable due to rock, additional protection shall be installed to withstand any anticipated external loads.

Cover over mains which are to be installed under existing or potential paving should be a minimum of 24 inches from the bottom of the street sub-base, whenever

possible. At no time shall cover under paving be reduced to less than 24 inches from the top of the paving or to less than 8 inches below or the bottom of the sub-base, whichever provides the greatest depth.

In areas to be graded after installation of the pipeline, the depth of the cover shall be a minimum of 24 inches from the finish grade.

2.2 Service Lines. Service lines shall be installed at a depth which provides for a minimum of 18 inches cover on private property, and 18 inches of cover in alleys, easements, street and roads. If the meter location is at the property line, minimum cover shall be 18 inches.

2.3 Yard Lines. Yard lines shall be installed at a depth which provides for a minimum cover of 18 inches.

3. Move In/Move Out. In the event TGS is required to remove its equipment and crews from the work site after commencement of work and prior to completion thereof, Applicant shall reimburse TGS the sum of \$2,000.00 for the expenses of same. This fee shall be paid by Applicant for each additional move in/move out required of TGS.

4. Additional Costs/Changes. Applicant shall be liable for any expenses incurred by TGS for the performance of any of the acts required of Applicant pursuant to this Addendum and for any additional design services or inspections necessitated by deviations from the construction plans or facilities described at Exhibit B.

5. Initiation of Gas Service. TGS may refuse to initiate gas service to the Service Site until Applicant has reimbursed TGS for any additional expenses as set forth in Section 4 above.

ADDENDUM 2

APPLICANT’S CERTIFICATION OF EXCLUSIVE GAS USAGE

Applicant hereby represents and warrants that it has selected Texas Gas Service Company as its sole and exclusive natural gas provider for the Site more particularly described as:

_____.

Applicant further represents and warrants that no other gas provider or alternate forms of energy for the gas service will be sought or utilized for a period of five (5) years from the date of commencement of gas service to the Site. Applicant further represents and warrants that as the Site is developed and built to completion; all eligible structures shall be connected to the Facilities installed by TGS as set forth in the agreement between the parties titled “Agreement for Gas Service Installation by Texas Gas Service Company.”

APPLICANT:

By: _____

Title: _____

Dated: _____

EXHIBIT A

DESCRIPTION OF FACILITIES

WHEREAS, Applicant has requested that TGS relocates approximately _____ feet of _____ inch steel pipe and its natural gas distribution system in the following described property: