



**US Army Corps
of Engineers
Tulsa District**

**RFP NUMBER: W9126G-11-D-0061, 0062, 0063, 0064
TASK ORDER: TBD**

Indefinite Delivery/Indefinite Quantity (IDIQ) Multiple Award Task Order Contract (MATOC) for Central Issue Warehouses, Support Supply Activity Warehouses, and General Purpose Warehouses Located West of the Mississippi River (AR, AZ, CA, CO, IA, KS, LA, MN, MO, MT, NE, ND, NM, NV, OK, OR, SD, TX, UT, WA, WY)

**SUPPLY SUPPORT ACTIVITY (SSA)
WAREHOUSE
Fort Sill, Oklahoma**

DESIGN-BUILD REQUEST FOR PROPOSAL

DECEMBER 2011

**SECTION 01 10 00.TBD
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1.0 PROJECT OBJECTIVES

1.0.1 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
Supply Support Activity Warehouse	Distribution Warehouse

1.0.2 It is the Army's objective that these buildings will have a 50 year useful life. 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 facility design should consider that the Army may repurpose the use of the facility over the 50 year life. The Army's intent is to install products and materials of good quality that meet industry standard average life that corresponds with the period of performance expected before a major renovation or repurpose. The design should be flexible and adaptable to possible future uses different than the current to the extent practical while still meeting the operational and functional requirements defined within. Flexibility is achieved through design of more flexible structural load-bearing wall and column system arrangements. The site infrastructure will have at least a 50-year life expectancy with industry-accepted maintenance and repair cycles. Develop the project site for efficiency and to convey a sense of unity or connectivity with the adjacent buildings and with the Installation as a whole.

1.0.3 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 most economical 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

Design and Construct two (2) Supply Support Activity Warehouses (SSA). The Warehouse is a specified application of general purpose warehouse space for organizational supply storage and provides enclosed, covered, and open storage space to accomplish materiel receiving, turn-in, shipping, distribution, and storage of Class II, III(P), IV, & IX supplies.

2.1 SUPPLY SUPPORT ACTIVITY WAREHOUSE

Design and construct two (2) SSA complexes in accordance with the Army SSA Standard. This warehouse is to accommodate logistics, maintenance and administrative operations and to store combustible and non-combustible supplies. Assume 50 percent of personnel are female, unless otherwise indicated.

Maximum number of administrative personnel per SSA is 11.

The maximum gross area for the SSA is 20,640 square feet.

Minimum interior clear height is 17'-0"

2.2. SITE:

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

Approximate area available 6.00 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: Tables, Chairs, Refrigerators, Microwave Ovens

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. Reference applicable appendix for Preliminary FF&E Information including furniture dimensions sizes as shown in the Standard Design.

2.5. NOT USED

3.0 SUPPLY SUPPORT ACTIVITY WAREHOUSE

3.1 GENERAL

Supply Support Activity (SSA) Facility is a specified application of general purpose warehouse space for organizational supply storage and provides enclosed, covered, and open storage space to accomplish material receiving, turn-in, shipping, distribution, and storage.

3.2 FUNCTIONAL AND AREA REQUIREMENTS

Gross building area shall be calculated in accordance with Appendix Q. Net area is measured to the inside face of the room or space walls. Minimum dimension where stated shall be measured to the inside face of the defining enclosure. Net area requirements for programmed spaces are included in this paragraph. If net area requirements are not specified, the space shall be sized to accommodate the required function and to comply with code requirements, overall gross area limitations, and any other requirement of this RFP. Area requirements for corridors, stairs, mechanical, and electrical rooms will typically be left to the discretion of the Offeror.

3.2.1 ACCESSIBILITY REQUIREMENTS

SSA facilities shall comply with Architectural Barriers Act Accessibility Guidelines (ABAAG) for Buildings and Facilities.

3.2.1.1 Site Plan Design and Construction:

- (a) Provide accessible access from the parking lot to the building.
- (b) Provide required number of accessible vehicle parking stalls.
- (c) Provide handicapped vehicle parking signage and pavement markings.

3.2.1.2 Facility Design and Construction:

- (a) Construction Materials - The building must be constructed with non-combustible materials and building elements, including walls, columns and floors.
- (b) Flooring – In warehouse bays, all floors shall be sealed and hardened during the curing process.
- (c) Intrusion Detection – The building will be protected by an intrusion detection system (ICIDS) tied into the installation's central monitoring system.
- (d) Penetrations in the walls must not reduce the specified fire resistance ratings. The fire resistance ratings of structural elements and construction assemblies must be in accordance with American Society of Testing and Materials E 119-98, Standard Test Methods for Fire Tests of Building Construction and Materials.
- (e) If fire barrier walls are erected with expansion joints, the joints must be protected to their full height.
- (f) Mechanical, Electrical, and Telecommunications Rooms: Rooms shall accommodate space for equipment maintenance/repair access without having to remove other equipment. Electrical and telecommunications rooms shall be keyed separately for access by Installation maintenance personnel. Filter changes and preventative maintenance shall be performed without requiring access to the facility. All telecommunications rooms shall be conditioned space. Telecommunications room will be provided in accordance with the latest Installation Information Infrastructure Architecture (I3A) guidance. Telecommunications room provides a demarcation point between the outside plant cable and the building telecommunications cabling. Refer to paragraphs 3.7 ELECTRICAL AND TELECOMMUNICATIONS REQUIREMENTS for additional information.

3.2.2 SUPPLY SUPPORT ACTIVITY WAREHOUSE (SSA): 20,640 SF

See standard SSA floor plan and associated site plan provided in Appendix J

3.2.2.1 Warehouse Area Functional Space Requirements: 17,597 SF

- (a) Warehouse Module: This area includes the Warehouse Operation Area, Turn-in Area, Receiving/Issue Area, Customer Issue Area and Secure Storage. This whole area requires an unobstructed ceiling height of 16 feet throughout. A total of six high-lift sectional overhead doors shall be furnished for the warehouse module. All overhead doors shall have a clear opening 14 feet high. One overhead door shall have a clear opening 18 feet wide and the remaining five doors shall each have a clear opening 10 feet wide. Warehouse module floor area shall be free of intermediate support columns and shall be designed to support the operation of 10,000-pound capacity rough terrain forklifts.
- (b) Warehouse Operations Area: Warehouse Operations Area shall be furnished with one 18 feet wide x 14 feet high overhead door and one 10 feet wide x 14 feet high high-lift sectional overhead doors. High-lift sectional overhead door operation shall not intrude into the required clear ceiling area. Doors shall be electrically operated with manual over-ride. Provide a forklift charging station along one of the enclosure walls of the facility close to the electrical room and in a location that does not impede container operations.
- (c) Forklift Charging Station: Provide an enclosed forklift charging station within the warehouse operations area. Location of forklift charging station shall not impede warehouse operations. Forklift charging station shall be approximately 13-feet wide by 14-feet deep, with a 10 feet wide x 10 feet high overhead door for access. Overhead door shall be electrically operated with manual over-ride. Provide a dedicated exhaust system for the forklift charging station.
- (d) Receiving/Issue Bay: Provide a separate Receiving/Issue area furnished with a loading dock for both commercial and/or military vehicle deliveries. Provide four separate loading bays. Each bay shall be furnished with a 9 feet wide x 10 feet high overhead door for Receiving/Issuing operations. Locate overhead doors at 25 feet on center. Door shall be electrically operated with manual over-ride. Loading dock shall be furnished with all necessary dock accessories, including electrical operated dock levelers – with vehicle restraint and lights communication package, dock seals, dock bumpers, removable safety railing, access stairs, etc.
- (e) Secure Storage: This is a Non-Sensitive Secure Storage area, and shall be provided with the appropriate access and physical security measures. Walls, ceiling and doors of secure storage shall be minimum 6 gage expanded metal diamond wire mesh with a maximum 2-inch mesh opening, on minimum 1 ½ inch x ¾ inch x 1/8 inch steel channel frame, spaced at 24 inches on center maximum, with minimum 1 ¾ inch x 1 ¾ inch x 1/8 inch steel angle corner posts.
- (f) Turn-in Bay: Provide a separate Turn-in bay on adjacent to the Receiving/Issue Bay. Turn-in area shall be 25 feet deep x 25 feet wide and shall be furnished with one 6 feet wide exterior double door.
- (g) Customer Issue Bay: Provide a separate Customer Issue bay adjacent to the Administrative Module and the Receiving/Issue Bay.
- (h) Loading/Unloading Apron: Provide a rigid-paved Loading/Unloading Apron on the warehouse side of the facility, furnished with exterior lighting to support night operations, and an external public address system. Loading and unloading operations shall not prevent access to the Receiving and Issue Bay. The Loading and Unloading Apron is a contiguous area sized for commercial container or flatbed vehicles. The area is composed of two components – an offload area and a static load area, with the former being temporary space for deliveries using commercial or military flatbed trailers or containers as the largest requirement to be met. The latter is based on military flatrack assemblies and provides a pre-loaded deployment configuration for movement by organic battalion assets.
- (i) Truck Dock Areas:
 - a. Docks shall be 48" (nominal) above hardstand. Provide dock seals, bumpers, and bollards.
 - b. Dock/Truck Guards – To avoid damage to the door jambs from trucking operations, suitable protective posts (bollards) or concrete truck wheel guards shall be provided at all truck entrances.

- c. Dock Bumpers – Rubber bumpers, size 12”d x 24”w x 12”h, are to be installed on both sides of each truck bay per manufacturer’s specifications.
- d. Loading Dock – Provide covered loading dock if allowable within SF requirements.
- (j) Circulation is not tabulated in space allocation table. Provide circulation space as needed.
- (k) Provide metal eyebrow canopy(s) to protect forklift drivers and pedestrians from the elements during inclement weather. Canopy to extend out above each pedestrian door, vertical (non-dock side) roll-up doors provided for forklift access.
- (l) Weather Seals On Doors - Provide nylon brush-style weather stripping on all perimeter doors of the facility, including the overhead vertical roll-up doors, for heating energy conservation and for pest management control.

3.2.2.2 Administrative Area Functional Space Requirements: 2,706 SF

- (a) Administrative Module: The Administrative Module consolidates all administrative functions for the SSA Facility, and includes enclosed offices, open workspaces, production, stock control, and support space (e.g. multipurpose conference/training room, restrooms, janitorial space, and administrative storage space), Contractor Logistics Support spaces, mechanical, electrical and telecommunication spaces.
- (b) Administrative Spaces: Provide administrative spaces consisting of four enclosed offices, a stock control office (open plan), copier space, a customer service area with a service counter and general circulation space.
- (c) Contractor Logistics Support: Provide a Contractor Logistics Support (CLS) office space.
- (d) Conference Room: Provide a consolidated meeting, conference, and training room.
- (e) Men’s and Women’s Toilets: Provide handicapped accessible toilet facilities for staff and guest use. Provide a janitor’s closet furnished with shelving for storage of janitorial supplies.
- (f) Janitor’s Closet: Provide a janitors closet furnished with a utility sink, mop racks and built-in stainless shelving for storing janitorial supplies.
- (g) Mechanical, Electrical, and Telecommunication: Mechanical/Electrical room shall be sized to accommodate space for equipment maintenance/repair access without having to remove other equipment. First floor exterior access is required for mechanical and electrical room. Telecommunications room shall be conditioned space.

3.2.2.4 SSA: SPACE ALLOCATION TABLE

MINIMUM SQUARE FOOTAGE¹	
SPACE	NSF
WAREHOUSE MODULE:	17,597
Warehouse Operations Area	11,438
Receiving/Issue Bay	3,600
Secure Storage	150
Turn-in Bay	625
Customer Issue Bay	1,788
ADMIN MODULE:	2,706
Administrative Spaces	1,506
Contractor Logistics Support	217
Conference/Multi-Purpose Room	238
Men's Toilets	140
Women's Toilets	140
Janitor's Closet	20
Mechanical/Electrical Room	AS REQ'D
Telecommunications Room	AS REQ'D
SUPPORT SPACES:	
Loading/Unloading Apron	2,800

Note 1: See standard floor plan provided in Appendix J

3.3 SITE REQUIREMENTS

3.3.1 SITE STRUCTURES AND AMENITIES

SSA Components: In addition to the primary SSA building, a covered area inside the Open Storage area will be provided for Serviceable and Unserviceable storage. This area will be 60-foot by 105-foot and will be placed at the back corner edge of the Open Storage area hardstand.

- a. **Serviceable Bulk Storage Area:** Provide a Serviceable Bulk Storage Area (covered hardstand) that provides a secure area for large parts that do not require indoor storage but do require modest protection from weather and ultra-violet affects. The roof must maintain sufficient clear span and floor loading to operate either organic tactical Material Handling Equipment (MHE) such as 6K Rough Terrain Forklift (RTFL) or 10K RTFK or commercial equivalents. This area may reside under the same overhead cover as the Unserviceable Bulk Storage Area and be divided by a security fence.
- b. **Unserviceable Bulk Storage Area:** Provide an Unserviceable Bulk Storage Area (rigid pavement apron). This area may reside under the same overhead cover as the Serviceable Bulk Storage Area and be divided by a security fence. Lateral clearances and ground pressure loading to allow for unimpeded movement by organic tactical 6K RTFL or 10K RTFL MHE or commercial equivalents. The apron shall include exterior lighting to support night operations.

Temporary Storage Area: Another area inside the Open Storage area will be provided for POL storage, and Hazmat storage. These containers will be located adjacent to the perimeter security fence.

3.4 ARCHITECTURAL REQUIREMENTS

3.4.1 HARDWARE

3.4.1.1 Finish Hardware: All hardware 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. Extension of the existing Installation keying system shall be provided. The Installation's keying system is Best Access Systems B.A.S.I.S. G. Cores shall have not less than seven pins; cylinders shall have key-removable type cores. Disassembly of knob or lockset shall not be required to remove core from lockset. Locksets for mechanical, electrical and communications rooms only shall be keyed to the existing Installation Master Keying System. HVAC terminal units that are accessed from a central corridor shall have a deadbolt to minimize protrusion into corridor. Plastic cores are unacceptable. Provide closers for all exterior doors, all doors opening to corridors and as required by codes. Exit devices shall be installed all building egress doors.

3.4.1.2 All hardware must be security type and heavy duty for maximum wear resistance and must comply with all Architectural Barriers Act (ABA) requirements.

3.4.1.3 Auxiliary Hardware: 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.

3.4.1.4 Fire Door Hardware: Hardware for fire doors shall be installed in accordance with the requirements of applicable codes. Exit devices installed on fire doors shall have a visible label bearing the marking "Fire Exit Hardware". Other hardware installed on fire doors, such as locksets, closers, and hinges shall have a visible label or stamp indicating that the hardware items have been approved by an approved testing agency for installation on fire-rated doors. Hardware for smoke-control door assemblies shall be installed in accordance with applicable codes.

3.4.2 SPECIAL ACOUSTICAL REQUIREMENTS

3.4.2.1 Exterior walls and roof/floor/ceiling assemblies, doors, windows and interior partitions shall be designed to provide for attenuation of external noise sources such as airfields in accordance with applicable criteria, but no less than the following:

- (a) Interior partitions – STC 45
- (b) Exterior walls – STC 42
- (c) Doors and frames – STC 25

3.4.2.2 Due to the operation of mechanical and electrical systems and devices, sound conditions and levels for interior spaces shall not exceed levels as recommended by ASHRAE handbook criteria. Provide acoustical treatment for drain lines and other utilities to prevent noise transmission into the offices and other areas requiring noise suppression.

3.4.3 EXTERIOR DESIGN OBJECTIVES

3.4.3.1 Provide durable and easily maintainable materials. Do not use exterior materials that require periodic repainting or similar refinishing processes. Material exposed to weather shall be factory pre-finished, integrally colored or provided with intrinsic weathering finish. Do not use pollutant generating finishes.

3.4.3.2 Exterior Walls: Where Exterior Insulation and Finish Systems (EIFS), or any other material except CMU or other Masonry material is used as exterior finish material, it shall be in conjunction with a CMU wainscot. EIFS shall be "high-impact" type and shall be "drainable" type. Masonry units shall be tested for efflorescence. Efflorescence testing shall conform to the provisions of ASTM C 67. CMU construction shall comply with the provisions of ASTM C 1400.

3.4.3.3 Roof: Minimum roof slope for membrane roof systems shall be 2" inches per foot. Minimum roof slope for pitched roof systems shall be as recommended by roof system manufacturer. Membrane roof systems shall be fully adhered. Structural standing seam metal roofs shall comply with the requirements of ASTM E 1592. Roof system shall be Underwriters Laboratory (UL 580 Class 90) rated or Factory Mutual Global (FM) I-90

rated. Roof system shall comply with applicable criteria for fire rating. Roof drainage shall be separated from paved areas and/or storm water collection systems. Roof surface shall not be pollution generating.

(a) Roof Mounted Equipment: Roof mounted equipment shall not be used unless absolutely necessary. If roof mounted equipment is required: provide permanent access walkways and platforms to protect roof. Roof mounted equipment on membrane roof systems shall be screened by the roof parapet.

(b) Roof access from building exterior is prohibited.

(c) Roof Access - At least one interior means of access to the roof and top of administrative space is required.

(d) Personal fall arrest systems shall be required for workers servicing roof-mounted equipment. All necessary anchorages for attachment of personal fall arrest equipment shall be provided in accordance with applicable codes and criteria.

3.4.3.4 Trim and Flashing: Gutters, downspouts, and fascias shall be factory pre-finished metal and shall comply with SMACNA Architectural Sheet Metal Manual.

3.4.3.5 Bird Habitat Mitigation: The Contractor shall provide details in the design necessary to eliminate the congregating and nesting of birds at, on, and in the facility.

3.4.3.6 Exterior Doors and Frames:

(a) Main Entrance Doors: Provide aluminum storefront doors and frames with Architectural Class 1 anodized finish, fully glazed, with medium or wide stile for entry into lobbies or corridors. Provide doors complete with frames, framing members, sub frames, transoms, sidelights, trim, applied mountings, and accessories. Framing systems shall have thermal-break design. Storefront systems shall be capable of withstanding area wind loads, thermal and structural movement required by location and project requirements, and shall comply with applicable codes and criteria.

(b) Other Exterior Doors: Provide insulated hollow metal exterior doors for entry to all spaces other than corridors, lobbies, or reception/waiting rooms. Doors and frames shall comply with applicable codes and criteria. Doors shall be minimum Level 3, physical performance Level A, Model 2 flush. Frames shall be 12-gauge, with continuously welded mitered corners and seamless face joints. Doors and frames shall be A60 galvanized, shall comply with ASTM A653 and shall be factory primed. Fire-rated openings shall comply with applicable codes, and the requirements of the labeling authority. Door and frame installation shall comply with applicable codes and criteria.

(c) Electrically Operated Sectional Overhead Roll-up Doors: Doors shall be industrial class, high-lift sectional overhead doors, electrically operated, with auxiliary hand chain override. In the open position, the horizontal portion of the door shall be aligned with the angle of the roof structural elements; and shall be no more than 6 inches below the bottom of the roof structural elements. Doors shall consist of horizontal sections hinged together which operate in a system of tracks to completely close the door opening in the closed position and make the full width and height of the door opening available for use in the open position. Provide a door locking mechanism on the interior. Provide a permanent label on the door indicating the name and address of the manufacturer. Doors, components, and methods of installation shall be designed in accordance with DASMA 102. Minimum design wind load shall be 20 psf. Maximum wind load deflection of the door shall not exceed the door height in inches divided by 120 and the door width in inches divided by 120. Doors shall be operable during design wind load when tested in accordance with ASTM E 330. Door sections shall be formed from hot-dipped galvanized steel not lighter than 16 gauge with longitudinal integral reinforcing ribs. Meeting rails shall have interlocking joints to ensure a weather tight closure and alignment for full width of the door. Provide sections of the height indicated or the manufacturer's standard. Do not exceed 24 inch height for intermediate sections. Bottom sections may be varied to suit door height. Do not exceed 30 inch height for bottom section. Door sections shall be insulated and shall provide a "U" factor of 0.14 or less when tested in accordance with ASTM C 1363. Interior of door sections shall be covered with steel sheets of not lighter than 20 gauge to completely enclose the insulating material. Provide galvanized steel tracks not lighter than 10 gauge. Provide vertical tracks with continuous steel angle not lighter than 10 gauge for installation to walls. Incline vertical track through use of adjustable brackets to obtain a weather tight closure at jambs. Reinforce horizontal track with galvanized steel angle; support from track ceiling construction with galvanized steel angle and cross bracing to provide a rigid installation. Provide hinges, brackets, rollers, locking devices, and other hardware required for complete installation. Counterbalance doors with an oil-tempered, helical-wound torsion spring mounted on a

steel shaft. Provide adjustable spring tension; connect spring to doors with cable through cable drums. Provide cable safety factor of at least 7 to 1. Provide operators of the type recommended by the door manufacturer. Operators shall include electric motor, machine-cut reduction gears, steel chain and sprockets, magnetic brake, brackets, pushbutton controls, limit switches, magnetic reversing contactor, a manual operator as specified below for emergency use and other accessories necessary for operation. The electric operator shall be designed so that the motor may be removed without disturbing the limit switch timing and without affecting the manual operator. The manual operator shall be clutch controlled so that it may be engaged and disengaged from the floor; operation shall not affect limit switch timing. Provide an electrical or mechanical device that disconnects the motor from the operating mechanism when the manual operator is engaged. Provide a galvanized, endless chain operating over a sprocket. Extend chain to within 4 feet of the floor and mount on inside of building. Obtain reduction by use of roller chain and sprocket drive or gearing. Provide chain cleat and pin for securing operator chain. The force required to operate the door shall not exceed 35 pounds. Each door motor shall have an enclosed, across-the-line type, magnetic reversing contactor, thermal overload and under voltage protection, solenoid-operated brake, limit switches, and control switches. Locate control switches at least 5 feet above the floor so the operator will have complete visibility of the door at all times. Control equipment shall conform to NEMA ICS 1 and NEMA ICS 2. Control enclosures shall be NEMA ICS 6, Type 12 or Type 4, except that contactor enclosures may be Type 1. Each control switch station shall be of the three-button type; buttons shall be marked "OPEN," "CLOSE," and "STOP." The "OPEN" and "STOP" buttons shall require only momentary pressure to operate. The "CLOSE" button shall require constant pressure to maintain the closing motion of the door. If the door is in motion and the "STOP" button is pressed or the "CLOSE" button released, the door shall stop instantly and remain in the stop position; from the stop position, the door may be operated in either direction by the "OPEN" or "CLOSE" buttons. Pushbuttons shall be full-guarded to prevent accidental operation. Provide limit switches to automatically stop doors at the fully open and closed positions. Limit switch positions shall be readily adjustable. Limit switches shall be mounted/protected in such a manner to minimize external damage/accidents. Provide a safety device on the bottom edge of electrically operated doors. The device shall immediately stop and reverse the door in its closing travel upon contact with an obstruction in the door opening or upon failure of the device or any component of the control system and cause the door to return to the full open position. The door-closing circuit shall be automatically locked out and the door shall be operable manually until the failure or damage has been corrected. Do not use the safety device as a limit switch. Each sectional overhead door shall be furnished with a "headache bar" on the interior and exterior side of the facility. Set bottom of each "headache bar" 6-inches below bottom of door head height and 4-feet from face of door. Each interior "headache bar" shall be suspended from a pair of steel cables mounted on the roof structure. Each exterior "headache bar" shall be suspended from a pair of steel cables mounted on the roof structure or suspended from a pair of steel cables mounted on the upper arm of a structural steel tube "Γ" structure set in concrete on one side of the door. Use one structural steel tube "Γ" structure on each side of doors wider than 10-feet. Length of "headache bar" shall be minimum 80% the width of the door and shall be centered on the door width.

3.4.3.7 Exterior Windows: Provide insulated, high efficiency window systems, with thermally broken frames complying with applicable codes and criteria. Operable windows shall be furnished with locks, and fiberglass or aluminum insect screens removable from the inside. Curtain wall systems shall be capable of withstanding area wind loads, thermal and structural movement required by location and project requirements, and shall comply with applicable codes and criteria. Window sills shall be designed to discourage bird nesting.

3.4.3.8 Exterior Glass and Glazing: Material and installation shall comply with applicable codes and criteria.

3.4.3.9 Thermal Insulation: Provide exterior wall, floor, and roof/ceiling assemblies with thermal transmittance (U-values) required to comply with the proposed energy calculations for the facilities. Insulation shall not be installed directly on top of suspended acoustical panel ceiling systems.

3.4.3.10 Exterior Louvers: Exterior louvers shall have bird screens, security screens to prevent illegal entry and shall be designed to exclude wind-driven rain. Exterior louvers shall be made to withstand wind loads in accordance with the applicable codes. Wall louvers shall bear the Air Movement & Control Association (AMCA) International 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.

3.4.3.11 Provide Clerestory Windows for Day lighting

3.4.4 INTERIOR DESIGN OBJECTIVES

3.4.4.1 General: Provide sustainable materials and furnishings that are easily maintained and replaced. Maximize use of day lighting. Provide interior surfaces that are easy to clean and light in color. Interior spaces should be structured to allow maximum flexibility for future modifications. **Note:** the use of skylights or translucent panels on sloped metal roofs is not permissible.

3.4.4.2 Signage: Provide interior signage as required by applicable codes and criteria.

3.4.4.3 Bulletin Boards: Provide one bulletin board at each entry vestibule. Bulletin board shall be 4'-0" high and 6'-0" wide. Bulletin boards shall have a header panel and shall have lockable, glazed doors.

3.4.4.4 Corner Guards: Provide surface mounted, high impact resistant, integral color, snap-on type resilient corner guards, extending from floor to ceiling for wall and column outside corners in high traffic areas such as corridors, waiting areas, lobbies, conference and multi-purpose rooms. Factory fabricated end closure caps shall be furnished for top and bottom of surface mounted corner guards.

3.4.4.5 Chair Rail: Chair rails shall be installed in areas prone to hi-impact use such as corridors, waiting areas, conference rooms and break areas.

3.4.4.6 Guardrails. Guardrails shall protect all exterior walls with minimum 17" high single guard rails and all interior walls with minimum 44" high double guard rails adjacent to the defined warehouse storage area.

3.4.4.7 Casework: Provide cabinets complying with AWI Quality Standards. Countertops shall have waterfall front edge. Toilet countertops and all other countertops with sinks shall have integral coved backsplash. Toilet countertops shall be minimum ½-inch thick cast 100 percent acrylic polymer solid surfacing material with waterfall front edge and integral coved backsplash.

3.4.4.8 Fire Extinguisher Cabinets and Mounting Brackets: Furnish and install semi - recessed fire extinguisher cabinets and mounting brackets as required by applicable codes and criteria. Furnish a list of installed fire extinguisher cabinets and mounting brackets (including location, type and size) to the Contracting Officer's Representative.

3.4.4.9 Furnish and install a 3200 series Knox box on all buildings with recessed hinge lid adjacent to the building entrance.

3.4.4.10 Interior Doors and Frames:

(a) **Wood Doors:** Provide flush solid core wood doors with Grade A hardwood face veneer for transparent finish. Stile edges shall be non-finger jointed hardwood compatible with face veneer. Provide wood doors at all interior locations except noted otherwise. Provide window panel on all wooden doors exiting into a corridor.

(b) **Insulated Hollow Metal Doors:** Comply with applicable codes and criteria. Doors shall be minimum Level 3, Physical Performance Level A, Model 2; factory primed. Provide insulated hollow metal doors at mechanical, electrical and telecommunications rooms, toilets, janitor closets, storage rooms, and high traffic areas.

(c) **Hollow Metal Frames:** Comply with ANSI A250.8/SDI 100. Frames shall be minimum Level 3, 16 gauge, with continuously welded mitered corners and seamless face joints; factory primed. All door frames shall be hollow metal frames reinforced at lock assemblies.

(d) **Fire-rated and Smoke Control Doors and Frames:** Comply with applicable codes, criteria and requirements of labeling authority.

(e) **STC ratings** shall be of the sound classification required and shall include the entire door and frame assembly.

3.4.4.11 Window Treatment: Provide horizontal mini blinds at all exterior windows. Uniformity of window covering color and material shall be maintained to the maximum extent possible throughout each building. Window stools shall be minimum ½ inch thick cast 100 percent acrylic polymer solid surfacing material. Uniformity of window covering color and material shall be maintained throughout the building.

3.4.4.12 Mold Mitigation: The Designer of Record shall provide details in the design analysis and design showing steps taken to mitigate the potential growth of mold and mildew in the facility.

3.4.4.13 Drinking Fountains- Provide the following drinking fountains: (2) high/low fixtures in the Admin areas- (1) per floor and (6) high/low fixtures in the Warehouse areas.

3.4.4.14 Toilet Accessories: Furnish and install the items listed below and all other toilet accessories necessary for a complete and usable facility. All toilet accessories shall be Type 304 stainless steel with satin finish. Toilet accessories shall include the following:

- (a) Glass Mirror/Shelf – 18 inch by 24 inch glass mirror on stainless steel frame with shelf at each lavatory
- (b) Hands free liquid soap dispenser at each lavatory
- (c) Hands free paper towel dispenser
- (d) Waste receptacle- recess mounted at each lavatory/toilet area
- (e) Sanitary napkin disposal at each female toilet
- (f) Toilet paper dispenser – lockable multiple roll toilet paper dispenser at each toilet
- (g) Sanitary toilet seat cover dispenser – at each toilet stall
- (h) Grab bars – as required by ABA

3.4.5 FINISHES

Designers are not limited to the minimum finishes listed in this paragraph and are encouraged to offer higher quality finishes. A minimum of 1% surplus or additional flooring tile (for each type used) shall be provided by the Contractor for replacement/repair purposes.

3.4.5.1 Minimum Paint Finish Requirements:

- (a) All paints used shall be listed on the "Approved Product List" of the Master Painters Institute (MPI). Application criteria shall be as recommended by MPI guide specifications for the substrate to be painted and the environmental conditions existing at the project site.
- (b) Exterior surfaces, except factory pre-finished material or exterior surfaces receiving other finishes shall be painted a minimum of one prime coat and two finish coats. Paints having a lead content over 0.06 percent by weight of nonvolatile content are unacceptable. Paints containing zinc-chromate, strontium-chromate, mercury or mercury compounds, confirmed or suspected human carcinogens shall not be used on this project. Exterior paints and coating products shall be classified as containing low volatile organic compounds (VOCs) in accordance with MPI criteria. Application criteria shall be as recommended by MPI guide specifications. Provide an MPI Gloss Level 5 Finish (semi-gloss), unless otherwise specified.
- (c) Interior surfaces, except factory pre-finished material or interior surfaces receiving other finishes, shall be painted a minimum of one prime coat and two finish coats. Paints having a lead content over 0.06 percent by weight of nonvolatile content are unacceptable. Paints containing zinc-chromate, strontium-chromate, mercury or mercury compounds, confirmed or suspected human carcinogens shall not be used on this project. Interior paints and coating products shall contain a maximum level of 150 grams per liter (g/l) of VOCs for non-flat coatings and 50 g/l of VOCs for flat coatings. Provide an MPI Gloss Level 5 Finish (semi-gloss) in wet areas and a flat finish in all other areas.

3.4.5.2 Minimum Interior Finish Requirements:

- (a) Wall, ceiling, floor finishes and movable partitions shall conform to the requirements of the IBC, NFPA and UFC 3-600-01 Fire Protection Engineering for Facilities. Where code requirements conflict, the most stringent code requirement shall apply.
- (b) Carpet shall be minimum of 2 yarn ply, modular tile conforming to ISO 2551, ASTM D 418, ASTM D 5793, ASTM D 5848, solution dyed, tufted, cut and loop pile, commercial 100% branded (federally registered trademark) nylon continuous filament. Vinyl composition tile (VCT) shall be minimum 1/8 inch thick, conforming

to ASTM F 1066, Class 2, through pattern tile, Composition 1, asbestos free, with color and pattern uniformly distributed throughout the thickness of the tile.

(c) Walls: All gypsum board shall achieve a score of 10, the highest level of performance for mold resistance under the ASTM D 3273 test method. All gypsum board shall be transported, handled, stored and installed in accordance with the GYPSUM ASSOCIATION – Guidelines for Prevention of Mold Growth on Gypsum Board (GA-238-03). Use impact resistant gypsum board in corridors, storage rooms, stairwells and conference rooms. All wall finish shall be minimum 5/8" painted gypsum board, except where stated otherwise. Gypsum wall board shall not be used as a wall finish in the warehouse area below 8 feet above finish floor. The warehouse side of all gypsum wall board partitions shall have a minimum 20 gauge sheet metal finish up to a height of 8 feet above the finish floor.

(d) Ceiling: All gypsum board shall achieve a score of 10, the highest level of performance for mold resistance under the ASTM D 3273 test method. All gypsum board shall be transported, handled, stored and installed in accordance with the GYPSUM ASSOCIATION – Guidelines For Prevention Of Mold Growth On Gypsum Board (GA-238-03).

(e) Interior paint shall be semi-gloss in wet areas and flat in all other areas.

(f) 24" x 24" lay-in Acoustical Ceilings will be used throughout the occupied areas at 9' AFF, unless otherwise noted. Tiles shall be omni-directional, mildew/moisture resistant. Ceilings shall have a minimum noise reduction coefficient NRC of .60.

3.4.5.3 INTERIOR FINISHES TABLE

WAREHOUSE INTERIOR FINISHES															
	FLOORS					BASE		WALLS			CEILING				REMARKS
	RESILIENT FLOORING	CERAMIC TILE	RECESSED ENTRY MAT	CARPET TILE	SEALED CONCRETE	RESILIENT BASE	CERAMIC BASE	GYPSUM WALL BOARD - PAINT	CERAMIC TILE	LAMINATED GLASS, INSUL. STORE FRONT SYSTEM	GYPSUM WALL BOARD - PAINT	PAINTED STRUCTURE	2' X 2' ACOUSTICAL CEILING TILE	MINIMUM-HEIGHT 9'-0" UNLESS STATED OTHERWISE	
WAREHOUSE OPERATIONS AREA AND UTILITY SPACES															
WAREHOUSE AREAS					•	•		•				•		17'	NOTE 5
LOADING DOCK					•							•			NOTE 5
SECURE STORAGE	•					•		•			•				
ADMINISTRATION AREAS															
CORRIDORS	•					•		•			•		•		NOTE 7
VESTIBULE	•		•			•		•		•			•		NOTE 7
CONFERENCE ROOM				•		•		•					•		NOTE 7
OFFICE AREAS				•		•		•					•		NOTE 7
CLS OFFICE				•		•		•					•		NOTE 7
MEN'S RESTROOM		•					•	•	•		•				NOTE 1 & 3
WOMEN'S RESTROOM		•					•	•	•		•				NOTE 1 & 3
TELECOMM	•					•		•			•			10'	
JANITOR CLOSET		•					•	•	•		•				NOTE 2
<p>NOTES:</p> <ol style="list-style-type: none"> All wet walls in toilet rooms shall have 4'-0" high ceramic tile wainscot. Vanity tops shall be cast 100% acrylic polymer solid surfacing material with waterfall front edges. Walls adjacent to janitor's sink shall have a 4'-0" high ceramic tile wainscot. All counters shall have a minimum of 4" high backsplash. In vending or recyclables storage area, match flooring, wall & ceiling finishes to those of adjacent area. Ceiling may be painted exposed structure if allowed by applicable code. Risers shall be painted steel. Stair landings and treads shall have resilient flooring or sealed concrete. Provide treads with slip resistant nosings. All acoustical ceiling tiles shall be installed with hold down clips to prevent upward movement. 															

3.5 STRUCTURAL REQUIREMENTS

Design and construct as a complete system in accordance with APPLICABLE CRITERIA.

3.5.1 LIVE LOADS: Design live loads shall be per the IBC but not lower than the following minimums.

(a) Primary roof members, exposed to work floor (in addition to the uniform load):

Single panel point on lower chord of roof trusses or any point along primary structural members supporting roofs.....2,000 pounds

(b) Floor slab:

(1) Warehouse: The most stringent loading of the following:

(a) Uniform load.....250 psf

(b) Fork lift with lifting capacity of 10,000 lb

(c) Pallets with average weight of 1200 lb each will be stacked in storage racks with the first pallet will be sitting on the floor. (Maximum pallet weight is 2500 lb). Slab shall be designed for all loads induced on slab by racking system.

(2) Administration.....80 psf

3.5.2 COLUMN SPACING

Floor area shall be free of intermediate support columns. Columns are to be spaced in such a way as to allow standard industrial shelving for palletized loading. Shelving shall be constructed in a back-to-back double row configuration with no interspersed single rows. Preference is to have no freestanding columns in open warehouse space.

3.5.3 SPECIAL CONSIDERATIONS

Consider mission effectiveness, the most economical system in the locality, life-cycle economics, and space adaptability in choosing the structural system. Space adaptability includes future reorganization or reallocation of space.

Analyze, design, and detail each building as complete structure system. Design structural elements to preclude damage to finishes, partitions, and other frangible, nonstructural elements; to prevent impaired operability of moveable components; and to relevant cladding leakage and roof ponding. Limit deflection of structural members to the allowable of the applicable material standard, e.g. ACI, AISC, and Brick Industry Association (BIA).

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, coatings on structural members, expansion joints, the level of corrosion protection, and the structural system. All concrete shall have a minimum compressive strength of 3,000 psi and shall be steel reinforced. Place floor mounted mechanical and electrical equipment on a 4" minimum concrete pad.

In addition to gravity, seismic, and lateral loads, design ancillary building items, e.g. doors, window jambs and connections, overhead architectural features, equipment bracing, 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.

3.5.4 APPLICABLE STANDARDS, CODES, AND CRITERIA

The structural design shall fully comply with the following listed criteria in addition to the provisions provided in Section 01 10 00 paragraph 4.0 Applicable Criteria. Use the latest edition of the International Building Code (IBC) for design guidance, and coordinate design with UFC 4-010-01. for buildings three stories and taller,

design for progressive collapse in accordance with UFC 4-023-03, Design of Buildings to Resist Progressive Collapse.

3.5.5 FOUNDATION

The foundation is site specific and must be designed upon known geotechnical considerations by an engineer knowledgeable of the local conditions, e.g. highly expansive soils, groundwater levels. Coordinate the need for a vapor barrier with the architectural floor finishes and requirements of the geotechnical report. All slab-on-grade to receive a coating (e.g. epoxy) or to receive and overlaying finish (e.g. carpet or tile), shall be underlain by a minimum of 20 mil polyethylene membrane vapor barrier over compacted sub grade. All floors in warehouse bays shall be sealed and hardened during the curing process. Floors throughout the facility shall be classified as "Flat" as defined by ACI 117 and must be finished to the same level not only for the safe installation of shelving, but also for the smooth movement of forklifts, platform trucks, etc. The concrete floor slabs will be constructed to meet the American Concrete Institute (ACI), Committee 302 tolerances for flatness and levelness.

3.5.6 DESIGN ANALYSIS

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. Results must include an output listing for maximum/minimum stresses/forces and deflections for each element and the reactions for each loading case and combination.

3.6 MECHANICAL REQUIREMENTS

3.6.1 PLUMBING

3.6.1.1 Plumbing system shall be designed and installed in accordance with the International Plumbing Code (IPC). Fixtures shall be of the water saving type and approved for its use per the IPC. Hot water shall be provided for all lavatories. Refer to paragraph 5 for domestic water metering requirements.

3.6.1.2 Gas systems (if applicable) shall be designed and installed in accordance with NFPA 54. Gas fired appliances shall be of the energy saving type. Refer to paragraph 5 for gas metering requirements.

3.6.1.3 Locate emergency eye wash stations in accordance with OSHA standards 1910 and 1926. Water must be heated and a thermostatic tempering valve employed to provide water at the OSHA-required temperature. Provide floor drains with a secondary waterless trap.

3.6.1.4 Provide floor drains in toilets and janitor closets to facilitate proper maintenance.

3.6.1.5 Tie all roof drains into existing underground drainage systems.

3.6.2 HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

3.6.2.1 All administrative spaces shall be heated and ventilated. Administrative spaces shall have user adjustable controls of +/- 2 degrees F with a set point of 70 degrees F for heating. Except for communications rooms, air conditioning is not allowed. Installation shall be in accordance with the International Mechanical Code (IMC). Toilets shall be continuously exhausted during occupied hours.

3.6.2.2 Stand alone DX air conditioning for communications rooms shall remain active at all times.

3.6.2.3 All warehouse spaces shall be heated and ventilated separate from administrative spaces. During cold weather warehouse areas shall be maintained at a minimum of 55 degrees F when occupied. During non-occupied hours the temperature shall be maintained at a minimum of 40 degrees F for freeze protection. The use of gas infrared heat should be considered for open warehouse areas. Air conditioning is not allowed in warehouse areas. Installation shall be in accordance with the IMC. Only freeze protection is required in the fire riser room. Maintain an indoor building design dew point of 54 degrees F.

3.6.2.4 Refer to Paragraph 5 for temperature control information.

3.6.2.5 Air handling units shall be located in a mechanical room accessible only through an exterior door. Mechanical rooms shall be sized for ease of service, maintenance, and replacement of HVAC equipment. Design shall be such that equipment is not "trapped" in the space. Rooftop-mounted equipment shall be accessible by means of a fully caged roof ladder accessible only from the interior of the building. Provide a lockable, full size roof hatch for the ladder.

3.6.2.6 Air handling units shall run continuously during occupied hours. Similarly, outdoor ventilation air required by ASHRAE 62.1 shall be continuous during occupied hours.

3.6.2.7 Equipment located outside (on the ground) shall be enclosed in a security-screened equipment yard. Sound/noise shall be a consideration in the selection of all equipment.

3.6.2.8 Fumes from the charging of fork lift storage batteries will need to be captured at the source and exhausted from the building so that hydrogen cannot accumulate and form an explosive mixture. A charging room (with rollup door) plus the necessary exhaust fan and associated connecting duct will be required to discharge the fumes harmlessly high above the roof. It is expected that two 5,000# capacity, conventional, pneumatic tire, electric forklifts will be on site. Based on contractor operation of the SSA the batteries will be charged and allowed to cool (8 hr + 8 hr) during the night. Usage (8hr) will occur during the day. Typical battery would be 24 cell, 1,085 AH.

Exhaust toilets at the rate of 50 cfm/unit. Utilize exhaust for energy recovery if possible.

Exhaust janitor closet at the rate of 1.0 cfm/sq ft.

Exhaust interstitial space above office hard ceiling (13' AFF) at a rate of 2 air changes per hour.

When occupied the warehouse must be ventilated at the rate .06 cfm/sq ft.

People loading for small offices is believed to be 1 per office with 2 people in the large corner office. The work area behind customer reception is believed to have 4 workers. The reception area has unknown density as does the conference room. Admin space (except for com room) shall be ventilated at 5 cfm/person or .06/sq ft.

3.6.2.9 Per 29 CFR 1910 and other applicable criteria provide for sufficient diffusion and ventilation of gases from fork lift storage batteries to prevent the accumulation of explosive mixtures. Batteries will be charged "in place". Provide charging areas for forklifts and chargers. Forklifts and charging equipment (GFGI) are not included in this project.

3.6.2.10 Administrative space must comply with the thermal comfort criteria required by LEED EQ7.1 However, only if the entire building complies with EQ 7.1 will the credit be earned. The mandatory requirement of Paragraph 5.8 that EQ 7.1 be earned for LEED Silver does not apply to this facility.

3.7 ELECTRICAL AND TELECOMMUNICATIONS REQUIREMENTS

Select electrical characteristics of the power system to provide a safe, efficient, and economical distribution of power based upon the size and types of loads to be served. Use distribution and utilization voltages of the highest level that is practical for the load to be served. The effect of nonlinear loads such as computers, other electronic equipment and electronic ballasts shall be considered and accommodated as necessary.

3.7.1 POWER OUTLETS

Interior power shall be provided for all installed equipment requiring power to include convenience receptacles and Government Furnished Government Installed (GFGI) equipments.

3.7.1.1 Duplex receptacles shall be provided per NFPA 70 and in conjunction with the proposed equipment and furniture layouts.

3.7.1.2 Each CATV outlet shall have a duplex receptacle mounted adjacent to it.

3.7.1.3 In addition to receptacles required elsewhere in the RFP provide one duplex receptacle per wall in each office for general purpose use.

3.7.1.4 For housekeeping purposes provide a minimum of one 125-volt, 20A duplex receptacle per corridor. No point along corridor wall at 18 inches above finished floor shall be more than 25 feet from a receptacle.

3.7.1.5 Provide duplex receptacles in restrooms.

3.7.1.6 For Break Room area, provide adequate receptacles for the room and counter-top.

3.7.1.7 In addition to the I3A Technical Guide requirements, two 125 Volt, 20 Amp receptacles each on a dedicated circuit shall be placed on the telephone backboard in each telecommunications room.

3.7.1.8 A minimum of two 125-volt, 20A duplex receptacles shall be provided in each mechanical room and one in each electrical room in addition to NFPA 70 requirements. Duplex receptacles in mechanical rooms with water containment vessels, such as boilers, shall be Ground Fault Circuit Interrupter (GFCI) type.

3.7.1.9 As required per I3A, provide a duplex receptacle adjacent to each telecommunication outlet.

3.7.1.10 Provide exterior ground fault circuit interrupter duplex receptacles on the building exterior walls near entrances. Provide ground fault circuit interrupter duplex receptacles in wet areas such as above countertops near sinks in break areas, in janitor closets with sinks, where serving water fountains, and on exterior walls. Provide weatherproof while-in-use covers for receptacles on exterior walls.

3.7.1.11 Provide duplex receptacles in warehouse area. Mount on each column 48" above finished floor. No point along the wall shall be more than 25 feet from a receptacle.

3.7.1.12 Provide exterior ground fault circuit interrupter duplex receptacles for loading dock area installed 18" above finished floor.

3.7.1.13 Provide power circuits to forklift battery charger station. Overcurrent protective devices shall be provided.

3.7.1.14 Static ground shall be provided for the hazardous material storage area. A dedicated overcurrent protective device shall be provided for each charging station.

3.7.1.15 Provide adequate duplex receptacles for conference room. In addition to receptacle for GFI equipment, provide two duplex receptacles on each wall minimum.

3.7.1.16 Provide a quadruplex receptacle for each battery charge table for charging hand-tool battery.

3.7.2 GROUNDING

Grounding shall be provided in accordance with NFPA 70 and the I3A Technical Guide.

3.7.3 LIGHTING

Interior lighting shall be as specified below in addition to the requirements of paragraph 5. Design luminance shall meet IESNA and ASHRAE 90.1 requirements. Local manual controls shall supplement automatic controls in offices, large open work spaces and specialized areas such as, warehouse areas. Compact fluorescent lamps of 13 watts or less shall not be used. All interior, other than warehouse area, shall be illuminated by utilizing fluorescent light and electronic ballast. All High Intensity Discharge (HID) lamps shall have a Color Rendering Index (CRI) above 65.

3.7.3.1 Warehouse area. Emergency lighting shall be provided along exit aisle and walkways. For safety purpose, lighting design shall prevent any shadow effects with equipment operation. Warehouse area is considered as un-conditioning areas. Lighting design should reference to operating temperature in Mechanical section to ensure the adequate lighting level will be provided to maintain IES requirements during hot and cold seasons.

3.7.3.2 Lighting level for conference room shall be 30 foot candles and controlled by dimmers.

3.7.3.3 Mechanical rooms, supply areas and electrical rooms shall be illuminated to a level of 30 foot-candles.

3.7.3.4 Lighting shall be compatible with security cameras and security requirements.

3.7.3.5 Provide dock light for loading dock door. Arm shall be 60 inches minimum in length. Provide housing composed of die cast aluminum and hood with wire guard.

3.7.3.6 In loading dock area, provide Stop and Go light for each loading dock door.

3.7.4 EXTERIOR LIGHTING AROUND BUILDING

All exterior lighting shall be controlled by photocell or timer and manual lighting switches.

3.7.4.1 Provide a wall-mounted light for each door.

3.7.4.2 Provide a Wall Pak light mounted above each garage door.

3.7.4.3 Provide security lighting around the building.

3.7.4.4 Provide lighting for covered dock area. Lighting fixture should be surface mounted at canopy.

3.7.5 TELECOMMUNICATIONS SYSTEM

Telecommunication outlets shall be provided per the I3A Technical Guide based on functional purpose of the space within the building and in accordance with other provisions of this RFP. The information systems designer must prepare the test plan, and witness and certify the testing of telecommunications cabling. In the I3A Technical Guide, the word "shall" shall be substituted for the word "should" throughout the document. The I3A Technical Guide shall be considered to be MANDATORY criteria.

3.7.5.1 Outside Plant Telecommunications Systems. The project's facilities must connect to the Installation telecommunications (voice and data) system through the outside plant (OSP) underground infrastructure per I3A guidance. Connections to the OSP cabling system shall be from each facility main cross connect located in the main telecommunications room or telecommunications equipment room to the closest OSP access point. Components include the physical cable plant and the supporting structures. Items included under OSP infrastructure encompass, but are not limited to, maintenance hole and duct infrastructure, copper cable, fiber optic cable, cross connects, terminations, splices, cable vaults, and copper and FO entrance facilities.

3.7.5.2 Provide voice and data connection capability to all workstations.

3.7.5.3 Provide wireless access point (WAP) outlets in warehouse areas with one-Cat 6, unshielded twisted pair (UTP) cable, each to a standard 8-pin modular connector for each wireless WAP outlet. Wiring and WAP outlets shall be installed in accordance with the Technical Guide for I3A.

3.7.5.4 Provide a data outlet at each roll-up door.

3.7.5.5 Provide a data outlet for each projector.

3.7.5.6 Provide a data outlet for each network printer, scanner and copier.

3.7.5.7 Provide communication jacks for elevator.

3.7.6 CATV

All CATV outlet boxes, connectors, cabling, and cabinets shall conform to applicable criteria unless noted otherwise. All horizontal cabling shall be homerun from the CATV outlet to the nearest telecommunications room. CATV connectivity shall be provided in: private offices. See paragraph 6.0 PROJECT SPECIFIC REQUIREMENTS for additional requirements.

3.7.7 MASS NOTIFICATION

Mass notification system shall meet intelligibility requirements up to a distance of 30' from the building's perimeter and in all courtyards. Visible notification appliances are not required on the building's exterior walls.

3.7.8 PAGING SYSTEM

A zoned paging system shall be provided throughout the facility and integrated with the telephone system. System may utilize mass notification amplifiers and speakers, but shall be overridden by the mass notification system if mass notification system is activated while the paging system is being utilized. System shall have a minimum capacity of eight zones. Facility shall be zoned per user requirements.

3.7.9 SECURITY INFRASTRUCTURE (Security Equipment Not in Contract)

The security infrastructure shall be installed to support Government furnished equipment including cameras, door alarms, and motion sensors. These devices will be utilized at all exterior entrances with the exception of utility room entrances. Refer to paragraph 6 for additional information.

3.8 FIRE ALARM REQUIREMENTS

3.8.1 Fire suppression systems shall be designed in accordance with the latest edition of UFC 3-600-01. Warehouse and storage areas shall be protected utilizing Early Suppression Fast Response (ESFR) type sprinklers. ESFR shall be designed and installed in accordance with NFPA 13. ESFR system shall be on a separate fire riser from the rest of the building.

3.8.2 Fire pumps, if required, shall be installed in accordance with NFPA 20. Fire pumps shall be installed in a separate room with access from the exterior. Fire pump room shall have one hour separation from the rest of the building.

3.8.3 Water storage tanks, if required, shall meet the requirements of UFC 3-600-01 and NFPA 22. Water tanks must be supervised by the building's fire alarm system.

3.8.4 Fire Department Connection (FDC) must be freestanding and located 40 feet away from the building. FDC must be located at curb next to fire department access lane.

3.8.5 Post Indicator Valve (PIV) shall be located 40 feet away from the building in accordance with NFPA 24. PIV shall be supervised by the building fire alarm system.

3.9 FIRE PROTECTION

3.9.1 Fire suppression systems shall be designed in accordance with the latest edition of UFC 3-600-01. Warehouse and storage areas shall be protected utilizing Early Suppression Fast Response (ESFR) type sprinklers. ESFR shall be designed and installed in accordance with NFPA 13. ESFR system shall be on a separate fire riser from the rest of the building. (Note: maximum roof slope for ESFR is 2/12.)

3.9.2 Fire pumps, if required, shall be installed in accordance with NFPA 20. Fire pumps shall be installed in a separate room with access from the exterior. Fire pump room shall have one hour separation from the rest of the building.

3.9.3 Water storage tanks, if required, shall meet the requirements of UFC 3-600-01 and NFPA 22. Water tanks must be supervised by the building's fire alarm system.

3.9.4 Fire Department Connection (FDC) shall be provided in accordance with NFPA requirements.

3.9.5 Post Indicator Valve (PIV) shall be provided in accordance with NFPA requirements. PIV shall be supervised by the building fire alarm system.

4.0 APPLICABLE CRITERIA

Unless a specific document version or date is indicated, use criteria from the most current references, including any applicable addenda, unless otherwise stated in the contract or task order, as of the date of the Contractor's latest accepted proposal or date of issue of the contract or task order solicitation, whichever is later. 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	National Electrical Safety Code
ANSI/AF&PA NDS	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.)
ASHRAE Standard 189.1	Standard for the Design of High-Performance Green Buildings (ANSI Approved; USGBC and IES Co-sponsored) , - (APPLICABLE TO THE EXTENT SPECIFICALLY CALLED OUT IN THE CONTRACT)
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)	
Latest Version	AWI Quality Standards
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(Standard Practice for Thermographic Inspection of Insulation Installations in Envelope Cavities of Frame Buildings
ASTM E 779	Standard Test Method for Determining Air Leakage Rate by Fan Pressurization
ASTM E1827-96	Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door
Builders Hardware Manufacturers Association (BHMA)	
ANSI/BHMA	The Various BHMA American National Standards
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</p>

	Code and Chapter 9 shall be considered to be references to Unified Facilities Criteria (UFC) 3-600-01.
IMC	International Mechanical Code – Note: For all references to “HEATING AND COOLING LOAD CALCULATIONS”, follow ASHRAE 90.1 Note: For all references to “VENTILATION”, follow ASHRAE 62.1
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 70E	Standard for Electrical Safety in the Workplace
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, 169	Food Equipment Standards
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 EPACK)

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: DetrickISECI3Aguide@conus.army.mil

4.2.11. U.S. Army Information Systems Engineering Command (USAISEC) SECRET Internet Protocol (IP) Router Network (SIPRNET) Technical Implementation Criteria (STIC).. See Paragraph 3 for applicability to specific facility type. May not apply to every facility. This is mandatory criteria for those facilities with SIPRNET.

4.2.11.1. Draft Guide Specification for Section 27 05 28 PROTECTIVE DISTRIBUTION SYSTEM (PDS) FOR SIPRNET COMMUNICATIONS SYSTEMS, found at http://mrsi.usace.army.mil/rfp/Shared%20Documents/SECTION_270528-v3.pdf

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.

5.3.5.7. Casework: Unless, otherwise specified, all casework for Cabinetry and cases shall be "custom grade", as described in the AWI Quality Standards.

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. 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 at elevator shafts. Coordinate the motorized elevator hoistway vent damper(s) with the Fire Protection System design in paragraph 5.10. Ensure that the damper(s) is accessible to facilitate regular inspection and maintenance.

5.5.2.9. Damper and control to close all ventilation or make-up air intakes and exhausts, , etc., when leakage can occur during inactive periods. Atrium smoke exhaust and intakes shall only open when activated per IBC and other applicable Fire Code requirements.

5.5.2.10. If garages under buildings are applicable, compartmentalize garages 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) Develop an Air Barrier Quality Control plan to assure that a competent air barrier inspector/specialist inspects the critical components prior to them being concealed. At a minimum, three onsite inspections are required during construction to assure the completeness of the construction and design.
- (b) 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 both pressurization and depressurization.. 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.
- (c) 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.
- (d) 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 non-water type, conforming to ASHRAE Standard 189.1. Non-Water type shall include sealed replaceable cartridge or integral liquid seal trap. Either non-water type urinal 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. Do not provide non-water type urinals for barracks type or other living spaces. Those fixtures shall be water-use type, conforming to ASHRAE 189.1 (0.5 gpf/1.9 lpf).

5.6.8. **BUILDING WATER USE REDUCTION.** Reduce building potable water use in each building 30 percent from the Baseline, using the Manufacturing Performance Requirements for Plumbing Fixtures from the Energy Policy Act of 1992 (Public Law 102-486), except as modified by LEED. See Appendix S. Public lavatory faucets shall deliver a maximum flow rate of 0.5 gallons per minute, when tested in accordance with ASME A 112.18/CSA B125 and use that flowrate as the Baseline figure for calculating the 30 percent reduction requirement from the 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.

5.6.11. Cover all drain, waste and vent piping to prevent mortar or other debris from being flushed down and blocking pipes during such construction activities.

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 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. See Also Appendix T, *Functional Area Lighting Control Strategy*.
- (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. In Air handlers that handle outdoor air and have fans that run continuously during the occupied mode, direct expansion cooling coils may be used only if the controls and compressor technology is provided that allows the compressor to operate down to 10% of full load without utilizing hot gas bypass to minimize the potential of delivering unconditioned outdoor air to the space.

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 and Telecommunications Equipment Rooms, (including SIPRNET ROOMS, where applicable for specific facility type). Comply with ANSI/EIA/TIA 569 (including applicable Addenda). Maintain environmental conditions at the Class 1 and 2 Recommended Operating Environment. Before being introduced into the room, filter and pre-condition outside air to remove particles with the minimum MERV filtration quality shown in the ASHRAE HVAC Applications, Chapter 17. Maintain rooms under positive pressure relative to surrounding spaces. Design computer room air conditioning units specifically for telecommunications room applications. Build and test units in accordance with the requirements of ANSI/ASHRAE Standard 127. A complete air handling system shall provide ventilation, air filtration, cooling and dehumidification, humidification (as determined during the design phase), and heating. The system shall be independent of other facility HVAC systems and shall be required year round.

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 (BAS), 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 all the heating, ventilating and air conditioning (HVAC) systems and for control of other building systems. 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.
- (i) Provide on board nonvolatile memory for devices accumulating energy consumption.

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

Instructions: Initial each item, sign and date verifying that the requirements have been met.		
#	Description	Initials
1	All DDC Hardware is installed on a TP/FT-10 local control bus.	
2	Communication between DDC Hardware is only via EIA 709.1B using SNVTs. Other protocols and network variables other than SNVTs have not been used.	
3	All sequences are performed using DDC Hardware.	
4	LNS Database is up-to-date and accurately represents the final installed system	
5	All software has been licensed to the Government	
6	M&C software monitoring displays have been created for all building systems, including all override and display points indicated on Points Schedule drawings.	
7	Final As-built Drawings accurately represent the final installed system.	
8	O&M Instructions have been completed and submitted.	
9	Connections between the UMCS IP network and ANSI/CEA-709.1B building networks are through ANSI/CEA-852 Routers.	
By signing below I verify that all requirements of the contract, including but not limited to the above, been met.		
Signature: _____ Date: _____		

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 (CxA), certified as a CxA by AABC, NEBB, or TABB, as described in Guideline 1.1. The CxA 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 CxA 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. Because required CxA contractual relationship may not be acceptable to GBCI for LEED certification, the project cannot earn LEED Credit EA3 Enhanced Commissioning. However, still complete, maintain and provide copies of all necessary LEED documentation for Credit EA 3. This LEED Credit cannot be included to meet the required LEED rating for this project. Contractor may attempt this as an additional credit for GBCI certification but the Government will not accept it until GBCI accepts it.

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 USACE LEED Commissioning Plan Template) 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 track 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 SILL, OK

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. Foundations: Due to expansive soil conditions at Ft. Sill, slabs on grade are not permitted. See paragraph 6.6.1.3.

6.2.2. Pressure piping. No Type M for underground pressure pipe will be allowed. See paragraph 6.8.2.

6.3. SITE PLANNING AND DESIGN

6.3.1. General:

6.3.1.1. The layout for conceptual site preparation and approximate grading elevations are shown on the drawings in Appendix J. Design and construct site and facilities within the specific site responsibility area. The Government will provide general site preparation and mass grading including:

(a) Clearing of all bush and vegetation from the site area. The Government will stockpile removed vegetation outside of site area as designated.

(b) Removal of rocks and stones larger than 6-inches in size;

(c) Rough grading to plus or minus 0.3 feet of proposed subgrade elevation (assumed to be finished floor elevations as shown on the infrastructure site plans minus an assumed foundation depth per the rough grading plan, for proposed structures. Maximum allowable variation of the finished floor elevations is plus or minus 0.2 feet. The Contractor is responsible for any additional fill or cut in order to meet the required minimum or maximum finished floor.

(d) The Infrastructure Contractor will perform rough grading. In areas that required fill during the rough grading, general compaction of fills between 95 to 100 percent of maximum density as measured by Standard Proctor with fill being constructed in maximum 8-inch lifts. The D/B Contractor's geotechnical engineer shall verify compaction of final site.

(e) The Contractor is responsible for any specific site preparation required to accommodate the foundation design prepared or proposed by the Contractor.

6.3.1.2. Time and weather conditions may affect the actual condition of the building site(s); therefore, the Contractor shall accept the site(s) as is and be solely responsible for all final site preparation including any excavation (if necessary), placement of select fill (if necessary), and any testing required to accommodate the proposed foundation, as required by the Contractor's final geotechnical report. Confine site preparation operations to the work area defined by the project site plan unless approved by the Government. Do not waste excess soil within the project site plan work area. Deposit at an approved stockpile or as directed by the Government.

6.3.1.3. Site Design. The Government will designate approximate building site locations and related site features within the drawing included in Appendix J. Since finish grades are not specifically established for specific site responsibility areas, establish finish grades and coordinate grading and other site aspects with the Infrastructure Contractor and other Contractors working on other sites. The Contractor is responsible for the shape of the footprint and the building orientation of the proposed facility or facilities on the designated parcel of land (designated as building envelope on the drawings) with respect to

adjacent and future facilities shown on the drawings. Coordinate the design with the Infrastructure Contractor, the included drawings and others working on nearby sites. Locate the facility on the respective parcel of land; however, the Government must approve any proposed changes from the layout identified in the RFP and Contractor must coordinate proposed changes with the Infrastructure Contractor. The Infrastructure Contractor is typically responsible for design and installation of the surrounding walkways, courtyards, gathering areas, site amenities and parking areas within the site constraints as shown on the drawings, except for organizational parking that is associated with such facilities as the Tactical Equipment Maintenance Facilities, as designated on the Site Drawings in Appendix J., which are the responsibility of the Contractor. Connect all utilities from the building to the service connection point, with the exception of natural gas. Coordinate between the Infrastructure Contractor, the drawings and other contractors relating to site, facility design and functionality and utility connections and outages. Coordinate specific utility outages a minimum of 48 hours in advance through the CO.

6.3.1.4. Upon finalizing the building footprint, provide proposed building footprint, site orientation and requests for deviations from the drawings for Government concurrence and coordination, as applicable, with other product lines. The Government will enforce coordination of proposed buildings and finalize the placement of the buildings within the drawings boundaries and finalize associated site grading around the proposed facilities. The Contractor shall coordinate efforts with work by others on adjacent sites. The Government may modify desired building placement within the building envelope, if deemed necessary. The Government will provide survey control benchmarks and monuments within the specific site area. Set finish floor as indicated in the RFP Drawings and at least a minimum of 8-inches higher than predominant exterior grade. Slope exterior finish grade down and away from each building at a minimum of 5% slope for the first 10 feet. Under no circumstances shall any slope exceed 20% unless retaining structures are not feasible.

6.3.1.5. Privately Owned Vehicle (POV) Parking. By Others. Coordinate POV parking requirements with the A/E Integrator, Infrastructure Contractor, and the Contracting Officer.

6.3.1.6. Additional Information

The site is fully designed and is being constructed by others under a separate contract. The limits of the sitework for this contract is as shown in Appendix J & MM. Refer to Appendix RR for information on site availability.

6.3.2. Site Structures and Amenities

Provide one dumpster pad and enclosure per facility. Locate dumpster enclosure per UFC 4-010-01. Dumpster screening, if required, shall be compatible with the building(s) they serve and shall incorporate the concepts of the architectural theme defined in Appendix F. Locate, design and construct dumpster enclosure(s) as directed within the drawings.

Refer to Appendix J.

6.3.3. Site Functional Requirements:

6.3.3.1. Stormwater Management (SWM) Systems. Storm drainage system design is shown within the drawings at Appendix J. Design any additional storm drain system required by the project. If the Contractor chooses to connect roof drain leaders to the storm water systems, coordinate the location and size for connection of roof drain leaders to the site storm water system with other contractors, as applicable, through the Contracting Officer prior to finalizing building design a minimum of 45 days prior to beginning building construction. The Contractor is responsible for the Storm Water Pollution Prevention Plan (SWPPP) of the entire construction site. Submit site specific SWPPP in accordance with requirements contained in Section 01 57 23 TEMPORARY STORM WATER POLLUTION CONTROL. Make any piping connection from the building to the connection point.

Include all information in the Storm Water Pollution Prevention Plan (SWPPP) required by the Oklahoma Department of Environmental Quality (ODEQ) General Permit OKR10 for storm water discharges from construction activities within the State of Oklahoma. A copy of the OKR10 permit may be found at the following web page:

http://www.deq.state.ok.us/WQDnew/stormwater/construction/okr10_final_permit_13_sep_2007

6.3.3.2. Erosion and Sediment Control. The Fort Sill Environmental Division of Public Works oversees the Stormwater Sediment and Erosion Control Management Plan for the Post.

6.3.3.3. Vehicular Circulation.

(a) Design and construct site pavement to provide access for Ft Sill's fire trucks. The turning radius of the ladder truck is 75-feet 6-inches and weight is 30 tons.

(b) The site is fully designed and allows for required vehicular circulation on the site. The site will be constructed by others to the limits shown in Appendix J and MM. If revisions to the current site design are required to accommodate the Contractor's SSA Warehouse design, all re-design and construction costs shall be the responsibility of the SSA Warehouse Contractor.

6.4. SITE ENGINEERING

6.4.1. Existing Topographical Conditions. The Government has provided a three dimensional digital topographic and utility survey. Bring any discrepancies which are found in the Government furnished survey to the immediate attention of the Government for clarification. Drawings showing existing conditions are included within Appendix J.

See the Infrastructure package in Appendix MM.

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

See Appendix KK for additional geotech information. The SSA Warehouse contractor will have access to the site to perform required geotechnical investigations in accordance with the schedule shown in Appendix RR.

The following supersedes the 1st sentence of paragraph 5.2.2.1: A report that contains raw data for the project site is contained in Appendix A. Borings, a boring location map, and the raw data on the subsurface conditions are included in the referenced appendix.

6.4.2.1. The following supersedes the 4th sentence of paragraph 5.2.2.1: Additional subsurface investigations and laboratory analysis are required to better characterize the site and develop the final design. Perform the investigation and analysis subsequent to award under the direction of a licensed geotechnical engineer.

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 requirements.

See Appendix D for fire flow tests.

6.4.4. Pavement Engineering and Traffic Estimates:

See the Infrastructure package in Appendix MM.

6.4.5. Traffic Signage and Pavement Markings

See the Infrastructure package in Appendix MM.

6.4.6. Base Utility Information

6.4.6.1. Utilities: The Installation's DPW supervises infrastructure and utilities. Most utilities are privatized. Points of contact for utilities and rates are shown in Section 00 73 00 SPECIAL CONTRACT REQUIREMENTS or 00 73 10 TASK ORDER SUPPLEMENTAL CONTRACT REQUIREMENTS, as applicable to this contract or task order. Existing utility services such as potable water, sanitary sewer, electric, natural gas, and COMM are all located near the site such that lengthy utility extensions are not anticipated for this building. Coordinate and plan utilities with the A/E Integrator through the Contracting Officer. The site plan contained in Appendix J provides utility main routing and general orientation for points of connection for each facility. Prior to final design, Verify the locations and sizes of utility services with the A/E Integrator.

(a) Storm Drainage System tie-in points are shown in the drawings at Appendix J. Tie into these systems as appropriate.

(b) Natural Gas distribution lines are shown on drawings at Appendix J. Coordinate point of connection to the facility with the service provider, Oklahoma Natural Gas (ONG), through the CO. The private utility contractor will run Natural gas service, including meter and regulator, to the face of the building.. Connect to the meter and all piping past the meter outlet. The D/B Contractor is not responsible for costs incurred for services provided by the service provider (ONG). Coordinate and provide gas flow and pressure (if different from the standard pressure) requirements with ONG. Coordinate the location of the facility gas connection with the A/E Integrator and ONG and follow ONG's written and diagrammed location requirements, see Appendix . Design and construct the required building service lines and modifications to any distribution lines in accordance with the requirements of ONG. Also see paragraph entitled "Metering Utilities" in this section.

(c) Water mains are shown on the drawings at Appendix J. Coordinate points of connection through the A/E Integrator with the service provider, American Water Enterprises (AWE). The Infrastructure Contractor will provide the potable water service between the main line to the 5-foot line of the building. Provide potable water service from the 5-foot line to the facility and within the building, through a backflow preventer (generally located in the mechanical room). Coordinate with the service provider, AWE through the CO. The Government will provide primary or main water pipe distribution, including the water meter and vault.. Design and construct water service lines from the 5-foot line to the building to meet the utility provider's installation details and specifications. The Government will provide the Post Indicator Valve (PIV) and any bollards required for protection and route the fire water line (separate from the domestic supply) to 5 feet from the building. See Appendix for AWE requirements.

(d) Sanitary Sewer: The Infrastructure Contractor will design and construct the sanitary sewer service line between the sanitary sewer main to 5 feet from the building, including cleanout or manhole. Sanitary sewer mains are shown on the drawings in Appendix J. Coordinate points of connection through the CO with the service provider (AWE).

(e) Electricity: Others will provide the electrical distribution system , including the primary feed from the distribution line to the pad-mounted transformer. See Appendix J for drawings. Complete the design and construct the work from the pad-mounted transformer. Provide underground secondary service from the pad-mounted transformer to the building electrical equipment room. Power for buildings will be provided from pad-mounted distribution transformers. Locate electric meters in service entrance electrical equipment/switchgear located in the main electrical room. Coordinate with the Infrastructure Contractor for installation of the primary underground feeder to the service entrance transformer.

(f) Communications. See Appendix J for Communications service plans and capacities. Coordinate through the CO with the Fort Sill Directorate of Information Management (DOIM). Determine requirements and capacity for each facility and verify with the DOIM, through the CO, that the infrastructure supports the requirements and capacity of the facility..

(g) Cable TV is privatized. The privatized utility (Sudden Link) will provide service to the building. Provide outlet locations in the building(s), including backbox, mud ring and raceway and vertical/horizontal coaxial cable wire management including, but not limited to, labeling and identification. Provide faceplates for coaxial terminator to be installed by Sudden Link. Sudden Link will terminate all

Contractor provided coaxial CATV cables. Provide a pre-wired CATV system throughout designated spaces. CATV system includes, but is not limited to, cables, conduits, pull boxes and CATV jacks. Route all CATV signal conduits and cables back to the communications room or other designated room/closet.

(h) Others will provide telephone system distribution design. Local Telephone Service tie-in points are shown on the drawings at Appendix J. The Infrastructure Contractor will provide telephone conduit duct bank from the primary distribution manhole to 5 feet outside the building. Design and install the telephone conduit duct bank from the [5 foot line] of the building to the communications room. Share the telephone duct bank with the communication duct bank. DOIM will provide telephone cabling.

6.4.6.1.1. Metering Utilities.

(a) Provide water meters Prepare meters for EMCS connection The gas utility provider will provide and install gas meters.. Provide connection from the gas and water meters to the EMCS system.

(b) Provide an electronic meter with equivalent capabilities to a Square D Power Logic Monitor Series 4000. Electric meter shall communicate with the EMCS. Connect to the EMCS.. Locate electric meters in the service entrance electrical equipment/switchgear located in the main electrical room.

6.4.7. Cut and Fill

6.4.7.1. The Government will provide grading as described hereinbefore.

6.4.8. Borrow Material

See Infrastructure package in Appendix MM.

6.4.9. Haul Routes and Staging Areas

6.4.9.1. Use the Haul Route(s) shown in Appendix J.

6.4.9.2. The Contractor will be allotted an area as shown in the attached Access and Haul Route Plan for the placement of a construction trailer complex, if required, and storage Use the haul route(s) shown in Appendix J.

6.4.9.3. For proposal purposes, the D/B Contractor may assume utilities will be provided during construction at the project site.

6.4.10. Clearing and Grubbing:

Clearing and grubbing is by others. Refer to the Infrastructure package in Appendix MM.

6.4.11. Landscaping:

Landscaping is not required

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 appearance 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 Fort Sill's Installation 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 Fort Sill's identified preferences. Implement these preferences considering the following:

- (c) Achievable within the Construction Contract Cost Limitation (CCL)
- (d) Meets Milestones within Maximum Performance Duration.
- (e) Achieves Full Scope indentified in this Solicitation
- (f) Best Life-Cycle Cost Design
- (g) Meets the Specified Sustainable Design and LEED requirements
- (h) 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:

Shown in Appendices AA, F & J. The Contractor shall work with the TEMF contractor and the COE to provide a campus-like feel for the SSA warehouses and the TEMF facilities. Early coordination between contractors and the COE is encouraged.

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 at Fort Sill. 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) **Installation Preference No. 1.** Provide standing seam metal roofing with either a 20-year comprehensive weather-tight warranty or an included maintenance contract for the period of 20 years and snow/ice guards. Provide snow/ice guards that are a standard product of the roofing manufacturer and install as recommended by the roofing manufacturer.
- (c) Low slope roof systems are only allowed where required in other sections of the RFP documents. Minimum roof slope for low slope roof systems is ¼ inch per foot (2%) and 3 inches per foot (3:12) for all other roof systems. Avoid complex valleys, flashing and venting conditions, where possible.
- (d) **Installation Preference No. 2.** Provide brick and/or split face CMU to be incorporated in the exterior walls. Any EIFS provided shall be high impact resistance rated to a distance of 7-feet vertically from finish grade in accordance with applicable criteria. EIFS shall incorporate a means to drain moisture to the exterior.
- (e) **Installation Preference No. 3.** Eliminate the use of roof-top units (RTUs), clerestories, and minimize all other roof penetrations.

- (f) Provide for attenuation of external noise sources such as airfields in accordance with applicable criteria for exterior walls and roof/ceiling assemblies, doors, windows and interior partitions.
- (g) Unless, otherwise specified in paragraph 3, do not exceed levels recommended by ASHRAE Handbook Criteria for sound conditions (and levels) for interior spaces due to the operation of mechanical and electrical systems and devices.
- (h) Trim and Flashing. All exterior metals including gutters, downspouts and fascias shall be factory pre-finished metal.
- (i) Bird Habitat Mitigation: Provide a means to eliminate the congregating and/or nesting of birds at, on and in the facility. Direct special attention to pedestrian entrances and control of such nuisance.
- (j) Exterior Doors and Frames:
- (1) Main Entrance Doors: Aluminum storefront doors and frames with Architectural Class 1 anodized finish, fully glazed, with medium or wide stile are encouraged for entry into lobbies or corridors. Storefront systems shall comply with wind load requirements of applicable codes and UFC 4-010-01 requirements. Framing systems shall have thermal-break design. Color shall conform to Appendix F.
- (2) Side Entrance Doors: Exterior doors and frames opening to corridors or lobbies shall be insulated hollow metal and comply with ANSI A250.8/SDI 100. Door and frame installation shall comply with applicable codes and UFC 4-010-01 requirements. Color shall conform to Appendix F.
- (3) Exterior Non-entrance Doors: Exterior doors and frames opening to spaces other than corridors or lobbies shall be insulated hollow metal and comply with ANSI A250.8/SDI 100. Door and frame installation shall comply with applicable codes and UFC 4-010-01 requirements. Color shall conform to Appendix F.
- (k) Finish Hardware
- (1) All hardware in the facility shall be consistent and shall conform to ANSI/BMHA standards for Grade 1. Coordinate all requirements for hardware keying with the CO. Hardware finishes shall conform to ANSI/BHMA A156.18. Provide ANSI 626 (Satin Chromium plated on Brass or Bronze) or 630 (Stainless Steel). Install deadbolt locks on mechanical and electrical rooms keyed to the DPW keying system. Coordinate door hardware and security requirements with the functional requirements, the Room-by-Room Criteria and the electrical security/fire alarm system requirements of this document. Provide bored locks per BHMA A156.2. Provide all hardware necessary to meet the requirements of NFPA 80 for fire doors and NFPA 101 for exit doors. Provide door closers for all exterior doors, all doors opening to corridors and as required by codes. The Main entrance door is considered a high traffic door. Provide a high quality door closing mechanism complying with BHMA A 156.4 with adequate strength to ensure safe and easy operation in a high-wind environment.
- (2) Programmable Electronic Key Card Access Systems: Even though programmable electronic key card access may be required elsewhere in the contract – do not provide such systems..
- (3) Keying for Facilities: Key all doors individually, even if the doors lead to the same room. The mechanical, electrical, and communication rooms may be keyed alike, but the Installation encourages that they be keyed to the DCF-1. The cores for the mechanical electrical and communications rooms, if not keyed to the DCF-1, shall have a cylinder that is capable of receiving a Best Lock core. Provide four (4) keys for each lock. Provide master keys.
- (l) Exterior Signage: The Government will provide building identification signs and illumination, where required, outside of 5-feet from the building. Design and install exterior signage attached to the facility and within 5-feet of the facility per Appendix H, Exterior Signage. Coordinate requirements with the Government.
- (m) Exterior Windows: Provide operable windows with locks and insect screens removable from the inside.
- (n) Thermal Insulation: Do not install Insulation directly on top of suspended panel ceilings.

(o) Exterior Louvers: Provide exterior louvers designed to exclude wind-driven rain, with bird screens, and made to withstand wind loads in accordance with the applicable codes. Provide wall louvers with the AMCA certified ratings program seal for air performance and water penetration in accordance with AMCA 500-D and AMCA 511.

(p) Exterior Paint Systems: Provide Exterior Paint Systems in accordance with the recommendations of the Master Painters Institute (MPI) for the substrate to be painted and the environmental conditions existing at the project site. Provide a minimum one prime coat and two finish coats for exterior surfaces (surfaces except factory pre-finished material). For exterior applications, provide an MPI Gloss Level 5 finish (semi-gloss) unless otherwise specified. Apply all paints in accordance with the manufacturer's instructions.

(b) Refer to Appendix KK for additional information.

6.5.3. Programmable Electronic Key Card Access Systems:

Not required.

6.5.4. INTERIOR DESIGN

6.5.4.1. Interior building signage requirements:

Provide all required interior building signage to include building directory and room names/numbers.

Fully integrate interior signage as a design element with the architecture and interior design. Provide modular signage for general office areas to accommodate personnel changes or room function changes. Use International symbols to the maximum extent possible. Locate emergency/fire evacuation plans at key areas to ensure fire safety. Coordinate signage plaque colors with the interior color scheme. Provide rooms signs for electrical or mechanical spaces. Provide room control sign for conference room(s).

6.5.4.2. Interior Design Considerations:

Provide maximum use of day lighting and operable windows within the constraints of the contract requirements. Provide interior surfaces that are easy to clean and light in color. Plan the interior spaces to allow maximum flexibility for future modifications.

(a) Interior Partitions and Walls. Non-combustible construction is encouraged even where combustible materials are allowed by code.

(b) Provide each occupied facility with an appropriately sized room that has been "hardened" to resist the forces of tornadoes which are prevalent in Oklahoma. Provide room in accordance with ICC-500 and FEMA 361. (c) Interior Glass and Glazing: Coordinate the arrangement of fenestrations with the proposed furniture layout.

(c) Where moisture or moisture infiltration from the wall cavity cannot be eliminated or sufficiently reduced, consider the use of wall coverings with higher permeability ratings. Don't use wall coverings that do not breathe, such as vinyl wall coverings in high humidity areas due to the tendency for mold to develop.

(d) Floors and Ceilings: Non-combustible construction is encouraged even where combustible materials are allowed by code.

(e) Interior Doors and Frames: Provide hollow metal doors and frames or wood doors in accordance with the standard design and requirements of the project. All door frames shall be hollow metal.

(f) Paint: Comply with the recommendations of, the Master Painters Institute (MPI) for the substrate to be painted and the interior environmental conditions existing at the project site. Paint a minimum of one (1) prime coat and two (2) finish coats for interior surfaces, except factory pre-finished material or

interior surfaces receiving other finishes. In wet areas, provide an MPI Gloss Level 5 (semi-gloss) finish. Apply all paints in accordance with manufacturer's instructions.

(g) Gypsum Board: Comply with ASTM C 36. Minimum panel thickness shall be 5/8-inch. Provide moisture resistant panels (glass-mat panels are encouraged) at locations subject to moisture.

6.5.4.3. Specialties and Furnishings

(a) Window Treatments: Provide horizontal mini-blinds or vertical blinds at all exterior glazed areas, unless otherwise noted.

(b) Bulletin Boards: Provide bulletin boards consisting of a tack board, aluminum tabular frame, and sliding aluminum framed glazed doors with a permanent header panel and a general title, such as "Notices" or "Information", and a 1/4-inch cork pinning surface glued to 1/4-inch thick plywood or hardboard backing. Provide cork with a plastic impregnated surface and burlap backing. The cork's surface finish to be smooth and be free from air pockets, raised cork blemishes, and joint imperfections. Provide the door frame with a removable glazing bead applied on the inside. Glazing to be 1/4-inch polished laminated glass. Each bulletin board door shall be complete with hardware including key operated lock. Provide aluminum hardware with anodized finish matching the frame. Header panel to be white letters on standard black background; cork panel - medium gray. Bulletin board dimensions to be 4 feet by 6 feet. Heading message shall be upper and lower case Helvetica medium, 2-inch capital letter height, centered. Secure frame to the wall by means of concealed screws or bolt hangers.

(c) Projection Screens: Provide projection screens that are ceiling recessed mounted and manual. Screens shall be flame retardant, mildew resistant and white matte with black masking borders. Bottom of screen fabric to be weighted with metal rod. Roller to be a rigid metal at least 3 inches in diameter mounted on sound absorbing supports. Ceiling recessed case to be extruded aluminum. Screens shall be UL listed. Projection screen viewing area shall be minimum 7'-3" high x 9'-8" wide. Provide one ceiling recessed mounted projection screen in each conference area.

(d) Projector Mount: Furnish and install a low profile ceiling mounted projector mount system. PROJECTOR NOT INCLUDED IN CONTRACT. Ceiling mount shall consist of a steel ball joint and Universal Projector Bracket. Mount shall project a maximum 6 inches below finished ceiling height and shall securely attach to ceiling and structure above with steel mounting plate. Provide mounting hardware appropriate to ceiling conditions. Steel ball joint attaches to the Universal Projector Bracket with twist-lock engagement. Mount shall provide up to 30° roll or pitch adjustment and 360° yaw adjustment at ball joint. Two setscrews lock ball joint in position. Silver finish. Maximum load to be 26 lbs. Furnish and install concealed electrical wiring, connections and accessories necessary for projector operation. Provide one low profile ceiling mounted projector mount system in each conference area.

(e) Corner Guards. Provide surface-mounted, high-impact integral color rigid vinyl corner guards at all outside corners of gypsum board walls.

(f) Chair Rail. Install chair rails in areas prone to hi-impact use, such as corridors, classrooms, conference rooms, etc.

(g) Toilet Accessories: All toilet accessories shall be Type 304 stainless steel with satin finish.

6.6. STRUCTURAL DESIGN

6.6.1. Site Specific Loading Requirements:

6.6.1.1. Use basic wind speed of 90 mph 3-second-gust, in miles per hour, for wind loads.

6.6.1.2. Use ground snow load of 10 psf.

6.6.1.3. Use frost penetration of 14 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: 38 (%g) and S1: 2 (%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.

6.6.3. Foundation

6.6.3.1. Due to soil conditions at Ft. Sill, the use of pier and supported grade beam foundation with structurally supported slab, conventional rib mat slabs or thickened structural slabs is required for this project. Slabs on grade or floating slabs are not permitted.

6.6.3.2. Perform controlled expansion consolidation tests on undisturbed samples collected from the overburden material to assess potential settlement and/or heave for piers and edge lift/center lift conditions for ribbed mat slabs and thickened slabs in accordance with ASTM D 4546, Method C, latest edition. Heave predictions using the Potential Vertical Rise (PVR) method or swell pressure predicted from free swell test are not allowed.

6.6.3.3. Assume a minimum 15-foot active zone measured from top of existing ground for uplift and heave calculations.

6.6.3.4. Provide foundation systems for permanent facilities capable of supporting the typical loadings specified elsewhere in this document that are capable of resisting the soil movement and chemical characteristics of the soils present for the design life of the facility. Systems proposed are to have been used successfully at the Installation for a time period equal to the design life of the proposed facility or submit documentation from an acceptable independent certifying entity certifying that a proposed alternate system has been used successfully for a period of time equal to the design life of the proposed facility on a minimum of 10 facilities where the soil movement and chemical characteristics are the same as at the Installation.

6.6.3.5. Site Features – Retaining Walls/Bridges/etc. Design site features with maximum 2 in 1 slope (same as the earth cover). Design site features to drain properly and tie into the drainage collector system.

6.7. THERMAL PERFORMANCE

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

6.8. PLUMBING

6.8.1. **Piping Materials:** Provide Piping materials per applicable criteria but pipe materials may be restricted based on specific conditions at a particular site. Type M copper is not allowed. Type L above ground pressure piping and copper Type K for underground pressure pipe are preferred. Non-plastic drainage, waste and venting (DWV) plumbing materials are preferred, however, PVC or ABS waste and vent pipe is acceptable.

6.8.2. **Cross Connection Control:** Follow local site specific requirements for cross connection control / backflow prevention. Provide an inlet water backflow prevention device for each facility. Protect potable water systems from contamination by hydronic water and other industrial and mechanical systems via a reduced pressure zone backflow preventer.

6.8.3. **Natural Gas Supply:** Normally use the standard gas pressure from utility provider's building regulator of 5.3 ounces. If higher pressures are needed, coordinate those requirements with the utility provider. Provide the utility provider with required flow rate and expected gas usage diversity so the utility

provider may provide the appropriate metering and regulation equipment. Report no diversity, that is, all loads are firing at the same time in the facility.

6.8.4. **Gas Regulator Venting:** Vent all gas regulators in building to the outside.

6.8.5. **Domestic Water Heating:** The Installation encourage the use of point-of-use instantaneous domestic hot water heaters for small hot water demand areas such as small restrooms (small is considered to be two lavatories or less) and gas-fired hot water storage heaters for larger demand areas such as larger gang restrooms and restrooms with showers.

6.8.6. **Exterior Water Piping Freeze Protection:** Design seasonally utilized (not used in winter) water supply piping for complete drain down. Provide an interior or below grade isolation valve. Insulate exposed water piping that is utilized year round, heat traced and protected with pipe jacketing to ensure that the piping will not freeze.

6.8.7. **Fixture Faucet Mixing Valves:**

(a) For administrative and classroom facilities, the automatic flush and water valves, with long-life batteries and backup manual flush buttons, for water closets, urinals and lavatories perform best.

(b) Provide automatic mixing type with anti-scald temperature control shower valves (pressure balancing/compensating type). Additionally, valves shall not have any internal or exterior plastic parts.

6.8.8. **Wall Hydrants.** Provide non-freeze wall hydrants on all building faces at no more than 100-foot intervals.

6.9. SITE ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

6.9.1. **Exterior Lighting.** Design and install exterior lighting within the construction limits. Exterior site and area lighting shall be pulse-start metal-halide (PSMH) or induction type, except compact fluorescent lighting is acceptable for walkway lighting where suitable for the climatic conditions. Exterior lighting includes parking areas, hardstands, roadways and walkways. Photo control devices for exterior lighting shall have adjustable operation range of approximately 0.5 to 5.0 foot candles. Provide protective lighting systems at the perimeter fence where required by the specific project to deter trespassers and to make them visible to guards. Use 90 degree cut off lighting facing any runway.

6.9.2. **Exterior Electrical:** Design and extend the electrical service underground from the pad-mounted transformer to building service equipment/main electrical switchgear.. Coordinate all electric work and interruptions through the CO and Ft Sill DPW. The existing distribution system is a 13,200Y/7,620 V three-phase, four-wire multi-ground system. Duct lines (600-volt) shall be direct buried thick wall type; concrete encased in vehicular traffic areas. Provide two spare conduits from the transformer to the building service equipment/main electrical switchgear..

6.9.3. **Exterior Communications:** Communications service to the buildings shall be underground six-way 4-inch conduit duct banks. Design and install the duct bank from 5-foot outside the building to the building's communications room. In each duct bank; dedicate one (1) 4-inch conduit to copper cables; dedicate one (1) 4-inch conduit to CATV coaxial cable and dedicate one (1) 4-inch conduit with two (2) 3-way fiber mesh to fiber optic cable. The other three (3) 4-inch conduits are spare. Others will provide duct bank, fiber optic and copper cabling from the manhole(s) to within 5-foot of the building at a location closest to the communications room under separate contract. Others will splice and complete the termination of the outside plant cables in the manhole and communications room. Securely fasten all entrance conduits to the building so they can withstand a typical placing operation. Keep area around the entrance conduit free of any construction, storage and mechanical apparatus.

6.10. FACILITY ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

6.10.1. Power system study shall consist of fault analysis and coordination study.

6.10.2. **Lightning Protection and Grounding:** Provide lightning protection shall be provided based on NFPA 780 (2004) Annex L Lightning Risk Assessment of the facility. Provide grounding, bonding, shielding for all facilities. Provide grounding straps and connect to the building grounding system. Provide grounding points in vehicle and equipment parking areas on 20 foot centers (maximum) and coordinated with the power and data board units. Provide ground strap on walls, and two (2) grounding points on each functional bay floor. Provide a bonding grounding in oil storage room.

6.10.3. **Closed Circuit TV (CCTV):** Install a conduit system to support CCTV throughout designated spaces. The conduit system includes but is not limited to conduits, pull boxes and pull wires. Route all conduits for CCTV signals back to the telecommunications room or the designated monitoring room.

6.10.4. **Telephone and Local Area Network (LAN):** Provide complete riser diagrams and equipment locations on the drawings. Connect the facility to the installation Campus Area Network (CAN) System and telephone system in accordance with the I3A (and SIPRNET guide, where applicable in paragraph 3). Communications systems resources will be allocated in accordance with the I3A regarding outlet densities based upon the functionality of the facility's (ies') various component floor spaces. Connect all standard MILCON outlets from the telecommunications room equipment communication patch panels with 2 pair, TIA/EIA 568-B Category 6 unshielded twisted pair (UTP) solid copper station cable. Connect all single 8-position wall outlets from the commercial rack patch panels with one pair TIA/RIA 568-B CAT 6 UTP cable. Provide a weatherproof telephone enclosure located on an exterior wall near the main entrance of each building.

6.10.5. Communication Testing. Provide material and documentation for communication testing. Provide complete end-to-end certification of all wire/cable installed in accordance with the TIA/EIA 568 Standards. Provide 30 days notification of testing. Testing includes but is not limited to:

- (a) A submitted and Government approved test plan.
- (b) Test of all installation ground bus bars, wiring and ground grids.
- (c) Furnishing test results within 7 days of testing performance and prior to final acceptance.
- (d) Test results include, as a minimum, electrical resistance readings, continuity readings, insulation and resistance and dB loss readings. Include graphical representation of results. Include: date, time, tester, building number, room number and panel number.

6.10.6. Terminate all components prior to testing. There will be no acceptance of equipment and systems until the required inspections and tests have been made and submittal of the required documentation to the Government.

6.11. HEATING, VENTILATING, AND AIR CONDITIONING

6.11.1. General:

6.11.1.1. Integration of new facilities into the existing EMCS database and monitoring and controls software (such as the Post-wide demand limiting) will require generation of custom graphics matching the style and complexity of the existing graphics. Integration of new facilities shall also include programming of alarm handling and demand load limiting which will require Directorate of Public Works (DPW) input for critical alarm lists and priority of building for demand load limiting. This must be done at the existing EMCS "front-end." Integration will be limited to qualified companies and personnel. Fort Sill's encourages the use of Tour Andover Controls (TAC) or their designated local representative in Oklahoma City, OK (OKC) do the integration; TAC's OKC representative is, Energy Management & Controls Synergy (EMCS), contact Mr. Jeff Houpt, 405-528-3627. Other possible integrators are: Tang & Associates, contact Mr. John Huston, 312-616-7498 or EMC Engineers, contact Mr. Carl Lundstrom, 678-

254-1221. Note that TAC and EMC Engineers are the only companies currently familiar with the Fort Sill EMCS.

6.11.2. **Water Quality Analysis and Treatment:** Water quality for the Installation and surrounding area is "hard." Treatment will be required for use as make-up water in HVAC equipment. Water Quality Analysis reports are included at Appendix. . Additional water analysis data from water treatment contractor is provided below:

Chlorides: 16 ppm

Total Alkalinity: 90 – 140 ppm (Total alkalinity varies by season.)

Total Hardness: 157 ppm (CaCO₃)

ph: 8.00

Silica: 3.4 ppm (SiO₂)

Iron: approx. 0.017 Reactive (Leaving plant; varies with location, age of piping, etc.)

Total Dissolved Solids: 190 ppm

6.11.2.1. Coordinate with water treatment contractor to confirm water 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. Currently, water treatment is contracted by VT Griffin to Nalco Chemical Company.

6.11.3. Fuel for Heating/Cooling

6.11.3.1. **Installation Preference No. 4.** Ft. Sill's preference for heating/cooling systems is geothermal or natural gas heating with geothermal most preferred. The preferred type of geothermal system is drilled wells with closed circuit earth heat exchange pumping and piping system to gather heat from the earth for exchange to water or air for heating in the facilities.

6.11.3.2. HVAC Cooling Building Systems: Electric driven refrigeration and cooling systems are the most prevalent types at Fort Sill. Geothermal systems and other renewable or highly energy-efficient types of cooling are definitely encouraged over standard refrigeration-based equipment (DX, chilled water, etc.), where they are applicable. Fort Sill currently has several facilities (family housing, UEPH, BEQ, large office buildings, etc.) that are cooled and heated by geothermal closed-loop, drilled vertical borehole systems that are very successful. Evaporative cooling, direct and indirect evaporative building cooling systems, can be energy efficient; and state-of-the-art types proposed will be readily considered as long as site limitations such as climate, dust storms, etc. are taken into account. Do not provide the old style "swamp" direct evaporative pad or media coolers as a form of building cooling as they suffer from water mineral, dirt buildup and are maintenance intensive.

6.11.3.3. HVAC Central Cooling Plant Systems (serving more than one building or facility): Electric driven refrigeration and cooling systems are the most prevalent types at Fort Sill. Chiller plants mainly employ electric centrifugal chillers with water cooling towers. While this type of system is acceptable for maintenance and durability, Ft Sill encourages the use of other types of cooling systems, such as geothermal central plants that have been installed and are in use. Newer plants, where they are proposed or required should be of much higher efficiency than standard energy code minimum systems and are highly encouraged to employ renewable energy such as geothermal. The recommended type of geothermal cooling/heating system is drilled wells with closed circuit earth, lake, etc. heat exchange to water for cooling/heating plants.

6.11.4. Mandatory Equipment Requirements:

6.11.4.1. All mechanical equipment shall automatically restart after a power outage. Provide equipment such as boiler low water boiler cut-offs and controls that can restart in a normal mode after

power is restored. Protect all mechanical equipment and controls against power surges and low and high supply voltage situations. Power loss, surges or low or high voltage shall not, in any way, effect HVAC or plumbing equipment or controls, set points, controls bindings etc.

6.11.4.2. Boiler Size: The maximum allowable individual boiler size that can be utilized is 10 million Btu per hour (input); this is a non-negotiable and mandatory Ft Sill requirement for them to operate under their current Environmental Air Quality Permit.

6.11.4.3. HVAC On/Off Switch. Provide an on/off switch for all HVAC systems in a central location as per UFC 4-010-01. Coordinate this requirement and switch features with local installation DPW during design.

6.11.4.4. HVAC Controls: Provide manual button or switch allowing users to have the capability to do minimal "run longer" control. Intent is for building users to work odd shifts without requiring Installation DPW input. HVAC controls shall provide all of the monitoring and controls points as mentioned for EMCS and shall expose all of the reset, tuning, etc. parameters as required for a completely open system as discussed above for EMCS. Coordinate with the CO to obtain the building occupied/unoccupied schedule for the facility; use that schedule for building controls and EMCS.

6.11.4.5. Chilled Water System Volume Requirements. For each chilled water system, the system must contain a minimum of 4-gallons per ton of chilling capacity, or more, if required by the manufacturer of proposed chiller. The volume calculation shall exclude the water volume of the chiller and all load heat exchange developed (coils, etc.) in the system. If the system volume does not contain the minimum volume, a chilled-water storage tank shall be designed to bring the system volume to the required minimum. The chilled-water storage tank shall be piped into the chilled water return line upstream of the chiller.

6.11.4.6. Provide all exterior air cooled HVAC equipment with hail guards.

6.11.4.7. Generator Equipment: Stationary emergency or electrical generator equipment shall use natural gas as a fuel source. This is required by the Installation's Environmental Permit.

6.11.5. **Installation Preference No. 3.** Ft. Sill prefers that no equipment, including HVAC, be roof mounted. However, if provided by the D/B Contractor, the D/B Contractor shall provide proper permanent ladders, roof-protecting walking surface and adequately large OSHA-approved work surfaces around each device or piece of equipment. See paragraph 6.5.2..

6.11.5.1. Equipment Placement: When possible, place the of air handling equipment to be either within the building spaces (i.e., equipment rooms or plants, etc.) which are sound isolated, within exterior on-grade equipment yards which are enclosed with screen walls or within enclosed roof penthouses. The Installation DPW encourages designers to organize vents, stacks, grilles and placement of mechanical or electrical service fixtures into locations which do not provide visually negative design impacts. Where possible, avoid catwalks especially when up and down travel is required to service multiple equipment pieces. (Coordinate with architectural design and RFP requirement.)

6.11.6. **Fort Sill's Freeze Protection:** Provide full protection down to lowest temperature with propylene glycol (PG) solution (dowfrost HD) or a combination of a lower concentration of PG in combination with controls logic to start and run the chilled water pumps to circulate water to help avoid freezing. If any secondary protection is required or provided it shall be self regulating, industrial grade with shielded jacket heat tracing.

6.12. ENERGY CONSERVATION

6.12.1. General

No additional requirements.

6.12.2. 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. Fire Sprinkler Service: Provide a separate fire sprinkler service connection within each building that requires fire sprinklers. The Infrastructure Contractor will provide the Post Indicator Valve (PIV) and any bollards required for protection and route the fire water line (separate from the domestic supply) to 5 feet from the building. Provide for all piping from the 5-foot line of the building and within the building. Provide Knox boxes.

6.13.2. Provide fire hydrants.

6.13.3. Riser Location: Install fire risers in a dedicated space or mechanical room with external access and keying for the Fire Department.

6.13.4. Fire Sprinkler Seismic Design: Since the installation is located in a seismic zone, design fire sprinkler systems for protection of piping against damage from earthquakes per NFPA 13.

6.13.5. Fire Sprinkler Backflow Prevention: Double check valve backflow preventers are the minimum protection required for all sprinkler systems. Systems utilizing antifreeze require reduced pressure principle backflow preventers.

6.13.6. Mass Notification System (MNS)/Public Address (PA): The MNS system shall be fully functioning and shall be designed and installed to operate as both MNS and PA. The systems shall be zoned and permit zonal selection of paging by both installed microphone jacks and telephone dialup. Indicating devices shall be visual and located throughout the facility including exterior wall locations. All strobes for the MNS shall be synchronized with the fire alarm strobes in the event both are active at the same time. The MNS shall have the ability to interrupt all localized audio systems that are independent of the building-wide PA system. The Installation-wide giant voice system is an ADT MNS. Each building shall communicate with the ADT Central Control Unit via an existing radio frequency transmitter and antenna. Furnish and connect the following equipment:

- (a) One (1) mass notification panel in accordance with the requirements of UFC 4-021-01 and compatible with the existing giant voice system at Fort Sill.
- (b) One (1) transceiver with the ability to communicate with the Installation's big voice radio frequency (RF) equipment with the ability to transmit and receive information.
- (c) Install One (1) antenna at the facility.
- (d) Connect eight (8) dry contacts to the building MNS for controlling prerecorded messages and push-to-talk for audio (remainder of the eight (8) shall become spares). Connect the 600-ohm audio for audio from the central control unit to the MNS.

6.13.7. Fire Alarm Systems: Provide Class A addressable systems consisting of a fire alarm panel, an RF transceiver, initiating devices and notification devices. The Fire Alarm Control Panel shall be fully compatible with the existing Monaco system. Provide pull stations that are single-action, non-glass rod type.

6.13.7.1. **Installation Preference No. 5:** Provide the required fire alarm system with 72 hours of standby with 15 minutes of alarm in lieu of the 24 hours of standby required by code.

- 6.13.7.2. The RF transceiver shall be a Monaco BT-X (verify with Post Fire Chief) or approved equal operating on a frequency of 141.3625 MHZ. Provide transceiver communication with the Lawton, Oklahoma 911 dispatch located off Post
- 6.13.7.3. The fire alarm receiving system is a Monaco D-21 system.
- 6.13.7.4. Provide zone by zone information sent to the Fire Department receiving system. Send All tamper devices to the D-21 system as a supervisory tamper.
- 6.13.7.5. Provide all initiating devices that are connected, Class A, Style D, to signal line circuits (SLC), Style 6.
- 6.13.7.6. Provide all alarm appliances connected to notification appliance circuits (NAC), Class A, Style Z.
- 6.13.8. Furnish all software, software locks, special tools and any other proprietary equipment required to maintain, add devices to or delete devices from the system or test the fire alarm system prior to the final inspection of the system.

6.14. SUSTAINABLE DESIGN

- 6.14.1. LEED Rating Tool Version. This project shall be executed 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: Hazmat & POL Storage (if applicable).
- 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 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 73503.

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

None.

6.15. ENVIRONMENTAL

6.15.1. Solid Waste Disposal/Diversion Practices:

6.15.1.1. Solid Waste Disposal/Diversion Practices shall be in accordance with Section 01 57 23 ENVIRONMENTAL PROTECTION. No offsite disposal is permitted. Dispose of all construction material waste and debris from demolition in the Ft Sill landfill (Dodge Hill). Items that can be used to help decrease diversion rates include salvaged items (may be reused by others), scrap metal, masonry products, gravel, asphalt, concrete, rock and topsoil (earth fill is specifically excluded). There are segregated areas at the landfill for disposal of asphalt, concrete and rock. Dispose of waste fill on Post; The Contracting Officer (CO) will coordinate and approve location of disposal areas. There is no charge for using the Ft Sill Landfill. Confine construction limits to the construction site boundaries shown on the drawings within Appendix J.

6.15.1.2. Government policy applies to sound environmental principles in the design, construction and use of facilities. As part of the implementation of that policy, (1) Practice efficient waste management when sizing, cutting, and installing products and materials, (2) use all reasonable means to divert construction, and demolition waste from landfills and incinerators and to facilitate their recycling or reuse.

6.15.2. Asbestos containing materials (ACMs), lead based paint (LBP), or PCBs shall not be used in the project.

6.15.3. Air pollution restrictions applicable to this project do not allow materials to be burned on Government premises.

6.15.4. Oil Water Separators (OWS). Fort Sill requires OWS to be installed in a vault per local EQD requirements. Equip the oil water separator with a sensor/alarm panel that indicates when the separator requires service. Also include a sump pump tied to the separator for removal of rainwater from the vault.

6.16. PERMITS

Obtain permits from Fort Sill for each generator required for on-site electrical service. Note that generators equal to or larger than 500 hp, in use for more than 1-year require a permit from Fort Sill EDQ.

6.17. DEMOLITION

Demolition is not required under this contract.

6.18. ADDITIONAL FACILITIES

Exterior Covered Hardstand/Bulk Storage facilities.

End of Section 01 10 00.TBD

**SECTION 01 33 00.TBD
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 two (2) copies of information only submittals.

End of Section 01 33 00.TBD

**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
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 - 3.5.4. LEED Documentation
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 - 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
 - 3.9.3. Mailing of Design Submittals
- 3.10. AS-BUILT DOCUMENTS

ATTACHMENT A STRUCTURAL INTERIOR DESIGN (SID) REQUIREMENTS

ATTACHMENT B FURNITURE, FIXTURES AND EQUIPMENT REQUIREMENTS

ATTACHMENT C TRACKING COMMENTS IN DRCHECKS

ATTACHMENT D SAMPLE FIRE PROTECTION AND LIFE SAFETY CODE REVIEW

ATTACHMENT E LEED SUBMITTALS

ATTACHMENT F BUILDING INFORMATION MODELING REQUIREMENTS

ATTACHMENT G DESIGN SUBMITTAL DIRECTORY AND SUBDIRECTORY FILE ARRANGEMENT

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. 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. Include the DCM procedures in the Design Quality Control Plan. 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 (jambs, 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.

3.5.2.13. Air Barrier System: Provide a narrative of the design and installation requirements for the Air Barrier system. As part of the design quality control process an air barrier consultant shall review drawing details to assure that details of critical Air Barrier components are properly detailed and incorporated during the design drawings and process (i.e. window flashing details, penetration in air barrier details, door flashing details, roofing/ceiling barrier interface details and etc.). Furnish the Government written review details and results.

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 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. Examples include specifications from MASTERSPEC from the American Institute of Architects, SPECTEXT from Construction Specification Institute or Unified Facility Guide Specifications (UFGS using MASTERFORMAT 2004 numbering system), etc. The UFGS are available through the "Whole Building Design Guide" website, using a websearch engine. 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). Note that the UFGS are NOT written for Design-Build and must be edited appropriately. For instance, they assume that the Government will approve most submittals, whereas in Design-Build, the Designer of Record has that action, unless this Solicitation requires Government approval for specific submittals. The Designer of Record should also note that some UFGS sections might either prescribe requirements exceeding the Government's own design standards in applicable references or contain requirements that should be selected where appropriately required by the applicable references. At any rate, where the UFGS are consistent with other major, well known master commercial guide specifications, then generally retain such requirements, as good practices.

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

(k) Air Barrier Design: Details of all Air Barrier components, (i.e. window flashing details, penetrations in air barrier details, door flashing details, roofing/ceiling barrier interface details and etc.)

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
- (c) Outside Plant (OSP) Cabling - Campus or Site Plans - Exterior Pathways and Inter-Building Backbones
- (d) 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.
- (e) Layout of complete building per floor - Serving Zone Boundaries, Backbone Systems, and Horizontal Pathways including Serving Zones Drawings - Drop Locations and Cable ID's
- (f) 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 MicroStation V8 or higher. Save all design CAD files as MicroStation V8 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) 22 x 34 Full Sets/ *Partial Sets	Design Analyses & Specs Full Sets/ *Partial Sets	Drawing Size (Half Size) 11 x 17 Full Sets/ *Partial Sets	Non-BIM Data CD-ROM or DVD as Necessary (PDF & .dgn)	Furniture Submittal (Per Attachment B)	Structural Interior Design Submittal	BIM Data DVD (Per Attachment F)
Commander, U.S.Army Engineer District Tulsa District	1/1	1/1	1/1	6	1	1	2
Commander, U.S.Army Engineer District, Center of Standardization Fort Worth District	2/0	1/1	2/2	6	N/A	2	1
Installation	3/3	3/3	3/3	5	2	1	2
U.S.Army Corps of Engineers Construction Area Office	4/4	4/4	4/4	4	1	1	1
Information Systems Engineering Command (ISEC)	0/0	0/0	0/0	1	*Partial Set (Work Station/System Furniture- IT Details)	N/A	1

Activity and Address	Drawing Size (Full Size) 22 x 34 Full Sets/ *Partial Sets	Design Analyses & Specs Full Sets/ *Partial Sets	Drawing Size (Half Size) 11 x 17 Full Sets/ *Partial Sets	Non-BIM Data CD-ROM or DVD as Necessary (PDF & <u>.dgn</u>)	Furniture Submittal (Per Attachment B)	Structural Interior Design Submittal	BIM Data DVD (Per Attachment F)
Huntsville Engineer & Support Center, Central Furnishings Program	N/A	N/A	N/A	N/A	1 Interim/Refer to attachment B for the final submission Qty	N/A	N/A
Other Offices	0/0	0/0	0/0	0	N/A	0	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

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 ten (10) 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 and 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) GSA Contract Number, Special Item Number (SIN), and contract expiration date
- (f) Manufacturer, Product name and Product model number or National Stock Number (NSN)
- (g) Finish name and number (code to finish samples)
- (h) Fabric name and number, minimum Wyzenbeek Abrasion Test double rubs (code to fabric samples)
- (i) Dimensions
- (j) Item location by room number and room name
- (k) Quantity per room
- (l) Total quantity
- (m) Special instructions for procurement ordering and/or installation (if applicable)
- (n) 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, beltline, below and/or above beltline)
- (14) Locations of communication cables (base, beltline, below and/or above beltline, 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. Manufacturer & Alternate Manufacturer List

Provide a table consisting of all the major furniture items in the order forms and two alternate manufacturers for each item. ALTERNATE MANUFACTURER ITEMS MUST BE SELECTED FROM GSA SCHEDULE AND MEET ALL THE SALIENT FEATURES OF THE ORIGINALLY SPECIFIED ITEM. Provide manufacturer name, address, telephone number, product series and product name for each item and the two alternate items. Major furniture items include, but are not limited to, casegoods, furniture systems, seating, and tables. Organize matrix by item code and item name.

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. Divide the FF&E package into different sections based on this listing, applies to order forms and cost estimates.

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 used 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. Coordinate the overall furniture and area plans with the Life Safety Code Review to ensure adequate clearances are provided for egress. Provide a narrative of this coordination to accompany the Furniture and Area plans.

1.2.2. Workstation Plans

Show each typical workstation configuration in plan view. In addition, provide either elevations or an 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. In addition, provide either elevation or an 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.

1.2.9. Portable Fire extinguishers:

Provide a list of all required portable fire extinguishers, with descriptions (location, size, type, etc.) and total number per type. See also attachment D, "SAMPLE FIRE PROTECTION AND LIFE SAFETY CODE REVIEW", paragraph 1.14.

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. Unless otherwise noted, specify workstations and storage of steel construction. Provide high pressure laminate worksurface tops constructed to prevent warpage (thermally fused worksurfaces are not acceptable). 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 manufacturers 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 commercial 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 commercial 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 with mitered solid wood edge of same wood type. 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. All task seating shall support up to a minimum of 250 lbs.

1.11.2. Desk and Guest Seating

Select ergonomic desk chairs with casters, 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.

1.12. 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.

training tables shall be reconfigurable, moveable and storable; lighter weight folding with dollies or casters as necessary. Plastic laminate self edges are unacceptable. Specify power and data requirements and dollies as 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
Wood Desks - 10 year minimum

Metal Desks – 12 year minimum
Seating, unless otherwise noted - 10 year minimum
Seating Mechanisms and Pneumatic Cylinders - 10 years
Seating Fabric - 3 years minimum
Wood Filing and Storage - 10 year minimum

Tables, unless otherwise noted - 10 year minimum
Table Mechanisms – 5 year minimum

Table Ganging Device - 1 year minimum
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 and Contractor reviewers enter design review comments into DrChecks. Designers of Record shall annotate comments timely and specifically to indicate for the review conference exactly what action will be taken or why the action is not required. After the design review conference and prior to the next design submittal for the package, the DOR's will annotate those comments that require DOR action, design revision, etc. to show how and where it has been addressed in the design documents, This shall be part of the required design configuration management plan. 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 resolved prior to the next submittal. Print and include the DrChecks comments and responses and included in the design analysis for record in the next design submittal for that package.

2.1. Upon review of comments prior to the design review conference, the DOR(s) shall identify whether they concur, non-concur, mark it "for information only" or mark it "check and resolve". Indicate exactly what action will be taken or why the action is not required.

2.2. 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.

2.3. After the conference, the DOR(s) shall formally respond to each applicable comment in DrChecks a second time prior to the next submittal, clearly indicating what action was taken and what drawing/spec/design analysis changed. 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 submittal, reviewers will back-check answers to the comments against the new submittal, in addition to reviewing additional design work.

2.4. Clearly annotate in DrChecks those comments that, in the DB Contractor's opinion, require effort outside the scope of the contract. Do 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's 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 (Step 1 of 2)

The role of the DOR(s) is to evaluate and respond to the comments entered by the Government's and DB Contractor's reviewers. 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 radio button (concur, non-concur, for information only, or check and resolve) and respond with a brief explanation in the Discussion field. An explanation other than to say "concur" is not necessary for "Concur", but may be useful for the Design Configuration Management purposes.
- 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 Comment Evaluation (Step 2 of 2)

This is where the DOR(s) respond to each applicable comment in DrChecks after the design review conference, prior to the next submittal, clearly indicating what action was taken and what drawing/spec/design analysis changed. Respond to the previous comments, following the same steps as above, adding the narrative in the discussion field.

7.0 DrChecks Back-Check

At the following design conference, (where applicable) or at some other agreed time, Government and Contractor reviewers will back-check comment annotations against newly presented documents to verify that the designers' responses are acceptable and that all revisions have been completed. Reviewers

shall either enter additional back-check comments, if necessary, or close those where actions are complete.

- 7.1. Log into DrChecks.
- 7.2. Click on the appropriate project.
- 7.3. Under "My Backcheck" click on the number under "Pending".
- 7.4. If you agree with the designer's response select "Close Comment" and add a closing response if desired.
- 7.5. 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.
- 7.6. Click on the Add button. The back-check will be added to the database and a fresh screen will appear with the next comment.
- 7.7. 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.		ARC

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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

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PAR		FEATURE	DUE AT					
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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PAR		FEATURE	DUE AT					
			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
			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

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	LEED-NC v3 Submittals (OCT09)	Provide for Credit Audit Only	REQUIRED DOCUMENTATION	DATE	REV	Date Submitted (to be filled in by Contractor)	Government Reviewer's Use
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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PAR		FEATURE	DUE AT		DATE	REV
			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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			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	X 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	X Manufacturer published product data or certification confirming regional material percentages in spreadsheet		PE

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PAR		FEATURE	DUE AT					
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 MEC

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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 05-31-2011

BUILDING INFORMATION MODELING REQUIREMENTS

1.0 Section 1 - General

- 1.1. Definitions. See Section 7 for definitions of terms used in this document.
- 1.2. Submittal Format
 - 1.2.1. The Model shall be developed using Building Information Modeling (“BIM”) supplemented with Computer Aided Design (“CAD”) content as necessary to produce a complete set of Construction Documents. Printed design submittal drawings shall be 22 x 34 size, suitable for half-size scaled reproduction.
 - 1.2.2. BIM submittals shall conform to the requirements of Sections 3 and 4 below.
 - 1.2.3. For each Center of Standardization (CoS) facility type included in this Project, all Models and associated Facility Data shall be submitted in V8 Workspace. The submittals shall be fully operable, compatible, and editable within the native BIM tools.

2.0 Section 2 – Design Requirements

- 2.1. Use of BIM for Design. Contractor shall use BIM application(s) and software(s) to develop Project designs consistent with the following requirements.
 - 2.1.1. Baseline Model. The Contractor will not be provided a baseline multi-discipline BIM Project Model.
 - 2.1.2. USACE BIM Workspace. The USACE Bentley BIM Workspace V8 must be used and can be downloaded from the CAD/BIM Technology Center website, currently <https://cadbim.usace.army.mil>.
 - 2.1.3. 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.
 - 2.1.4. Industry Foundation Class (IFC) Support. The Contractor’s selected BIM application(s) and software(s) must be consistent with the current IFC property sets. Any deviations from or additions to the IFC property sets for any new spaces, systems, and equipment must be submitted for Government acceptance.
 - 2.1.5. BIM Project Execution Plan.
 - 2.1.5.1. Develop a BIM Project Execution Plan (“Plan” or “PxP”) documenting the BIM uses, analysis technologies and workflows.
 - 2.1.5.2. Contractors shall utilize the link for the USACE BIM PROJECT EXECUTION PLAN (USACE PxP) Template located in Attachment H to develop an acceptable Plan.
- 2.2. BIM Requirements.
 - 2.2.1. Facility Data. Develop the Facility Data to include material definitions and attributes that are necessary for the Project facility design and construction as described in Section 4.0. Additional data in support of Section 6.0 Contractor Electives is encouraged to be added to the Model.

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

2.2.3. Model Granularity. Individual elements may vary in level of detail within the 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 on appropriately scaled civil drawings.

2.3. Output. Submitted Drawings (e.g., plans, elevations, sections, schedules, details, etc.) shall be derived (commonly known as extractions, views or sheets) from the Model and Facility Data. Drawings derived from the Model shall remain connected to the Model for the life of the Project and documented in the PxP. Drawings not derived from the Model shall also be documented in the PxP.

2.3.1. Drawings derived from the Model shall be compliant with the A/E/C CAD Standard. Deliver electronic CAD files used for the creation of the Construction Documents per requirements in Section 01 33 16, the criteria of the USACE Tulsa District District, and as noted herein.

2.3.2. The CAD file format specified for drawings shall not dictate which application(s) are used for development and execution of the Model and Facility Data. Application(s) used shall be documented in the PxP.

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

2.4.1. Model Standards Checks. QC validation ensures that the Project Facility Data set has no undefined, incorrectly defined or duplicated elements. Identify and report non-compliant elements and submit a corrective action plan. Provide the Government with detailed justification and request Government acceptance for any non-compliant element that the Contractor proposes to be allowed to remain in the Model.

2.4.2. CAD Standards Checks. QC checking ensures that the fonts, dimensions, line styles, levels and other construction document formatting issues are followed per requirements in Section 01 33 16. Identify and report non-compliant content and submit a corrective action plan.

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

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

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

2.5.2. 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, code space requirements) in a written report and resolve.

2.5.3. 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.

2.5.4. Other Parameters. Develop other design and construction review parameters as the Contractor deems appropriate for the Project and provide to the Government for acceptance.

3.0 Section 3 – Submittal Requirements

3.1. General Submittal Requirements.

3.1.1. Provide submittals in compliance with the PxP deliverables at stages as described below.

3.1.2. For each Interim Design Submittal as set forth in Paragraphs 3.3 through 3.6, provide a Contractor-certified written report confirming that consistency checks as identified in Paragraphs 2.4 and 2.5 above 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 Interim Design Submittal as set forth in Paragraphs 3.3 through 3.6, provide the Government with:

3.1.3.1. The Model, Facility Data, Workspace and CAD Data files in the native BIM/CAD format.

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

3.1.3.3. A list of all submitted electronic files including a description, directory, and file name for each file submitted. For all CAD printed sheets, include a list of the sheet titles and sheet numbers. Identify which files have been produced from the Model and Facility Data.

3.1.4. The Government shall confirm acceptability of all submittals identified in Section 3 in coordination with the USACE Geographic District BIM Manager.

3.2. Initial Design Conference Submittal.

3.2.1. Submit a digital copy of the PxP 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 into the PxP.

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

3.3. Interim Design Submittals.

3.3.1. BIM and CAD Data. Submit the Model with Facility Data per the requirements identified in Paragraphs 2.2 and 2.3 as applicable to the Interim Design package(s).

3.4. Final Design Submissions and Design Complete Submittals.

3.4.1. BIM and CAD Data. Submit the Model with Facility Data per the requirements identified in Paragraphs 2.2 and 2.3. 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-Built BIM and CAD Data Submittal. Submit the final Model, Facility Data, and CAD files reflecting as-built construction conditions for Government acceptance, 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 Model shall be developed to include the systems described below as they would be built, the processes of installing them, and to reflect final as-built construction 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 actual net square footage and net volume, and holding data to develop the room finish schedule including room names and numbers. Include program information 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(s) shall be developed in the Structural Model and then referenced by the Architectural Model.

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 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. All architectural specialties (i.e., toilet room accessories, toilet partitions, grab bars, lockers, and display cases) and millwork (i.e., cabinetry and counters) shall be accurately depicted with the necessary intelligence to produce accurate plans, elevations, sections and schedules 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 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, 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. Equipment shall be depicted to meet layout requirements with the necessary intelligence to produce accurate plans and schedules, indicating the configuration, materials, finishes, mechanical, and electrical requirements.. 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 with 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, related building/wall sections, and schedules.
- 4.5.4. Cast-in-Place Concrete. All walls, columns, 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. All 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. All shafts and pits, including necessary intelligence to produce accurate plans and building/wall sections depicting these design elements.
- 4.5.8. Openings and Penetrations. All major openings and penetrations that would be included on a quarter inch (1/4"=1'0") scaled drawing.
- 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 to be depicted in the Model. Additional minimum Model requirements include:

4.6.1. HVAC. All necessary heating, ventilating, air-conditioning and specialty equipment, including air distribution for supply, return, ventilation and exhaust ducts, control systems, 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 Mechanical equipment clearances shall be modeled for use in interference management and maintenance access requirements.

4.6.4. Elevator Equipment. All necessary equipment and control systems, including necessary intelligence to produce accurate plans, sections and elevations depicting these design elements.

4.7. Electrical/Telecommunications. The Electrical and Telecommunications 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 to be depicted 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. All necessary special electrical components (i.e., security, mass notification, public address, nurse call and other special electrical occupancy sensors, and control systems), including necessary intelligence to produce accurate plans, details and schedules.

4.7.3. Grounding. All necessary grounding components (i.e., lightning protection systems, static grounding systems, communications grounding systems, and bonding), including necessary intelligence to produce accurate plans, details and schedules.

4.7.4. Telecommunications. All existing and new telecommunications 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 including all lighting fixtures, relevant existing and proposed support utility lines and equipment with necessary intelligence to produce accurate plans, details and schedules.

4.7.6. Equipment Clearances. All Electrical equipment clearances shall be modeled for use in interference management and maintenance access requirements.

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, with necessary connections to mains or other distribution points as appropriate, including necessary intelligence to produce accurate plans and profiles .

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, parking lots, and 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, as described in the proposal submission requirements and evaluation criteria, the requirements of paragraphs 6.2 through 6.5 are as applicable for those elective feature(s) that will be included in the project.

6.2. COBIE Compliance. The Model and Facility Data for the Project shall fulfill Construction Operations Building Information Exchange (COBIE) requirements on the Whole Building Design Guide website (www.wbdg.org) , including all requirements for the indexing and submission of Portable Document Format (PDF) and other appropriate records 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 PxP and during the Initial Design Conference Submittal Demonstration, 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 Stages identified in Paragraphs 3.3 through 3.6, the Contractor shall deliver the construction schedule 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 PxP and during the Initial Design Conference Submittal Demonstration, provide an overview of the use of BIM in the development and support of cost estimating, or other costing applications such as comparative cost analysis for proposed changes and estimate validation.

6.4.1. Submittal Requirements. During the Stages identified in Paragraphs 3.3 through 3.6, the Contractor shall deliver cost estimating information derived from the Model.

6.4.2. Project Completion. At Project completion, the Contractor shall provide an Micro Computer Aided Cost Estimating System Generation II ("MII") Cost Estimate that follows the USACE Cost Engineering Military Work Breakdown System ("WBS"), a modified Uniformat, to at least the sub-systems level and uses quantity information supplied directly from Model output to the maximum extent possible, though other "gap" quantity information will be included by the contractor as necessary for a complete and accurate Cost Estimate. (See Paragraph 6.4.2.2).

6.4.2.1. Sub system level extracted quantities from the Model 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. When developing a Model, the contractor shall be cognizant of construction sequencing at the beginning stages of Model development, such as recognizing tasks performed 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 Model shall be broken down by their location (proximity in the structure) as well as the complexity of installation.

6.4.2.2. At all design Stages it shall be acknowledged that BIM output 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 alone. (An example of this would be plumbing that is less than 1.5" diameter and, therefore, not expected to be modeled due to permitted level of design granularity; this information is commonly referred to as "The Gap". Quantities addressing "The Gap" and their associated costs shall be included in the final Project actual Cost Estimates as well even though not derived directly from the Model data).

6.5. Other Analyses and Reports. Structural, energy and efficiency, EPACK 2005 & EISA 2007, lighting design, daylighting, electrical power, psychrometric processing, shading, programming, LEED, fire protection, code compliance, Life Cycle Cost, acoustic, plumbing and other analyses that may be generated from the Model or reports summarizing the data compiled from these analyses shall be submitted in the form established by contractor in its accepted PxP.

7.0 Definitions

7.1. The following definitions apply specifically in the context of this attachment only.

7.2. "Model": An electronic, three-dimensional representation of facility elements with associated intelligent attribute data ("Facility Data").

7.3. "Facility Data": The non-graphical information attached to objects in the Model that defines various characteristics of the object. Facility Data can include properties such as parametric values that drive physical sizes, material definitions and characteristics (e.g. wood, metal), manufacturer data, industry standards (e.g. AISC steel properties), and project identification numbers. Facility Data can also define supplementary physical entities that are not shown graphically in the Model, such as insulation around a duct, or hardware on a door.

7.4. "Workspace": A collection of content libraries and supporting files that define and embody a BIM standard. A workspace includes BIM libraries such as wall types, standard steel shapes, furniture, HVAC fittings, and sprinkler heads. It also contains sheet libraries such as print/plot configurations, font and text style libraries, and sheet borders and title blocks. The USACE has developed Workspaces

specific to USACE BIM standards; these workspaces are dependent on specific versions of the BIM applications they serve. All USACE BIM Workspaces can be downloaded from the CAD/BIM Technology Center (<https://cadbim.usace.army.mil>). In some cases, there is a specific Workspace for a given CoS Facility Standard Design.

7.5. “IFC”: Industry Foundation Class, a standard and file format used for the exchange of BIM data; see www.iai-tech.org. Note: In the context of this attachment, IFC does not mean “Issued For Construction.”

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).	

ATTACHMENT H
USACE BIM Project Execution Plan (PxP) Template Version 1.0

This template is a tool that is provided to assist in the development of a USACE BIM Project Execution Plan as required per contract. The template provides a standard format for organizations to establish their general means and methods for meeting the scope and deliverable requirements in Attachment F. It was adapted from the buildingSMART alliance™ (bSa) Project "BIM Project Execution Planning" as developed by The Computer Integrated Construction (CIC) Research Group of The Pennsylvania State University. The bSa project is sponsored by The Charles Pankow Foundation, Construction Industry Institute (CII), Penn State Office of Physical Plant (OPP), and The Partnership for Achieving Construction Excellence (PACE). The template can be found at the following link:

https://mrsi.usace.army.mil/rfp/Shared%20Documents/USACE_BIM_PXP_TEMPLATE_V1.0.pdf

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

**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 at the site, responsible for the overall site activities, including but not limited to 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. Different contractors have different names for the on-site overall project supervisor. For clarification, the term "site project superintendent" refers to the Contractor's senior site representative or "on-site manager", or other similar title, as those terms are used in contract Clause 52.236-7, "Superintendence by the Contractor" and in the Division 00 Section(s) of the solicitation for this contract or task order, or elsewhere in the contract. It does not refer to a construction superintendent, unless that person is also the Contractor's permanently assigned senior site representative in charge of all on-site activities.

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.

3.2.2.4. 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. Include the DCM plan as a subset of the DQC Plan. See Section 'Design After Award'.

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, or by Section 00 73 10 if this is a task order). 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 Tulsa District. 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
 - Not Applicable
 - Not Applicable

- Not Applicable
- For other deliveries:
 - As directed by the Contracting Officer
 - Not Applicable
 - Not Applicable
 - Not Applicable

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.TBD
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.TBD

SECTION 01 57 23

ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPAPUB (2003) NPDES (National Pollution Discharge Elimination System) General Permits for Storm Water Discharges from Construction Sites

1.2 DEFINITIONS

For the purpose of this specification, environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic, cultural and/or historical purposes. The control of environmental pollution and damage requires consideration of air, water, and land, and includes management of visual aesthetics, noise, solid waste, radiant energy and radioactive materials, as well as other pollutants.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00.00 10 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Environmental Protection Plan; G.

The environmental protection plan shall address all items in the paragraph ENVIRONMENTAL PROTECTION REQUIREMENTS and shall be submitted with the Quality control Plan as described in Section 01 45 01.00 10.

Storm Water Pollution Prevention Plan (SWP3); G, RE.

The Storm Water Pollution Prevention Plan (SWP3) shall contain all the information required by the Oklahoma Department of Environmental Quality (ODEQ) General Permit OKR10 for storm water discharges from construction activities within the State of Oklahoma. A copy of the OKR10 permit may be found at the following web page:
http://www.deq.state.ok.us/WQDnew/stormwater/construction/okr10_final_permit_13_sep_2002.pdf

Waste Management Plan; G.

The water management plan shall address the waste stream, estimated quantities of waste, describe and tentatively classify the broad waste types as follows:

- a. Special wastes such as hazardous waste, medical waste, universal waste, radioactive waste, mixed hazardous/radioactive waste; and other special waste;
- b. Wastes including trash, garbage, cardboard, packing and crating, rubble, concrete, asphalt, metals, lumber, salvageable, recyclable, scrap, and others.

Restoration Plan; G.

Submit a restoration plan showing how trees, shrubs, grass areas, flower gardens, etc., scarred or damaged by the Contractor's equipment or operations, shall be restored to the original condition.

Notice of Intent (ODEQ Form 640-571); G

Submit two (2) copies of a completed Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activities for coverage for all construction, demolition, or excavation projects. This form can be obtained from the Oklahoma Department of Environmental Quality at their web site, <http://www.deq.state.ok.us>. The Contractor shall submit the unsigned NOI forms to the Contracting Officer for submission to Fort Sill environmental personnel.

Notice of Termination (NOT) (ODEQ Form 640-572); G

Submit two (2) copies of the completed form to terminate coverage for Storm Water Discharges from Construction Activities. Form shall be submitted when final stabilization of construction site has been achieved. Final stabilization means all soil disturbing activities have been completed and a uniform vegetative with a density of 70 percent of native background cover has been established. This form can be obtained from the Oklahoma Department of Environmental Quality at their web site, <http://www.deq.state.ok.us>. The Contractor shall submit the NOT forms to the Contracting Officer for submission to Fort Sill environmental personnel.

1.4 ENVIRONMENTAL PROTECTION REQUIREMENTS

Provide and maintain, during the life of the contract, environmental protection. Plan for and provide environmental protective measures to control pollution that develops during normal construction practice. Plan for and provide environmental protective measures required to correct conditions that develop during the construction of permanent or temporary environmental features associated with the project. Comply with Federal, State, and local regulations pertaining to the environment, including but not limited to water, air, and noise pollution.

1.4.1 Environmental Protection Plan

Within 15 days after receipt of Notice of Award of the contract and at least 7 days prior to the Preconstruction Conference, the Contractor shall submit in writing, with drawings, an Environmental Protection Plan and meet with representatives of the Contracting Officer to develop mutual understanding relative to compliance with this provision and administration of the environmental protection program. Approval of the Contractor's plan

will not relieve the Contractor of his responsibility for adequate and continuing control of pollutants and other environmental protection measures. The Government reserves the right to make changes in his environmental protection plan and operations as necessary to maintain satisfactory environmental protection performance. The environmental protection plan shall include but not be limited to the following:

1.4.1.1 Laws, Regulations, and Permits

The Contractor shall prepare a list of Federal, State and local laws, regulations, and permits concerning environmental protection, pollution control and abatement that are applicable to the Contractor's proposed operations and the requirements imposed by those laws, regulations and permits.

1.4.1.2 Notice of Intent (NOI)

If required, the Contractor shall submit two copies of a completed Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activities to the Post Environmental Office as required in paragraph entitled SUBMITTALS contained in this section. The Post will submit the NOI to the State; the State will bill the Contractor for the fee. The Contractor is responsible for all payment of fees.

The Contractor is responsible for submitting the NOI as soon as possible after contract award. Failure to obtain there permit in a timely manner will not be grounds for a contract extension.

1.4.1.3 Protection of Features

The Contractor shall determine methods for the protection of features to be preserved within authorized work areas. The Contractor shall prepare a listing of methods to protect resources needing protection, i.e., trees, shrubs, vines, grasses and ground cover, landscape features, air and water quality, fish and wildlife, soil, historical, archaeological and cultural resources.

1.4.1.4 Procedures

The Contractor shall implement procedures to provide the required environmental protection and to comply with the applicable laws and regulations. The Contractor shall set out the procedures to be followed to correct pollution of the environment due to accident, natural causes or failure to follow the procedures set out in accordance with the environmental protection plan.

1.4.1.5 Permit or License

The Contractor shall obtain all needed permits or licenses for disposal of solid, liquid, chemical, and other waste generated as a result of this contract.

1.4.1.6 Drawings

The Contractor shall include drawings showing locations of any proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, stockpiles of earth materials, and disposal areas for excess earth material and unsatisfactory earth materials.

1.4.1.7 Environmental Monitoring Plans

The Contractor shall include environmental monitoring plans for the job site which incorporate land, water, air and noise monitoring.

1.4.1.8 Traffic Control Plan

The Contractor shall include a traffic control plan for the job site.

1.4.1.9 Surface and Ground Water

The Contractor shall establish methods of protecting surface and ground water during construction activities.

1.4.1.10 Work Area Plan

The Contractor shall include a work area plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. The plan shall include measures for marking the limits of use areas.

1.4.1.11 Plan of Borrow Area(s)

The Contractor shall include a plan of borrow area(s) for the job site, if applicable.

1.4.1.12 Method of Marking Clearing Limits

The Contractor shall include the method of marking and maintaining markings for limits of clearing, if applicable.

1.4.1.13 Method of Controlling Equipment

The Contractor shall include a plan of the method for controlling equipment maneuvering to avoid environmental damage.

1.4.1.14 Training of Contractor's Personnel

The Contractor shall include a plan for training and control of his personnel for environmental damage.

1.4.1.15 Prevention and Control of Spillage

The Contractor shall include a plan for prevention and control of damaging spillages.

1.4.1.16 Layout of Work Areas and Other Areas

The Contractor shall include a plan of his method for layout of work areas, plant sites, haul roads, and borrow and waste areas.

1.4.1.17 Method and Location of Waste and Debris Disposal

The Contractor shall include the location for disposal of waste and debris.

1.4.1.18 Preplanning

Meetings of the Contractor with Contracting Officer or his authorized

representative as specified in the paragraph MEETINGS, for the purpose of preplanning prevention of environmental damage.

1.4.1.19 Proposed Schedule for Training of Contractor Personnel

The Contractor shall include a schedule of proposed meetings to be attended by all Contractor personnel for the purpose of training for environmental protection with a Contracting Officer's representative present at appropriate intervals. Sufficient length of time to accomplish the purpose shall be included.

1.4.1.20 Method of Training

The Contractor shall include a proposed method of training all new employees in environmental protection before they commence working project.

1.4.1.21 Material Storage

Contractor shall provide a list sorting and identifying by chemical compatibility those materials to be used for the project. This information will be included in the EPP (Environmental Protection Plan) and will be updated periodically to insure all materials are included. It will be used to insure that incompatible chemicals are not stored together.

1.4.1.22 Material Safety Data Sheets (MSDS)

MSDS forms shall be on file prior to use of listed chemicals.

1.5 STORM WATER POLLUTION PREVENTION PLANS (SWPPP OR SWP3)

The Contractor shall prepare a Storm Water Pollution Prevention Plan for the construction activity. [The Contractor is required to comply with the requirements outlined in the Oklahoma Department of Environmental Quality (ODEQ) General Permit for Storm Water Discharges from Construction Activities.] [This plan shall be in accordance with Texas Commission on Environmental Quality TPDES General Permit NO. TXR150000, issued on 05 March 2003, or the most recent Texas general permit issued pursuant to Section 26.040 of the Texas Water Code and Section 402 of the Clean Water Act.] Adequate Best Management Practices (BMPs) and appropriate control measures shall be included in the SWPPP to prevent construction dirt, chemicals, and/or debris from becoming a pollutant source to storm water discharges and to retain sediment on site. Such measures include but are not limited to silt fences, hay bails, earth dikes, sediment traps, storm drain inlet protection and temporary/permanent sediment basins.

Stabilization practices shall also be included in the SWPPP and implemented to preserve existing vegetation and to stabilize those portions of the construction site that were disturbed.

This plan shall be in accordance with EPAPUB NPDES General Permits for Storm Water Discharges from Construction Sites. [The plan shall be in accordance with ODEQ General Permit for Construction, General Permit OKR10 for Storm Water Discharge from Construction Activities within the State of Oklahoma.] The plan shall identify potential sources of pollution resulting from storm water discharge from the project site(s) and present methods for reducing or eliminating such discharge.

The Contracting Officer and the Contractor shall review the SWP3 to determine the adequacy of the plan. The SWP3 may be modified to insure

that all current measures to prevent offsite migration of pollutants, including soils, are included in the plan. Contractor shall be required to amend the SWPPP as necessary, including when there is a change in the project's design, operation, or maintenance and when BMPs/control measures are ineffective in minimizing pollution.

No work that would disturb the natural vegetation shall be performed prior to the submission and approval of the SWP3 and receipt of the permit requested by the Notice of Intent unless approved by the Contracting Officer.

1.5.1 Contents of the Storm Water Pollution Prevention Plan (SWP3)

The SWP3 shall include the following items as a minimum. It is the responsibility of the contractor to ensure the latest version of the General Permit OKR10 requirements are utilized when developing the SWP3.

1.5.1.1 Site Description

The SWP3 shall provide a description of potential pollutant sources and other information as indicated below:

- a. A description of the nature of the construction activity;
- b. A description of the intended sequence of major activities that disturb soils for major portions of the site (e.g., grubbing, excavation, grading, utilities and infrastructure installation);
- c. Estimates of the total area of the site and the total area of the site that is expected to be disturbed by excavation, grading, or other activities including off-site borrow and fill areas;
- d. An estimate of the runoff coefficient of the site for both the pre-construction and post-construction conditions and data describing the soil or the quality of any discharge from the site;
- e. A general location map (e.g., USGS quadrangle map, a portion of a city or county map) with enough detail to identify the location of the construction site and the receiving waters within one mile of the site and a site map indicating the following: drainage patterns and approximate slopes anticipated after major grading activities; areas of soil disturbance; areas that will not be disturbed; locations of major structural and nonstructural controls identified in the SWP3; locations where stabilization practices are expected to occur; locations of off-site material, waste, borrow or equipment storage areas; surface waters (including wetlands); and locations where storm water discharges to a surface water;
- f. Location and description of any discharge associated with industrial activity other than construction, including storm water discharges from dedicated asphalt plants and dedicated concrete plants, that is covered by the General Permit OKR10;
- g. The name of the receiving water(s) and the areal extent and description of wetlands or other special aquatic sites (as defined by 40 CFR 230.3(q-1)) at or near the site that will be disturbed or that will receive discharges from disturbed areas of the project;
- h. A copy of the permit requirements (attaching a copy of the General

Permit OKR10 is acceptable);

i. Information on whether listed endangered or threatened species, or critical habitat, are found in proximity to the construction activity and whether such species may be affected by the applicant's storm water discharges or storm water discharge-related activities; and

j. Information on whether storm water discharges or storm water discharge-related activities would have an affect on a property that is protected by Federal, State or local historic preservation laws along with any written agreements reached with the State services to mitigate those effects.

1.5.1.2 Controls

The SWP3 shall include a description of appropriate control measures (i.e., Best Management Practices (BMP)) that will be implemented as part of the construction activity to control pollutants in storm water discharges. The SWP3 must clearly describe for each major activity identified in Part IV. E. 1. b listed in the General Permit OKR10: appropriate control measures and the general timing (or sequence) during the construction process that the measures will be implemented; and which permittee is responsible for implementation (e.g., perimeter controls for one portion of the site will be installed by Contractor A after the clearing and grubbing necessary for installation of the pollution prevention measure, but before the clearing and grubbing for the remaining portions of the site; and perimeter controls will be actively maintained by Contractor B until final stabilization of those portions of the site up-gradient of the perimeter control; and temporary perimeter controls will be removed by the permittee after final stabilization). The description and implementation of control measures shall address the following minimum components.

a. Erosion and Sediment Controls.

(1) Short and Long Term Goals and Criteria.

(a) The construction-phase erosion and sediment controls shall be designed to retain sediment on site to the extent practicable.

(b) All control measures must be properly selected, installed, and maintained in accordance with the manufacturer's specifications and good engineering practices. If periodic inspections or other information indicates a control has been used inappropriately, or incorrectly, the permittee must replace or modify the control for site situations.

(c) If sediment escapes the construction site, off-site accumulations of sediment must be removed at a frequency sufficient to minimize offsite impact (e.g., fugitive sediment in street could be washed into storm sewers by the next rain and/or pose a safety hazard to users of public streets).

(d) Sediment must be removed from sediment traps or sedimentation ponds when design capacity has been reduced by 50%.

(e) Litter, construction debris, and construction chemicals exposed to storm water shall be prevented from becoming a pollutant source for storm water discharges (e.g., screening outfalls, picked up daily).

(f) Offsite material storage areas (also including overburden and stockpiles of dirt, borrow areas, etc.) used solely by the permitted project are considered a part of the project and shall be addressed in the SWP3.

(2) Stabilization Practices. The SWP3 must include a description of interim and permanent stabilization practices for the site, including a schedule of when the practices will be implemented. Site plans should ensure that existing vegetation is preserved where attainable and that disturbed portions of the site are stabilized. Stabilization practices may include but are not limited to: establishment of temporary vegetation, establishment of permanent vegetation, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of trees, preservation of mature vegetation, and other appropriate measures. Use of impervious surfaces for stabilization should be avoided.

The following records shall be maintained and attached to the SWP3: the dates when major grading activities occur; the dates when construction activities temporarily or permanently cease on a portion of the site; and the dates when stabilization measures are initiated.

Except as provided in (a), (b), and (c) below, stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased.

(a) Where the initiation of stabilization measures by the 14th day after construction activity temporary or permanently ceased is precluded by adverse climatological conditions (i.e. snow, ice, heavy rains, or drought) stabilization measures shall be initiated as soon as practicable.

(b) Where construction activity on a portion of the site is temporarily ceased, and earth disturbing activities will be resumed within 21 days, temporary stabilization measures do not have to be initiated on that portion of site.

(c) In arid areas (areas with an average annual rainfall of 0 to 10 inches), semiarid areas (areas with an average annual rainfall of 10 to 20 inches), and areas experiencing droughts where the initiation of stabilization measures by the 14th day after construction activity has temporarily or permanently ceased is precluded by seasonably arid conditions, stabilization measures shall be initiated as soon as practicable.

(3) Structural Practices. The SWP3 must include a description of structural practices to divert flows from exposed soils, store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site to the degree attainable. Structural practices may include but are not limited to: silt fences, earth dikes, drainage swales, sediment traps, check dams, subsurface drains, pipe slope drains, level spreaders, storm drain inlet protection, rock outlet protection, reinforced soil retaining systems, gabions, and temporary or permanent sediment

basins. Placement of structural practices in floodplains should be avoided to the degree attainable. The installation of these devices may be subject to Section 404 of the Clean Water Act (CWA).

(a) For common drainage locations that serve an area with ten (10) or more acres disturbed at one time, a temporary (or permanent) sediment basin that provides storage for a calculated volume of runoff from a 2 year, 24 hour storm from each disturbed acre drained, or equivalent control measures, shall be provided where attainable until final stabilization of the site. Where no such calculation has been performed, a temporary (or permanent) sediment basin providing 3,600 cubic feet of storage per acre drained, or equivalent control measures, shall be provided where attainable until final stabilization of the site. When computing the number of acres draining into a common location it is not necessary to include flows from offsite areas and flows from onsite areas that are either undisturbed or have undergone final stabilization where such flows are diverted around both the disturbed area and the sediment basin.

In determining whether installing a sediment basin is attainable, the permittee may consider factors such as site soils, slope, available area on site, etc. In any event, the permittee must consider public safety, especially as it relates to children, as a design factor for the sediment basin and alternative sediment controls shall be used where site limitations would preclude a safe design. For drainage locations that serve ten (10) or more disturbed acres at one time and where a temporary sediment basin or equivalent controls is not attainable, smaller sediment basins and/or sediment traps should be used. Where neither the sediment basin nor equivalent controls are attainable due to site limitations, silt fences, vegetative buffer strips, or equivalent sediment controls are required for all down slope boundaries of the construction area and for those side slope boundaries deemed appropriate as dictated by individual site conditions. The Oklahoma Department of Environmental Quality (ODEQ) encourages the use of a combination of sediment and erosion control measures in order to achieve maximum pollutant removal.

(b) For drainage locations serving less than 10 acres, smaller sediment basins and/or sediment traps should be used. At a minimum, silt fences, vegetative buffer strips, or equivalent sediment controls are required for all down slope boundaries (and for those side slope boundaries deemed appropriate as dictated by individual site conditions) of the construction area unless a sediment basin providing storage for a calculated volume of runoff from a 2 year, 24 hour storm or 3,600 cubic feet of storage per acre drained is provided. The Oklahoma Department of Environmental Quality (ODEQ) encourages the use of a combination of sediment and erosion control measures in order to achieve maximum pollutant removal.

b. Storm Water Management.

A description of measures that will be installed during the construction process to control pollutants in storm water discharges that will occur after construction operations have been completed must be included in the SWP3. Structural measures should be placed on upland

soils to the degree attainable. The installation of these devices may also require a separate permit under Section 404 of the CWA.

Permittees are only responsible for the installation and maintenance of storm water management measures prior to final stabilization of the site, and are not responsible for maintenance after storm water discharges associated with construction activity have been eliminated from the site. However, post-construction storm water BMPs that discharge pollutants from point sources once construction is completed, may in themselves, need authorization under a separate OPDES permit.

(1) Such practices may include but are not limited to: storm water detention structures (including wet ponds); storm water retention structures; flow attenuation by use of open vegetated swales and natural depressions; infiltration of runoff onsite; and sequential systems (that combine several practices). The SWP3 shall include an explanation of the technical basis used to select the practices to control pollution where flows exceed predevelopment levels.

(2) Velocity dissipation devices shall be placed at discharge locations and along the length of any outfall channel to provide a non-erosive flow velocity from the structure to a water course so that the natural physical and biological characteristics and functions are maintained and protected (e.g. no significant changes in the hydrological regime of the receiving water).

c. Other Controls.

(1) No solid materials, including building materials, shall be discharged to waters of the State, except as authorized by a permit issued under Section 404 of the CWA.

(2) Off-site vehicle tracking of sediments and the generation of dust shall be minimized.

(3) The SWP3 shall be consistent with applicable State and/or local waste disposal, sanitary sewer or septic system regulations to the extent these are located within the permitted area.

(4) The SWP3 shall include a description of construction and waste materials expected to be stored on-site with updates as appropriate. The SWP3 shall also include a description of controls to reduce pollutants from these materials including storage practices to minimize exposure of the materials to storm water, and spill prevention and response.

(5) The SWP3 shall include a description of pollutant sources from areas other than construction (including storm water discharges from dedicated asphalt plants and dedicated concrete plants), and a description of controls and measures that will be implemented at those sites to minimize pollutant discharges.

(6) The SWP3 shall include a description of measures necessary to protect listed endangered or threatened species, or critical habitat, including any terms or conditions that are imposed under the eligibility requirements of the General Permit OKR10 Part I B 3 e (2), unless a determination has indicated that no impact is imminent. Failure to describe and implement such measures will result in storm water discharges from construction activities that

are ineligible for coverage under the General Permit OKR10.

d. Approved State or Local Plans.

(1) Permittees which discharge storm water associated with construction activities must ensure their Storm Water Pollution Prevention Plan is consistent with requirements specified in applicable sediment and erosion site plans of site permits, or storm water management site plans or site permits approved by State or local officials.

(2) Storm Water Pollution Prevention Plans must be updated as necessary to remain consistent with any changes applicable to protecting surface water resources in sediment erosion site plans or site permits, or storm water management site plans or site permits approved by State or local officials for which the permittee receives written notice.

1.5.1.3 Maintenance

All erosion and sediment control measures and other protective measures identified in the SWP3 must be maintained in effective operating condition. If site inspections required by General Permit OKR10 Part IV E 4 identify BMPs that are not operating effectively, maintenance shall be performed before the next anticipated storm event, or as necessary to maintain the continued effectiveness of storm water controls. If maintenance prior to the next anticipated storm event is impracticable, maintenance must be scheduled and accomplished as soon as practicable.

1.5.1.4 Inspections

Qualified personnel (provided by the permittee or cooperatively by multiple permittees) shall inspect disturbed areas of the construction site that have not been finally stabilized, areas used for storage of materials that are exposed to precipitation, structural control measures, and locations where vehicles enter or exit the site, at least once every fourteen (14) calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater.

Where sites have been finally or temporarily stabilized, runoff is unlikely due to winter conditions (e.g., site is covered with snow, ice, or frozen ground exists), or during seasonal arid periods in arid areas (areas with an average annual rainfall of 0 to 10 inches) and semi-arid areas (areas with an average annual rainfall of 10 to 20 inches) such inspections shall be conducted at least once every month.

Inspections should at a minimum consist of the following items:

- a. Disturbed areas and areas used for storage of materials that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Sediment and erosion control measures identified in the SWP3 shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Where discharge locations are inaccessible, nearby downstream locations shall be inspected to the extent that such inspections are practicable. Locations where vehicles enter or exit the site shall be inspected for evidence of off-site

sediment tracking.

b. Based on the results of the inspection, the SWP3 shall be modified as necessary (e.g., show additional controls on map required by General Permit OKR10 Part IV. D. 1; revise description of controls required by General Permit OKR10 Part IV E 2) to include additional or modified BMPs designed to correct problems identified. Revisions to the SWP3 shall be completed within 7 calendar days following the inspection. If existing BMPs need to be modified or if additional BMPs are necessary, implementation shall be completed before the next anticipated storm event. If implementation before the next anticipated storm event is impracticable, they shall be implemented as soon as practicable.

c. A report summarizing the scope of the inspection, name(s) and qualifications of personnel making the inspection, the date(s) of the inspection, and major observations relating to the implementation of the SWP3 shall be made and retained as part of the SWP3 for at least three years from the date that the site is finally stabilized. Major observations should include: the location(s) of discharges of sediment or other pollutants from the site; location(s) of BMPs that need to be maintained; location(s) of BMPs that failed to operate as designed or proved inadequate for a particular location; and location(s) where additional BMPs are needed that did not exist at the time of inspection. Actions taken in accordance with General Permit OKR10 Part IV. E. 4. b shall be made and retained as part of the Storm Water Pollution Prevention Plan for at least three years from the date that the site is finally stabilized. Such reports shall identify any incidents of non-compliance. Where a report does not identify any incidents of non-compliance, the report shall contain a certification that the facility is in compliance with the Storm Water Pollution Prevention Plan and General Permit OKR10. The report shall be signed in accordance with Part VI. G of the General Permit OKR10.

1.5.1.5 Non-Storm Water Discharges

Except for flows from fire fighting activities, sources of non-storm water listed in Part III. A. 2 or 3 of the General Permit OKR10 that are combined with storm water discharges associated with construction activity must be identified in the SWP3. The SWP3 shall identify and ensure the implementation of appropriate pollution prevention measures for the non-storm water component(s) of the discharge.

1.5.1.6 Contractor Certifications

This procedure is initiated only at the discretion of the permittee with the cooperation and agreement of applicable contractor(s). The Contractor Certification form, Addendum D of the General Permit OKR10 should be rewritten by the permittee to fit their specific objectives. Contractor Certification is recommended but is not a requirement of the ODEQ.

a. Contractors, subcontractors, builders, installers, regular suppliers, support service companies or others who are not the permittee involved in construction activity, and have not been issued construction general permit authorization, shall execute a Contractor Certification, at the discretion of the permittee, which places the responsibility of complying with and abiding by the intent and purpose of the permit with the contractor for work performed under the authority and direction of the contractor. Contractors must ensure that activities regulated by the Construction General Permit (Permit)

are protective of endangered and threatened species and critical habitat according to Part X.

b. Contractors must be thoroughly familiar with and adhere to the Notice of Intent (NOI), the SWP3, and Best Management Practices (BMP). The SWP3 shall clearly identify, for each control measure identified in the plan, the party, which will implement the measure. The Permittee(s) should insure that all contractors or others involved in construction activity identified in the plan as being responsible for implementing storm water control measures, and sign a copy of the contractor certification, before performing any work in the area covered by the Storm Water Pollution Prevention Plan. All contractor certifications should be included with the Storm Water Pollution Prevention Plan.

c. The Contractor Certification should include the name and title of the person providing the signature, the name, address and telephone number of the contracting firm; the address (or other identifying description) of the site; and the date the certification is made. An example of an assignment of certification can be found in the General Permit OKR10 Addendum D.

1.6 WASTE MANAGEMENT PLAN

Waste Management plan shall be submitted to the Contracting Officer for Post Environmental Division review within 15 days after contract award and prior to initiating any site preparation work.

1.6.1 Government Policy

Government policy is to apply sound environmental principles in the design, construction and use of facilities. As part of the implementation of that policy, the Contractor shall:

- a. Practice efficient waste management when sizing, cutting, and installing products and materials;
- b. Use all reasonable means to divert construction and demolition waste from landfills and incinerators and to facilitate their recycling or reuse.

1.6.2 Management

The Contractor shall take a pro-active, responsible role in the management of construction and demolition waste and require all subcontractors, vendors, and suppliers to participate in the effort. Construction and demolition waste includes products of demolition or removal, excess or unusable construction materials, packaging materials for construction products, and other materials generated during the construction process but not incorporated into the work. In the management of waste, consideration shall be given to the availability of viable markets, the condition of the materials, the ability to provide the material in suitable condition and in a quantity acceptable to available markets, and time constraints imposed by internal project completion mandates. The Contractor shall be responsible for implementation of any special programs involving rebates or similar incentives related to recycling of waste. Revenues or other savings obtained for salvage, or recycling shall accrue to the Contractor. Firms and facilities used for recycling, reuse, and disposal shall be appropriately permitted for the intended use to the extent required by

federal, state, and local regulations.

1.6.3 Waste Management Plan Content

The plan shall have two sections and include the following information:

a. Section 1, Special Waste.

(1) Waste Streams and Anticipated Quantities to be Generated: The waste streams shall be estimated, described and tentatively classified. Special wastes include items such as hazardous waste, medical waste, universal waste, radioactive waste, mixed hazardous/radioactive waste; and other special waste. The rationale for the assignment of each specific waste classification shall be provided.

(2) Waste Segregation and Temporary Storage: The procedures to be used to segregate wastes of different specific waste types shall be provided. The temporary accumulation or staging of these materials shall be discussed and the applicable regulations regarding quantity or time limitations for storage of these materials, spill prevention and control, inspection procedures, container requirements or other required actions shall be referenced. The procedures to be used to insure compliance with these regulations

(3) Analytical/Physical testing required to dispose waste above and beyond that required in other sections of these specifications.

(4) Waste container marking and labeling, transport vehicle placarding requirements or each specific waste type.

(5) Paperwork Requirements for Disposal of Wastes: For hazardous wastes generated on Fort Sill, the Contractor shall coordinate turn ins and provide transportation of waste to the Post Environmental Division at Building 2592 for proper disposal.

(6) Common items include mercury switches, fluorescent bulbs, lighting ballasts, solvent, paint, coatings, oils, sand or water blast media, cleaning compounds, and others.

(7) Special waste not originally identified shall be reported to the Contracting Officer as soon as practicable to determine disposal requirements.

(8) Asbestos (if applicable) is not included in this plan. Refer to specific specifications for Asbestos Abatement.

b. Section 2, Solid Waste.

(1) Provide the name of individual(s) on the Contractor's staff responsible for waste prevention and management.

(2) Identify actions that shall be taken to reduce solid waste generation.

(3) Describe the specific approaches to be used in recycling/reuse of the various materials generated, including the areas and equipment to be used for processing, sorting, and temporary

storage of wastes.

(4) Provide characterization, including estimated types and quantities, of the waste to be generated.

(5) Identify local and regional 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.

(6) Provide a list of specific waste materials that will be salvaged for resale, salvaged and reused, or recycled. Recycling facilities that will be used shall be identified.

(7) Identify materials that cannot be recycled/reused with an explanation or justification.

(8) Provide anticipated net cost savings determined by the revenue generated by the sale of the materials and landfill cost savings, less Contractor costs.

1.6.4 Records

Records shall be maintained to document the quantity, in actual or estimated weights, of waste generated, the quantity of waste diverted through sale, reuse, or recycling, the quantity of waste disposed at the Fort Sill Municipal Landfill, and the quantity of waste disposed at the Fort Sill Construction and Demolition Landfill. The records shall be delivered to Fort Sill Environmental Division on a monthly basis, at or near the first week of the month.

1.6.5 Collection

The necessary containers, bins and storage areas to facilitate effective waste management shall be provided and shall be clearly and appropriately identified. Recyclable materials shall be handled to prevent contamination of materials from incompatible products and materials.

1.6.6 Disposal

Unless otherwise specified, disposal shall be in accordance with the following:

a. Reuse. First consideration shall be given to salvage for reuse since little or no re-processing is necessary for this method and less pollution is created when items are reused in their original form. Sale or donation of waste suitable for reuse shall be considered. Salvaged materials, other than those specified in other sections to be salvaged and reinstalled, shall not be used in this project.

b. Recycle. Waste materials not suitable for reuse, but having value as being recyclable, shall be made available for recycling whenever economically feasible.

c. Landfill. Materials with no practical use or economic benefit shall be disposed at the Fort Sill Municipal or Construction and Demolition Landfills.

1.7 MEETINGS

The Contractor shall meet with representatives of the Contracting Officer to develop mutual understanding relative to compliance with this section of the specifications and administration of the environment protection program. The Contractor shall be prepared to discuss the program in conferences convened by the Contracting Officer before starting work on each major phase of operation. Approval of the Contractor's plan for environmental protection will not relieve the Contractor of his responsibility for adequate and continuing control of pollutants and protection of environmental features. All Contractor personnel shall be required to attend.

1.8 SUBCONTRACTORS

Assurance of compliance with this section by subcontractors will be the responsibility of the Contractor.

1.9 REGULATORY REQUIREMENTS

The Contractor shall comply with all federal, state, and local regulatory and statutory requirements for all items contained in this section.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 PROTECTION OF ENVIRONMENTAL RESOURCES

The environmental resources within the project boundaries and those affected outside the limits of permanent work under this contract shall be protected during the entire period of this contract. The Contractor shall confine his activities to areas defined by the contract drawings or specifications. Environmental protection shall be as stated in the following subparagraphs.

3.1.1 Compliance of Storm Water General Permit for Construction Activity (ADD)

The contractor shall comply with all requirements specified in the Oklahoma Department of Environmental Quality (ODEQ) General Permit OKR10 for storm water discharges from construction activities within the State of Oklahoma. A copy of the OKR10 permit may be found at the following web site: http://www.deq.state.ok.us/WQDnew/stormwater/construction/okr10_final_permit_13_sep_2002.pdf

The Contractor shall be responsible to fully understand their parameters specified with the General Permit OKR10 and determine the permit eligibility of the construction site definition. The Contractor shall complete, sign, and file the Notice of Intent(s) as directed by the General Permit OKR10. The Contractor shall be the permittee and control the activities necessary to ensure full compliance of the conditions within the General Permit OKR10.

3.1.2 Protection of Land Resources

Prior to the beginning of any construction, the Contracting Officer will identify all land resources to be preserved within the Contractor's work area. The Contractor shall not remove, cut, deface, injure, or destroy

land resources including trees, shrubs, vines, grasses, topsoil, and land forms without special permission from the Contracting Officer. No ropes, cables, or guys shall be fastened to or attached to any trees for anchorage unless specifically authorized. Where such special emergency use is permitted, the Contractor shall provide effective protection for land and vegetation resources at all times as defined in the following subparagraphs.

The Contractor shall make every effort to preserve land resources within the project boundaries and outside the limits of permanent work performed under this contract in their present condition or they shall be restored to a condition, after completion of construction, that shall appear to be natural and not detract from the appearance of the project. The Contractor shall confine his construction activities to areas defined by the plans and specifications, to areas to be cleared for other operations, or to quarry, borrow or waste areas indicated on plans. At the onset of borrow excavation, topsoil shall be saved for use in restoring the borrow area. Waste and borrow areas shall be leveled or trimmed to regular lines and shaped to provide a neat appearance. In all instances, the restored area shall be well drained, to prevent the accumulation of stagnant water. Except in areas marked on the plans to be cleared, the Contractor shall not deface, injure, or destroy trees or shrubs, nor remove or cut them without approval of the Contracting Officer.

3.1.2.1 Work Area Limits

Prior to any construction, the Contractor shall mark the areas where no work is to be performed under this contract. Isolated areas within the general work area which are to be saved and protected shall also be marked or fenced. Monuments and markers shall be protected before construction operations commence and during all construction operations. Where construction operations are to be conducted during darkness, the markers shall be visible during darkness. The Contractor shall convey to his personnel the purpose of marking and/or protection of all necessary objects.

3.1.2.2 Protection of Landscape

Trees, shrubs, vines, grasses, land forms and other landscape features to be preserved, indicated and defined on the drawings submitted by the Contractor as a part of the Environmental Protection Plan, shall be clearly identified by marking, fencing, or wrapping with boards, or any other approved techniques.

3.1.2.3 Reduction of Exposure of Unprotected Erodible Soils

Earthwork brought to final grade shall be finished as indicated and specified. Side slopes and back slopes shall be protected as soon as practicable upon completion of rough grading. All earthwork shall be planned and conducted to minimize the duration of exposure of unprotected soils. Except in instances where the constructed feature obscures borrow areas, quarries and waste material areas, these areas shall not initially be cleared in total. Clearing of such areas shall progress in reasonably sized increments as needed to use the areas developed as approved by the Contracting Officer.

3.1.2.4 Temporary Protection of Disturbed Areas

Such methods as necessary shall be utilized to effectively prevent erosion and control sedimentation, including but not limited to the following:

a. Retardation and Control of Runoff

Runoff from the construction site shall be controlled by construction of diversion ditches, benches, and berms to retard and divert runoff to protected drainage courses, and the Contractor shall also utilize any measures required by area-wide plans approved under Paragraph 208 of the Clean Water Act.

3.1.2.5 Erosion and Sedimentation Control Devices.

The Contractor shall construct or install all temporary and permanent erosion sedimentation control features as indicated on the contract drawings. Temporary erosion and sediment control measures such as berms, dikes, drains, sedimentation basins, grassing and mulching shall be maintained until permanent drainage and erosion control facilities are completed and operative.

3.1.2.6 Stabilization of Disturbed Soils

Stabilization measures of areas involved in the SWP₃ shall be initiated on disturbed areas as soon as practicable, but no more than 14 days after the construction activity on a particular portion of the site has temporarily or permanently ceased except as follows:

- (a) where construction activities will resume on a portion of the site within 21 days from the time when construction activities temporarily ceased;
- (b) where the initiation of the stabilization measure is precluded by snow cover in which case stabilization measures shall be initiated as soon thereafter as practicable.

3.1.2.7 Inspections

Weekly inspections of construction sites shall be conducted by the Contractor to insure that the various controls and components of the various plans required by this section are in place. In addition, the Contractor shall make an inspection within 24 hours following a 1/2 inch or greater rainfall event to insure that the controls are working adequately and have not been impacted by the rainfall event.

The Contractor shall annotate these inspections in a report to be kept on site or at an easily accessible location. The report shall summarize the scope of the inspection, person performing the inspection, the date and time, the major observances relating to the effectiveness of the Storm Water Pollution Prevention Plan, and the corrective actions that were taken, if any. Any instances of non-compliance shall be corrected within 7 days of the inspection.

3.1.2.8 Location of Contractor Facilities

The Contractor's field offices, staging areas, stockpiles, storage, and temporary buildings shall be placed in areas designated on the contract drawings and approved by the Contracting Officer. Temporary movement or relocation of Contractor facilities shall be made only on approval by the Contracting Officer.

3.1.2.9 Borrow Areas on Government Property

Borrow areas on government property shall be managed to minimize erosion and to prevent sediment from entering nearby water courses or lakes.

3.1.2.10 Disposal Areas on Government Property

Disposal areas on Government property shall be managed and controlled to limit material to areas designated on the contract drawings and prevent erosion of soil or sediment from entering nearby water courses or lakes. Disposal areas shall be developed in accordance with the grading plan indicated on the contract drawings.

3.1.2.11 Temporary Excavation and Embankments

Temporary excavation and embankments shall be controlled to protect adjacent areas from contamination.

3.1.2.12 Disposal of Solid Wastes

All waste shall be disposed of in accordance with the approved Waste Management Plan. All handling and transportation shall be the responsibility of the Contractor. Waste shall be handled in such a manner to prevent contamination. The Contractor shall be in compliance with all Federal, state, and local requirements for solid waste disposal.

3.1.2.13 Disposal of Chemical Wastes

Chemical wastes shall be stored in appropriate and compatible containers, transported from the work area to the Post Environmental Division, Building 2592, for proper disposal.

3.1.2.14 Disposal of Discarded Materials

Discarded materials other than those which can be included in the solid waste category shall be handled as directed by the Contracting Officer.

3.1.2.15 Disposal of Materials at Ft. Sill

Disposal of trash, garbage, or domestic waste shall be in the Ft. Sill Post Sanitary Landfill. Demolition rubble shall be disposed of in the Ft. Sill rubble pit. Disposal of metals shall be the responsibility of the Contractor off Government Property. Disposal of Contractor produced POL products, chemicals, or other hazardous or toxic compounds shall be in accordance with Ft. Sill Regulation USAFACFS Regulation 200-2. The Contracting Officer shall be advised of the type of Contractor produced POL products, chemicals, or other hazardous or toxic compounds and the amount of these products. The Contracting Officer will determine the methods of disposal of these products and such actions may require EPA or State permits.

3.2 HISTORICAL, ARCHAEOLOGICAL AND CULTURAL RESOURCES

Existing historical, archaeological and cultural resources within the Contractor's work area will be so designated by the Contracting Officer and precautions shall be taken by the Contractor to preserve all such resources as they existed at the time they were pointed out to the Contractor. The Contractor shall install all protective devices such as off-limit markings, fencing, barricades, or other devices deemed necessary by the Contracting

Officer for these resources so designated on the contract drawings and shall be responsible for their preservation during this contract. If during construction items of apparent archaeological or historical interest are discovered, they shall be left undisturbed and the Contractor shall report the find immediately to the Contracting Officer.]

3.3 PROTECTION OF WATER RESOURCES

The Contractor shall keep construction activities under surveillance, management and control to avoid pollution of surface and ground waters. Special management techniques as set out below shall be implemented to control water pollution by the listed construction activities which are included in this contract.

See Attachment A, TAFB Section 00 72 00, located at the end of this section.

3.3.1 Washing and Curing Water

Waste waters directly derived from construction activities shall not be allowed to enter water areas. These waste waters shall be collected and placed in retention ponds where the suspended materials can be settled out or the water evaporated in order to separate the pollutants from the water.

3.3.2 Monitoring of Water Areas Affected by Construction Activities

Monitoring of water areas affected by construction activities shall be the responsibility of the Contractor. All water areas affected by construction activities shall be monitored by the Contractor.

3.4 PROTECTION OF FISH AND WILDLIFE RESOURCES

The Contractor shall keep construction activities under surveillance, management and control to minimize interference with, disturbance to and damage of fish and wildlife. Species that require specific attention along with measures for their protection shall be listed by the Contractor prior to beginning of construction operations.

3.5 PROTECTION OF AIR RESOURCES

The Contractor shall keep construction activities under surveillance, management and control to minimize pollution of air resources. All activities, equipment, processes, and work operated or performed by the Contractor in accomplishing the specified construction shall be in strict accordance with all Federal and State of Oklahoma emission and performance laws and standards. Special management techniques as set out below shall be implemented to control air pollution by the construction activities which are included in the contract.

3.5.1 Particulates

Dust particles, aerosols, and gaseous by-products from all construction activities, processing and preparation of materials, such as from asphaltic batch plants, shall be controlled at all times, including weekends, holidays and hours when work is not in progress. The Contractor shall maintain all excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and all other work areas within or outside the project boundaries free from particulates which would cause the air pollution standards mentioned in the paragraph "PROTECTION OF AIR RESOURCES" to be exceeded or which would cause a hazard

or a nuisance. Sprinkling, chemical treatment of an approved type, light bituminous treatment, baghouse, scrubbers, electrostatic precipitators or other methods will be permitted to control particulates in the work area. Sprinkling, to be efficient, must be repeated at such intervals as to keep the disturbed area damp at all times. The Contractor must have sufficient competent equipment available to accomplish this task. Particulate control shall be performed as the work proceeds and whenever a particulate nuisance or hazard occurs.

3.5.2 Hydrocarbons and Carbon Monoxide

Hydrocarbons and carbon monoxide emissions from equipment shall be controlled to Federal and State allowable limits at all times.

3.5.3 Odors

Odors shall be controlled at all times for all construction activities, processing and preparation of materials.

3.5.4 Monitoring Air Quality

Monitoring of air quality shall be the responsibility of the Contractor. All air areas affected by the construction activities shall be monitored by the Contractor.

3.6 TESTS

The Contractor shall establish and maintain quality control for environmental protection operations to assure compliance with contract requirements and maintain records of his quality control for all construction operations, including, but not limited to the following items. The Contractor shall record on daily reports any problems in complying with laws, regulations and ordinances and corrective action taken. Three copies of these records and tests, as well as the records of corrective action taken, shall be furnished the Government as directed by the Contracting Officer.

3.6.1 Protection of Land Resources

The Contractor shall prevent landscape defacement and provide post-construction clean-up.

3.6.2 Protection of Water Resources

The Contractor shall prevent the contamination of lakes, ditches, or other bodies of water with harmful chemicals; the Contractor shall dispose of waste materials; and the Contractor shall provide erosion control.

3.6.3 Pollution Control Facilities

The Contractor shall maintain all constructed facilities and temporary pollution control devices for the duration of the contract or for that length of time construction activities create the particular pollutant. The Contractor shall conduct a training course on the maintenance of pollution control facilities.

3.7 INSPECTION

The Contracting Officer will notify the Contractor in writing of any

observed noncompliance with any of the Contractor's required plans. The Contractor shall, after receipt of such notice, inform the Contracting Officer of proposed corrective action and take such action as may be approved. If the Contractor fails 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 time extensions will be granted or costs or damages allowed to the Contractor for any such suspension.

3.8 POST CONSTRUCTION CLEANUP

The Contractor shall clean up all area(s) used for construction.

3.9 RESTORATION OF LANDSCAPE DAMAGE

The Contractor shall restore all landscape features damaged or destroyed during construction operations outside the limits of the approved work areas. Such restoration shall be in accordance with the plans submitted for approval by the Contracting Officer.

3.9.1 Damage Report

The Contractor shall furnish a report to the Contracting Officer identifying the date, location, type of facility, and cost to repair the damage. The report shall become a part of the permanent record of the construction contract.

3.9.2 Inspection of Utility Taken Out of Service

The Contractor may request the Contracting Officer or his representative to confirm in his presence with the appropriate utility supervisor (electricity, gas, compressed air, water, etc.) that the utility has been taken out of service (locked out/tagged out) and is safe to work on.

3.9.3 Restoration Requirements for Pavements, Etc.

All pavement, surfacing, driveways, curbs, walks, buildings, utility poles, guy wires, surface structures, or other Government property affected, damaged, or destroyed directly or indirectly by construction operations in connection with performance of this contract shall be restored to its original condition, as determined and approved by the Contracting Officer. All replacements of surface structures or parts thereof shall be made with new materials conforming to the requirements of the specifications or as approved by the Contracting Officer. Such replacements or repairs shall be made without additional cost to the Government.

3.10 RECORD KEEPING

During construction, all records shall be retained onsite. Inspection reports and modifications of the plans required shall be retained for 3 years following construction.

-- End of Section --

Appendix A

Geotechnical Information

See Drawing G004 – Geotechnical Boring Locations

See Appendix KK for Additional Information

Redox Test

The results of Redox tests are presented in the following table:

Redox Test Results				
Boring No.	Sample No.	Depth (feet)	Soil Descriptions	Redox Potential (mV)
BH-4,5,8,10,22,24,28-33	Composite #1	0 - 5	Brown Sandy Clay	180
BH-12,14,15,17-19,35,37-40	Composite #2	0 - 5	Brown Sandy Clay	188

Earthwork Recommendations

Building Pad Construction

A critical geotechnical consideration at Ft Sill TEMF site is the swelling soils. We recommend thickened ribbed mat foundation, spread footing foundation, underreamed drilled shaft, or drilled pier be used for the buildings at Ft. Sill TEMF site, either soil stabilization or construction of an inert fill / non-expansive fill building pad is advisable. The amount of ground surface movement that can be tolerated by the structure should be evaluated by the designer (a value of 0.50 inch or less may be used for Ft. Sill sites) and the corresponding amount of removal and replacement or over ground fill should be performed as indicated in the following options:

Option 1: Cut and Fill

- Remove the required amount of existing soil (see following table) and replace that soil with inert fill, meeting all requirements given herein, or native soil stabilized with lime to achieve a primary swell of no more than 1.0 percent when tested in accordance with ASTM D4546 (2008) Method B with a vertical stress equal to the anticipated in-situ vertical stress.

Cut and Fill Building Pad Requirements	
Depth of Removal and Replacement Soil (feet)*	Estimated Heave Potential (inches)
0.0	3.1
1.0	2.7
2.0	2.3
3.0	2.0
4.0	1.7
5.0	1.4
6.0	1.1
7.0	0.9
8.0	0.7
9.0	0.5

* - Below final site grade

or

Option 2: Fill Only

- Place the required amount or more of inert fill over existing soil (see following table), meeting all requirements given herein, over the native soils.

Over Ground Inert Fill Building Pad Requirements	
Depth of Over Ground Inert Fill Building Pad (feet)*	Estimated Heave Potential (inches)
0.0	3.1
1.0	2.7
2.0	2.3
3.0	2.0
4.0	1.7
5.0	1.4
6.0	1.1
7.0	0.8
8.0	0.5

* - Above existing site grade

Earthwork and Compaction Requirements - Entire Facility

Only nonplastic to low plasticity on-site soils (having a plasticity index of 4 to 12) or imported inert fill should be used for fill under structures and pavement. Inert fill should meet the following requirements:

Inert Fill Requirements

- Amount finer than 2 inch sieve = 100%
- Amount finer than No. 200 sieve = 12% minimum and, if PI ≤ 7, 60% maximum
- Liquid Limit = 40 maximum
- Plasticity Index (PI) = 4 to 12

Subgrade Preparation

The existing subgrade for the building pads should be:

- stripped of all vegetation, topsoil, existing asphalt, existing aggregate base, and any other deleterious materials,
- overexcavated to a required depth and extended to at least 5 feet beyond building footprints,

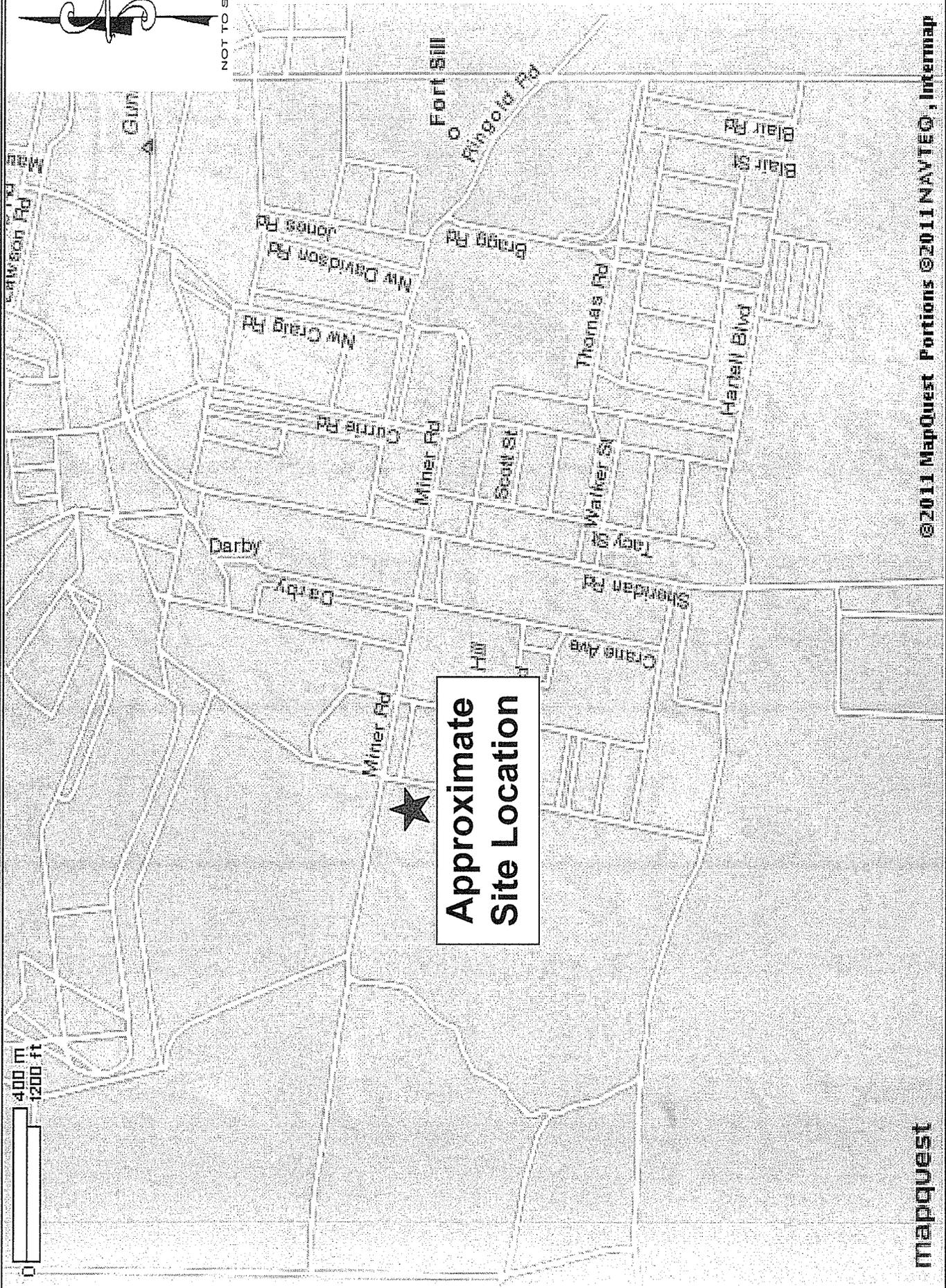
APPENDIX A

**Vicinity Map
Site and Boring Location Plan**

0 400 m 1200 ft



NOT TO SCALE



mapquest

©2011 MapQuest Portions ©2011 NAVTEQ, Internmap

Section:

Vicinity Map

Project Name: Ft. Sill TEMF
Project Location: Lawton, Oklahoma
Project No.: 7311-3256



APPENDIX B

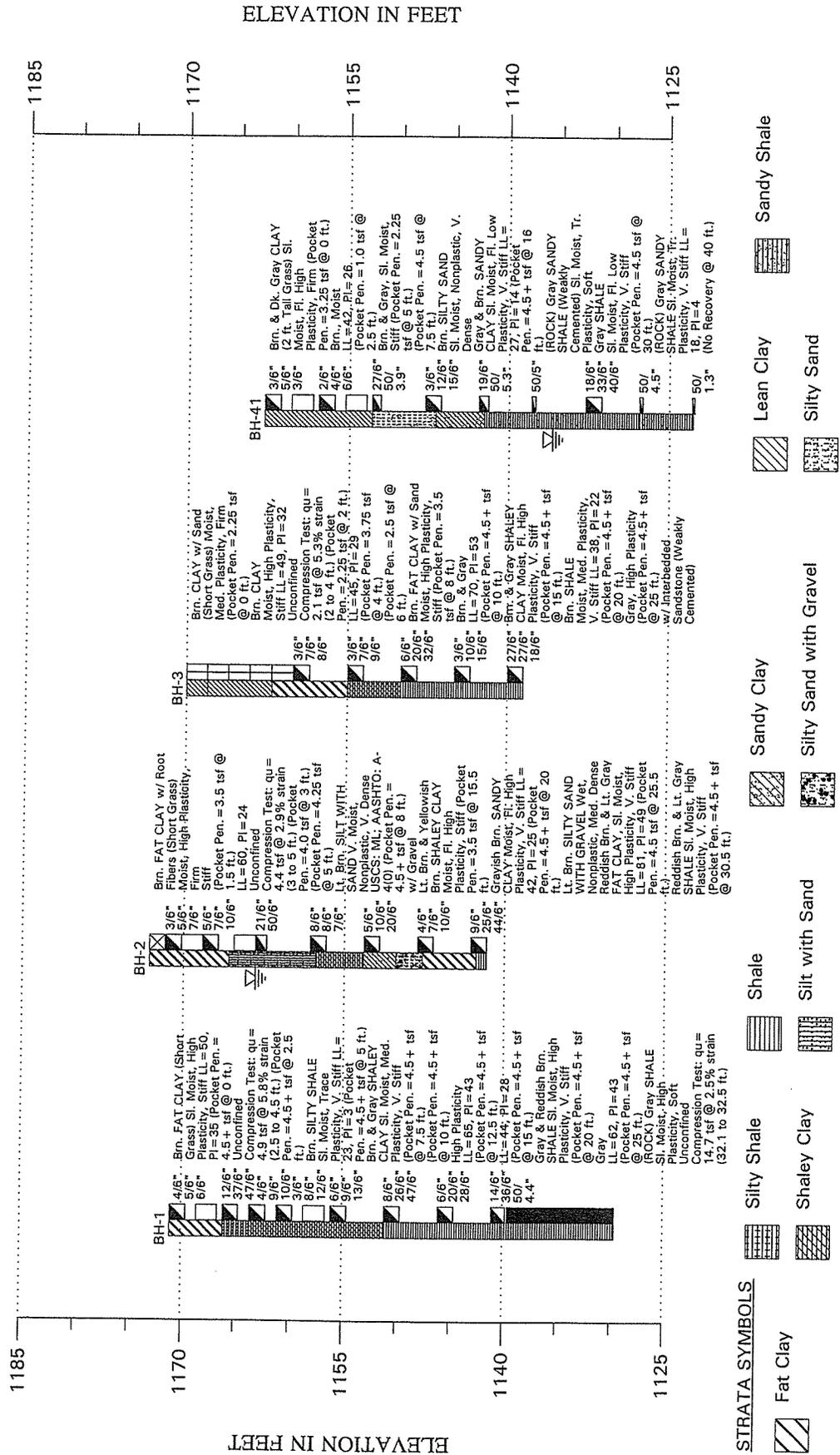
Soil Profiles

Boring Logs

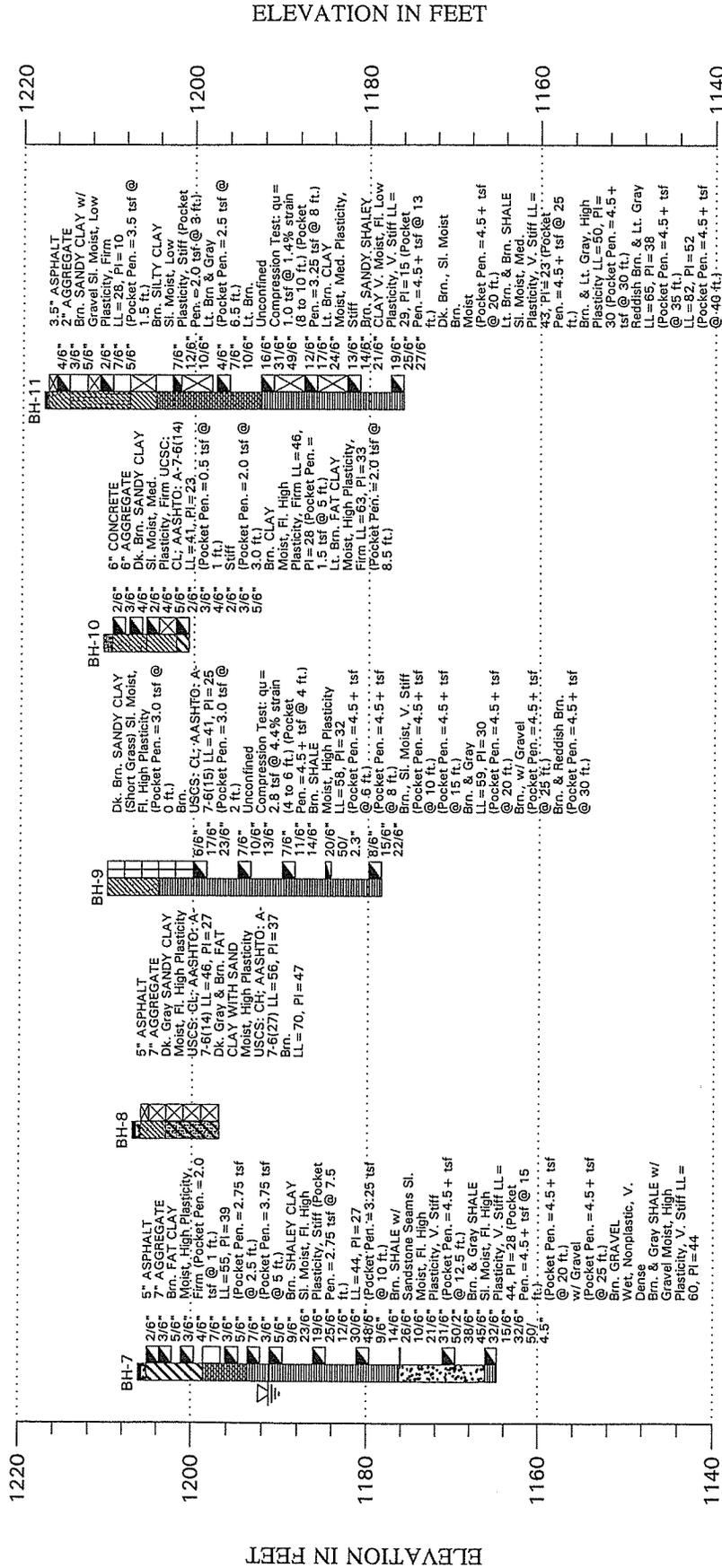
Key to Symbols

Definition of Descriptive Terms

LOG OF BORINGS
Fort Sill New TEMF Complex

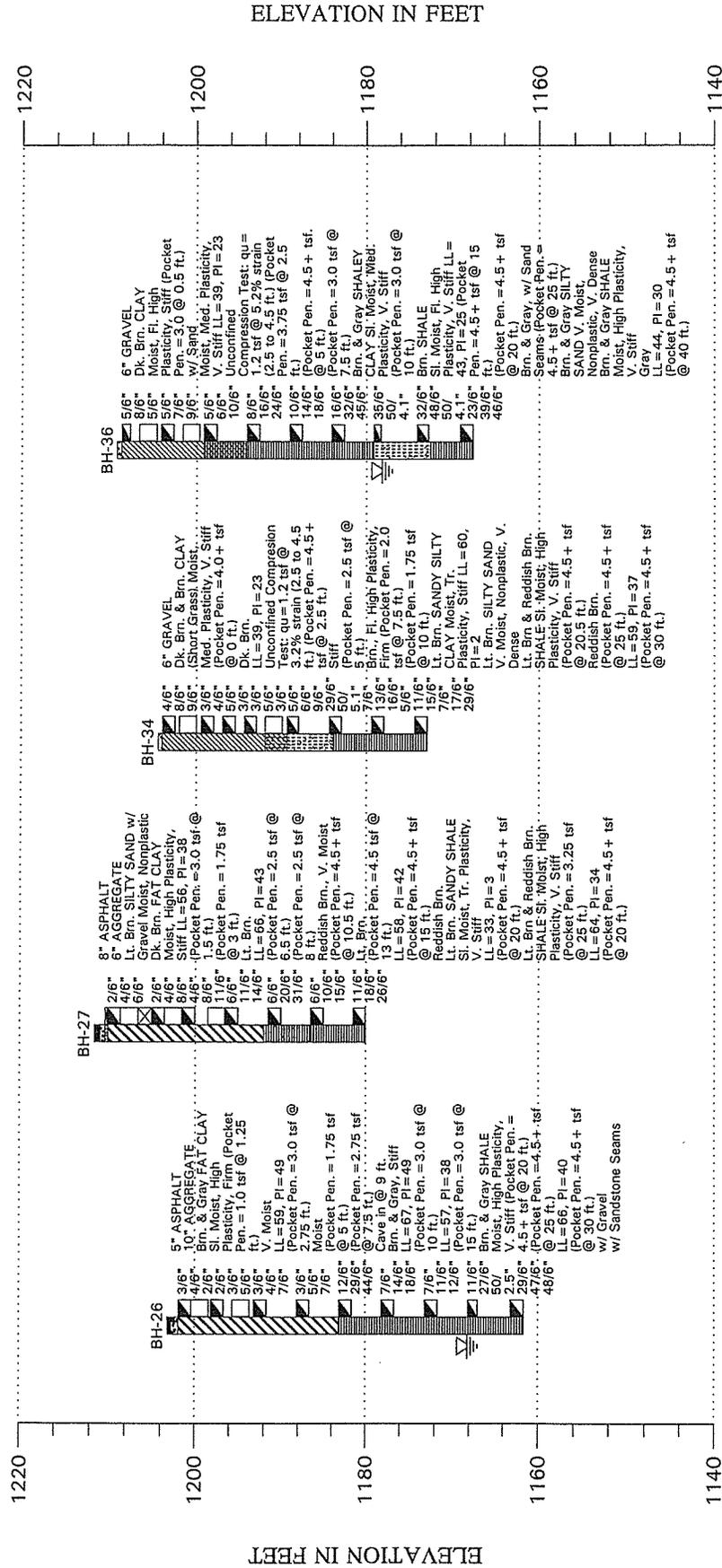


LOG OF BORINGS
Fort Sill New TEMF Complex

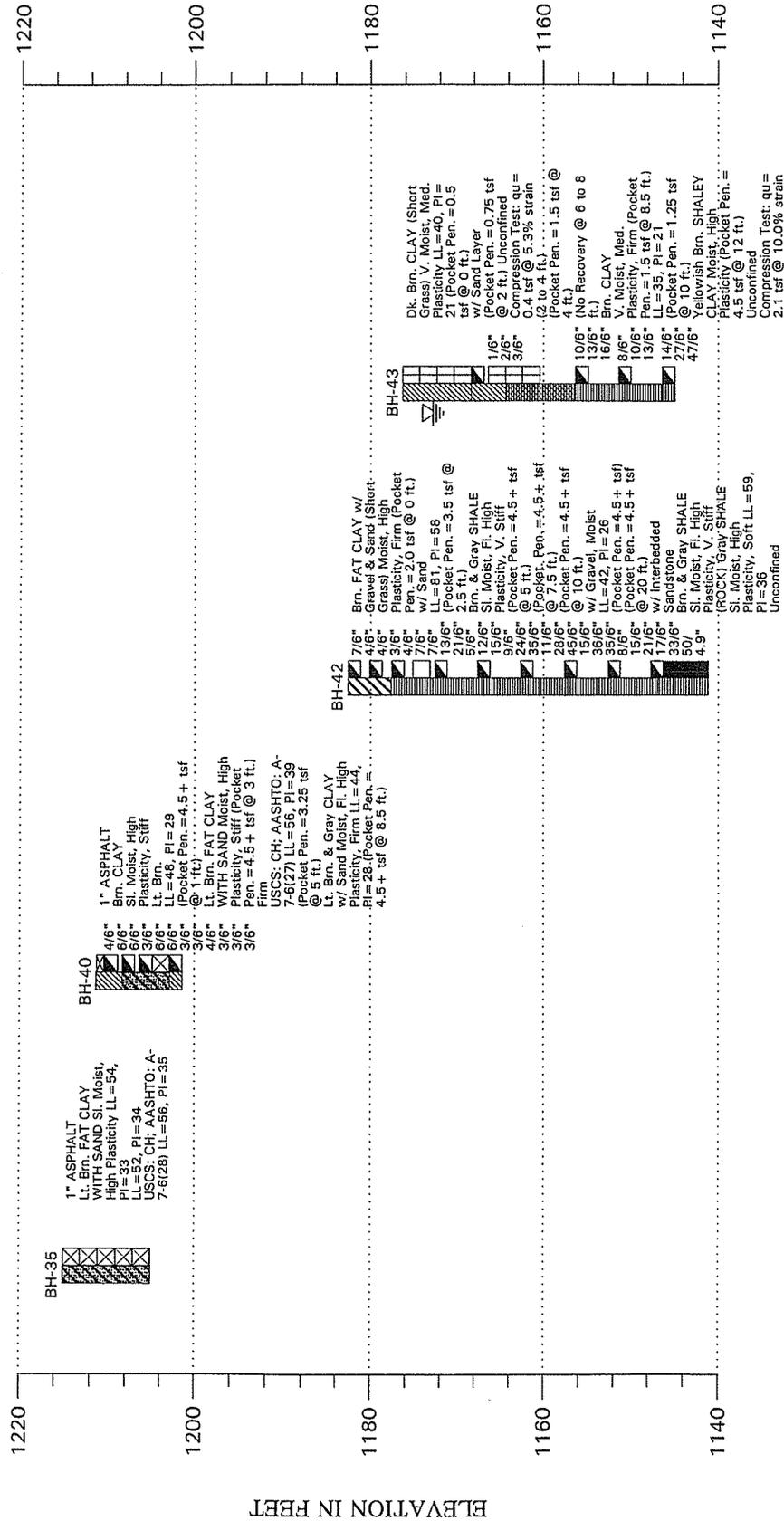


- STRATA SYMBOLS**
- Asphalt
 - Aggregate
 - Fat Clay
 - Shale
 - Shaley Clay
 - Gravel
 - Sandy Clay
 - Concrete
 - Fat Clay with Sand
 - Lean Clay
 - Silty Clay

LOG OF BORINGS
Fort Sill New TEMF Complex



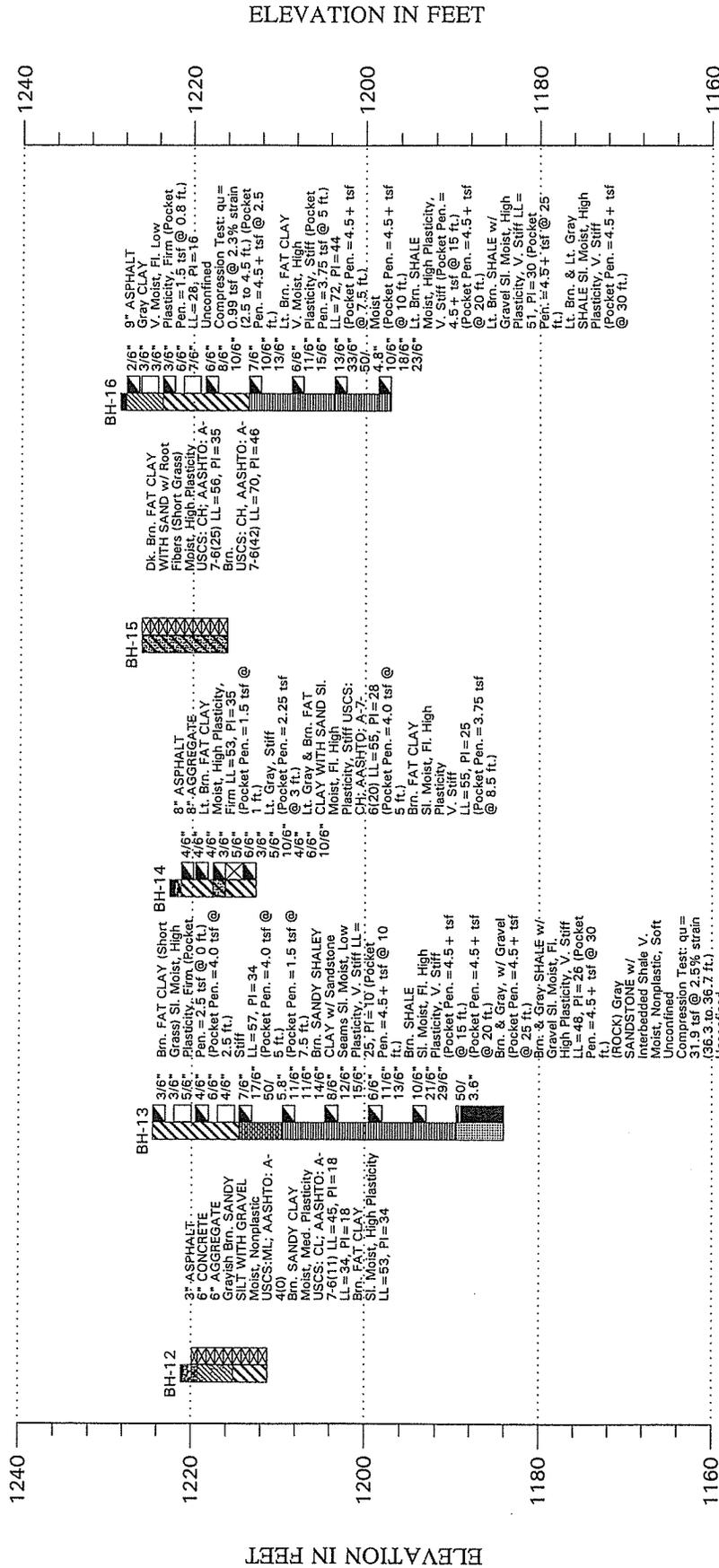
LOG OF BORINGS
Fort Sill New TEMF Complex



ELEVATION IN FEET

ELEVATION IN FEET

LOG OF BORINGS
Fort Sill New TEMF Complex



STRATA SYMBOLS

	Asphalt		Fat Clay		Fat Clay with Sand
	Concrete		Sandy Silt with Gravel		Shale
	Aggregate		Sandy Clay		Sandstone
	Lean Clay		Sandy Shaley Clay		Fat Clay

Compression Test: qu = 47.1 lb @ 0.1% strain (40.1 to 40.5 ft.)

Unconfined Compression Test: qu = 31.9 tsf @ 2.5% strain (36.3 to 36.7 ft.)

Unconfined Compression Test: qu = 4.5 + tsf @ 20 ft.

Unconfined Compression Test: qu = 4.5 + tsf @ 15 ft.

Unconfined Compression Test: qu = 4.5 + tsf @ 10 ft.

Unconfined Compression Test: qu = 4.5 + tsf @ 5 ft.

Unconfined Compression Test: qu = 4.5 + tsf @ 2.5 ft.

Unconfined Compression Test: qu = 4.5 + tsf @ 1.5 ft.

Unconfined Compression Test: qu = 4.5 + tsf @ 1.0 ft.

Unconfined Compression Test: qu = 4.5 + tsf @ 0.8 ft.

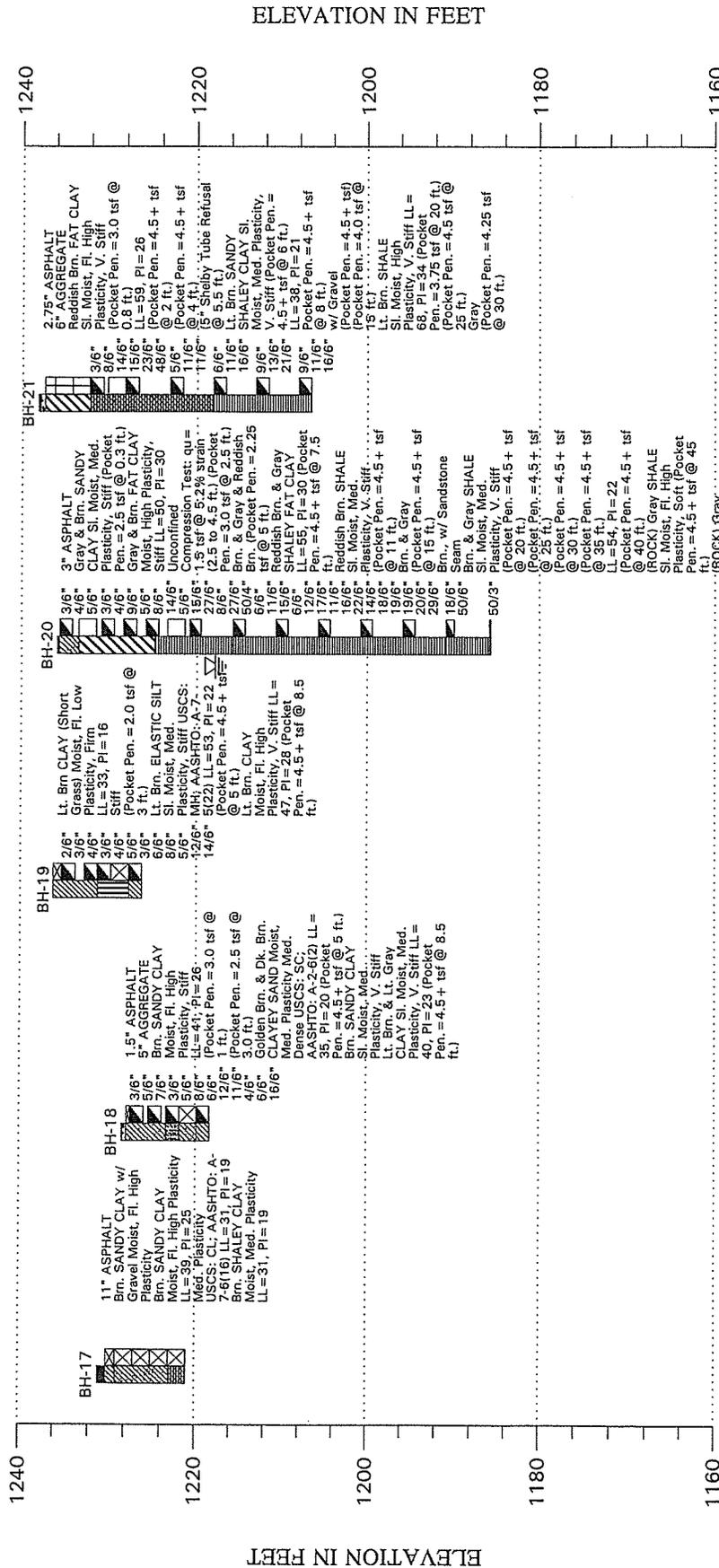
Unconfined Compression Test: qu = 4.5 + tsf @ 0.6 ft.

Unconfined Compression Test: qu = 4.5 + tsf @ 0.4 ft.

Unconfined Compression Test: qu = 4.5 + tsf @ 0.2 ft.

Unconfined Compression Test: qu = 4.5 + tsf @ 0.1 ft.

LOG OF BORINGS
Fort Sill New TEMF Complex



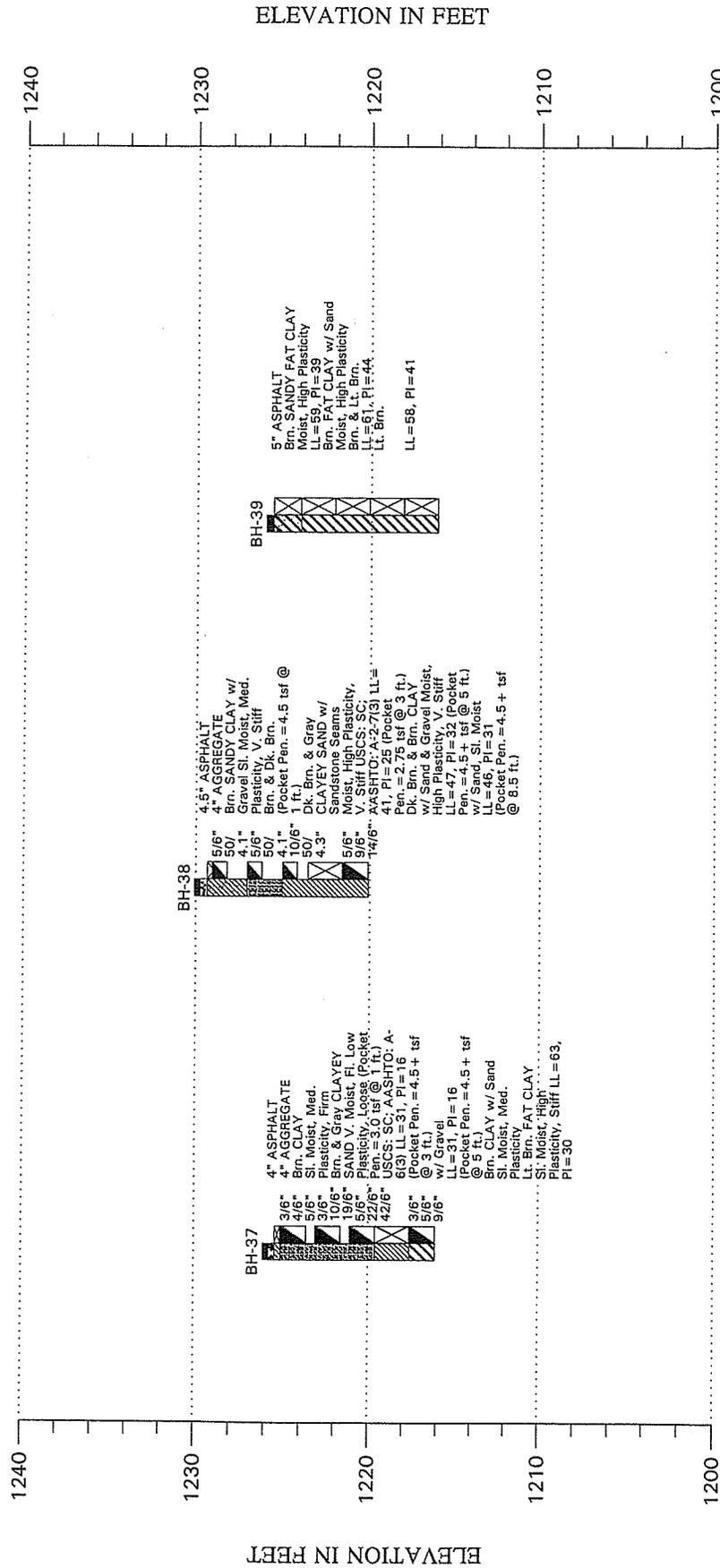
STRATA SYMBOLS

	Asphalt
	Sandy Clay
	Shaley Clay
	Aggregate
	Clayey Sand
	Lean Clay
	Elastic Silt
	Fat Clay
	Shale
	Sandstone
	Gravel
	Sandy Shaley Clay

ELEVATION IN FEET

ELEVATION IN FEET

LOG OF BORINGS
Fort Sill New TEMF Complex



SOIL BORING LOG

Boring No. BH-1

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 1/27/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA (0 to 31.5 ft.) Field Logger: Jieliang Pan, P.E.
 Surface Elevation: 1171.1 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client; Rock coring (31.5 to 4

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
							Water Content, % - ●	
							10 20 30 40 50 60	10 20 30 40 50 60
1170			4/6" 5/6" 6/6"	Brn. FAT CLAY (Short Grass) Sl. Moist, High Plasticity, Stiff LL=50, PI=35 (Pocket Pen. = 4.5 + tsf @ 0 ft.) Unconfined Compression Test: qu = 4.9 tsf @ 5.8% strain (2.5 to 4.5 ft.) (Pocket Pen. = 4.5 + tsf @ 2.5 ft.)	119 107			
1165			12/6" 37/6" 47/6"	Brn. SILTY SHALE Sl. Moist, Trace Plasticity, V. Stiff LL=23, PI=3 (Pocket Pen. = 4.5 + tsf @ 5 ft.)	125			
			4/6" 9/6" 10/6"	Brn. & Gray SHALEY CLAY Sl. Moist, Med. Plasticity, V. Stiff (Pocket Pen. = 4.5 + tsf @ 7.5 ft.)	113			
1160			3/6" 8/6" 12/6"	(Pocket Pen. = 4.5 + tsf @ 10 ft.) High Plasticity LL=65, PI=43 (Pocket Pen. = 4.5 + tsf @ 12.5 ft.)	105			
1155			6/6" 9/6" 13/6"	LL=44, PI=28 (Pocket Pen. = 4.5 + tsf @ 15 ft.)	106			
1150			8/6" 26/6" 47/6"	Gray & Reddish Brn. SHALE Sl. Moist, High Plasticity, V. Stiff (Pocket Pen. = 4.5 + tsf @ 20 ft.)	125			
1145			6/6" 20/6" 28/6"	Gray LL=62, PI=43 (Pocket Pen. = 4.5 + tsf @ 25 ft.)	118			
1140			14/6" 36/6" 50/4.4"	(ROCK) Gray SHALE Sl. Moist, High Plasticity, Soft Unconfined Compression Test: qu = 14.7 tsf @ 2.5% strain (32.1 to 32.5 ft.)	131			

SOIL BORING LOG

Boring No. BH-1 continued

Project: Fort Sill New TEMF Complex

Project No.: 7311-3256

Project Location: Lawton, Oklahoma

Date Drilled.: 1/27/2011

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity											
							PL	10	20	30	40	50	60	LL				
1135				RQD = 90% (31.5 to 36.5 w/ 60 in. recovery) Unconfined Compression Test: qu = 11.8 tsf @ 2.0% strain (36.5 to 36.9 ft.)	98													
1130				Unconfined Compression Test: qu = 10.2 tsf @ 2.1% strain (41.1 to 41.5 ft.) RQD = 93% (36.5 to 41.5 ft. w/ 60 in. recovery)	130													
1125																		
1120																		
1115																		
1110																		
1105																		

SOIL BORING LOG

Boring No. BH-2

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 1/27/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Peter Shau, P.E.
 Surface Elevation: 1173.2 ft. Water Depth: 10 ft. @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
							Water Content, % - ●	
							10	20 30 40 50 60
0				Brn. FAT CLAY w/ Root Fibers (Short Grass) Moist, High Plasticity, Firm Stiff (Pocket Pen. = 3.5 tsf @ 1.5 ft.) LL = 60, PI = 24 Unconfined Compression Test: qu = 4.4 tsf @ 2.9% strain (3 to 5 ft.) (Pocket Pen. = 4.0 tsf @ 3 ft.) (Pocket Pen. = 4.25 tsf @ 5 ft.)	110		●	—
1170			3/6" 5/6" 7/6"					
5			5/6" 7/6" 10/6"					
1165				Lt. Brn. SILT WITH SAND V. Moist, Nonplastic, V. Dense USCS: ML; AASHTO: A-4(0) (Pocket Pen. = 4.5 + tsf @ 8 ft.) w/ Gravel		74.9	●	
1160			21/6" 50/6"					
1155			8/6" 8/6" 7/6"	Lt. Brn. & Yellowish Brn. SHALEY CLAY Moist, Fl. High Plasticity, Stiff (Pocket Pen. = 3.5 tsf @ 15.5 ft.)	118		●	
1150			5/6" 10/6" 20/6"	Grayish Brn. SANDY CLAY Moist, Fl. High Plasticity, V. Stiff LL = 42, PI = 25 (Pocket Pen. = 4.5 + tsf @ 20 ft.)	107		●	—
1145			4/6" 7/6" 10/6"	Lt. Brn. SILTY SAND WITH GRAVEL Wet, Nonplastic, Med. Dense				
1140			9/6" 25/6" 44/6"	Reddish Brn. & Lt. Gray FAT CLAY, Sl. Moist, High Plasticity, V. Stiff LL = 81, PI = 49 (Pocket Pen. = 4.5 tsf @ 25.5 ft.)	104		●	— 81
1140				Reddish Brn. & Lt. Gray SHALE Sl. Moist, High Plasticity, V. Stiff (Pocket Pen. = 4.5 + tsf @ 30.5 ft.)	124		●	

SOIL BORING LOG

Boring No. BH-3

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 1/28/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Jieliang Pan, P.E.
 Surface Elevation: 1170.0 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
1170 - 0				Brn. CLAY w/ Sand (Short Grass) Moist, Med. Plasticity, Firm (Pocket Pen. = 2.25 tsf @ 0 ft.)	98		Water Content, % - ●	
				Brn. CLAY Moist, High Plasticity, Stiff LL = 49, PI = 32 Unconfined Compression Test: qu = 2.1 tsf @ 5.3% strain (2 to 4 ft.) (Pocket Pen. = 2.25 tsf @ 2 ft.) LL = 45, PI = 29 (Pocket Pen. = 3.75 tsf @ 4 ft.) (Pocket Pen. = 2.5 tsf @ 6 ft.)				
1165 - 5				Brn. FAT CLAY w/ Sand Moist, High Plasticity, Stiff (Pocket Pen. = 3.5 tsf @ 8 ft.)	115			
1160 - 10		3/6" 7/6" 8/6"		Brn. & Gray LL = 70, PI = 53 (Pocket Pen. = 4.5 + tsf @ 10 ft.)				
1155 - 15				Brn. & Gray SHALEY CLAY Moist, Fl. High Plasticity, V. Stiff (Pocket Pen. = 4.5 + tsf @ 15 ft.)	102			
1150 - 20				Brn. SHALE Moist, Med. Plasticity, V. Stiff LL = 38, PI = 22 (Pocket Pen. = 4.5 + tsf @ 20 ft.)	108			
1145 - 25		3/6" 10/6" 15/6"		Gray, High Plasticity (Pocket Pen. = 4.5 + tsf @ 25 ft.)				
1140 - 30				w/ Interbedded Sandstone (Weakly Cemented)	116			
		27/6" 27/6" 18/6"						

SOIL BORING LOG

Boring No. BH-4

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 2/8/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Jieliang Pan, P.E.
 Surface Elevation: 1189.1 ft. Water Depth: Dry @ Completion
 Remarks: Surface elev. provided by client; Boring moved 25 ft. west

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
0				Brn. FAT CLAY WITH SAND (Short Grass) Moist, High Plasticity USCS: CH; AASHTO: A-7-6(31) LL = 56, PI = 35		83.9	10	56
1185		5		Sl. Moist LL = 58, PI = 38			10	58
1180		10		LL = 52, PI = 35			10	52
1175								
1170								
1165								
1160								

SOIL BORING LOG

Boring No. BH-5

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 2/8/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Jieliang Pan, P.E.
 Surface Elevation: 1198.4 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
0			5/6"	Brn. CLAY (Short Grass) Sl. Moist, Fl. High Plasticity, Stiff LL=44, PI=25 (Pocket Pen. = 4.25 tsf @ 1 ft.)				
		6/6"						
		7/6"						
1195		3/6"	(Pocket Pen. = 2.0 tsf @ 3 ft.)					
		4/6"						
		5/6"						
5		3/6"	Brn. FAT CLAY Moist, High Plasticity, Stiff LL=56, PI=37 (Pocket Pen. = 2.0 @ 5 ft.)	106				
		4/6"						
		6/6"						
1190		3/6"	LL=50, PI=29 (Pocket Pen. = 2.25 tsf @ 8.5 ft.)	108				
	3/6"							
	6/6"							
1185								
15								
1180								
20								
1175								
25								
1170								
30								
1165								

SOIL BORING LOG

Boring No. BH-6

Project: Fort Sill New TEMF Complex
 Project Location: Lawton, Oklahoma
 Boring Location: See "Site and Boring Location Plan"
 Drill Method: CME-55 w/ 3.25" I.D. HSA
 Surface Elevation: 1210.6 ft.
 Remarks: Surface elevation provided by client

Project No.: 7311-3256
 Date Drilled.: 1/26/2011
 Project Engineer: Jieliang Pan, P.E.
 Field Logger: Peter Shau, P.E.
 Water Depth: Dry @ Completion

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
1210				10" ASPHALT				
				6" AGGREGATE				
			2/6" 3/6" 4/6"	Lt. Brn. FAT CLAY Moist, High Plasticity, Firm (Pocket Pen. = 2.0 tsf @ 1.5 ft.) USCS: CH; AASHTO: A-7-6(44) LL = 64, PI = 41	98	94.9		
1205			4/6" 6/6" 10/6"	Unconfined Compression Test: qu = 1.2 tsf @ 5.4% strain (3 to 5 ft.) (Pocket Pen. = 2.25 tsf @ 3 ft.) Reddish Brn. Lt. Brn. & Reddish Brn., V. Stiff LL = 60, PI = 35 (Pocket Pen. = 3.5 tsf @ 6.5 ft.) (Pocket Pen. = 3.5 tsf @ 8.5 ft.)	105			
1200			5/6" 7/6" 10/6"	(Pocket Pen. = 3.5 tsf @ 10 ft.)				
				(Pocket Pen. = 4.0 tsf @ 13 ft.)	112			
1195			8/6" 19/6" 35/6"	Lt. Brn. SHALE Sl. Moist, Fl. High Plasticity, V. Stiff LL = 41, PI = 26 (Pocket Pen. = 4.5 + tsf @ 15 ft.) w/ Sand Layer (Coarse Grain)	124			
1190			9/6" 9/6" 16/6"	Reddish Brn. (Pocket Pen. = 4.5 + tsf @ 20 ft.)	116			
1185			7/6" 15/6" 19/6"	Reddish Brn. & Lt. Gray, High Plasticity (Pocket Pen. = 4.5 + tsf @ 25 ft.)				
1180			8/6" 11/6" 15/6"	(Pocket Pen. = 4.5 + tsf @ 30 ft.)				

SOIL BORING LOG

Boring No. BH-6 continued

Project: Fort Sill New TEMF Complex

Project No.: 7311-3256

Project Location: Lawton, Oklahoma

Date Drilled.: 1/26/2011

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
							10 20 30 40 50 60	10 20 30 40 50 60
1175			12/6" 16/6" 20/6"	LL = 72, PI = 45 (Pocket Pen. = 4.5+ tsf @ 35 ft.)				72
1170			15/6" 50/5.1"	(ROCK) Lt. Gray & Reddish Brn. SHALE w/ Interbedded Sandstone Sl. Moist, High Plasticity, Soft				
1165								
1160								
1155								
1150								
1145								

SOIL BORING LOG

Boring No. BH-7

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 1/26/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Jieliang Pan, P.E.
 Surface Elevation: 1206.2 ft. Water Depth: 15 ft. @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
							Water Content, % - ●	
							10 20 30 40 50 60	10 20 30 40 50 60
0				5" ASPHALT				
1205				7" AGGREGATE				
			2/6"	Brn. FAT CLAY Moist, High Plasticity, Firm (Pocket Pen. = 2.0 tsf @ 1 ft.) LL = 55, PI = 39 (Pocket Pen. = 2.75 tsf @ 2.5 ft.)	110			
		3/6"						
		5/6"						
		3/6"						
		4/6"						
		7/6"						
5			3/6"	(Pocket Pen. = 3.75 tsf @ 5 ft.)				
1200			5/6"					
			7/6"					
				Brn. SHALEY CLAY Sl. Moist, Fl. High Plasticity, Stiff (Pocket Pen. = 2.75 tsf @ 7.5 ft.)				
10			3/6"	LL = 44, PI = 27 (Pocket Pen. = 3.25 tsf @ 10 ft.)	127			
		5/6"						
		9/6"						
1195				Brn. SHALE w/ Sandstone Seams Sl. Moist, Fl. High Plasticity, V. Stiff (Pocket Pen. = 4.5 + tsf @ 12.5 ft.)				
			23/6"		126			
		19/6"						
		25/6"						
15			12/6"	Brn. & Gray SHALE Sl. Moist, Fl. High Plasticity, V. Stiff LL = 44, PI = 28 (Pocket Pen. = 4.5 + tsf @ 15 ft.)	124			
		30/6"						
		48/6"						
1190				(Pocket Pen. = 4.5 + tsf @ 20 ft.)				
20			9/6"					
1185			14/6"					
			26/6"					
25			10/6"	w/ Gravel (Pocket Pen. = 4.5 + tsf @ 25 ft.)				
1180			21/6"					
			31/6"					
30			50/2"	Brn. GRAVEL Wet, Nonplastic, V. Dense				
1175								

SOIL BORING LOG

Boring No. BH-7 continued

Project: Fort Sill New TEMF Complex

Project No.: 7311-3256

Project Location: Lawton, Oklahoma

Date Drilled.: 1/26/2011

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
1170			38/6" 45/6" 32/6"					
1165			15/6" 32/6" 50/4.5"	Brn. & Gray SHALE w/ Gravel Moist, High Plasticity, V. Stiff LL = 60, PI = 44	121			
1160								
1155								
1150								
1145								
1140								

SOIL BORING LOG

Boring No. BH-8

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 1/25/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Jieliang Pan, P.E.
 Surface Elevation: 1207.0 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
							10 20 30 40 50 60	10 20 30 40 50 60
0				5" ASPHALT				
1205				7" AGGREGATE		62.3		
				Dk. Gray SANDY CLAY Moist, Fl. High Plasticity USCS: CL; AASHTO: A-7-6(14) LL = 46, PI = 27				
5				Dk. Gray & Brn. FAT CLAY WITH SAND Moist, High Plasticity USCS: CH; AASHTO: A-7-6(27) LL = 56, PI = 37 Brn.		75.1		
1200								
10								
1195								
15								
1190								
20								
1185								
25								
1180								
30								
1175								

SOIL BORING LOG

Boring No. BH-9

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 1/25/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Jieliang Pan, P.E.
 Surface Elevation: 1210.0 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
							10 20 30 40 50 60	10 20 30 40 50 60
1210 - 0				Dk. Brn. SANDY CLAY (Short Grass) Sl. Moist, Fl. High Plasticity (Pocket Pen. = 3.0 tsf @ 0 ft.) Brn. USCS: CL; AASHTO: A-7-6(15) LL = 41, PI = 25 (Pocket Pen. = 3.0 tsf @ 2 ft.) Unconfined Compression Test: qu = 2.8 tsf @ 4.4% strain (4 to 6 ft.) (Pocket Pen. = 4.5+ tsf @ 4 ft.)	122	67.5		
1205 - 5				Brn. SHALE Moist, High Plasticity LL = 58, PI = 32 (Pocket Pen. = 4.5+ tsf @ 6 ft.) (Pocket Pen. = 4.5+ tsf @ 8 ft.)	123			
1200 - 10		6/6" 17/6" 23/6"		Brn., Sl. Moist, V. Stiff (Pocket Pen. = 4.5+ tsf @ 10 ft.)	105			
1195 - 15		7/6" 10/6" 13/6"		(Pocket Pen. = 4.5+ tsf @ 15 ft.)				
1190 - 20		7/6" 11/6" 14/6"		Brn. & Gray LL = 59, PI = 30 (Pocket Pen. = 4.5+ tsf @ 20 ft.)	104			
1185 - 25		20/6" 50/2.3"		Brn., w/ Gravel (Pocket Pen. = 4.5+ tsf @ 25 ft.)				
1180 - 30		8/6" 15/6" 22/6"		Brn. & Reddish Brn. (Pocket Pen. = 4.5+ tsf @ 30 ft.)				

SOIL BORING LOG

Boring No. BH-10

Project: Fort Sill New TEMF Complex
 Project Location: Lawton, Oklahoma
 Boring Location: See "Boring Location and Site Plan"
 Drill Method: CME-55 w/ 3.25" I.D. HSA
 Surface Elevation: 1210.6 ft.
 Remarks: Surface elevation provided by client

Project No.: 7311-3256
 Date Drilled.: 1/25/2011
 Project Engineer: Jieliang Pan, P.E.
 Field Logger: Peter Shau, P.E.
 Water Depth: Dry @ Completion

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
1210				6" CONCRETE				
				6" AGGREGATE				
			2/6"	Dk. Brn. SANDY CLAY Sl. Moist, Med. Plasticity, Firm UCSC: CL; AASHTO: A-7-6(14) LL=41, PI=23 (Pocket Pen. = 0.5 tsf @ 1 ft.) Stiff	69.2		●	-----
		3/6"						
		4/6"						
			2/6"	Brn. CLAY Moist, Fl. High Plasticity, Firm LL=46, PI=28 (Pocket Pen. = 1.5 tsf @ 5 ft.)			●	-----
1205		3/6"						
		4/6"						
			2/6"	Lt. Brn. FAT CLAY Moist, High Plasticity, Firm LL=63, PI=33 (Pocket Pen. = 2.0 tsf @ 8.5 ft.)			●	-----
1200		3/6"						
		5/6"						
1195								
1190								
1185								
1180								

SOIL BORING LOG

Boring No. BH-11

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 1/25/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Peter Shau, P.E.
 Surface Elevation: 1217.6 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
							10 20 30 40 50 60	10 20 30 40 50 60
0				3.5" ASPHALT				
				2" AGGREGATE				
1215			4/6"	Brn. SANDY CLAY w/ Gravel	114			
			3/6"	Sl. Moist, Low Plasticity, Firm				
			5/6"	LL = 28, PI = 10 (Pocket Pen. = 3.5 tsf @ 1.5 ft.)	107			
5				Brn. SILTY CLAY				
				Sl. Moist, Low Plasticity, Stiff				
				(Pocket Pen. = 2.0 tsf @ 3 ft.)				
1210			2/6"	Lt. Brn & Gray	101			
			7/6"	(Pocket Pen. = 2.5 tsf @ 6.5 ft.)				
			5/6"	Lt. Brn.	96			
				Unconfined Compression Test:				
				qu = 1.0 tsf @ 1.4% strain (8 to 10 ft.)				
				(Pocket Pen. = 3.25 tsf @ 8 ft.)				
1205				Lt. Brn. CLAY				
				Moist, Med. Plasticity, Stiff				
					94			
15			7/6"	Brn. SANDY SHALEY CLAY				
			12/6"	V. Moist, Fl. Low Plasticity, V. Stiff				
			10/6"	LL = 29, PI = 15 (Pocket Pen. = 4.5 + tsf @ 13 ft.)	108			
1200				Dk. Brn., Sl. Moist				
				Brn.				
20			4/6"	Moist	105			
			7/6"	(Pocket Pen. = 4.5 + tsf @ 20 ft.)				
			10/6"					
1195								
25			16/6"	Lt. Brn. & Brn. SHALE	124			
			31/6"	Sl. Moist, Med. Plasticity, V. Stiff				
			49/6"	LL = 43, PI = 23 (Pocket Pen. = 4.5 + tsf @ 25 ft.)				
1190								
30			12/6"	Brn. & Lt. Gray, High Plasticity	115			
			17/6"	LL = 50, PI = 30				
			24/6"	(Pocket Pen. = 4.5 + tsf @ 30 ft.)				
1185								

SOIL BORING LOG

Boring No. BH-11 continued

Project: Fort Sill New TEMF Complex

Project No.: 7311-3256

Project Location: Lawton, Oklahoma

Date Drilled.: 1/25/2011

Elev./Depth Feet	Symbol	Samples	SPT Blows/ Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
35			13/6" 14/6" 21/6"	Reddish Brn. & Lt. Gray LL = 65, PI = 38 (Pocket Pen. = 4.5 + tsf @ 35 ft.)	104			
40			19/6" 25/6" 27/6"	LL = 82, PI = 52 (Pocket Pen. = 4.5 + tsf @ 40 ft.)	102			82
45								
50								
55								
60								
65								

SOIL BORING LOG

Boring No. BH-12

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 1/25/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Peter Shau, P.E.
 Surface Elevation: 1221.2 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
							Water Content, % - ●	
							10 20 30 40 50 60	10 20 30 40 50 60
1220				3" ASPHALT 6" CONCRETE 6" AGGREGATE				
				Grayish Brn. SANDY SILT WITH GRAVEL Moist, Nonplastic USCS: ML; AASHTO: A-4(0)	58.1	54.4	●	—
5				Brn. SANDY CLAY Moist, Med. Plasticity USCS: CL; AASHTO: A-7-6(11) LL = 45, PI = 18 LL = 34, PI = 18			●	—
1215				Brn. FAT CLAY Sl. Moist, High Plasticity LL = 53, PI = 34			●	—
10								
1210								
15								
1205								
20								
1200								
25								
1195								
30								
1190								

SOIL BORING LOG

Boring No. BH-13

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 1/26/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Peter Shau, P.E.
 Surface Elevation: 1224.6 ft. Water Depth: Dry @ Completion
 Remarks: Stake moved 10' North

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
0			3/6" 3/6" 5/6"	Brn. FAT CLAY (Short Grass) Sl. Moist, High Plasticity, Firm (Pocket Pen. = 2.5 tsf @ 0 ft.) (Pocket Pen. = 4.0 tsf @ 2.5 ft.)				
1220			4/6" 6/6" 4/6"	Stiff LL = 57, PI = 34 (Pocket Pen. = 4.0 tsf @ 5 ft.) (Pocket Pen. = 1.5 tsf @ 7.5 ft.)	109			
1215			7/6" 17/6" 50/5.8"	Brn. SANDY SHALEY CLAY w/ Sandstone Seams Sl. Moist, Low Plasticity, V. Stiff LL = 25, PI = 10 (Pocket Pen. = 4.5+ tsf @ 10 ft.)	124			
1210			11/6" 11/6" 14/6"	Brn. SHALE Sl. Moist, Fl. High Plasticity, V. Stiff (Pocket Pen. = 4.5+ tsf @ 15 ft.)				
1205			8/6" 12/6" 15/6"	(Pocket Pen. = 4.5+ tsf @ 20 ft.)				
1200			6/6" 11/6" 13/6"	Brn. & Gray, w/ Gravel (Pocket Pen. = 4.5+ tsf @ 25 ft.)				
1195			10/6" 21/6" 29/6"	Brn. & Gray SHALE w/ Gravel Sl. Moist, Fl. High Plasticity, V. Stiff LL = 48, PI = 26 (Pocket Pen. = 4.5+ tsf @ 30 ft.)				

SOIL BORING LOG

Boring No. BH-13 continued

Project: Fort Sill New TEMF Complex

Project No.: 7311-3256

Project Location: Lawton, Oklahoma

Date Drilled.: 1/26/2011

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity										
							PL	10	20	30	40	50	60	LL			
1190			50/3.6"	(ROCK) Gray SANDSTONE w/ Interbedded Shale V. Moist, Nonplastic, Soft Unconfined Compression Test: qu=31.9 tsf @ 2.5% strain (36.3 to 36.7 ft.)	136												
1185				Unconfined Compression Test: qu=4.7 tsf @ 1.0% strain (40.1 to 40.5 ft.) RQD=75% (35.5 to 40.5 ft. w/ 60 in. recovery)	129												
1180																	
1175																	
1170																	
1165																	
1160																	

SOIL BORING LOG

Boring No. BH-14

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 1/25/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Peter Shau, P.E.
 Surface Elevation: 1222.7 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by Client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
							Water Content, % - ●	
							10 20 30 40 50 60	10 20 30 40 50 60
0				8" ASPHALT				
				8" AGGREGATE				
1220			4/6"	Lt. Brn. FAT CLAY				
			4/6"	Moist, High Plasticity, Firm				
			3/6"	LL = 53, PI = 35				
			5/6"	(Pocket Pen. = 1.5 tsf @ 1 ft.)				
			6/6"	Lt. Gray, Stiff				
5			3/6"	(Pocket Pen. = 2.25 tsf @ 3 ft.)		71.4		
			5/6"	Lt. Gray & Brn. FAT CLAY WITH SAND				
			10/6"	Sl. Moist, Fl. High Plasticity, Stiff				
1215				USCS: CH; AASHTO: A-7-6(20)				
				LL = 55, PI = 28				
				(Pocket Pen. = 4.0 tsf @ 5 ft.)				
			4/6"	Brn. FAT CLAY				
			6/6"	Sl. Moist, Fl. High Plasticity				
10			10/6"	V. Stiff				
				LL = 55, PI = 25				
				(Pocket Pen. = 3.75 tsf @ 8.5 ft.)				
1210								
15								
1205								
20								
1200								
25								
1195								
30								
1190								

SOIL BORING LOG

Boring No. BH-15

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 1/25/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Peter Shau, P.E.
 Surface Elevation: 1226.1 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
							Water Content, % - ●	
							10 20 30 40 50 60	10 20 30 40 50 60
1225	[Diagonal Hatching]	[X Hatching]		Dk. Brn. FAT CLAY WITH SAND w/ Root Fibers (Short Grass) Moist, High Plasticity USCS: CH; AASHTO: A-7-6(25) LL = 56, PI = 35	72.3		20	55
1220				Brn. USCS: CH, AASHTO: A-7-6(42) LL = 70, PI = 46	84.3		20	55
1215								
1210								
1205								
1200								
1195								

SOIL BORING LOG

Boring No. BH-16

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 2/8/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Jieliang Pan, P.E.
 Surface Elevation: 1228.7 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
							10 20 30 40 50 60	10 20 30 40 50 60
0				9" ASPHALT				
1225		2/6" 3/6" 3/6"		Gray CLAY V. Moist, Fl. Low Plasticity, Firm (Pocket Pen. = 1.5 tsf @ 0.8 ft.) LL = 28, PI = 16 Unconfined Compression Test: qu = 0.99 tsf @ 2.3% strain (2.5 to 4.5 ft.) (Pocket Pen. = 4.5 + tsf @ 2.5 ft.)	97			
1220		3/6" 6/6" 7/6"		Lt. Brn. FAT CLAY V. Moist, High Plasticity, Stiff (Pocket Pen. = 3.75 tsf @ 5 ft.) LL = 72, PI = 44 (Pocket Pen. = 4.5 + tsf @ 7.5 ft.)	77			72
1215		6/6" 8/6" 10/6"		Moist (Pocket Pen. = 4.5 + tsf @ 10 ft.)				
1210		7/6" 10/6" 13/6"		Lt. Brn. SHALE Moist, High Plasticity, V. Stiff (Pocket Pen. = 4.5 + tsf @ 15 ft.)				
1205		6/6" 11/6" 15/6"		(Pocket Pen. = 4.5 + tsf @ 20 ft.)				
1200		13/6" 33/6" 50/4.8"		Lt. Brn. SHALE w/ Gravel Sl. Moist, High Plasticity, V. Stiff LL = 51, PI = 30 (Pocket Pen. = 4.5 + tsf @ 25 ft.)				
1195		10/6" 18/6" 23/6"		Lt. Brn. & Lt. Gray SHALE Sl. Moist, High Plasticity, V. Stiff (Pocket Pen. = 4.5 + tsf @ 30 ft.)				

SOIL BORING LOG

Boring No. BH-17

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 2/8/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Jieliang Pan, P.E.
 Surface Elevation: 1231.0 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
							10 20 30 40 50 60	10 20 30 40 50 60
0				11" ASPHALT				
1230				Brn. SANDY CLAY w/ Gravel Moist, Fl. High Plasticity				
				Brn. SANDY CLAY Moist, Fl. High Plasticity LL = 39, PI = 25 Med. Plasticity USCS: CL; AASHTO: A-7-6(16) LL = 31, PI = 19		64.1		
1225								
				Brn. SHALEY CLAY Moist, Med. Plasticity LL = 31, PI = 19				
1220								
1215								
1210								
1205								
1200								

SOIL BORING LOG

Boring No. BH-18

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 2/15/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/3.25" I.D. HSA Field Logger: Jieliang Pan, P.E.
 Surface Elevation: 1228.4 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
							10 20 30 40 50 60	10 20 30 40 50 60
0				1.5" ASPHALT				
				5" AGGREGATE				
1225			3/6"	Brn. SANDY CLAY Moist, Fl. High Plasticity, Stiff LL = 41, PI = 26 (Pocket Pen. = 3.0 tsf @ 1 ft.) (Pocket Pen. = 2.5 tsf @ 3.0 ft.)	108	32.5		
		5/6"						
		7/6"						
5			3/6"	Golden Brn. & Dk. Brn. CLAYEY SAND Moist, Med. Plasticity Med. Dense USCS: SC; AASHTO: A-2-6(2) LL = 35, PI = 20 (Pocket Pen. = 4.5 + tsf @ 5 ft.)	116	32.5		
		5/6"						
		8/6"						
1220			6/6"	Brn. SANDY CLAY Sl. Moist, Med. Plasticity, V. Stiff	114	32.5		
		4/6"						
		6/6"						
10			16/6"	Lt. Brn. & Lt. Gray CLAY Sl. Moist, Med. Plasticity, V. Stiff LL = 40, PI = 23 (Pocket Pen. = 4.5 + tsf @ 8.5 ft.)				
1215								
15								
1210								
20								
1205								
25								
1200								
30								
1195								

SOIL BORING LOG

Boring No. BH-19

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 1/24/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Peter Shau, P.E.
 Surface Elevation: 1236.2 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
							10 20 30 40 50 60	10 20 30 40 50 60
1235			2/6" 3/6" 4/6"	Lt. Brn CLAY (Short Grass) Moist, Fl. Low Plasticity, Firm LL=33, PI=16				
			3/6" 4/6" 5/6"	Stiff (Pocket Pen. = 2.0 tsf @ 3 ft.)				
1230			3/6" 6/6" 8/6"	Lt. Brn. ELASTIC SILT Sl. Moist, Med. Plasticity, Stiff USCS: MH; AASHTO: A-7-5(22) LL=53, PI=22 (Pocket Pen. = 4.5 + tsf @ 5 ft.)		85.8		
10			5/6" 12/6" 14/6"	Lt. Brn. CLAY Moist, Fl. High Plasticity, V. Stiff LL=47, PI=28 (Pocket Pen. = 4.5 + tsf @ 8.5 ft.)				
1225								
15								
1220								
20								
1215								
25								
1210								
30								
1205								

SOIL BORING LOG

Boring No. BH-20

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 1/24/2011
 Boring Location: See "Boring Site and Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Jieliang Pan, P.E.
 Surface Elevation: 1235.9 ft Water Depth: 18' @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
1235.9			3/6"	3" ASPHALT				
			4/6"	Gray & Brn. SANDY CLAY	97			
			5/6"	Sl. Moist, Med. Plasticity, Stiff (Pocket Pen. = 2.5 tsf @ 0.3 ft.)				
				Gray & Brn. FAT CLAY				
				Moist, High Plasticity, Stiff LL=50, PI=30				
1230			3/6"	Unconfined Compression Test:				
			4/6"	qu = 1.5 tsf @ 5.2% strain (2.5 to 4.5 ft.)				
			9/6"	(Pocket Pen. = 3.0 tsf @ 2.5 ft.)				
				Brn. & Gray & Reddish Brn.				
				(Pocket Pen. = 2.25 tsf @ 5 ft.)				
			5/6"	Reddish Brn. & Gray SHALEY FAT CLAY				
			8/6"	LL=55, PI=30				
			14/6"	(Pocket Pen. = 4.5 + tsf @ 7.5 ft.)				
1225			5/6"	Reddish Brn. SHALE				
			15/6"	Sl. Moist, Med. Plasticity, V. Stiff				
			27/6"	(Pocket Pen. = 4.5 + tsf @ 11 ft.)				
1220			8/6"	Brn. & Gray				
			27/6"	(Pocket Pen. = 4.5 + tsf @ 15 ft.)				
			50/4"	Brn., w/ Sandstone Seam				
1215			6/6"	Brn. & Gray SHALE				
			11/6"	Sl. Moist, Med. Plasticity, V. Stiff				
			15/6"	(Pocket Pen. = 4.5 + tsf @ 20 ft.)				
1210			6/6"	(Pocket Pen. = 4.5 + tsf @ 25 ft.)				
			12/6"					
			17/6"					
1205			11/6"	(Pocket Pen. = 4.5 + tsf @ 30 ft.)				
			16/6"					
			22/6"					

SOIL BORING LOG

Boring No. BH-20 continued

Project: Fort Sill New TEMF Complex

Project No.: 7311-3256

Project Location: Lawton, Oklahoma

Date Drilled.: 1/24/2011

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
1200			14/6" 18/6" 19/6"	(Pocket Pen. = 4.5 + tsf @ 35 ft.)				
1195			19/6" 20/6" 29/6"	LL = 54, PI = 22 (Pocket Pen. = 4.5 + tsf @ 40 ft.)	102			
1190			18/6" 50/6"	(ROCK) Gray SHALE Sl. Moist, Fl. High Plasticity, Soft (Pocket Pen. = 4.5 + tsf @ 45 ft.)				
1185			50/3"	(ROCK) Gray SANDSTONE Moist, Nonplastic, V. Soft				
1180								
1175								
1170								

SOIL BORING LOG

Boring No. BH-21

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 1/24/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Peter Shau, P.E.
 Surface Elevation: 1238.2 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
							Water Content, % - ●	
							10 20 30 40 50 60	10 20 30 40 50 60
0				2.75" ASPHALT				
				6" AGGREGATE				
1235				Reddish Brn. FAT CLAY Sl. Moist, Fl. High Plasticity, V. Stiff (Pocket Pen. = 3.0 tsf @ 0.8 ft.) LL = 59, PI = 26 (Pocket Pen. = 4.5 + tsf @ 2 ft.) (Pocket Pen. = 4.5 + tsf @ 4 ft.) (5" Shelby Tube Refusal @ 5.5 ft.)	99		●	—
5				Lt. Brn. SANDY SHALEY CLAY Sl. Moist, Med. Plasticity, V. Stiff (Pocket Pen. = 4.5 + tsf @ 6 ft.) LL = 38, PI = 21 Pocket Pen. = 4.5 + tsf @ 8 ft.)	128		●	—
1230				w/ Gravel (Pocket Pen. = 4.5 + tsf)				
10								
1225								
15								
1220								
20				Lt. Brn. SHALE Sl. Moist, High Plasticity, V. Stiff LL = 68, PI = 34 (Pocket Pen. = 3.75 tsf @ 20 ft.)			●	—
1215								
25								
1210				Gray				
30								
1205								

SOIL BORING LOG

Boring No. BH-22

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 2/16/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/3.25" I.D. HSA Field Logger: Jieliang Pan, P.E.
 Surface Elevation: 1224.7 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client, Boring moved 24 ft. so

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity		
							PL	LL	
							Water Content, % - ●		
							10 20 30 40 50 60	10 20 30 40 50 60	
0			3/6"	Brn. FAT CLAY w/ Sand (Short Grass) Sl. Moist, High Plasticity, Firm LL=64, PI=44 (Pocket Pen. = 3.5 tsf @ 1 ft.)					
			3/6"						
			5/6"						
				3/6"	Lt. Brn. FAT CLAY Sl. Moist, High Plasticity, Stiff (Pocket Pen. = 2.75 tsf @ 3 ft.) LL=72, PI=41 (Pocket Pen. = 2.75 tsf @ 5 ft.)				
1220			3/6"						
			6/6"						72
				3/6"	Lt. Brn. & Gray, V. Stiff LL=68, PI=39 (Pocket Pen. = 3.25 tsf @ 8.5 ft.)				
				4/6"					
1215			7/6"						
			11/6"						
1210									
1205									
1200									
1195									

SOIL BORING LOG

Boring No. BH-23

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 1/26/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Peter Shau, P.E.
 Surface Elevation: 1220.1 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
							10 20 30 40 50 60	10 20 30 40 50 60
1220				11" ASPHALT				
				4" AGGREGATE				
			11/6"	Lt. Brn. SILTY SAND	99			
			3/6"	Moist, Nonplastic				
			4/6"	Dk. Brn. FAT CLAY	96			
				Moist, High Plasticity, Firm				
				LL = 58, PI = 28				
				(Pocket Pen. = 2.5 tsf @ 1.5 ft.)				
1215				Brn.				
				LL = 71, PI = 48				
			2/6"	(Pocket Pen. = 2.5 tsf @ 3 ft.)				
			3/6"	Unconfined Compression Test:				
			5/6"	qu = 1.8 tsf @ 3.9% strain (3 to 5 ft.)	99			
				Lt. Brn.				
				(Pocket Pen. = 2.5 tsf @ 6.5 ft.)				
				LL = 75, PI = 48				
			5/6"	Unconfined Compression Test:				
			8/6"	qu = 2.6 tsf @ 7.2% strain (8 to 10 ft.)				
			10/6"	(Pocket Pen. = 3.0 tsf @ 8 ft.)				
				Greenish Gray & Reddish Brn. CLAY				
				Sl. Moist, Med. Plasticity, V. Stiff				
				(Pocket Pen. = 4.25 tsf @ 10 ft.)				
				(Pocket Pen. = 4.5 + tsf @ 13 ft.)				
1205				Reddish Brn.				
			6/6"	(Pocket Pen. = 4.25 tsf @ 15 ft.)				
			9/6"					
			11/6"					
1200				Lt. Brn. SHALE	128			
			10/6"	Sl. Moist, Med. Plasticity, V. Stiff				
			25/6"	LL = 36, PI = 20				
			36/6"	(Pocket Pen. = 4.5 + tsf @ 20 ft.)				
1195				Greenish Brn. & Reddish Brn., Moist	116			
			5/6"	(Pocket Pen. = 4.5 + tsf @ 25 ft.)				
			12/6"					
			18/6"					
1190				Reddish Brn., w/ Sand				
			10/6"	(Pocket Pen. = 4.5 + tsf @ 30 ft.)				
			17/6"					
			22/6"					

SOIL BORING LOG

Boring No. BH-23 continued

Project: Fort Sill New TEMF Complex

Project No.: 7311-3256

Project Location: Lawton, Oklahoma

Date Drilled.: 1/26/2011

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity					
							PL	LL				
							10	20	30	40	50	60
							Water Content, % - ●					
							10	20	30	40	50	60
1185			9/6" 12/6" 17/6"	Lt. Brn. & Reddish Brn., w/ Sand & Gravel (Pocket Pen. = 4.5 + tsf @ 40 ft.)	113							
1180			33/6" 25/6" 40/6"	(Pocket Pen. = 4.5 + tsf @ 40 ft.)	110							
1175												
1170												
1165												
1160												
1155												

SOIL BORING LOG

Boring No. BH-24

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 1/26/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I. D. HSA Field Logger: Peter Shau, P.E.
 Surface Elevation: 1211.2 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
							Water Content, % - ●	
							10 20 30 40 50 60	10 20 30 40 50 60
0				5" ASPHALT				
1210			5/6"	6" AGGREGATE				
			4/6"	Brn. FAT CLAY Moist, High Plasticity, Firm (Pocket Pen. = 1.5 tsf @ 1 ft.) USCS: CH; AASHTO: A-7-6(35) LL = 55, PI = 37	96	89.5	-----	-----
		3/6"						
		2/6"						
		3/6"						
			4/6"	(Pocket Pen. = 1.5 tsf @ 3 ft.)	99	-----	-----	
5		3/6"	(Pocket Pen. = 1.75 tsf @ 5 ft.)					
1205		5/6"	LL = 60, PI = 42					
			2/6"	w/ Gravel	103	●		
			3/6"	(Pocket Pen. = 1.75 tsf @ 8.5 ft.)				
			5/6"					
10								
1200								
15								
1195								
20								
1190								
25								
1185								
30								
1180								

SOIL BORING LOG

Boring No. BH-25

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 1/26/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Jieliang Pan, P.E.
 Surface Elevation: 1215.9 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
							Water Content, % - ●	
							10 20 30 40 50 60	10 20 30 40 50 60
1215			9/6"	6.5" ASPHALT				
			9/6"	5.5" AGGREGATE				
			3/6"	Brn. & Gray FAT CLAY Moist, High Plasticity, Stiff (Pocket Pen. = 1.25 tsf @ 1 ft.)				
				Gray (Pocket Pen. = 3.0 tsf @ 2.5 ft.)				
1210			4/6"	LL = 58, PI = 40	105			
			4/6"	(Pocket Pen. = 3.0 tsf @ 5 ft.)				
			6/6"					
			3/6"	Brn. (Pocket Pen. = 2.25 tsf @ 7.5 ft.)				
			4/6"					
			7/6"					
1205				Sl. Moist LL = 62, PI = 33 (Unconfined Compression Test: qu = 1.3 tsf @ 3.9% strain (10 to 12 ft.)	102			
			3/6"	(Pocket Pen. = 3.0 tsf @ 10 ft.)				
			6/6"	(Pocket Pen. = 3.0 tsf @ 12.5 ft.)	96			
			8/6"					
1200			4/6"	V. Stiff LL = 64, PI = 34 (Pocket Pen. = 3.0 tsf @ 15 ft.)	98			
			7/6"					
			9/6"					
1195			11/6"	Brn. & Reddish Brn. SHALE	124			
			18/6"	Sl. Moist, Med. Plasticity, V. Stiff (Pocket Pen. = 4.5+ tsf @ 20 ft.)				
			21/6"					
1190			7/6"	Brn. (Pocket Pen. = 4.5 tsf @ 25 ft.)	108			
			13/6"					
			18/6"					
1185			10/6"	Brn. & Reddish Brn. (Pocket Pen. = 4.5+ tsf @ 30 ft.)				
			18/6"					
			25/6"					

SOIL BORING LOG

Boring No. BH-26

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 1/26/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Jieliang Pan, P.E.
 Surface Elevation: 1203.2 ft. Water Depth: 35 ft. @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
0				5" ASPHALT				
				10" AGGREGATE				
1200		3/6" 4/6" 2/6"		Brn. & Gray FAT CLAY Sl. Moist, High Plasticity, Firm (Pocket Pen. = 1.0 tsf @ 1.25 ft.) V. Moist LL = 59, PI = 49 (Pocket Pen. = 3.0 tsf @ 2.75 ft.)	103			
5		2/6" 3/6" 5/6"		Moist (Pocket Pen. = 1.75 tsf @ 5 ft.) (Pocket Pen. = 2.75 tsf @ 7.5 ft.)				
1195				Cave in @ 9 ft.				
10		3/6" 4/6" 7/6"		Brn. & Gray, Stiff LL = 67, PI = 49 (Pocket Pen. = 3.0 tsf @ 10 ft.)	107			
1190								
15		3/6" 5/6" 7/6"		LL = 57, PI = 38 (Pocket Pen. = 3.0 tsf @ 15 ft.)	103			
1185								
20		12/6" 29/6" 44/6"		Brn. & Gray SHALE Moist, High Plasticity, V. Stiff (Pocket Pen. = 4.5+ tsf @ 20 ft.)				
1180								
25		7/6" 14/6" 18/6"		(Pocket Pen. = 4.5+ tsf @ 25 ft.)				
1175								
30		7/6" 11/6" 12/6"		LL = 66, PI = 40 (Pocket Pen. = 4.5+ tsf @ 30 ft.)	101			
1170								

SOIL BORING LOG

Boring No. BH-26 continued

Project: Fort Sill New TEMF Complex

Project No.: 7311-3256

Project Location: Lawton, Oklahoma

Date Drilled.: 1/26/2011

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity											
							PL	-----				LL						
							10	20	30	40	50	60						
							Water Content, % - ●											
							10	20	30	40	50	60						
35			11/6" 27/6" 50/2.5"	w/ Gravel														
1165																		
40			29/6" 47/6" 48/6"	w/ Sandstone Seams														
1160																		
45																		
1155																		
50																		
1150																		
55																		
1145																		
60																		
1140																		
65																		

SOIL BORING LOG

Boring No. BH-27

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 1/26/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Peter Shau, P.E.
 Surface Elevation: 1211.6 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
0				8" ASPHALT				
1210				6" AGGREGATE				
			2/6" 4/6" 6/6"	Lt. Brn. SILTY SAND w/ Gravel Moist, Nonplastic	109			
				Dk. Brn. FAT CLAY Moist, High Plasticity, Stiff LL = 56, PI = 38 (Pocket Pen. = 3.0 tsf @ 1.5 ft.) (Pocket Pen. = 1.75 tsf @ 3 ft.)				
1205			2/6" 4/6" 8/6"	Lt. Brn. LL = 66, PI = 43 (Pocket Pen. = 2.5 tsf @ 6.5 ft.) (Pocket Pen. = 2.5 tsf @ 8 ft.)	99			
					98			
1200			4/6" 8/6" 11/6"	Reddish Brn., V. Moist (Pocket Pen. = 4.5+ tsf @ 10.5 ft.)	98			
				Lt. Brn. (Pocket Pen. = 4.5 tsf @ 13 ft.)				
1195			6/6" 11/6" 14/6"	LL = 58, PI = 42 (Pocket Pen. = 4.5+ tsf @ 15 ft.) Reddish Brn.	102			
1190			6/6" 20/6" 31/6"	Lt. Brn. SANDY SHALE Sl. Moist, Tr. Plasticity, V. Stiff LL = 33, PI = 3 (Pocket Pen. = 4.5+ tsf @ 20 ft.)	119			
1185			6/6" 10/6" 15/6"	Lt. Brn & Reddish Brn. SHALE Sl. Moist, High Plasticity, V. Stiff (Pocket Pen. = 3.25 tsf @ 25 ft.)				
1180			11/6" 18/6" 26/6"	LL = 64, PI = 34 (Pocket Pen. = 4.5+ tsf @ 20 ft.)	110			

SOIL BORING LOG

Boring No. BH-28

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 1/28/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Jieliang Pan, P.E.
 Surface Elevation: 1204.4 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
0				Brn. SANDY FAT CLAY (Short Grass) Moist, High Plasticity LL = 52, PI = 34				
1200				Sl. Moist USCS: CH; AASHTO: A-7-6(24) LL = 55, PI = 39		66.9		
1195				Brn. FAT CLAY Moist, High Plasticity LL = 85, PI = 58				85
1190								
1185								
1180								
1175								

SOIL BORING LOG

Boring No. BH-29

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 1/28/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Jieliang Pan, P.E.
 Surface Elevation: 1194.4 ft. Water Depth: Dry @ Completion
 Remarks: _____

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
0				Brn. CLAY WITH SAND Sl. Moist, Fl. High Plasticity LL = 43, PI = 24				
1190				Brn. FAT CLAY WITH SAND Sl. Moist, High Plasticity USCS: CH; AASHTO: A-7-6(25) LL = 55, PI = 37		70.5		
1185				Brn. FAT CLAY Sl. Moist, Med. Plasticity LL = 66, PI = 48				
1180								
1175								
1170								
1165								

SOIL BORING LOG

Boring No. BH-30

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 2/8/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Jieliang Pan, P.E.
 Surface Elevation: 1183.5 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client; Boring moved 5 ft. east

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
0				Brn. CLAY Moist, High Plasticity, Stiff LL=48, PI=32 (Pocket Pen. = 4.5 + tsf @ 1 ft.)			10	50
1180				Brn. FAT CLAY WITH SAND Moist, High Plasticity, Stiff USCS: CH; AASHTO: A-7-6(29) LL=60, PI=43 (Pocket Pen. = 4.5 + tsf @ 3 ft.) (Pocket Pen. = 4.5 + tsf @ 5 ft.) Sl. Moist LL=67, PI=48	70.9		10	50
1175				Brn. & Gray (Pocket Pen. = 4.5 + tsf @ 8.5 ft.)			10	50
1170								
1165								
1160								
1155								
1150								

SOIL BORING LOG

Boring No. BH-31

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 1/28/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Jieliang Pan, P.E.
 Surface Elevation: 1198.6 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
0				Brn. CLAY WITH SAND (Short Grass) Sl. Moist, Fl. High Plasticity, V. Stiff USCS: CL; AASHTO: A-7-6(19) LL = 47, PI = 27 (Pocket Pen. = 4.5 + tsf @ 1 ft.) (Pocket Pen. = 4.5 + tsf @ 3 ft.)	113	72.6	●	—
1195			4/6" 7/6" 9/6"					
5			6/6" 10/6" 10/6"	LL = 44, PI = 27 (Pocket Pen. = 4.5 + tsf @ 5 ft.)	117		●	—
1190			5/6" 8/6" 8/6"					
10			3/6" 5/6" 7/6"	Brn. FAT CLAY Moist, High Plasticity, Stiff LL = 50, PI = 32 (Pocket Pen. = 4.5 + tsf @ 8.5 ft.)	107		●	—
1185								
15								
1180								
20								
1175								
25								
1170								
30								
1165								

SOIL BORING LOG

Boring No. BH-32

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 2/15/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/3.25" I.D. HSA Field Logger: Peter Shau, P.E.
 Surface Elevation: 1184.8 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
0				Brn. CLAY WITH SAND (Short Grass) Moist, Med. Plasticity, Soft USCS: CL; AASHTO: A-7-6(15) LL = 45, PI = 22		72.6	10 20 30 40 50 60	10 20 30 40 50 60
1180				Sl. Moist, Fl. High Plasticity LL = 41, PI = 25			10 20 30 40 50 60	10 20 30 40 50 60
1175				Brn. FAT CLAY Sl. Moist, High Plasticity LL = 60, PI = 38			10 20 30 40 50 60	10 20 30 40 50 60
1170								
1165								
1160								
1155								

SOIL BORING LOG

Boring No. BH-33

Project: Fort Sill New TEMF Complex
 Project Location: Lawton, Oklahoma
 Boring Location: See "Site and Boring Location Plan"
 Drill Method: CME-55 w/3.25" I.D. HSA
 Surface Elevation: 1189.7 ft.
 Remarks: Surface elevation provided by client

Project No.: 7311-3256
 Date Drilled.: 2/15/2011
 Project Engineer: Jieliang Pan, P.E.
 Field Logger: Peter Shau, P.E.
 Water Depth: Dry @ Completion

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
0				Dk. Brn. FAT CLAY (Short Grass) Moist, High Plasticity, Firm LL=61, PI=41 (Pocket Pen. = 2.5 tsf @ 1 ft.)	102			
			3/6" 4/6" 3/6"					
			3/6" 3/6" 5/6"	(Pocket Pen. = 3.5 tsf @ 3 ft.)				
1185			3/6" 4/6" 6/6"	Lt. Brn. FAT CLAY WITH SAND Moist, High Plasticity, Stiff USCS: CH; AASHTO: A-7-6(35) LL=59, PI=41 (Pocket Pen. = 4.0 tsf @ 5 ft.)	104	79.2		
			3/6" 4/6" 5/6"	Brn. FAT CLAY Moist, High Plasticity, Stiff (Pocket Pen. = 3.75 tsf @ 8.5 ft.)	102			
1180								
1175								
1170								
1165								
1160								

SOIL BORING LOG

Boring No. BH-34

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 2/8/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Jieliang Pan, P.E.
 Surface Elevation: 1204.5 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
0				6" GRAVEL				
			4/6" 8/6" 9/6"	Dk. Brn. & Brn. CLAY (Short Grass) Moist, Med. Plasticity, V. Stiff (Pocket Pen. = 4.0+ tsf @ 0 ft.) Dk. Brn. LL = 39, PI = 23 Unconfined Compression Test: qu = 1.2 tsf @ 3.2% strain (2.5 to 4.5 ft.) (Pocket Pen. = 4.5+ tsf @ 2.5 ft.)	106		●	—
1200			3/6" 4/6" 5/6"	Brn., Fl. High Plasticity, Firm (Pocket Pen. = 2.0 tsf @ 7.5 ft.)	102		●	
1195			3/6" 3/6" 5/6"	(Pocket Pen. = 1.75 tsf @ 10 ft.)				
			3/6" 5/6" 6/6"					
1190			9/6" 29/6" 50/5.1"	Lt. Brn. SANDY SILTY CLAY Moist, Tr. Plasticity, Stiff LL = 60, PI = 2			●	H
				Lt. Brn. SILTY SAND V. Moist, Nonplastic, V. Dense				
1185			7/6" 13/6" 16/6"	Lt. Brn & Reddish Brn. SHALE Sl. Moist, High Plasticity, V. Stiff (Pocket Pen. = 4.5+ tsf @ 20.5 ft.)	112		●	
1180			5/6" 11/6" 15/6"	Reddish Brn. (Pocket Pen. = 4.5+ tsf @ 25 ft.)				
1175			7/6" 17/6" 29/6"	LL = 59, PI = 37 (Pocket Pen. = 4.5+ tsf @ 30 ft.)			●	—

SOIL BORING LOG

Boring No. BH-35

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 2/15/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/3.25" I.D. HSA Field Logger: Jieliang Pan, P.E.
 Surface Elevation: 1215.1 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
1215				1" ASPHALT				
				Lt. Brn. FAT CLAY WITH SAND Sl. Moist, High Plasticity LL = 54, PI = 33				
1210				LL = 52, PI = 34				
1205				USCS: CH; AASHTO: A-7-6(28) LL = 56, PI = 35		78.5		
1200								
1195								
1190								
1185								

SOIL BORING LOG

Boring No. BH-36

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 1/31/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Jieliang Pan, P.E.
 Surface Elevation: 1209.2 ft. Water Depth: 31 ft. @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
0				6" GRAVEL				
1205			5/6" 8/6" 5/6"	Dk. Brn. CLAY Moist, Fl. High Plasticity, Stiff (Pocket Pen. = 3.0 @ 0.5 ft.) w/ Sand Moist, Med. Plasticity, V. Stiff LL = 39, PI = 23 Unconfined Compression Test: qu = 1.2 tsf @ 5.2% strain (2.5 to 4.5 ft.) (Pocket Pen. = 3.75 tsf @ 2.5 ft.) (Pocket Pen. = 4.5 + tsf. @ 5 ft.) (Pocket Pen. = 3.0 tsf @ 7.5 ft.)	110			
1200			5/6" 6/6" 10/6"	Brn. & Gray SHALEY CLAY Sl. Moist, Med. Plasticity, V. Stiff (Pocket Pen. = 3.0 tsf @ 10 ft.)				
1195			8/6" 16/6" 24/6"	Brn. SHALE Sl. Moist, Fl. High Plasticity, V. Stiff LL = 43, PI = 25 (Pocket Pen. = 4.5 + tsf @ 15 ft.)	119			
1190			10/6" 14/6" 18/6"	(Pocket Pen. = 4.5 + tsf @ 20 ft.)				
1185			16/6" 32/6" 45/6"	Brn. & Gray, w/ Sand Seams (Pocket Pen. = 4.5 + tsf @ 25 ft.)				
1180			35/6" 50/4.1"	Brn. & Gray SILTY SAND V. Moist, Nonplastic, V. Dense				

SOIL BORING LOG

Boring No. BH-36 continued

Project: Fort Sill New TEMF Complex

Project No.: 7311-3256

Project Location: Lawton, Oklahoma

Date Drilled.: 1/31/2011

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity					
							PL	LL				
							10	20	30	40	50	60
							Water Content, % - ●					
							10	20	30	40	50	60
1175		▲	32/6"	Brn. & Gray SHALE Moist, High Plasticity, V. Stiff								
			48/6"									
			50/4.1"									
1170		▲	23/6"	Gray LL = 44, PI = 30 (Pocket Pen. = 4.5 + tsf @ 40 ft.)	121							
			39/6"									
			46/6"									
1165												
1160												
1155												
1150												
1145												

SOIL BORING LOG

Boring No. BH-37

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 2/15/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/3.25" I.D. HSA Field Logger: Jieliang Pan, P.E.
 Surface Elevation: 1226.1 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
0				4" ASPHALT				
1225			3/6"	4" AGGREGATE				
			4/6"	Brn. CLAY				
			5/6"	Sl. Moist, Med. Plasticity, Firm				
			3/6"	Brn. & Gray CLAYEY SAND	120	44.2	●	—
			10/6"	V. Moist, Fl. Low Plasticity, Loose				
			19/6"	(Pocket Pen. = 3.0 tsf @ 1 ft.)				
5			5/6"	USCS: SC; AASHTO: A-6(3)	115		●	—
1220			22/6"	LL = 31, PI = 16				
			42/6"	(Pocket Pen. = 4.5 + tsf @ 3 ft.)				
				w/ Gravel				
				LL = 31, PI = 16				
				(Pocket Pen. = 4.5 + tsf @ 5 ft.)				
			3/6"	Brn. CLAY w/ Sand	97		●	—
			5/6"	Sl. Moist, Med. Plasticity				
10			9/6"	Lt. Brn. FAT CLAY				
1215				Sl. Moist, High Plasticity, Stiff				
				LL = 63, PI = 30				
15								
1210								
20								
1205								
25								
1200								
30								
1195								

SOIL BORING LOG

Boring No. BH-38

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 2/15/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/3.25" I.D. HSA Field Logger: Jieliang Pan, P.E.
 Surface Elevation: 1230.1 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client; Boring moved 15 ft. west

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
							Water Content, % - ●	
							10 20 30 40 50 60	10 20 30 40 50 60
1230				4.5" ASPHALT				
				4" AGGREGATE				
		5/6"	50/4.1"	Brn. SANDY CLAY w/ Gravel Sl. Moist, Med. Plasticity, V. Stiff Brn. & Dk. Brn. (Pocket Pen. = 4.5 tsf @ 1 ft.)		33.0		
		5/6"	50/4.1"	Dk. Brn. & Gray CLAYEY SAND w/ Sandstone Seams				
1225		10/6"	50/4.3"	Moist, High Plasticity, V. Stiff USCS: SC; AASHTO: A-2-7(3) LL = 41, PI = 25 (Pocket Pen. = 2.75 tsf @ 3 ft.)				
		5/6"	9/6"	Dk. Brn. & Brn. CLAY w/ Sand & Gravel Moist, High Plasticity, V. Stiff LL = 47, PI = 32 (Pocket Pen. = 4.5 + tsf @ 5 ft.)				
1220		14/6"		w/ Sand, Sl. Moist LL = 46, PI = 31 (Pocket Pen. = 4.5 + tsf @ 8.5 ft.)				
1215								
1210								
1205								
1200								

SOIL BORING LOG

Boring No. BH-39

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 2/15/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/3.25" I.D. HSA Field Logger: Jieliang Pan, P.E.
 Surface Elevation: 1226.1 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client; Potential fuel not encountered

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
0				.5" ASPHALT				
1225				Brn. SANDY FAT CLAY Moist, High Plasticity LL = 59, PI = 39				
5				Brn. FAT CLAY w/ Sand Moist, High Plasticity Brn. & Lt. Brn. LL = 61, PI = 44				
1220				Lt. Brn. LL = 58, PI = 41				
10								
1215								
15								
1210								
20								
1205								
25								
1200								
30								
1195								

SOIL BORING LOG

Boring No. BH-40

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 2/15/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/3.25" I.D. HSA Field Logger: Jieliang Pan, P.E.
 Surface Elevation: 1211.4 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
0				1" ASPHALT				
1210			4/6" 6/6" 6/6"	Brn. CLAY Sl. Moist, High Plasticity, Stiff Lt. Brn. LL=48, PI=29 (Pocket Pen. =4.5 + tsf @ 1 ft.)	109		●	—
5			3/6" 6/6" 6/6"	Lt. Brn. FAT CLAY WITH SAND Moist, High Plasticity, Stiff (Pocket Pen. =4.5 + tsf @ 3 ft.)	108	72.1	●	—
1205			3/6" 3/6" 4/6"	Firm USCS: CH; AASHTO: A-7-6(27) LL=56, PI=39 (Pocket Pen. =3.25 tsf @ 5 ft.)				
10			3/6" 3/6" 3/6"	Lt. Brn. & Gray CLAY w/ Sand Moist, Fl. High Plasticity, Firm LL=44, PI=28 (Pocket Pen. =4.5 + tsf @ 8.5 ft.)	109		●	—
1200								
15								
1195								
20								
1190								
25								
1185								
30								
1180								

SOIL BORING LOG

Boring No. BH-41

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 1/31/11
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Jieliang Pan, P.E.
 Surface Elevation: 1162.9 ft. Water Depth: 27 ft. @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
0				Brn. & Dk. Gray CLAY (2 ft. Tall Grass) Sl. Moist, Fl. High Plasticity, Firm (Pocket Pen. = 3.25 tsf @ 0 ft.)				
1160		3/6" 5/6" 3/6"		Brn., Moist LL = 42, PI = 26 (Pocket Pen. = 1.0 tsf @ 2.5 ft.)	112		●	—
5		2/6" 4/6" 6/6"		Brn. & Gray, Sl. Moist, Stiff (Pocket Pen. = 2.25 tsf @ 5 ft.)				
1155				(Pocket Pen. = 4.5 tsf @ 7.5 ft.)	100		●	
10		27/6" 50/3.9"		Brn. SILTY SAND Sl. Moist, Nonplastic, V. Dense				
1150								
15		3/6" 12/6" 15/6"		Gray & Brn. SANDY CLAY Sl. Moist, Fl. Low Plasticity, V. Stiff LL = 27, PI = 14 (Pocket Pen. = 4.5 + tsf @ 16 ft.)	121		●	—
1145								
20		19/6" 50/5.3"		(ROCK) Gray SANDY SHALE (Weakly Cemented) Sl. Moist, Tr. Plasticity, Soft				
1140								
25		50/5"			121		●	
1135								
30		18/6" 33/6" 40/6"		Gray SHALE Sl. Moist, Fl. Low Plasticity, V. Stiff (Pocket Pen. = 4.5 tsf @ 30 ft.)				
1130								

SOIL BORING LOG

Boring No. BH-41 continued

Project: Fort Sill New TEMF Complex

Project No.: 7311-3256

Project Location: Lawton, Oklahoma

Date Drilled.: 1/31/11

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
35		50/4.5"	50/4.5"	(ROCK) Gray SANDY SHALE Sl. Moist, Tr. Plasticity, V. Stiff LL = 18, PI = 4	116		Water Content, % - ●	
1125							10	20
40			50/1.3"	(No Recovery @ 40 ft.)				
1120								
45								
1115								
50								
1110								
55								
1105								
60								
1100								
65								
1095								

SOIL BORING LOG

Boring No. BH-42

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 1/27/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Jieliang Pan, P.E.
 Surface Elevation: 1182.7 ft. Water Depth: Dry @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
0			7/6" 4/6" 4/6"	Brn. FAT CLAY w/ Gravel & Sand (Short Grass) Moist, High Plasticity, Firm (Pocket Pen. = 2.0 tsf @ 0 ft.)				
1180			3/6" 4/6" 7/6"	w/ Sand LL=81, PI=58 (Pocket Pen. = 3.5 tsf @ 2.5 ft.)	100			81
5			7/6" 13/6" 21/6"	Brn. & Gray SHALE Sl. Moist, Fl. High Plasticity, V. Stiff (Pocket Pen. = 4.5+ tsf @ 5 ft.)				
1175				(Pocket Pen. = 4.5+ tsf @ 7.5 ft.)				
10			5/6" 12/6" 15/6"	(Pocket Pen. = 4.5+ tsf @ 10 ft.)				
1170								
15			9/6" 24/6" 35/6"	w/ Gravel, Moist LL=42, PI=26 (Pocket Pen. = 4.5+ tsf)	120			
1165								
20			11/6" 28/6" 45/6"	(Pocket Pen. = 4.5+ tsf @ 20 ft.)				
1160								
25			15/6" 36/6" 35/6"	w/ Interbedded Sandstone				
1155								
30			8/6" 15/6" 21/6"	Brn. & Gray SHALE Sl. Moist, Fl. High Plasticity, V. Stiff				
1150								

SOIL BORING LOG

Boring No. BH-42 continued

Project: Fort Sill New TEMF Complex

Project No.: 7311-3256

Project Location: Lawton, Oklahoma

Date Drilled.: 1/27/2011

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity	
							PL	LL
							10 20 30 40 50 60	10 20 30 40 50 60
							Water Content, % - ●	
							10 20 30 40 50 60	10 20 30 40 50 60
35			17/6" 33/6" 50/4.9"	(ROCK) Gray SHALE Sl. Moist, High Plasticity, Soft LL = 59, PI = 36 Unconfined Compression Test: qu = 8.0 tsf @ 1.8% strain (37 to 37.4 ft.)	123			
1145				Unconfined Compression Test: qu = 39.0 tsf @ 1.0% strain (40 to 40.4 ft.) RQD = 43% (36.5 to 41.5 ft.)	126			
40					130			
1140								
45								
1135								
50								
1130								
55								
1125								
60								
1120								
65								
1115								

SOIL BORING LOG

Boring No. BH-43

Project: Fort Sill New TEMF Complex Project No.: 7311-3256
 Project Location: Lawton, Oklahoma Date Drilled.: 1/27/2011
 Boring Location: See "Site and Boring Location Plan" Project Engineer: Jieliang Pan, P.E.
 Drill Method: CME-55 w/ 3.25" I.D. HSA Field Logger: Peter Shau, P.E.
 Surface Elevation: 1176.4 ft. Water Depth: 3.5 ft. @ Completion
 Remarks: Surface elevation provided by client

Elev./Depth Feet	Symbol	Samples	SPT Blows/Increment	Soil Description	Dry Density (pcf)	% Passing #200 Sieve	Moisture/Plasticity					
							PL	LL				
0							10	20	30	40	50	60
1175				Dk. Brn. CLAY (Short Grass) V. Moist, Med. Plasticity LL = 40, PI = 21 (Pocket Pen. = 0.5 tsf @ 0 ft.) w/ Sand Layer (Pocket Pen. = 0.75 tsf @ 2 ft.) Unconfined Compression Test: qu = 0.4 tsf @ 5.3% strain (2 to 4 ft.) (Pocket Pen. = 1.5 tsf @ 4 ft.) (No Recovery @ 6 to 8 ft.)	88							
1170												
1165				Brn. CLAY V. Moist, Med. Plasticity, Firm (Pocket Pen. = 1.5 tsf @ 8.5 ft.) LL = 35, PI = 21 (Pocket Pen. = 1.25 tsf @ 10 ft.)	98							
1160				Yellowish Brn. SHALEY CLAY Moist, High Plasticity (Pocket Pen. = 4.5 tsf @ 12 ft.) Unconfined Compression Test: qu = 2.1 tsf @ 10.0% strain (12 to 14 ft.) w/ Sand Layer (No Recovery @ 14 to 16 ft.)	117							
1155				Lt. Brn. SHALE Moist, High Plasticity, V. Stiff (Pocket Pen. = 3.75 tsf @ 20 ft.)	99							
1150				Brn., w/ Sand Seams, V. Moist LL = 65, PI = 38 (Pocket Pen. = 4.0 tsf @ 25 ft.)	89							
1145				Gray SHALE Moist, High Plasticity, V. Stiff	122							

KEY TO SYMBOLS

Symbol Description

STRATA SYMBOLS



Fat Clay



Silty Shale



Shaley Clay



Shale



Silt with Sand



Sandy Clay



Silty Sand with Gravel



Lean Clay



Fat Clay with Sand



Asphalt



Aggregate



Gravel



Concrete



Silty Clay



Sandy Shaley Clay

Symbol Description



Sandy Silt with Gravel



Sandstone



Clayey Sand



Elastic Silt



Silty Sand



Sandy Shale



Lean Clay with Sand



Sandy Silty Clay



Sandy Fat Clay

Misc. Symbols



Boring continues



Water level at completion of drilling operations

KEY TO SYMBOLS

Symbol Description

Soil Samplers



Standard Penetration Test, ASTM D1586



3" Undisturbed Thin-Walled Tube
(Shelby tube), ASTM D1587



Diamond Core Drilling, ASTM D2113-83



Bulk sample taken
from auger flights, ASTM D1452



5" Undisturbed Thin-Walled Tube
(Shelby tube), ASTM D1587

DEFINITION OF DESCRIPTIVE TERMS

Consistency of Cohesive Soils (at moisture content near plastic limit):

Very Soft - Easily penetrated 4" to 6" by fist; tall core will sag under its own weight.

Soft - Easily molded by fingers.

Firm - Can be penetrated 2" to 3" by thumb with moderate effort, imprinted with fingers.

Stiff - Readily indented by thumb but penetrated only with great effort.

Very Stiff - Readily indented by thumbnail, imprinted very slightly with pressure from fingers.

Hard - Indented with difficulty by thumbnail, cannot be imprinted with fingers.

Density of Cohesionless Soils:

Very Loose - less than 4 SPT "N" value corrected for overburden.

Loose - 5 to 10 SPT "N" value corrected for overburden.

Medium Dense - 11 to 30 SPT "N" value corrected for overburden.

Dense - 31 to 50 SPT "N" value corrected for overburden.

Very Dense - 51 to 50/6" SPT "N" value corrected for overburden.

Hard - less than 6" penetration in 50 SPT "N" blows corrected for overburden (cemented).

Hardness of Rock:

Very Soft - can be scratched readily by fingernail

Soft - can be grooved readily by knife or pick

Medium - can be grooved 0.05" deep by firm pressure of knife

Moderately Hard - can be scratched by knife

Hard - can be scratched by knife or pick only with difficulty

Very Hard - cannot be scratched by knife or sharp pick

Other Terms Descriptive of Consistency:

Brittle - Ruptures with little deformation

Friable - Crumbles or pulverizes easily.

Elastic - Returns to original length after small deformation.

Spongy - Is very porous, loose and elastic.

Sticky - Adheres or sticks to tools or hands.

In Situ Moisture Descriptions:

Dry - powdery

Slightly Moist - water not readily absorbed by paper

Moist - water readily absorbed by paper

Very Moist - water condenses on sample tray

Wet - water drips from sample

Degree of Plasticity When Moist to Very Moist:

Nonplastic - cannot be rolled into a ball

Trace of Plasticity - can be rolled into a ball but not into a 1/8" thread

Low Plasticity - barely holds its shape when rolled into a 1/8" thread

Fairly Low Plasticity - 1/8" thread quickly ruptures when bent

Medium Plasticity - 1/8" thread withstands considerable deformation without rupture.

Fairly High Plasticity - difficult to rupture a 1/8" thread by bending.

High Plasticity - can be kneaded without rupture; greasy texture.

Abbreviations:

V. - Very

Tr. - Trace

Fl. - Fairly

Sl. - Slightly

Dk. - Dark

Lt. - Light

Med. - Medium

Blk. - Black

Brn. - Brown

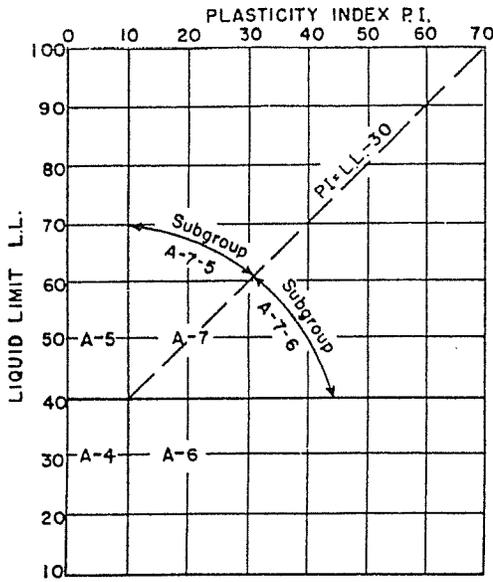
APPENDIX C

AASHTO Soil Classification System

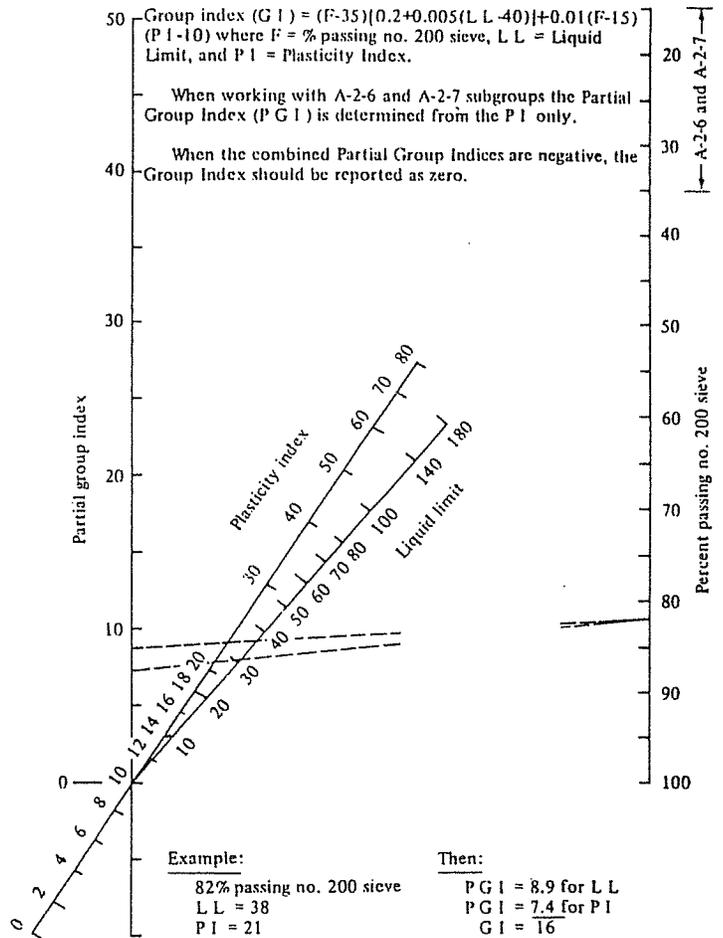
Unified Soil Classification System

Soil Classification System — American Association of State Highway and Transportation Officials

The tables and charts given below are from AASHTO Designation: M 145-83, The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes. More detailed information as to the background and application of the system may be obtained from the report.



Liquid-limit and plasticity-index ranges for the A-4, A-5, A-6 and A-7 subgrade groups.



Group index chart

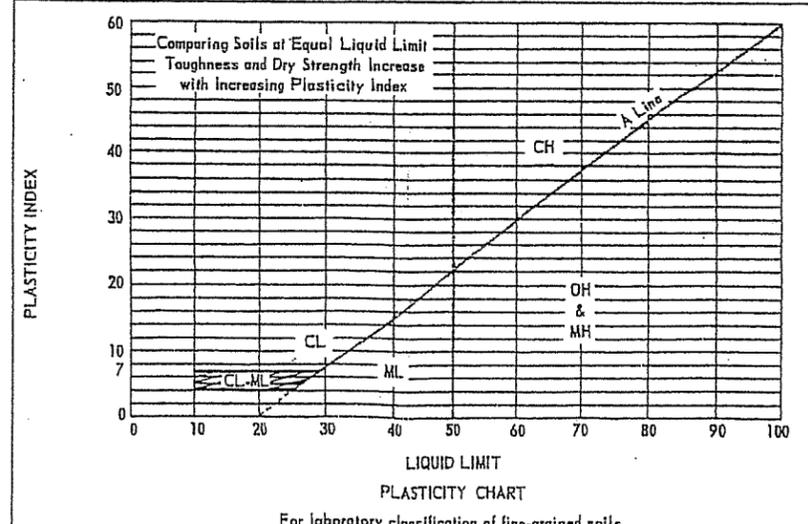
Classification of Soils and Soil-Aggregate Mixtures (with Suggested Subgroups)

General classification	Granular materials (35 per cent or less passing No. 200)						Silt-clay materials (More than 35 per cent passing No. 200)				
	A-1		A-3	A-2			A-4	A-5	A-6	A-7	
Group classification	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5; A-7-6
Sieve analysis: Per cent passing:											
No. 10	50 max.	—	—	—	—	—	—	—	—	—	—
No. 40	30 max.	50 max.	51 min.	—	—	—	—	—	—	—	—
No. 200	15 max.	25 max.	10 max.	35 max.	35 max.	35 max.	35 max.	36 min.	36 min.	36 min.	36 min.
Characteristics of fraction passing No. 40:											
Liquid limit	—	—	—	40 max.	41 min.	40 max.	41 min.	40 max.	41 min.	40 max.	41 min.
Plasticity index	6 max.	—	NP	10 max.	10 max.	11 min.	11 min.	10 max.	10 max.	11 min.	11 min.*
Usual types of significant constituent materials	Stone fragments, gravel and sand		Fine sand	Silty or clayey gravel and sand				Silty soils		Clayey soils	
General rating as subgrade	Excellent to good						Fair to poor				

*P.I. of A-7-5 subgroup is equal to or less than L.L. minus 30. P.I. of A-7-6 subgroup is greater than L.L. minus 30

UNIFIED SOIL CLASSIFICATION
(Including Identification and Description)

Major Divisions		Group Symbols	Typical Names	Field Identification Procedures (Excluding particles larger than 3 inches and basing fractions on estimated weights)	Information Required for Describing Soils	Laboratory Classification Criteria		
1	2	3	4	5	6	7		
Coarse-grained Soils More than half of material is larger than No. 200 sieve size. (For visual classification, the 1/4-in. size may be used as equivalent to the No. 4 sieve size)	Gravels More than half of coarse fraction is larger than No. 4 sieve size.	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.	Wide range in grain sizes and substantial amounts of all intermediate particle sizes.	For undisturbed soils add information on stratification, degree of compactness, cementation, moisture conditions and drainage characteristics. Give typical name; indicate approximate percentages of sand and gravel, maximum size; angularity, surface condition, and hardness of the coarse grains; local or geologic name and other pertinent descriptive information; and symbol in parentheses. Example: Silty sand, gravelly; about 20% hard, angular gravel particles 1/2-in. maximum size; rounded and sub-angular sand grains coarse to fine; about 15% non-plastic fines with low dry strength; well compacted and moist in place; alluvial sand; (SM).	$C_u = \frac{D_{60}}{D_{10}}$ Greater than 6 $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between one and 3 Not meeting all gradation requirements for GW Atterberg limits below "A" line or PI less than 4 Atterberg limits above "A" line with PI greater than 7		
			GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines.			Predominantly one size or a range of sizes with some intermediate sizes missing.	
		GM	Silty gravels, gravel-sand-silt mixtures.	Nonplastic fines or fines with low plasticity (for identification procedures see ML below).			Plastic fines (for identification procedures see CL below).	
								GC
		Sands More than half of coarse fraction is smaller than No. 4 sieve size. (For visual classification, the 1/4-in. size may be used as equivalent to the No. 4 sieve size)	SW	Well-graded sands, gravelly sands, little or no fines.			Wide range in grain size and substantial amounts of all intermediate particle sizes.	
				SP			Poorly-graded sands, gravelly sands, little or no fines.	Predominantly one size or a range of sizes with some intermediate sizes missing.
	SM		Silty sands, sand-silt mixtures.	Nonplastic fines or fines with low plasticity (for identification procedures see ML below).	Plastic fines (for identification procedures see CL below).			
						SC	Clayey sands, sand-clay mixtures.	Plastic fines (for identification procedures see CL below).
	Fine-grained Soils More than half of material is smaller than No. 200 sieve size.	Silts and Clays Liquid limit less than 50	Identification Procedures on Fraction Smaller than No. 40 Sieve Size					
				Dry Strength (Crushing characteristics)	Dilatancy (Reaction to shaking)	Toughness (Consistency near PL)		
ML			Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.	None to slight	Quick to slow	None		
CL			Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.	Medium to high	None to very slow	Medium		
OL			Organic silts and organic silty clays of low plasticity.	Slight to medium	Slow	Slight		
MH			Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.	Slight to medium	Slow to none	Slight to medium		
CH			Inorganic clays of high plasticity, fat clays.	High to very high	None	High		
OH	Organic clays of medium to high plasticity, organic silts.	Medium to high	None to very slow	Slight to medium				
Highly Organic Soils		PI	Peat and other highly organic soils.	Readily identified by color, odor, spongy feel and frequently by fibrous texture.				



(1) Boundary classifications: Soils possessing characteristics of two groups are designated by combinations of group symbols. For example GW-GC, well-graded gravel-sand mixture with clay binder. (2) All sieve sizes on this chart are U. S. standard.

FIELD IDENTIFICATION PROCEDURES FOR FINE-GRAINED SOILS OR FRACTIONS
These procedures are to be performed on the minus No. 40 sieve size particles, approximately 1/64 in. For field classification purposes, screening is not intended, simply remove by hand the coarse particles that interfere with the tests.

Dilatancy (Reaction to shaking)

After removing particles larger than No. 40 sieve size, prepare a pat of moist soil with a volume of about one-half cubic inch. Add enough water if necessary to make the soil soft but not sticky. Place the pat in the open palm of one hand and shake horizontally, striking vigorously against the other hand several times. A positive reaction consists of the appearance of water on the surface of the pat which changes to a livery consistency and becomes glossy. When the sample is squeezed between the fingers, the water and gloss disappear from the surface, the pat stiffens, and finally it cracks or crumbles. The rapidity of appearance of water during shaking and of its disappearance during squeezing assist in identifying the character of the fines in a soil.

Very fine clean sands give the quickest and most distinct reaction whereas a plastic clay has no reaction. Inorganic silts, such as a typical rock flour, show a moderately quick reaction.

Dry Strength (Crushing characteristics)

After removing particles larger than No. 40 sieve size, mold a pat of soil to the consistency of putty, adding water if necessary. Allow the pat to dry completely by oven, sun, or air drying, and then test its strength by breaking and crumbling between the fingers. This strength is a measure of the character and quantity of the colloidal fraction contained in the soil. The dry strength increases with increasing plasticity.

High dry strength is characteristic for clays of the CH group. A typical inorganic silt possesses only very slight dry strength. Silty fine sands and silts have about the same slight dry strength, but can be distinguished by the feel when powdering the dried specimen. Fine sand feels gritty whereas a typical silt has the smooth feel of flour.

Toughness (Consistency near plastic limit)

After removing particles larger than the No. 40 sieve size, a specimen of soil about one-half inch cube in size, is molded to the consistency of putty. If too dry, water must be added and if sticky, the specimen should be spread out in a thin layer and allowed to lose some moisture by evaporation. Then the specimen is rolled out by hand on a smooth surface or between the palms into a thread about one-eighth inch in diameter. The thread is then folded and rerolled repeatedly. During this manipulation the moisture content is gradually reduced and the specimen stiffens, finally loses its plasticity, and crumbles when the plastic limit is reached. After the thread crumbles, the pieces should be lumped together and a slight kneading action continued until the lump crumbles.

The tougher the thread near the plastic limit and the stiffer the lump when it finally crumbles, the more potent is the colloidal clay fraction in the soil. Weakness of the thread at the plastic limit and quick loss of coherence of the lump below the plastic limit indicate either inorganic clay of low plasticity, or materials such as kaolin-type clays and organic clays which occur below the A-line. Highly organic clays have a very weak and spongy feel of the plastic limit.

APPENDIX D

Summary of Laboratory Test Results

Corrosion Testing Results

Modified Proctor Test Evaluation

California Bearing Ratio

Unconfined Compression Test Results

Triaxial Compression Test Results

Consolidation Curve

Percent Swell vs. Log(Time)

Direct Shear Test Results

Redox Potential

CORROSION TESTING RESULTS

Client: Burns & McDonnell Engineering Company, Inc.

Date: April 4, 2011

Project: Ft. Sill TEMF, Lawton, Oklahoma

Project No.: 7311-3256

Boring No.	Sample I.D.	Depth (ft.)	Soil Description	Resistivity (Ohms-cm)	pH	Sulfate Content (ppm)	Chloride Content (ppm)	Redox Potential (mV)
BH-4,5,8,10,22,24,28-33	Composite #1	0 - 5	Brown Sandy Clay	47	9.7	560	126	180
BH-12,14,15,17-19,35,37-40	Composite #2	0 - 5	Brown Sandy Clay	199	9.8	120	21	188

MODIFIED PROCTOR TEST EVALUATION

Project: Ft. Sill TEMF
Lawton, Oklahoma

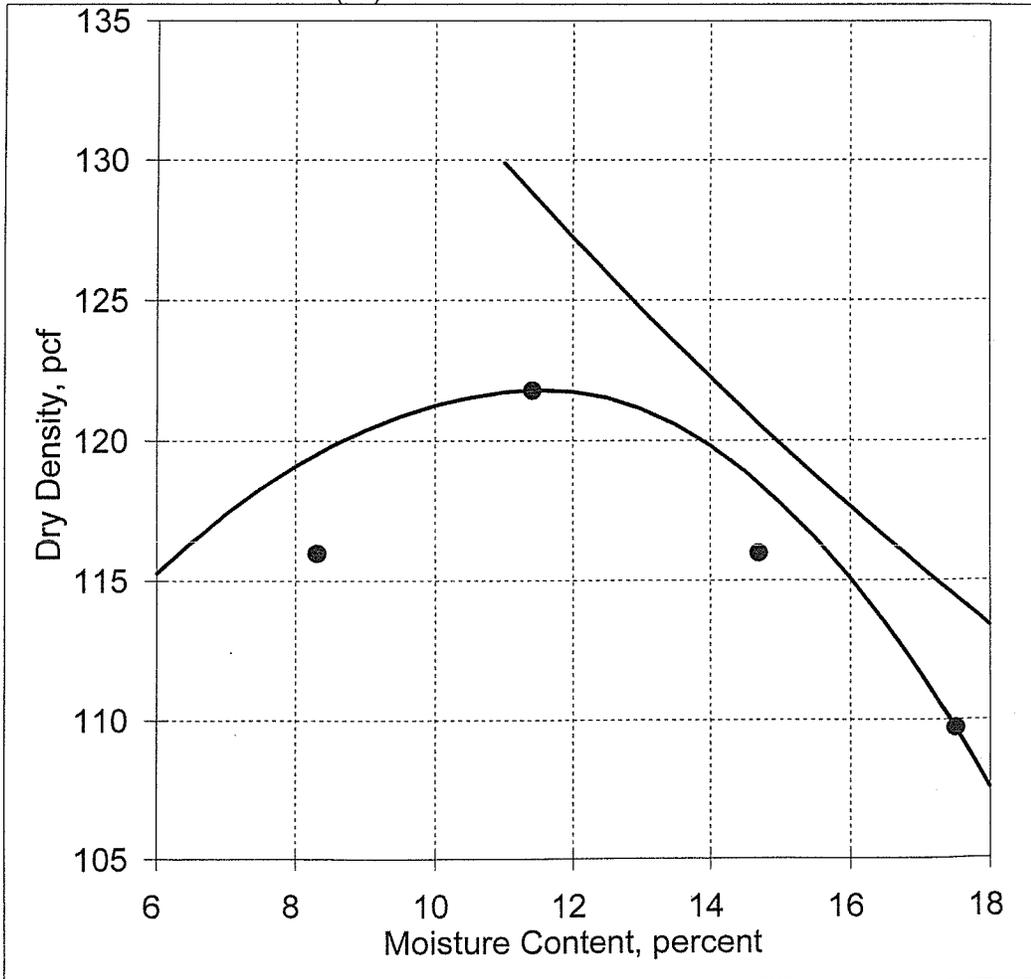
Sample: **Composite #1**
Test Method: ASTM D1557
Project No.: 7311-3256

Test Sequence # =	1	2	3	4	5
DD, pcf =	109.5	116.0	121.8	116.0	109.7
M, % =	3.9	8.3	11.4	14.7	17.5
Specific Gravity =	2.70 (estimated)				

Results:

Maximum Dry Density =	121.8 pcf
Optimum Moisture =	11.6 %

Description: Brown Sandy Clay
 Sieve= #4 #10 #40 #200
 % Passing= 95 92 82 67.2
 LL=45 PL=20 PI=25
 USCS= CL
 AASHTO= A-7-6(15)



MODIFIED PROCTOR TEST EVALUATION

Project: Ft. Sill TEMF
Lawton, Oklahoma

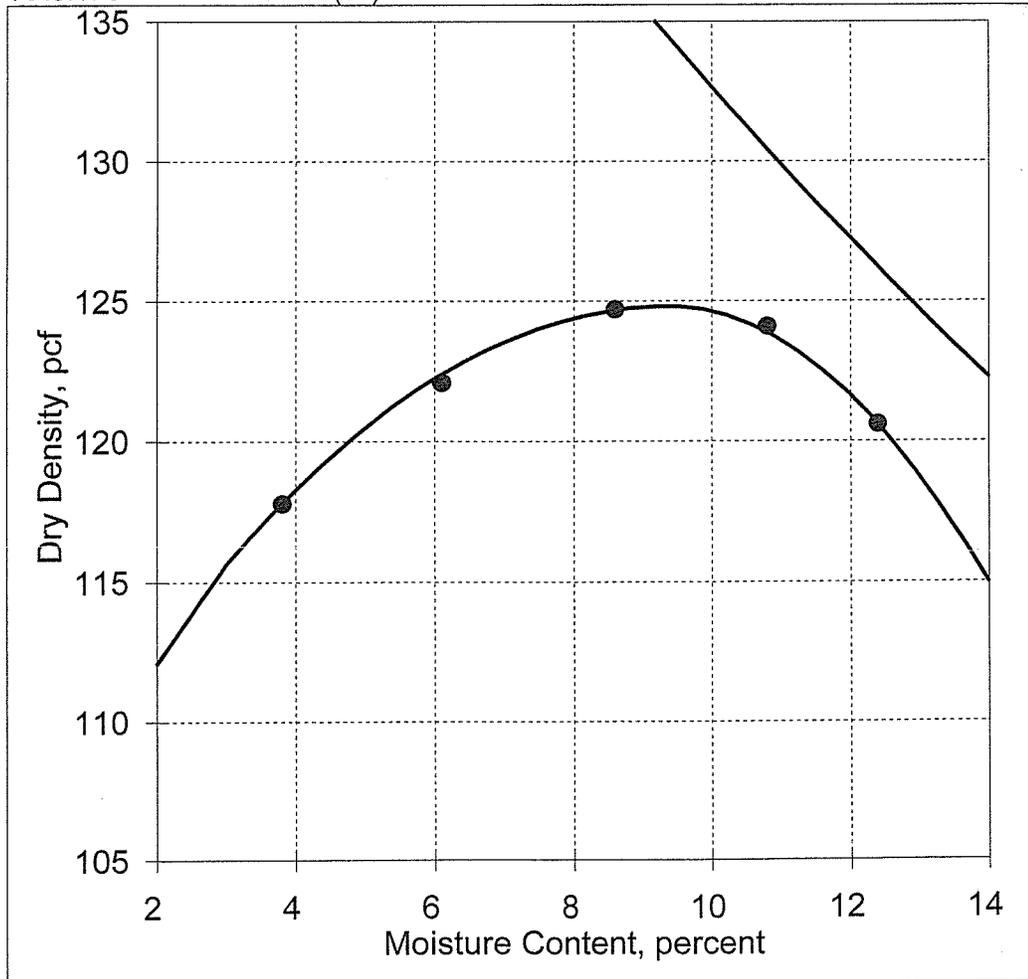
Sample: **Composite #2**
Test Method: ASTM D1557
Project No.: 7311-3256

Test Sequence # =	1	2	3	4	5
DD, pcf =	117.8	122.1	124.7	124.1	120.6
M, % =	3.8	6.1	8.6	10.8	12.4
Specific Gravity =	2.70 (estimated)				

Results:

Maximum Dry Density =	124.8 pcf
Optimum Moisture =	9.4 %

Description: Brown Sandy Clay
Sieve= #4 #10 #40 #200
% Passing= 90 85 71 55.1
LL=46 PL=20 PI=26
USCS= CL
AASHTO= A-7-6(11)



CORPORATE OFFICE and CENTRAL LABORATORY
3400 N. Lincoln Blvd., Oklahoma City, OK 73105 (405) 528-0541
CA77 Exp. 06/30/07

Area Offices
5358 S. 125th E. Ave., Ste. B Tulsa, OK 74146 (918) 459-2700
902 Trails West Loop Enid, OK 73703 (580) 237-3130
202 SE "J" Ave. Lawton, OK 73501 (580) 353-0872

Acc. No: 0230BUR20

Project No.: 7311-3256

Report Date: 03/21/11	Date Sampled: 02/15/11
Project: Ft. Sill TEMF	Sampled By: Johnny Jarman
Location: Lawton, Oklahoma	By Order Of:
Arch./Engr.:	Order No.:
Contractor: Burns & McDonnell Engineering Company, Inc	Quantity:
REPORT: CALIFORNIA BEARING RATIO	Represented: Composite #1
Specification: Project Specs.	Sample No: BH-4,5,8,10,22,24,28-33
	Test Method: ASTM D1883

TEST RESULTS

Soil Description: Brown Sandy Clay

Density as Molded, Lbs./Cu.Ft.	131.1
Moisture content of Sample as Molded, Percent	11.3
Dry Density as Molded, Lbs./Cu.Ft.	117.8
Dry Density after Soaking, Lbs./Cu.Ft.	110.6
Average Moisture Content after Soaking, Percent	17.6
Moisture Content in Top "1" inch, Percent	19.6
Soaking Time, Days	4.0
Swell, Percent	6.5

Bearing Ratio as % of Standard	
<u>Penetration Inches</u>	<u>CBR Values</u>
0.1	1.3
0.2	1.3
0.3	1.3
0.4	1.3

Nominal CBR Value:	1.3	Target Density Method:	ASTM D1557
Surcharge Weight, Lbs.:	9.967	Max. Density, lbs./cu.ft.	121.8
Method of Compaction:	ASTM D1883	Optimum Moisture, %	11.6

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Acc. No: 0230BUR20

Project No.: 7311-3256

Report Date: 03/21/11	Date Sampled: 02/15/11
Project: Ft. Sill TEMF	Sampled By: Johnny Jarman
Location: Lawton, Oklahoma	By Order Of:
Arch./Engr.:	Order No.:
Contractor: Burns & McDonnell Engineering Company, Inc	Quantity:
REPORT: CALIFORNIA BEARING RATIO	Represented: Composite #2
Specification: Project Specs.	Sample No: BH-12,14,15,17-19,35,37-40
	Test Method: ASTM D1883

TEST RESULTS

Soil Description: Brown Sandy Clay

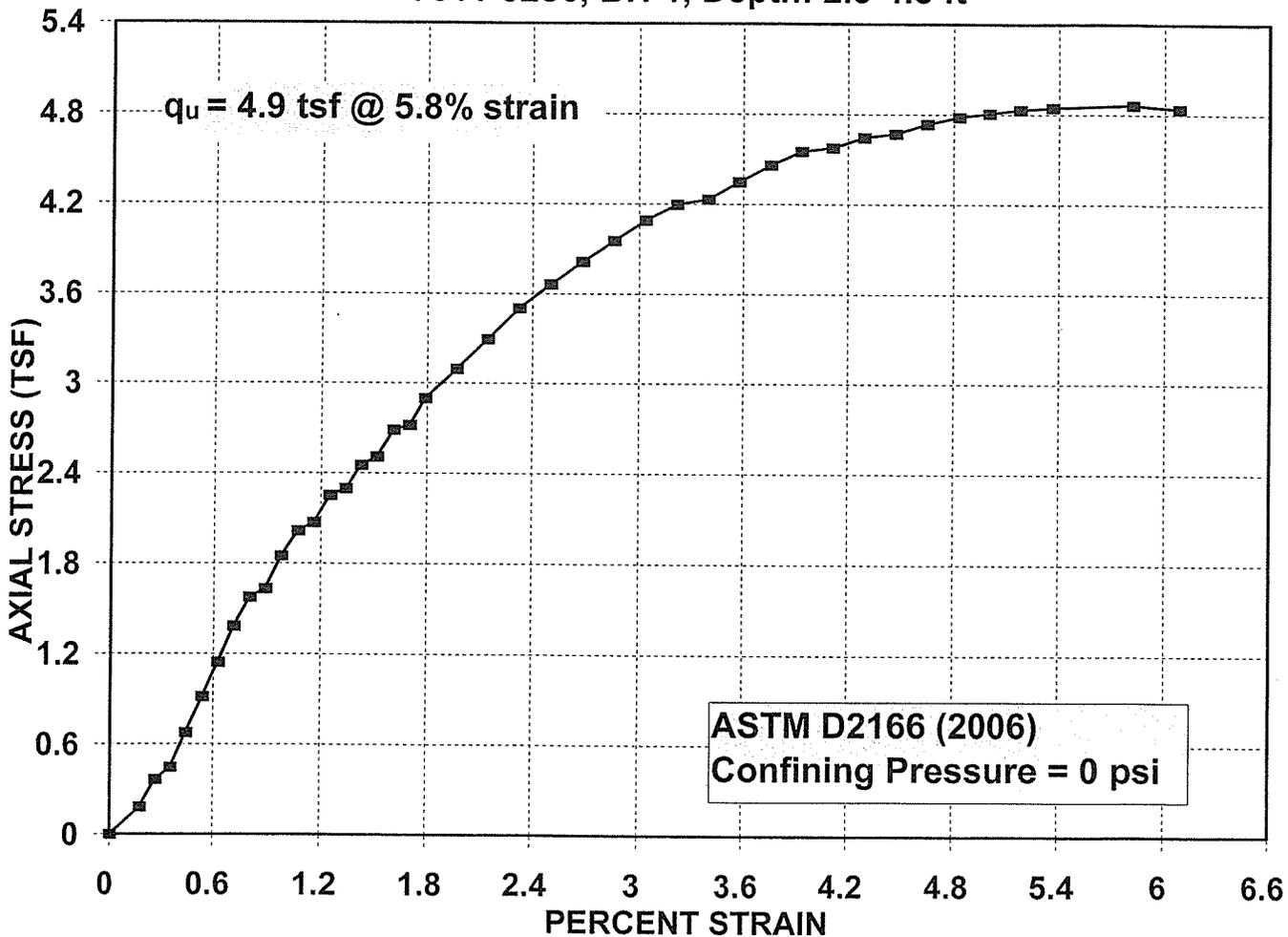
Density as Molded, Lbs./Cu.Ft.	134.5
Moisture content of Sample as Molded, Percent	9.5
Dry Density as Molded, Lbs./Cu.Ft.	122.8
Dry Density after Soaking, Lbs./Cu.Ft.	117.0
Average Moisture Content after Soaking, Percent	17.4
Moisture Content in Top "1" inch, Percent	16.4
Soaking Time, Days	4.0
Swell, Percent	4.9

Bearing Ratio as % of Standard	
<u>Penetration Inches</u>	<u>CBR Values</u>
0.1	1.8
0.2	1.7
0.3	1.6
0.4	1.6

Nominal CBR Value:	1.8	Target Density Method:	ASTM D1557
Surcharge Weight, Lbs.:	9.996	Max. Density, lbs./cu.ft.	124.8
Method of Compaction:	ASTM D1883	Optimum Moisture, %	9.4

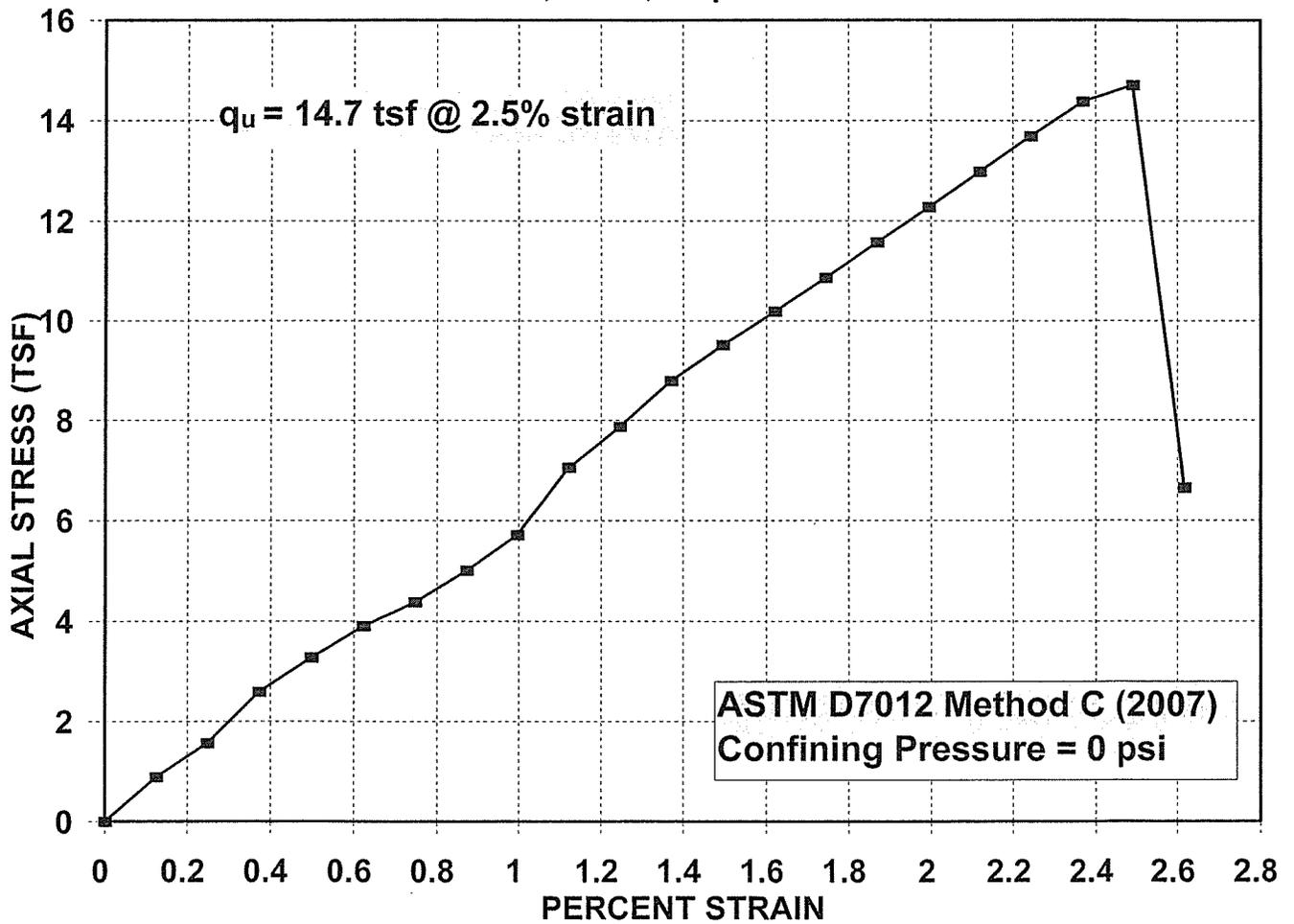
UNCONFINED COMPRESSION TEST

7311-3256, BH-1, Depth: 2.5-4.5 ft



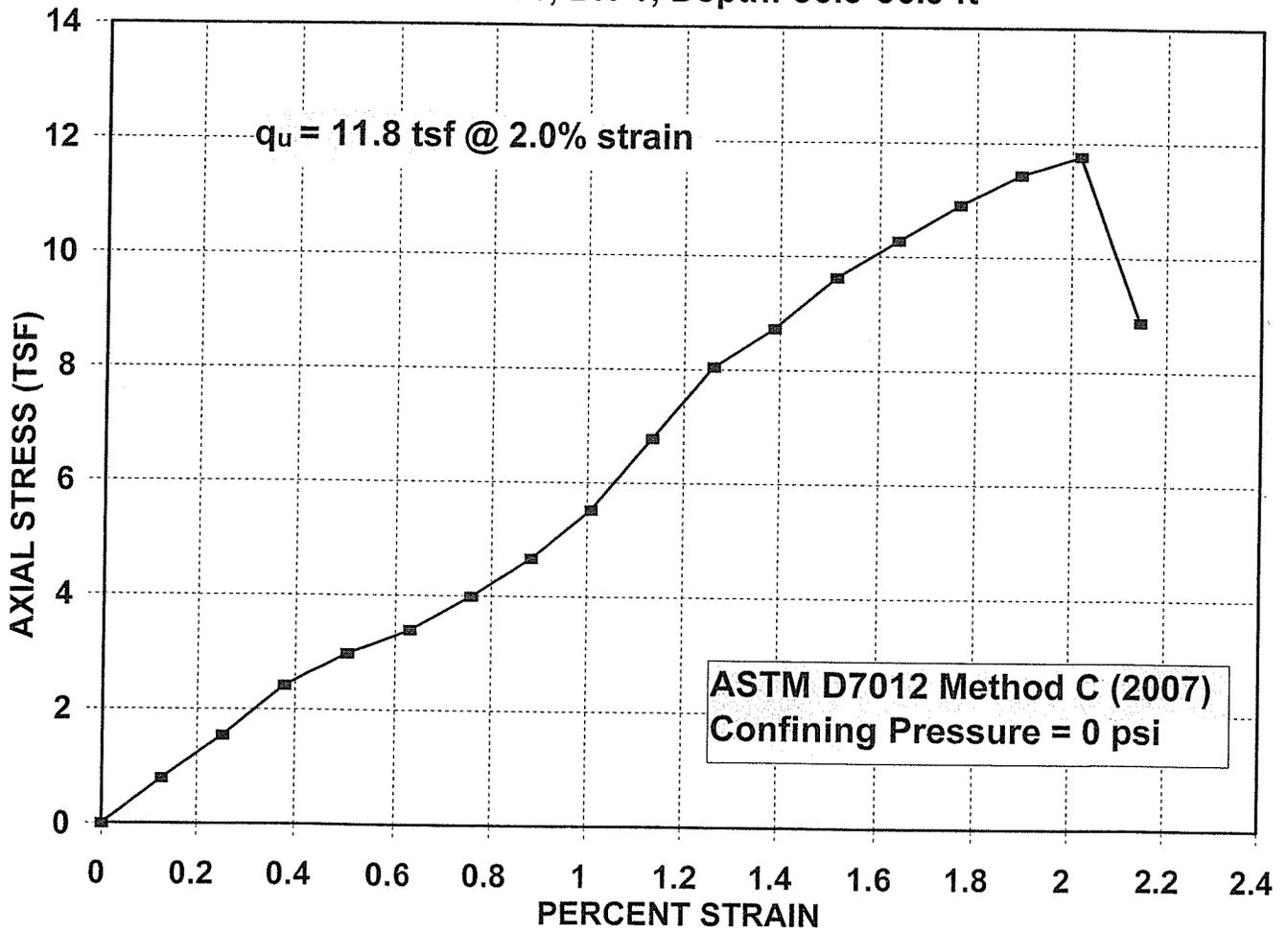
UNCONFINED COMPRESSION TEST

7311-3256, BH-1, Depth: 32.1-32.5 ft



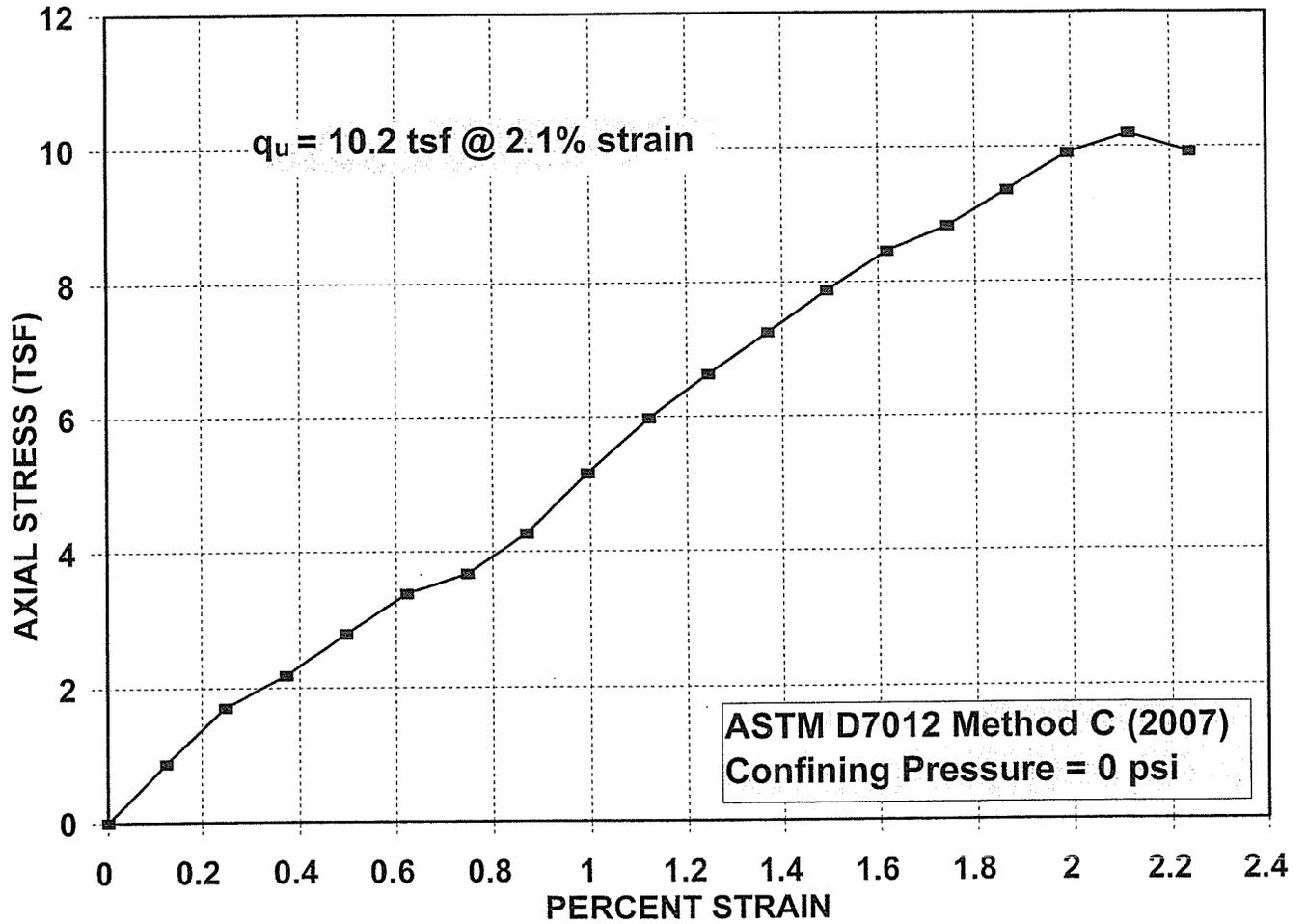
UNCONFINED COMPRESSION TEST

7311-3256, BH-1, Depth: 36.5-36.9 ft



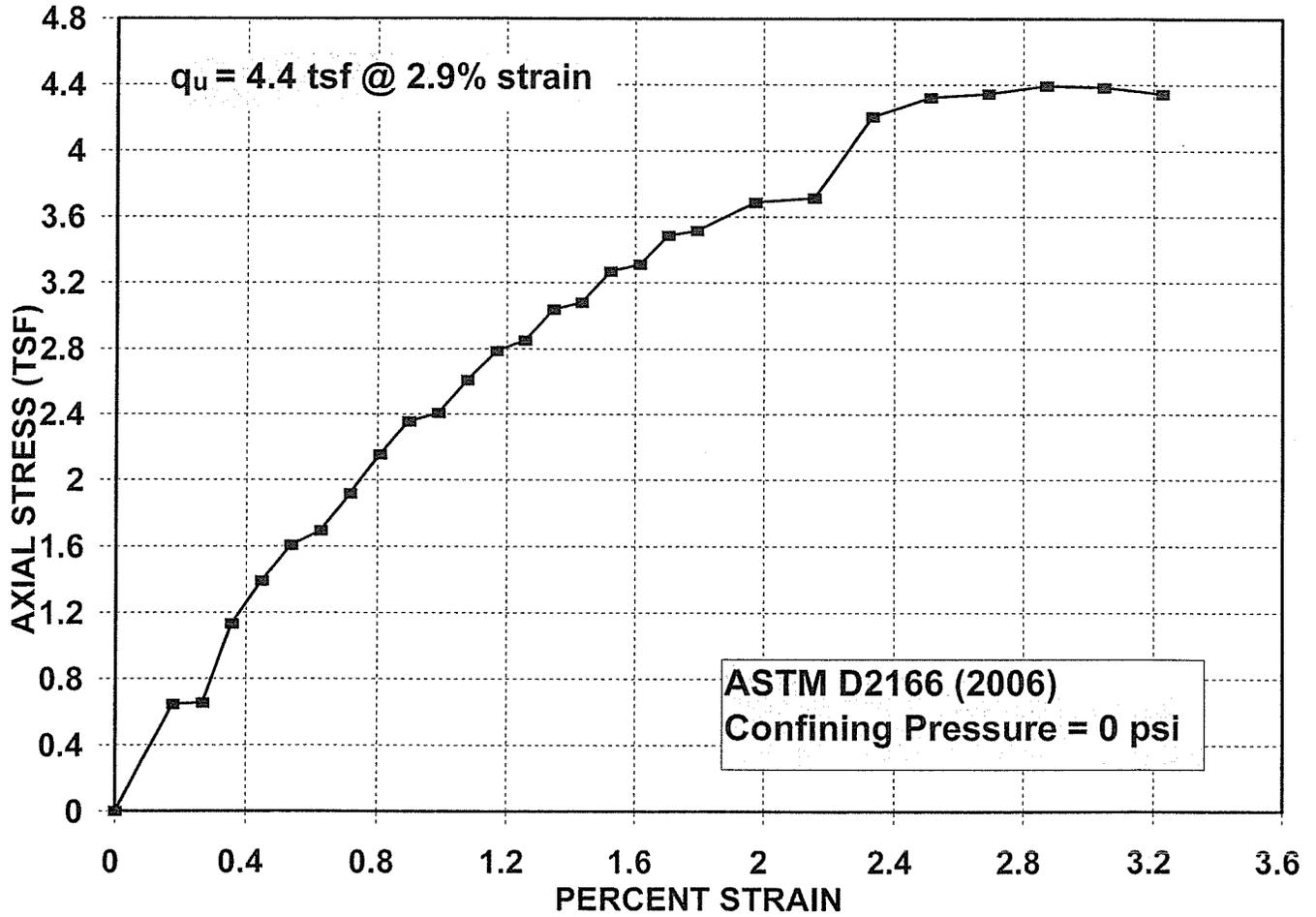
UNCONFINED COMPRESSION TEST

7311-3256, BH-1, Depth: 41.1-41.5 ft



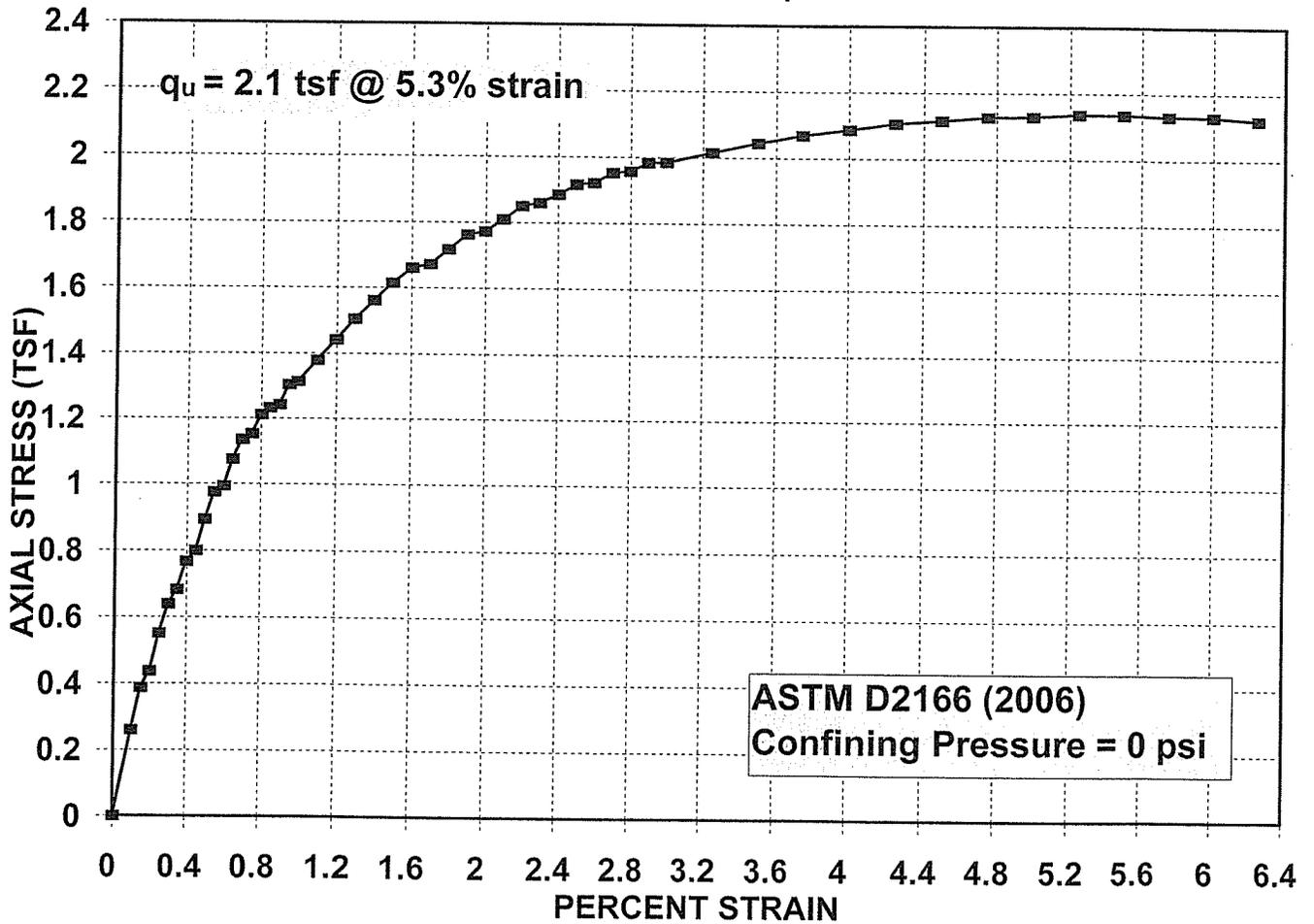
UNCONFINED COMPRESSION TEST

7311-3256, BH-2, Depth: 3-5 ft



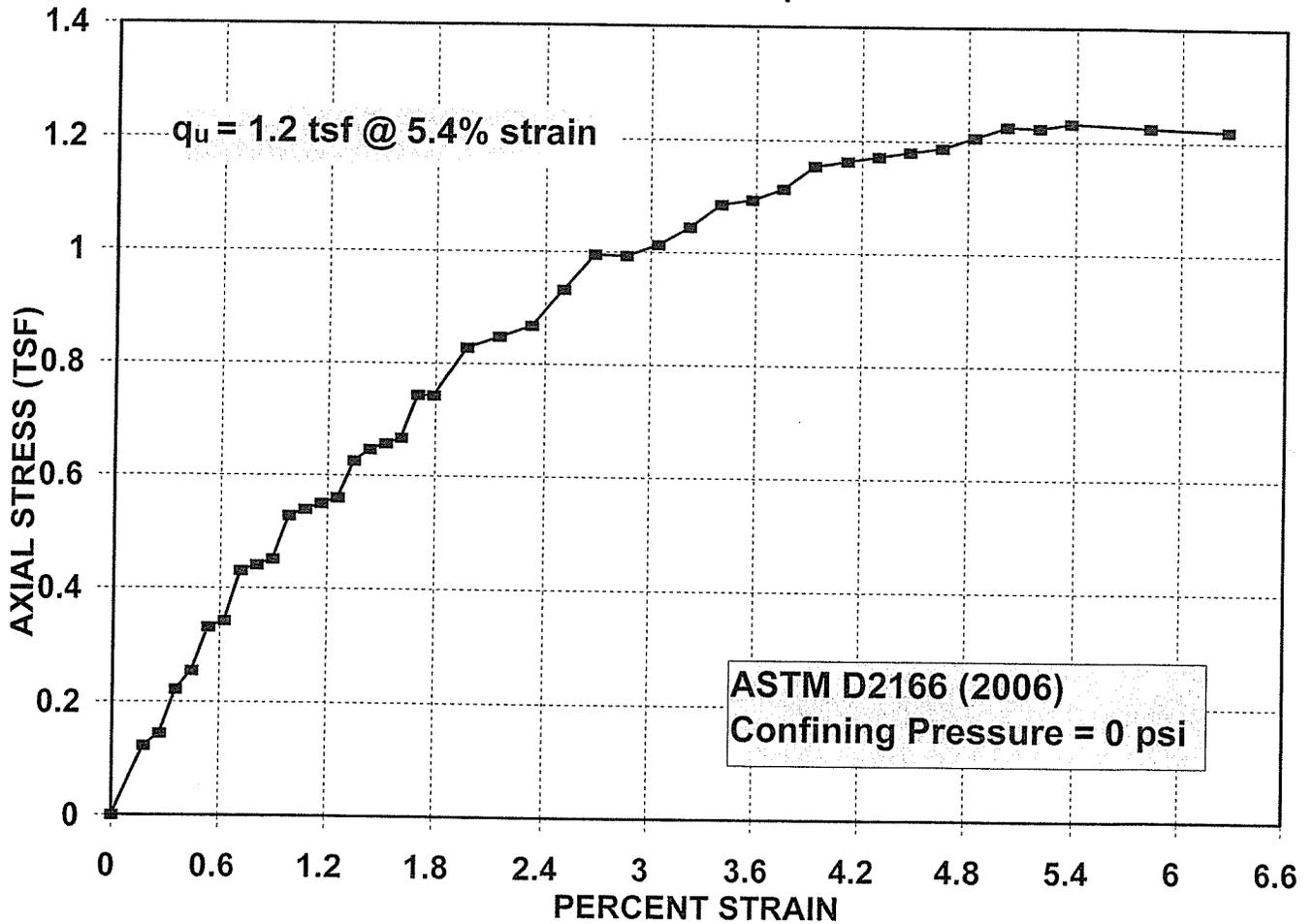
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7311-3256, BH-3, Depth: 2-4 ft



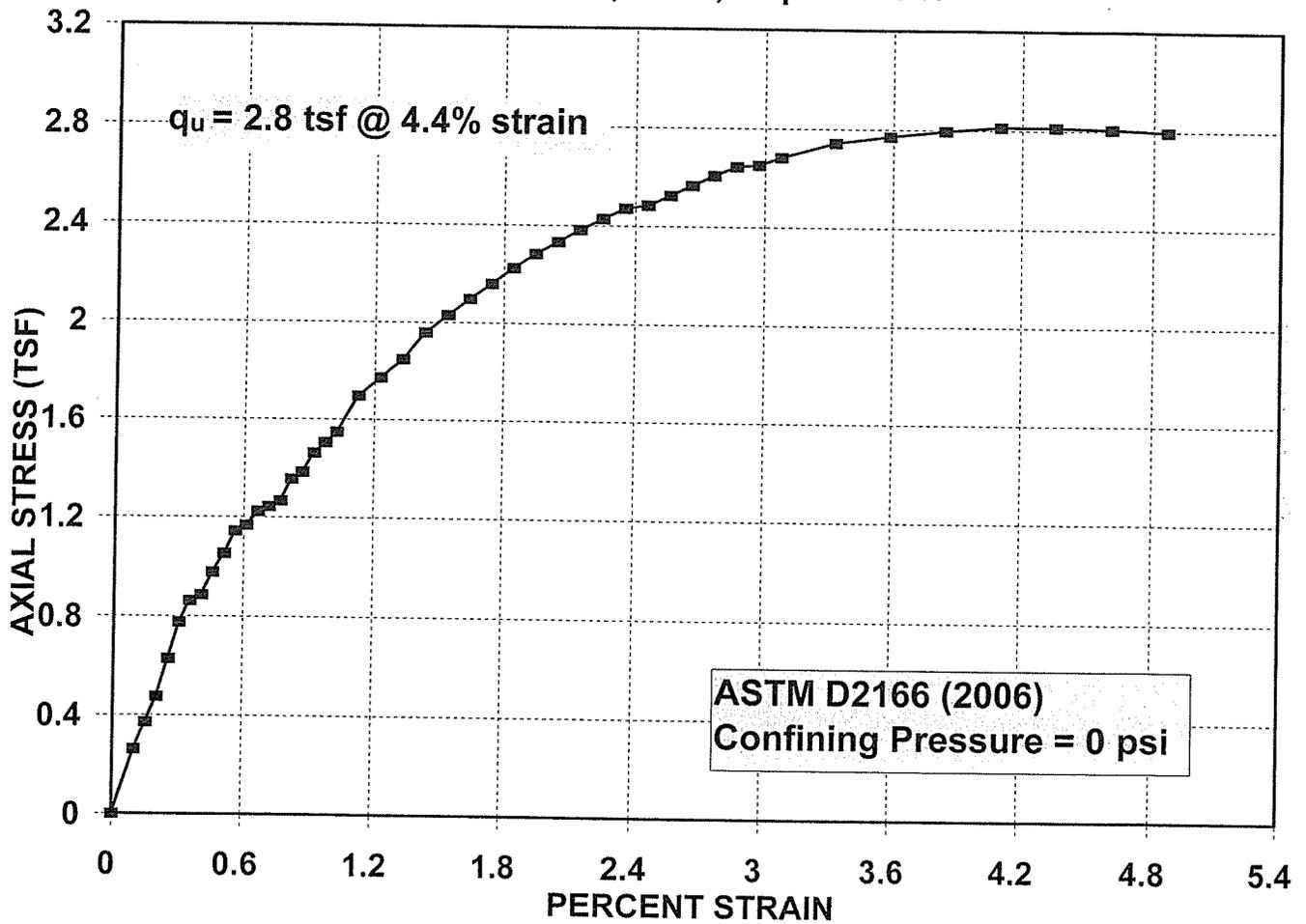
UNCONFINED COMPRESSION TEST

7311-3256, BH-6, Depth: 3-5 ft



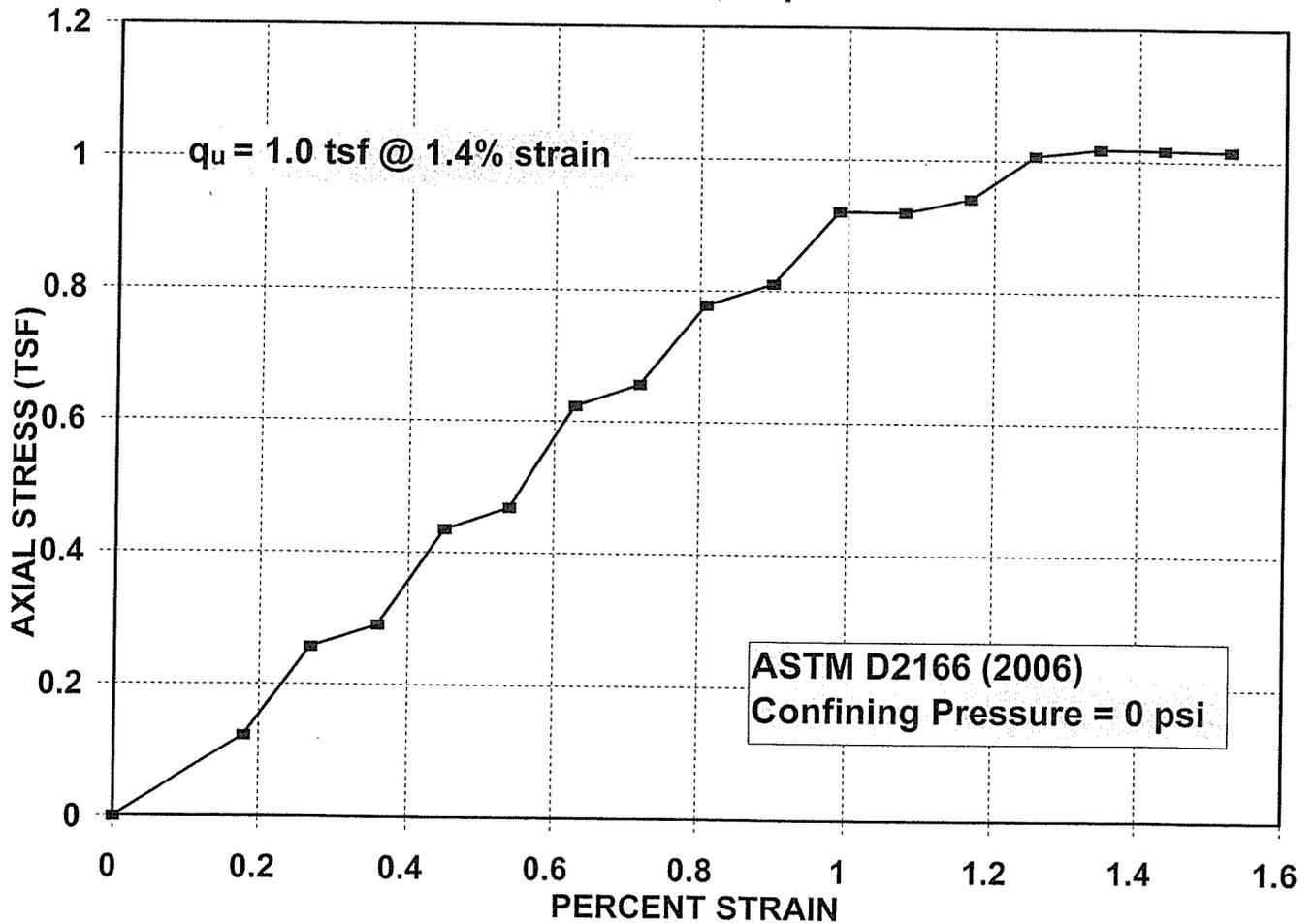
UNCONFINED COMPRESSION TEST

7311-3256, BH-9, Depth: 4-6 ft



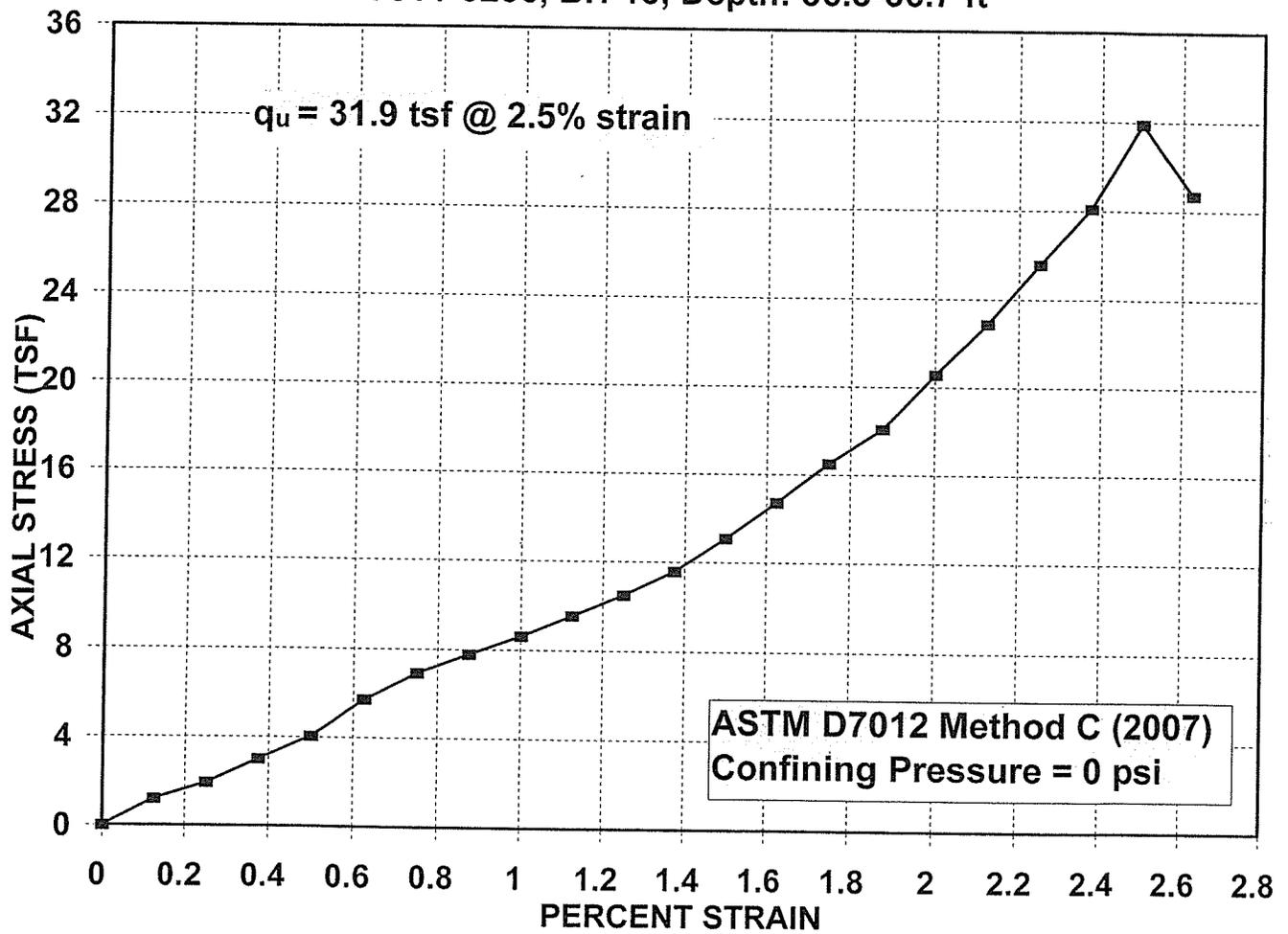
UNCONFINED COMPRESSION TEST

7311-3256, BH-11, Depth: 8-10 ft



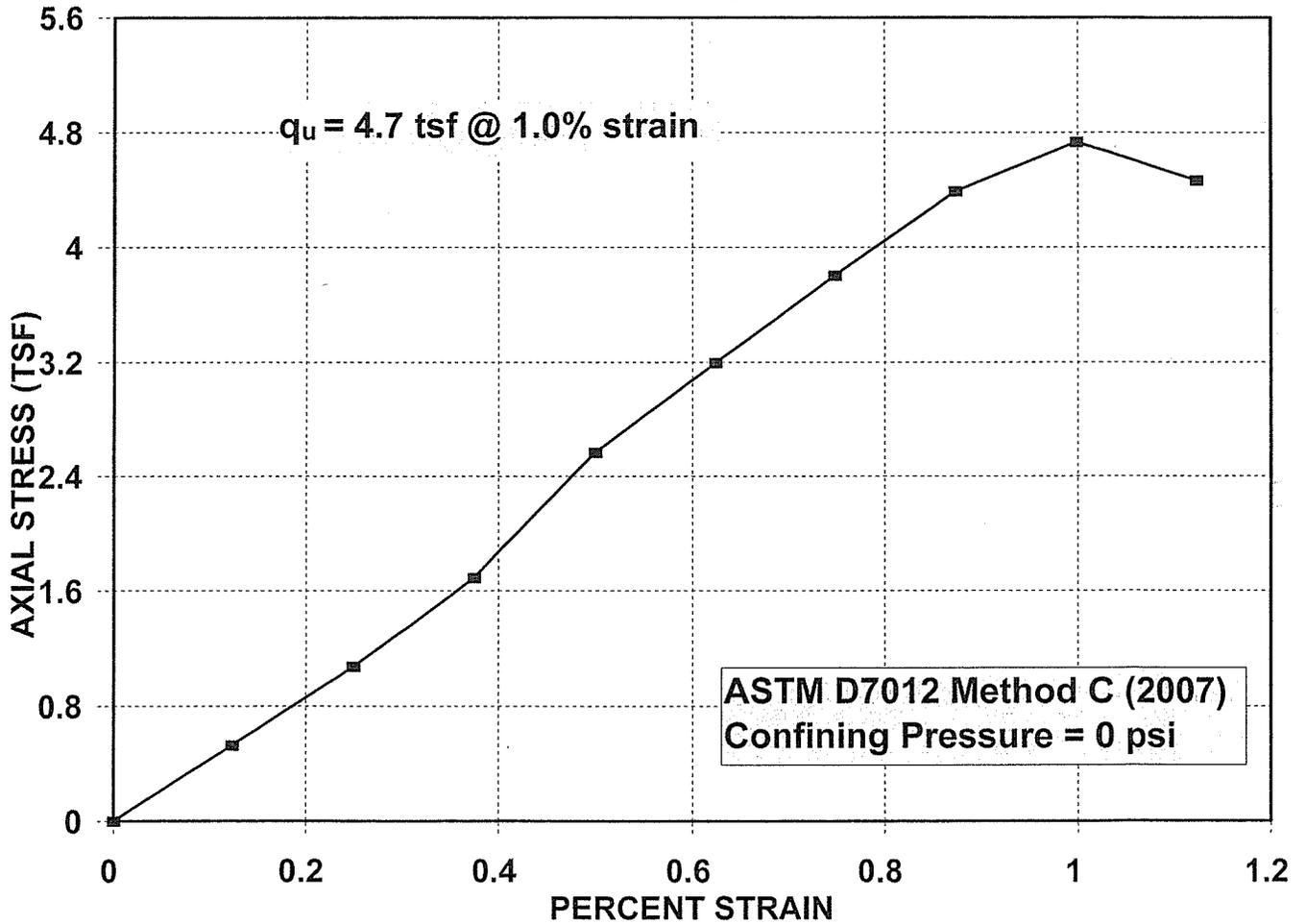
UNCONFINED COMPRESSION TEST

7311-3256, BH-13, Depth: 36.3-36.7 ft



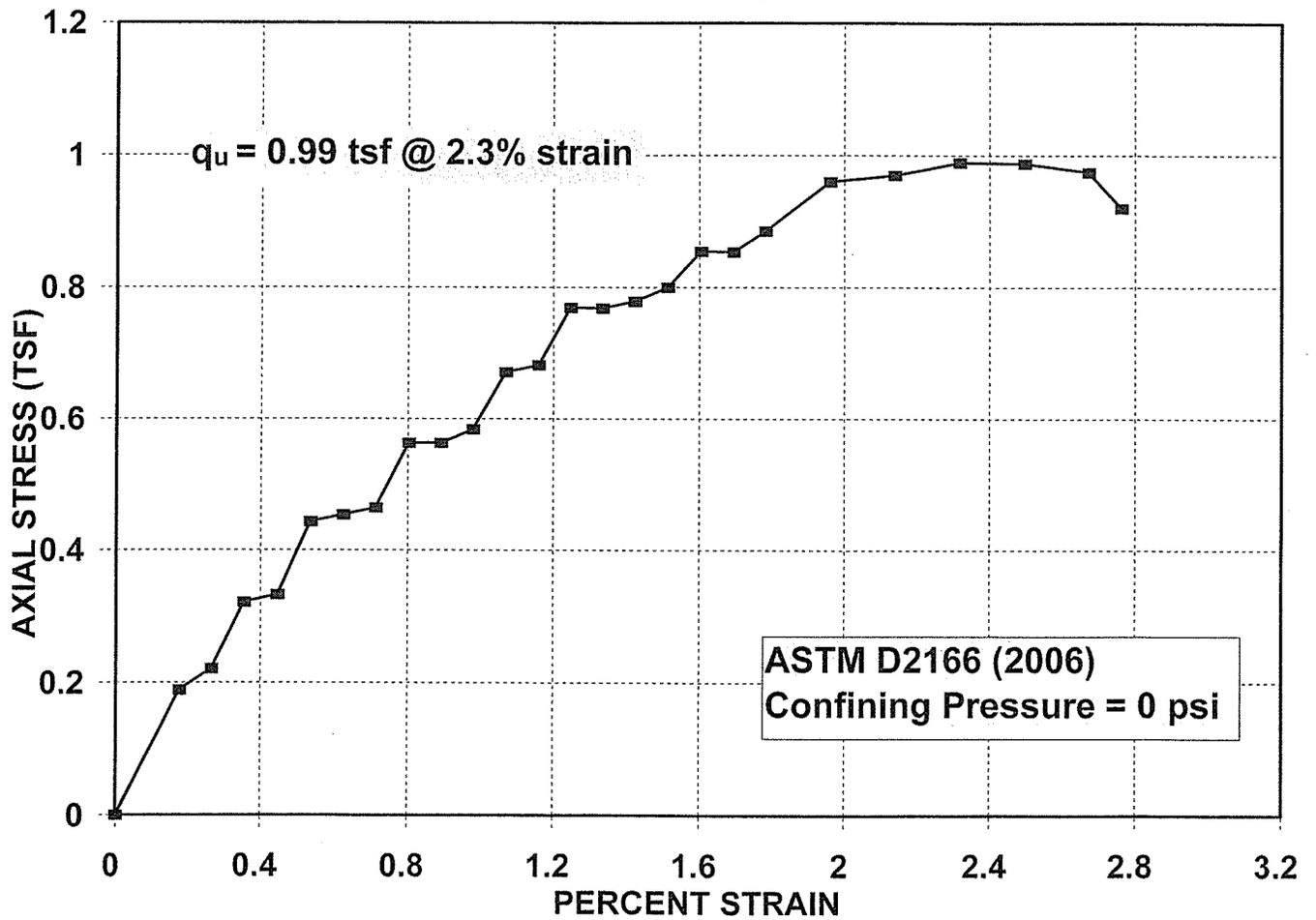
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7311-3256, BH-13, Depth: 40.1-40.5 ft



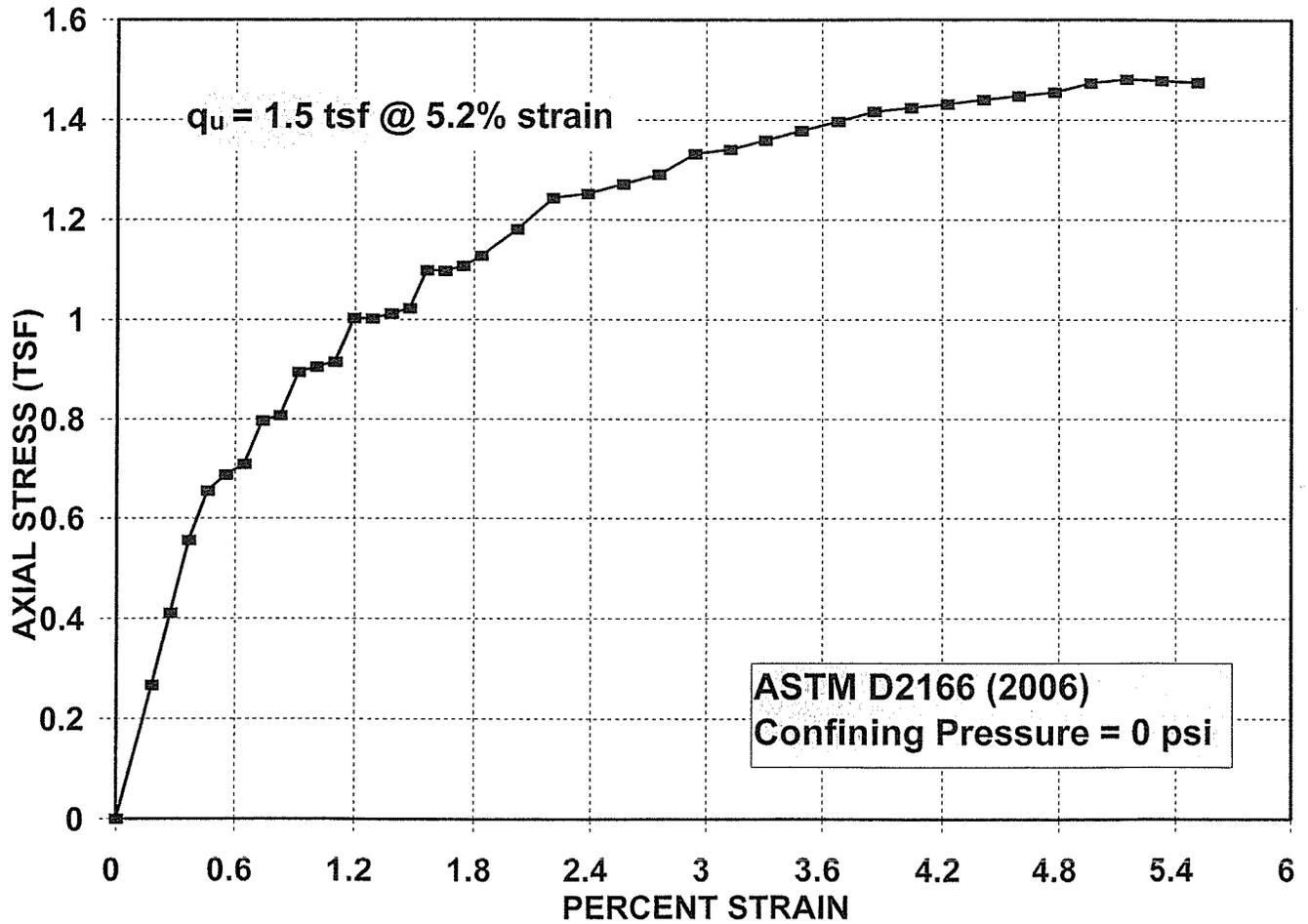
UNCONFINED COMPRESSION TEST

7311-3256, BH-16, Depth: 2.5-4.5 ft



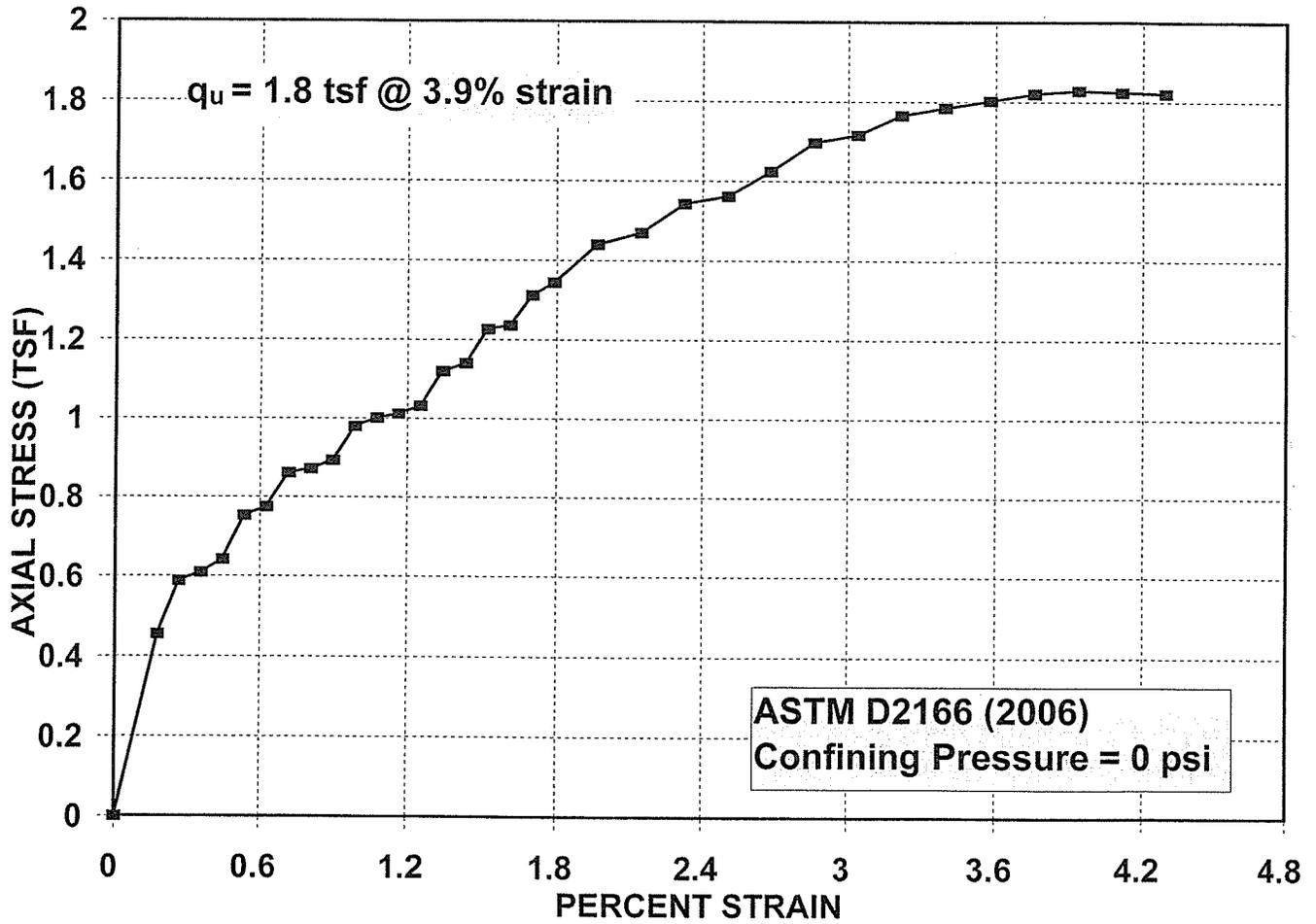
UNCONFINED COMPRESSION TEST

7311-3256, BH-20, Depth: 2.5-4.5 ft



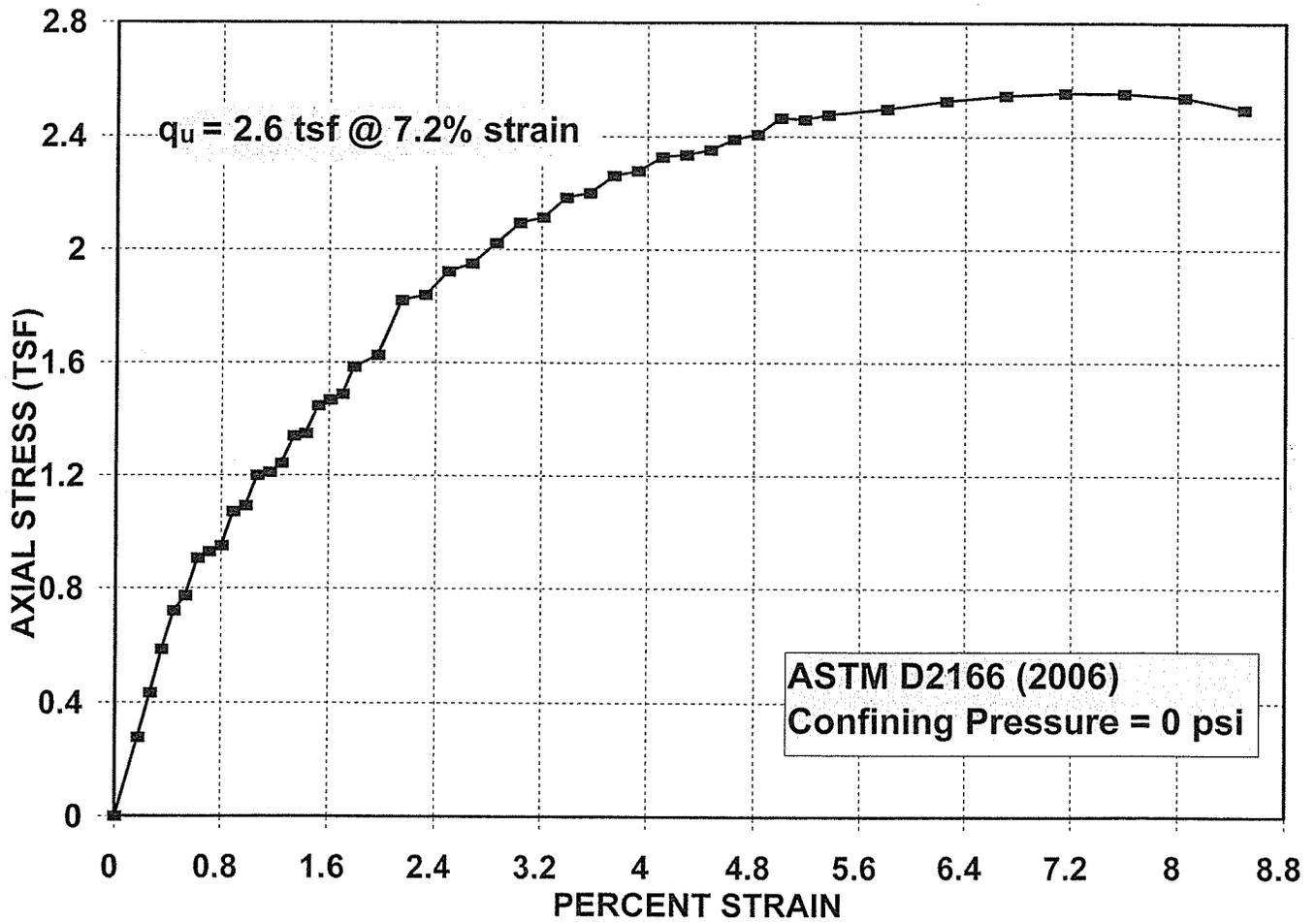
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7311-3256, BH-23, Depth: 3-5 ft



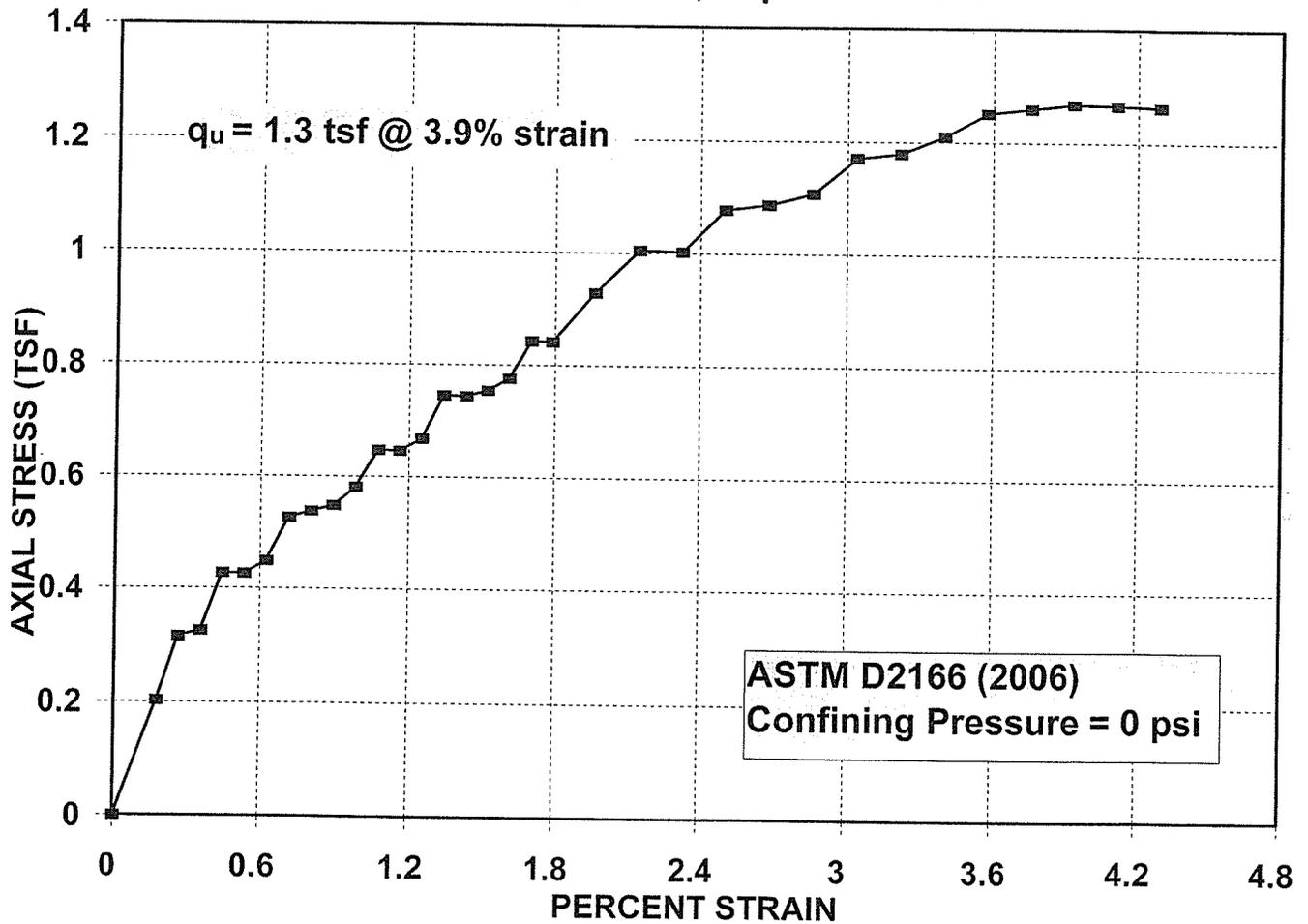
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7311-3256, BH-23, Depth: 8-10 ft



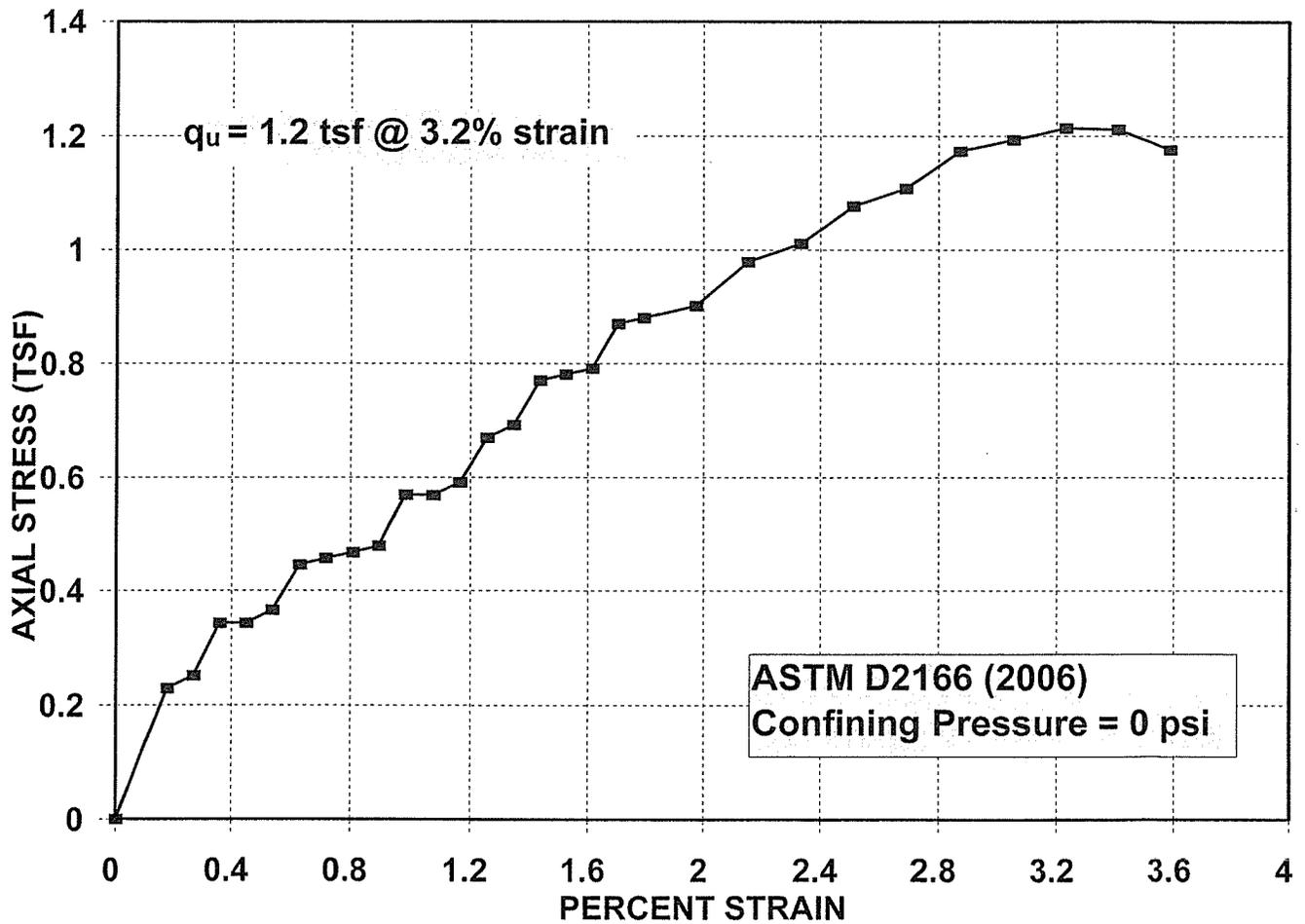
UNCONFINED COMPRESSION TEST

7311-3256, BH-25, Depth: 7.5-9.5 ft



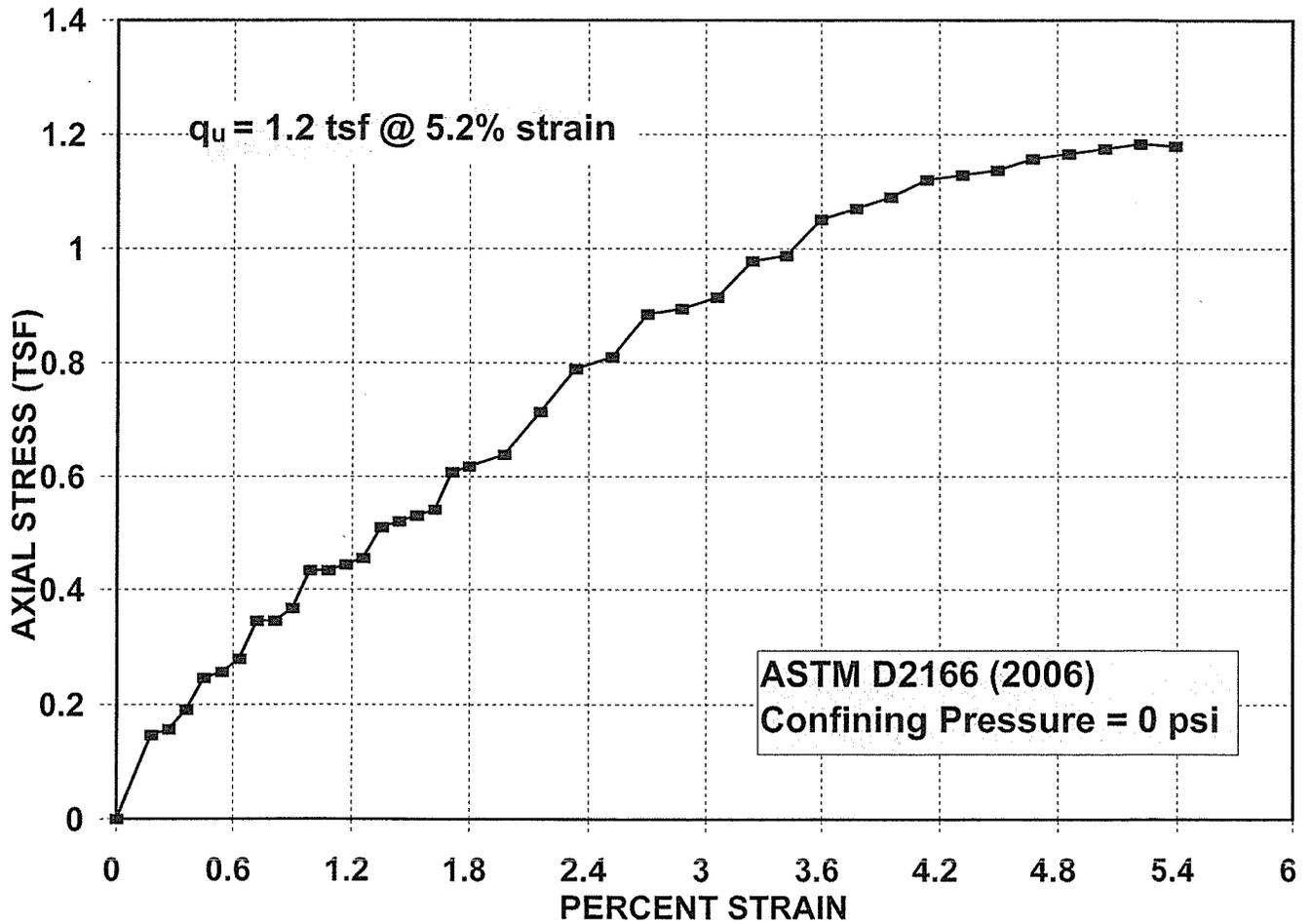
UNCONFINED COMPRESSION TEST

7311-3256, BH-34, Depth: 2.5-4.5 ft



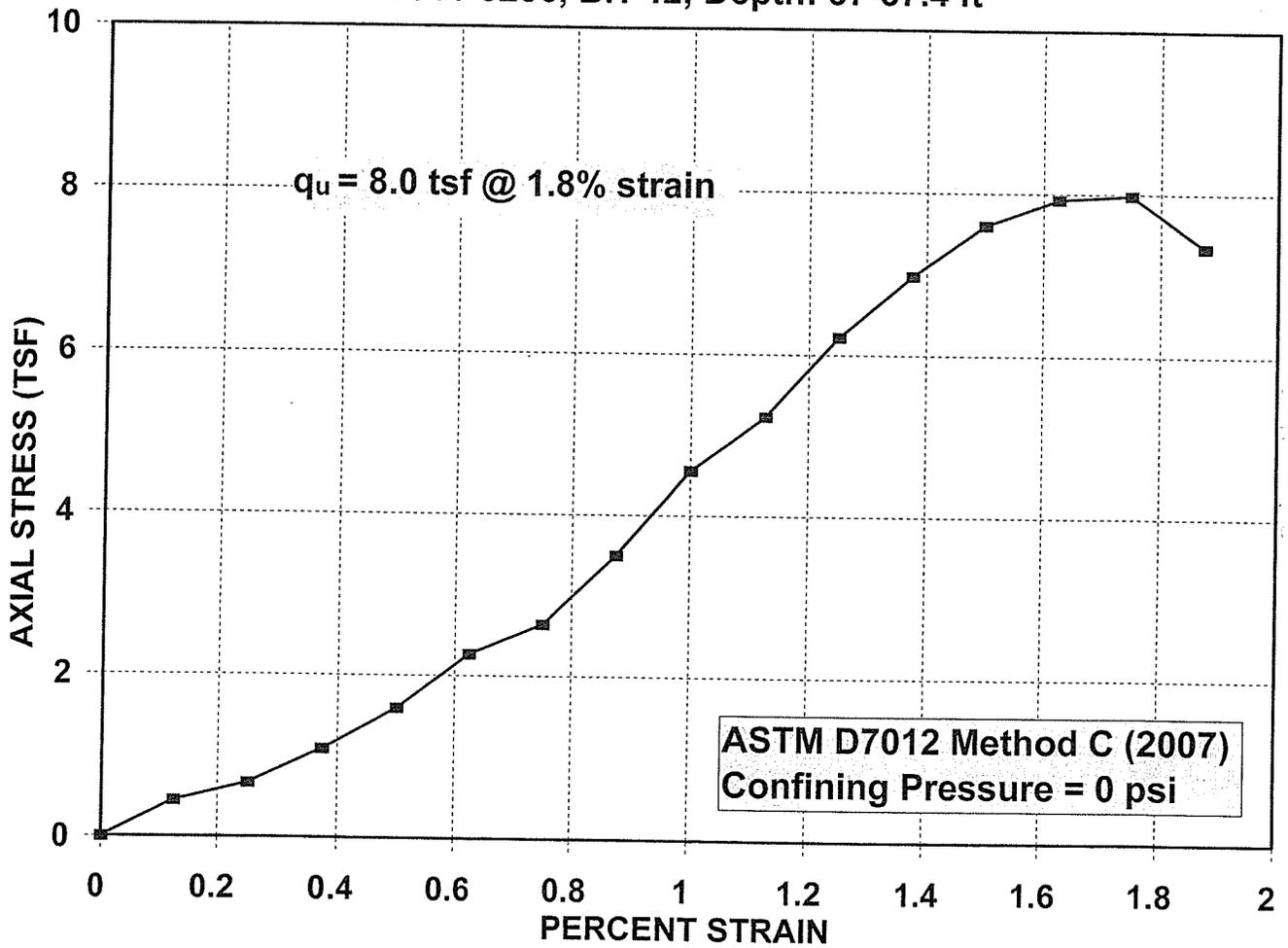
UNCONFINED COMPRESSION TEST

7311-3256, BH-36, Depth: 2.5-4.5 ft



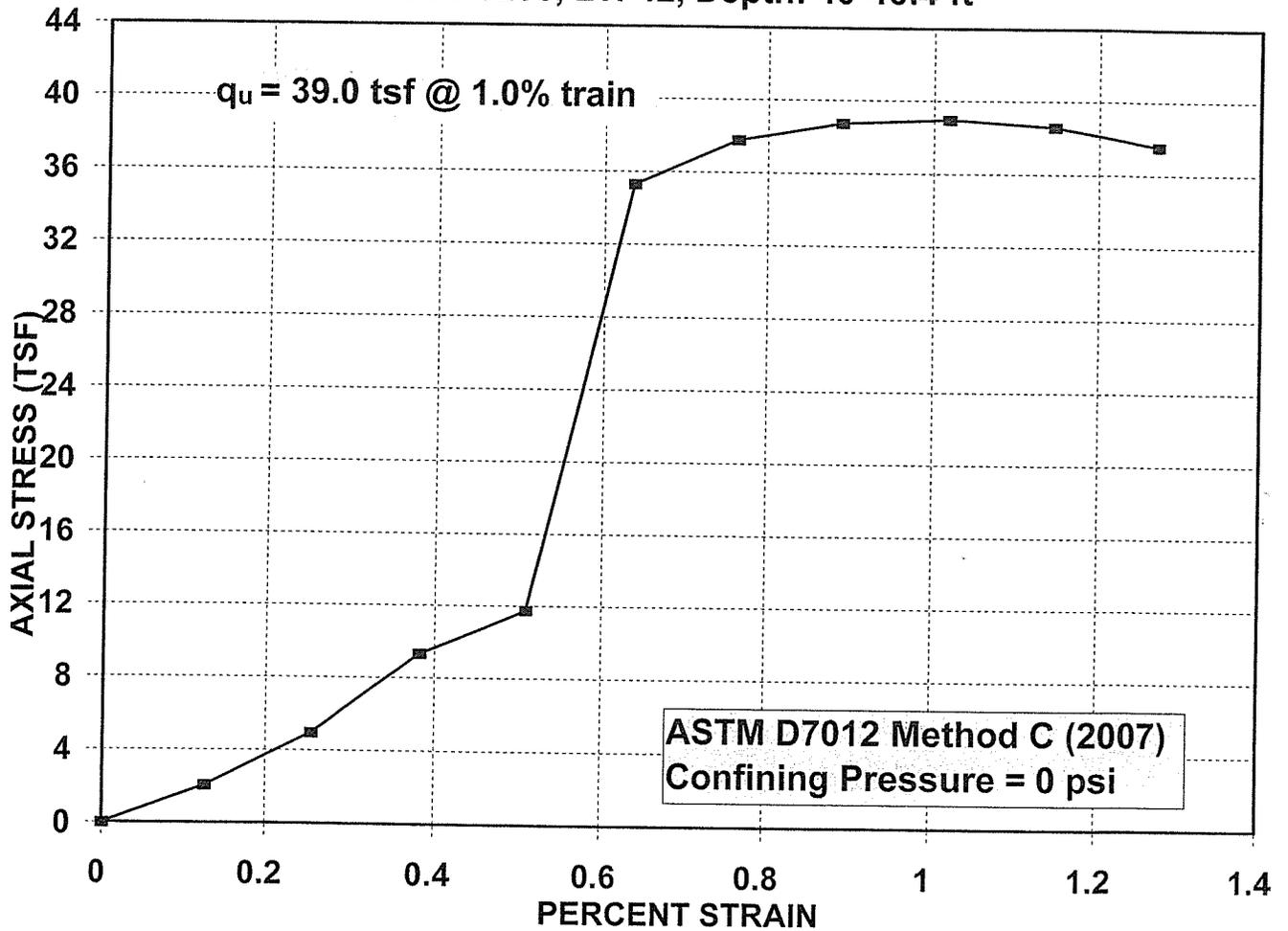
UNCONFINED COMPRESSION TEST

7311-3256, BH-42, Depth: 37-37.4 ft



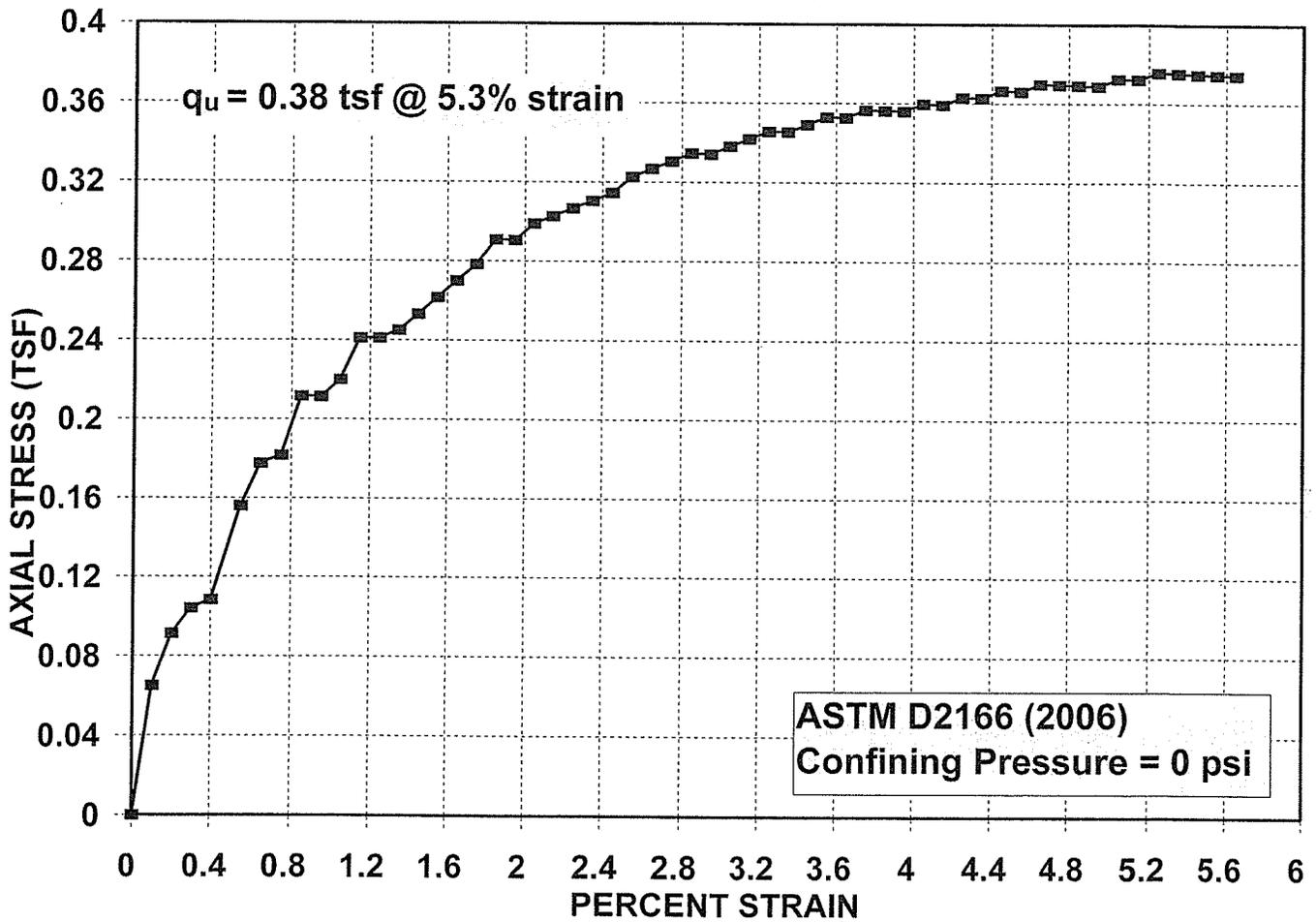
UNCONFINED COMPRESSION TEST

7311-3256, BH-42, Depth: 40-40.4 ft



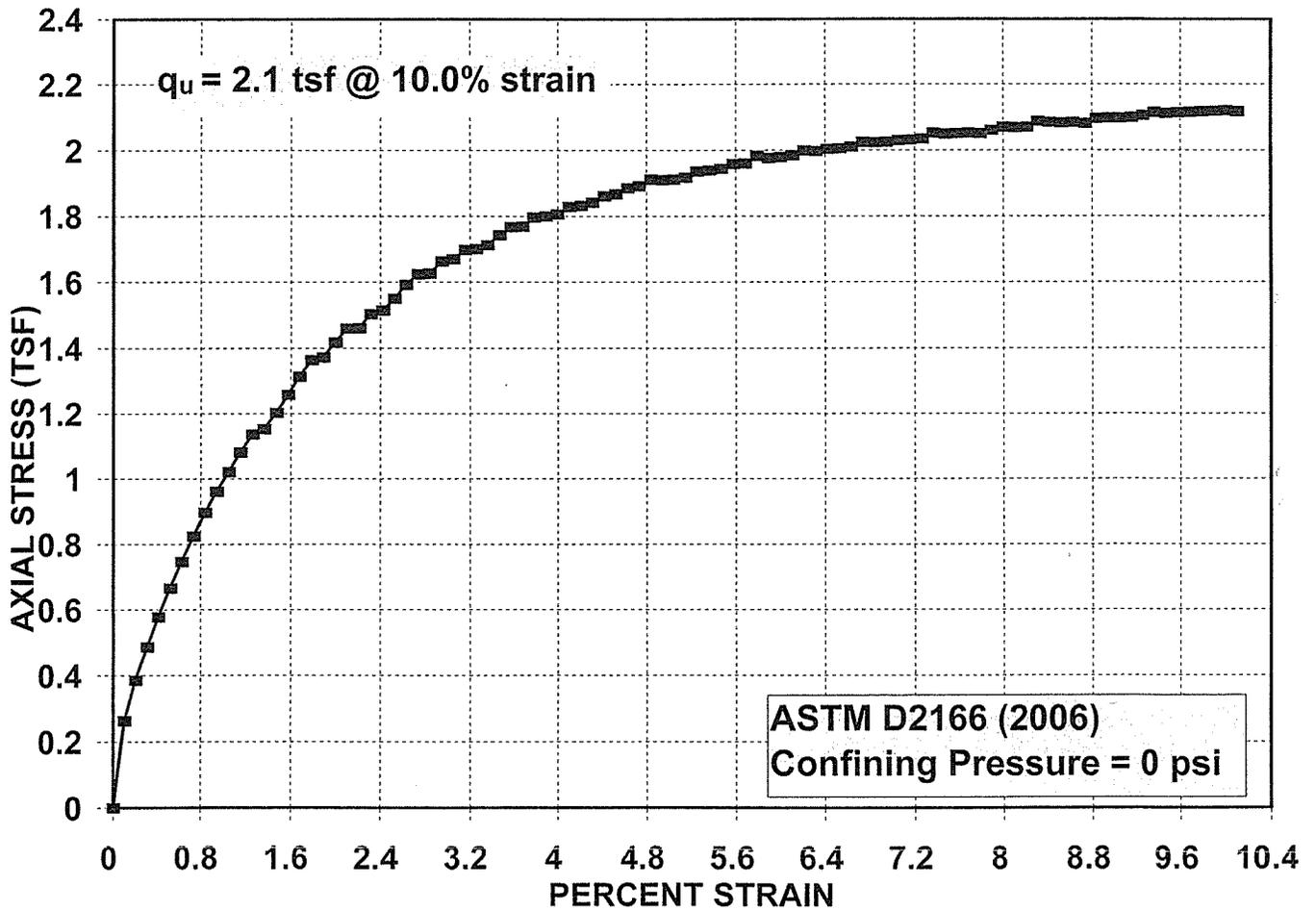
UNCONFINED COMPRESSION TEST

7311-3256, BH-43, Depth: 2-4 ft

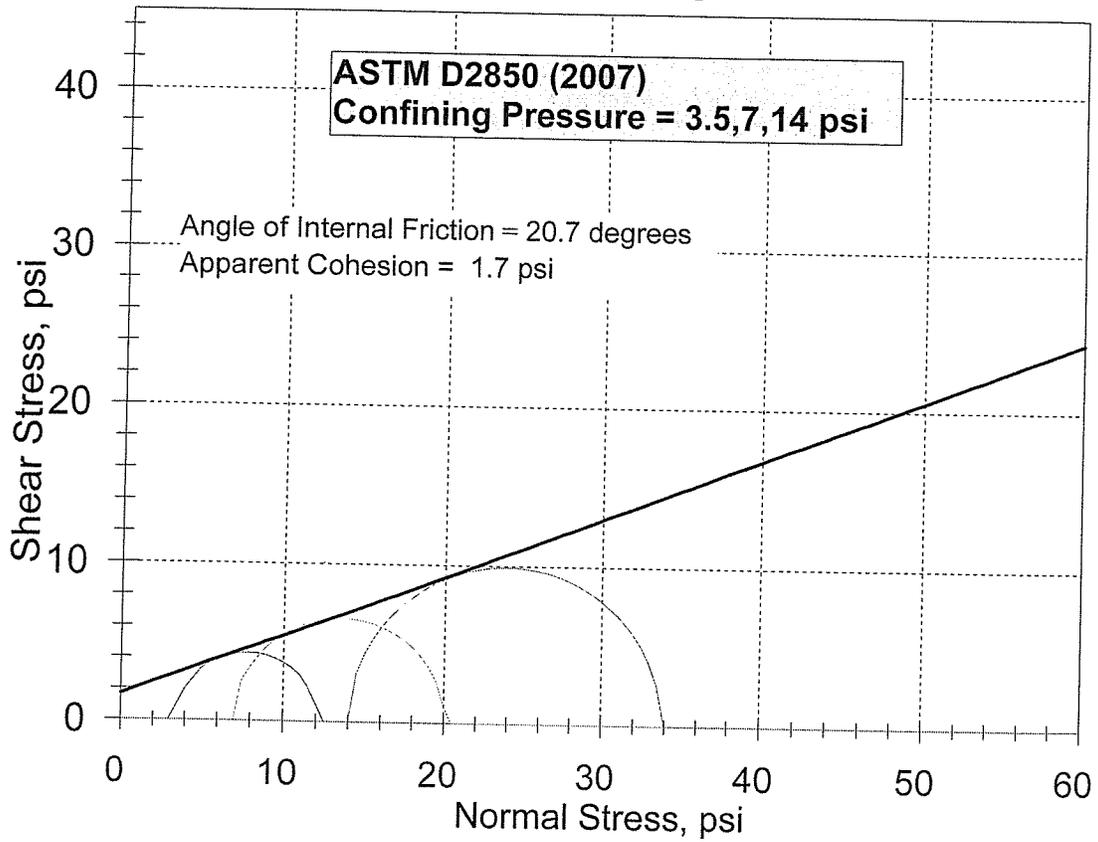


UNCONFINED COMPRESSION TEST

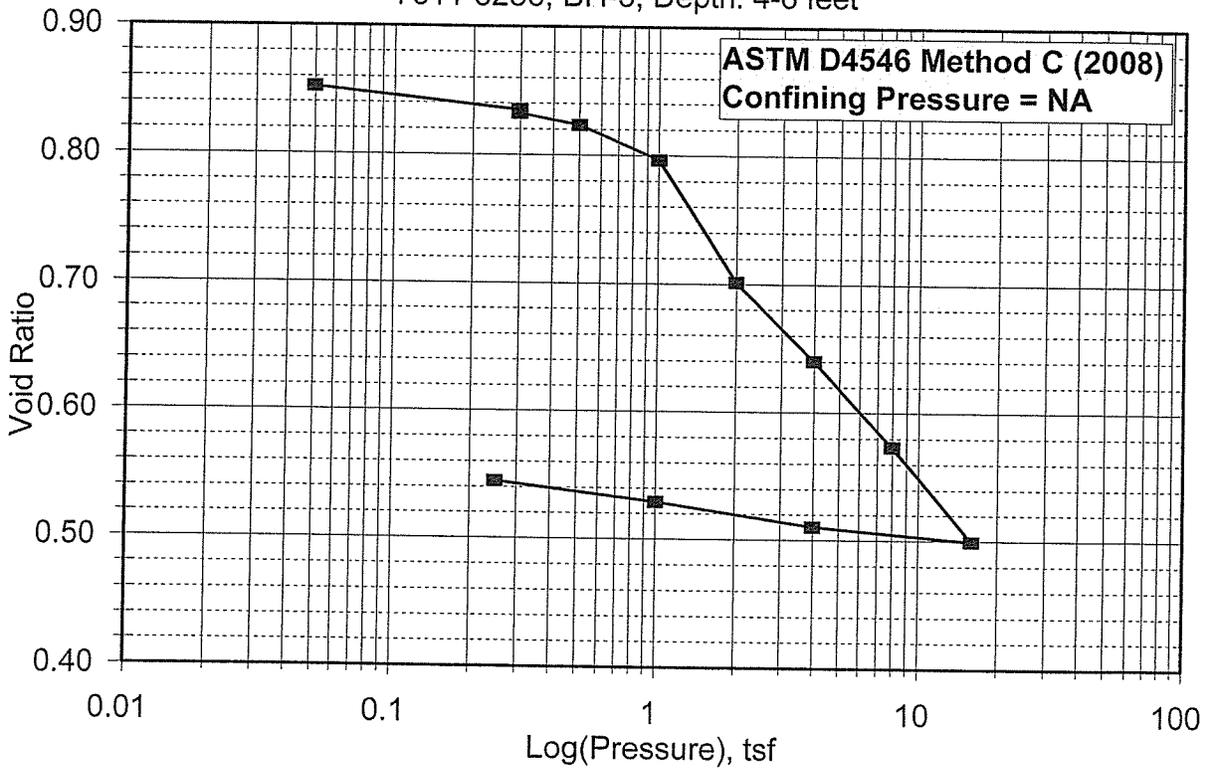
7311-3256, BH-43, Depth: 12-14 ft



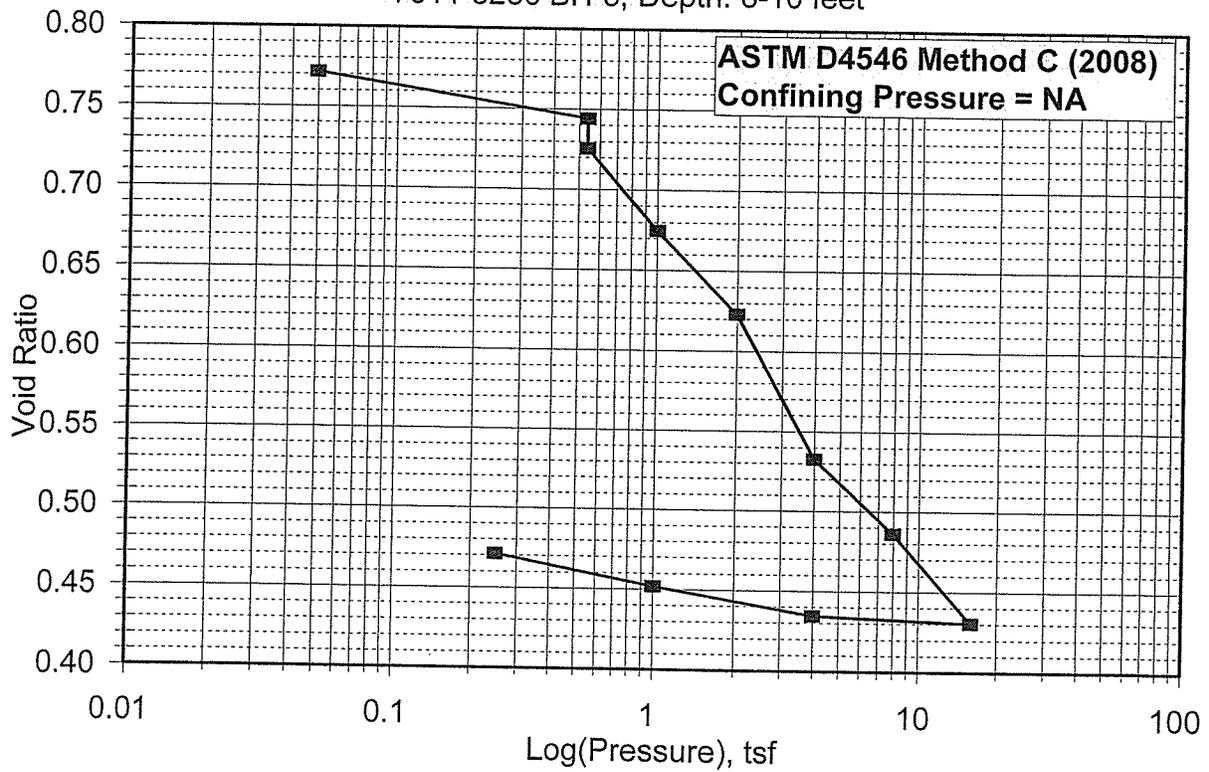
Triaxial Compression Test Results
7311-3256, BH-41 @ 2.5-4.5 ft.



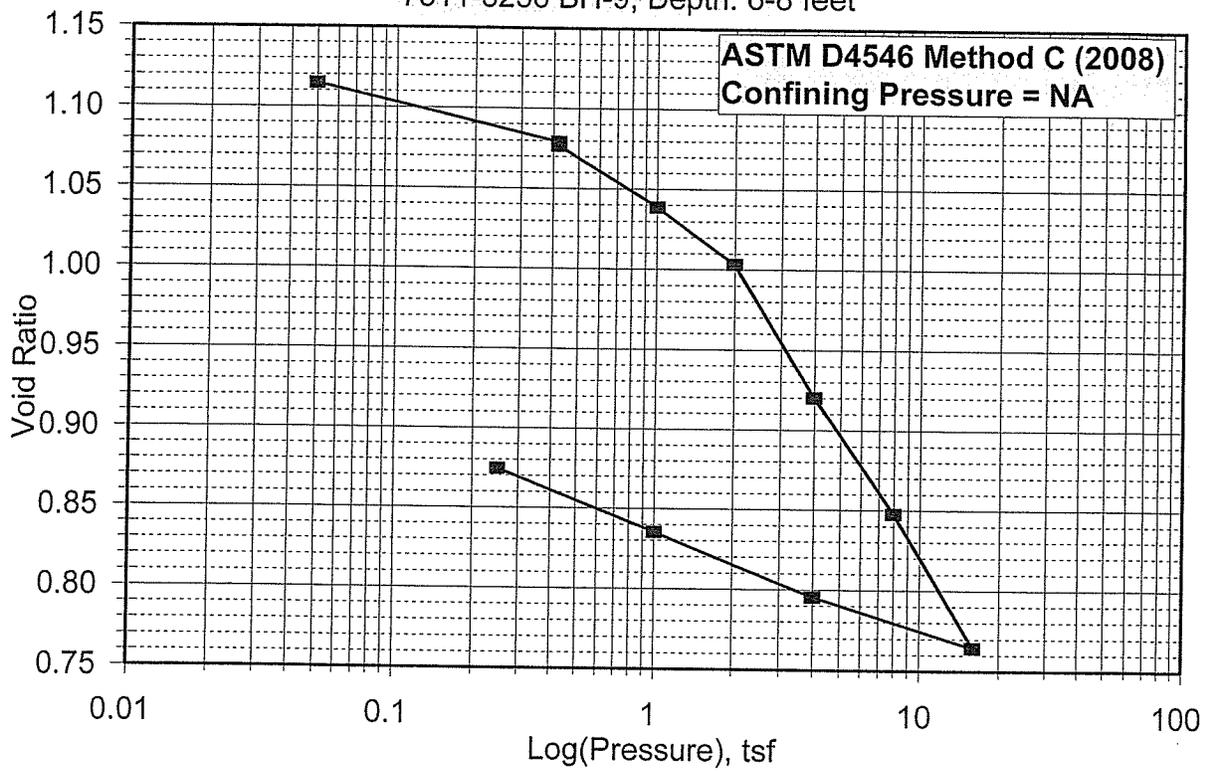
Consolidation Curve
Void Ratio versus Log (Pressure)
7311-3256, BH-3, Depth: 4-6 feet



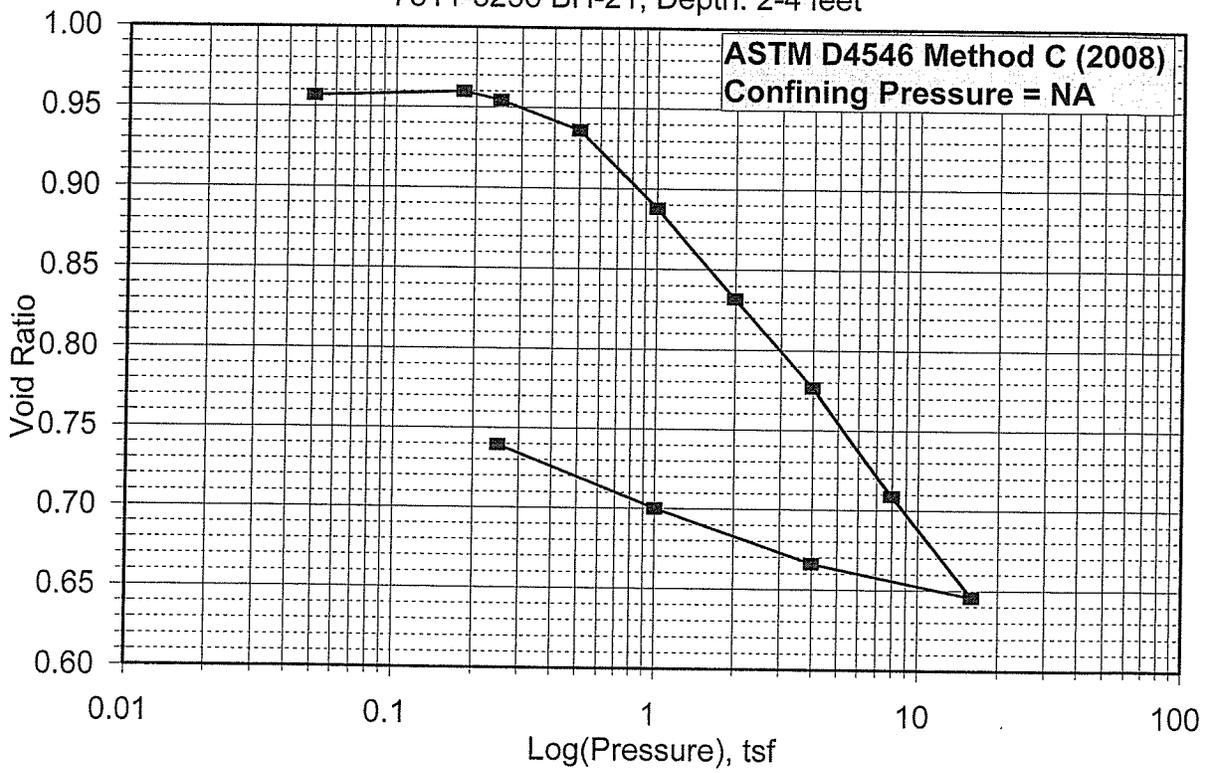
Consolidation Curve
Void Ratio versus Log (Pressure)
7311-3256 BH-3, Depth: 8-10 feet



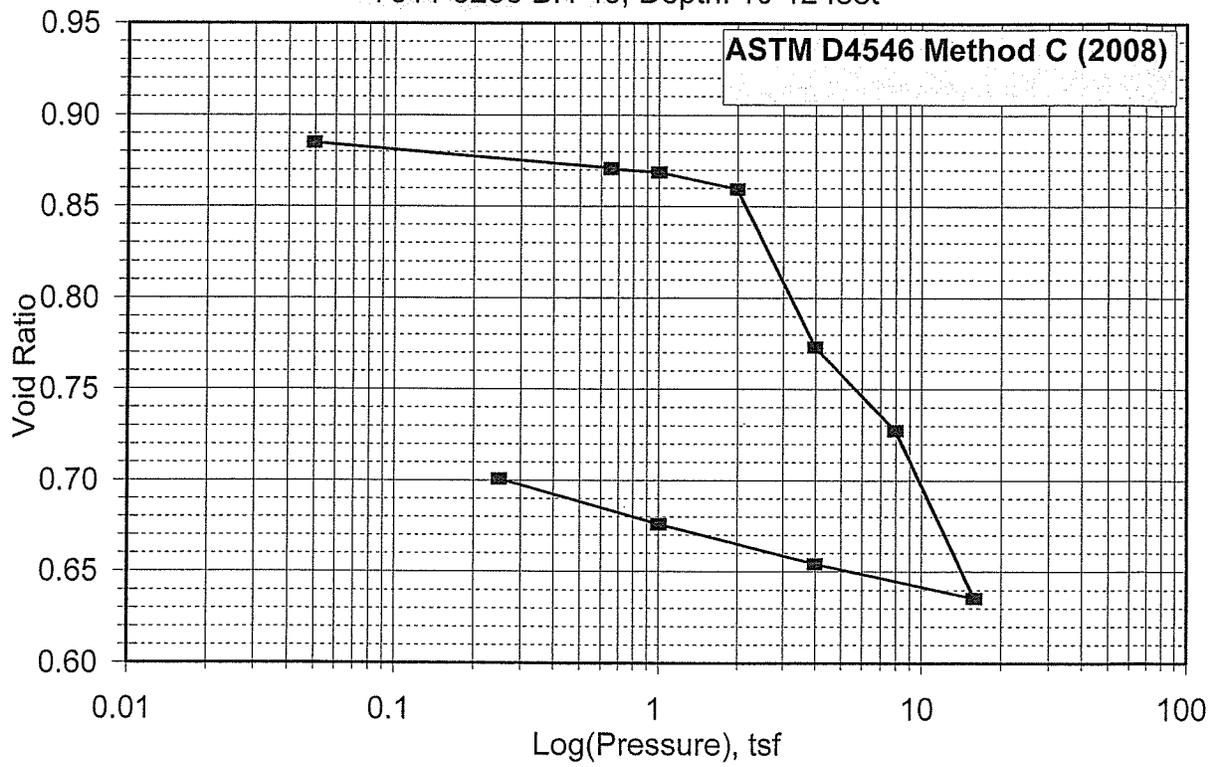
Consolidation Curve
Void Ratio versus Log (Pressure)
7311-3256 BH-9, Depth: 6-8 feet



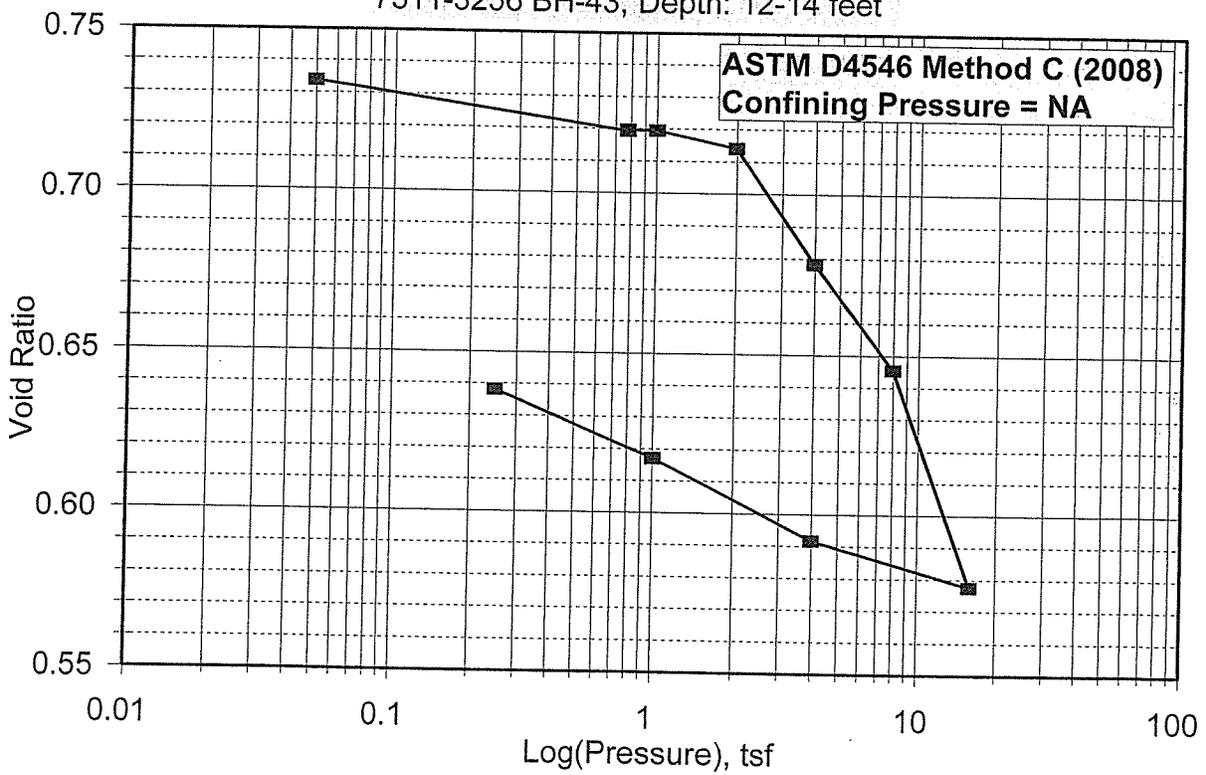
Consolidation Curve
Void Ratio versus Log (Pressure)
7311-3256 BH-21, Depth: 2-4 feet

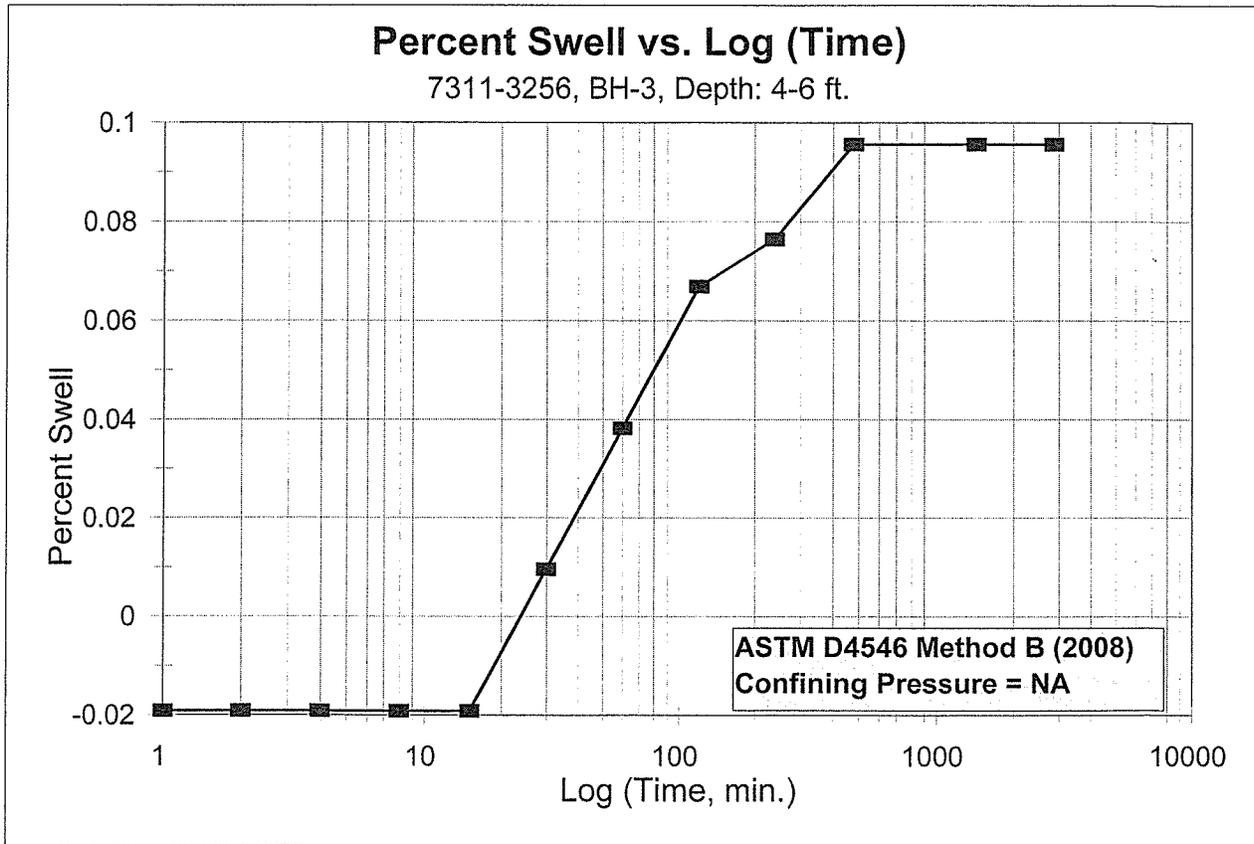


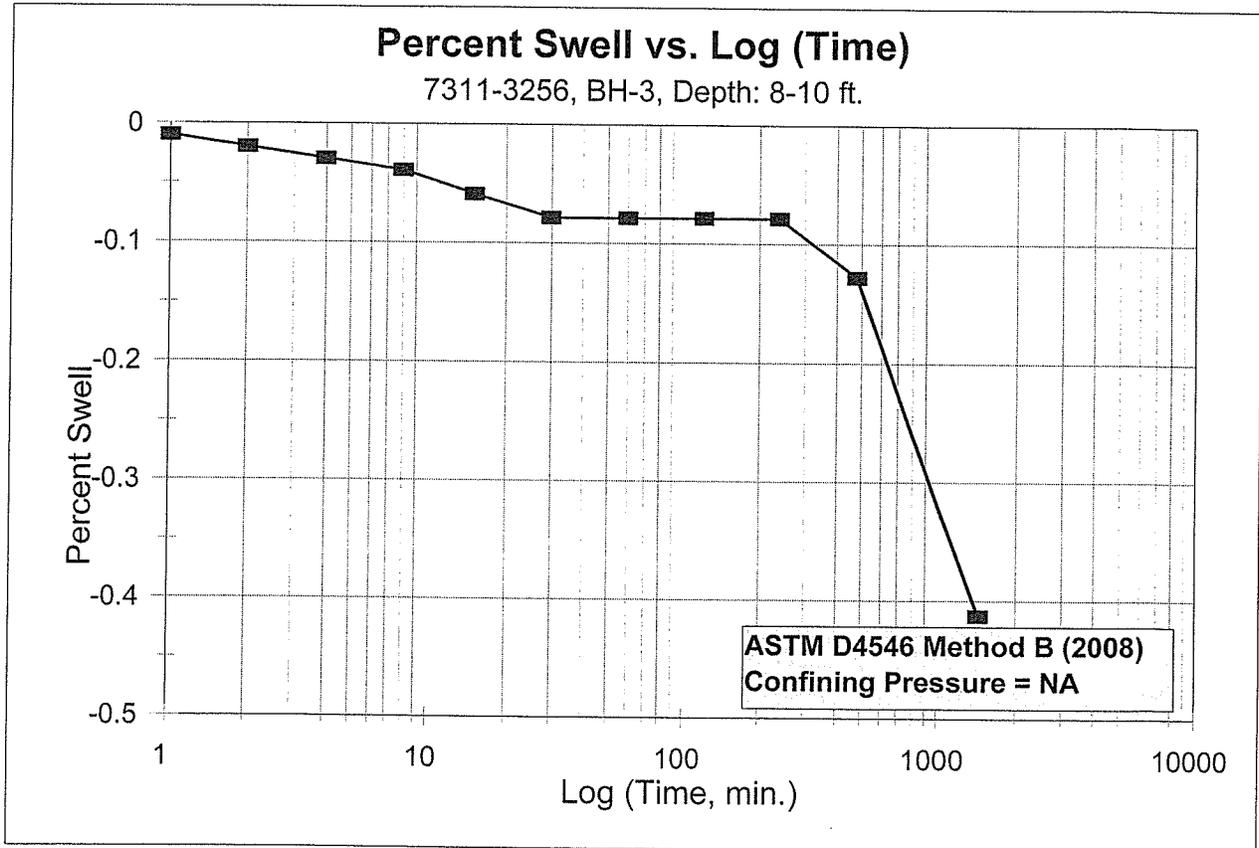
Consolidation Curve
Void Ratio versus Log (Pressure)
7311-3256 BH-43, Depth: 10-12 feet

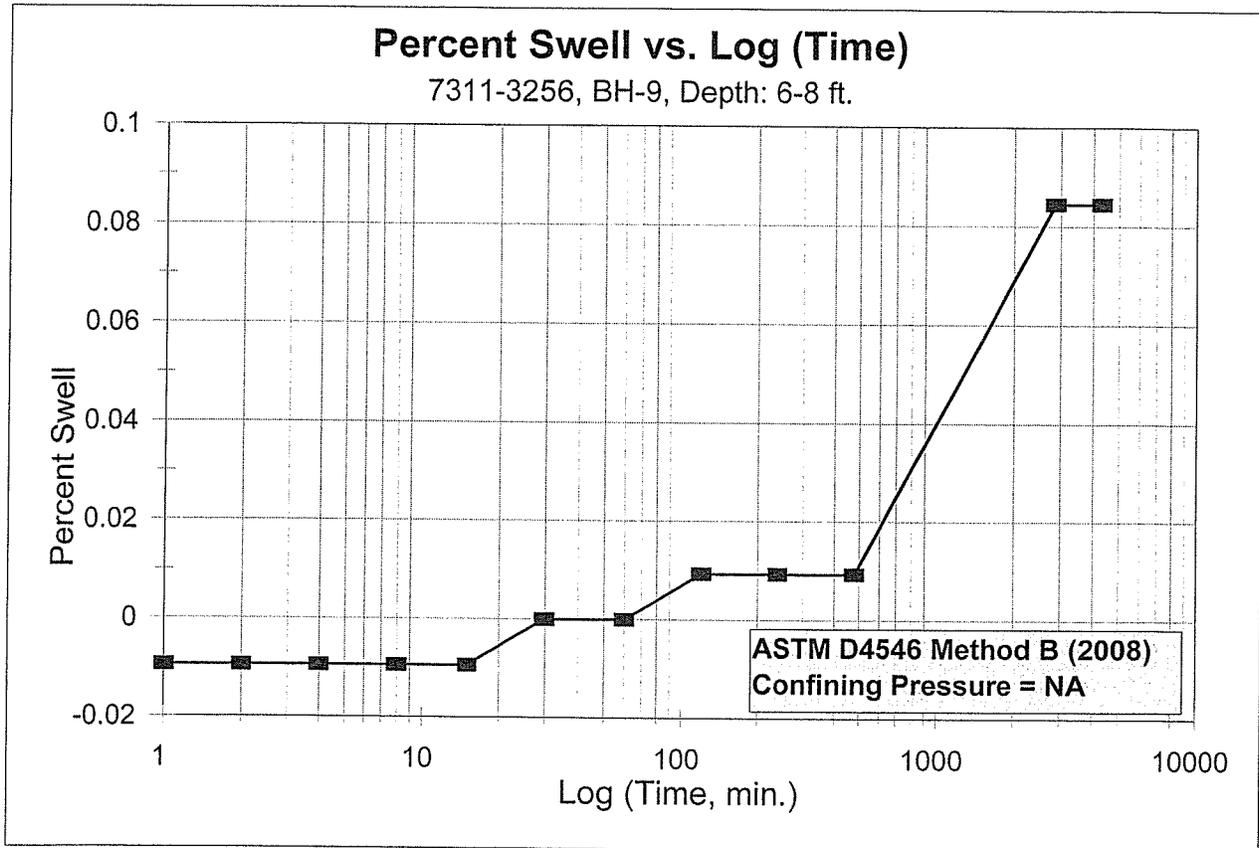


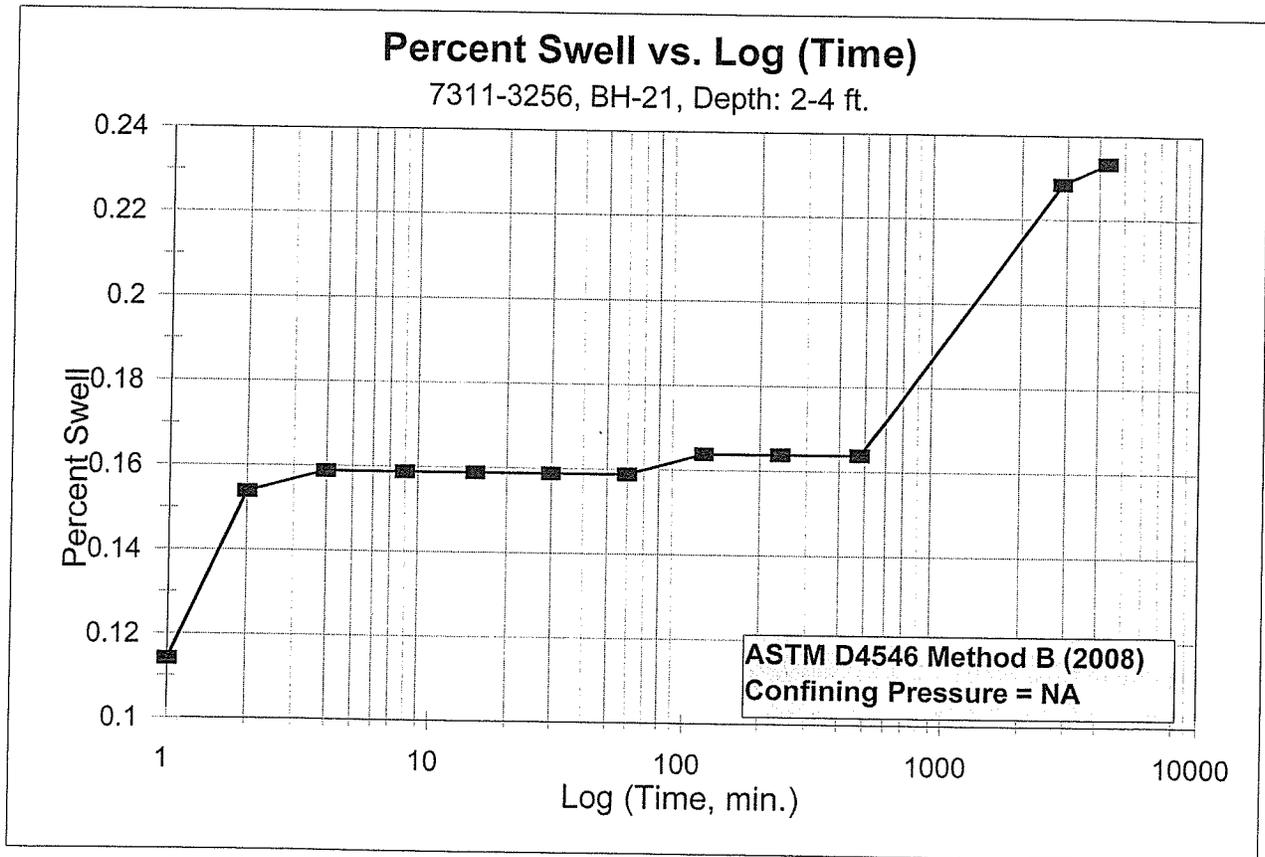
Consolidation Curve
Void Ratio versus Log (Pressure)
7311-3256 BH-43, Depth: 12-14 feet

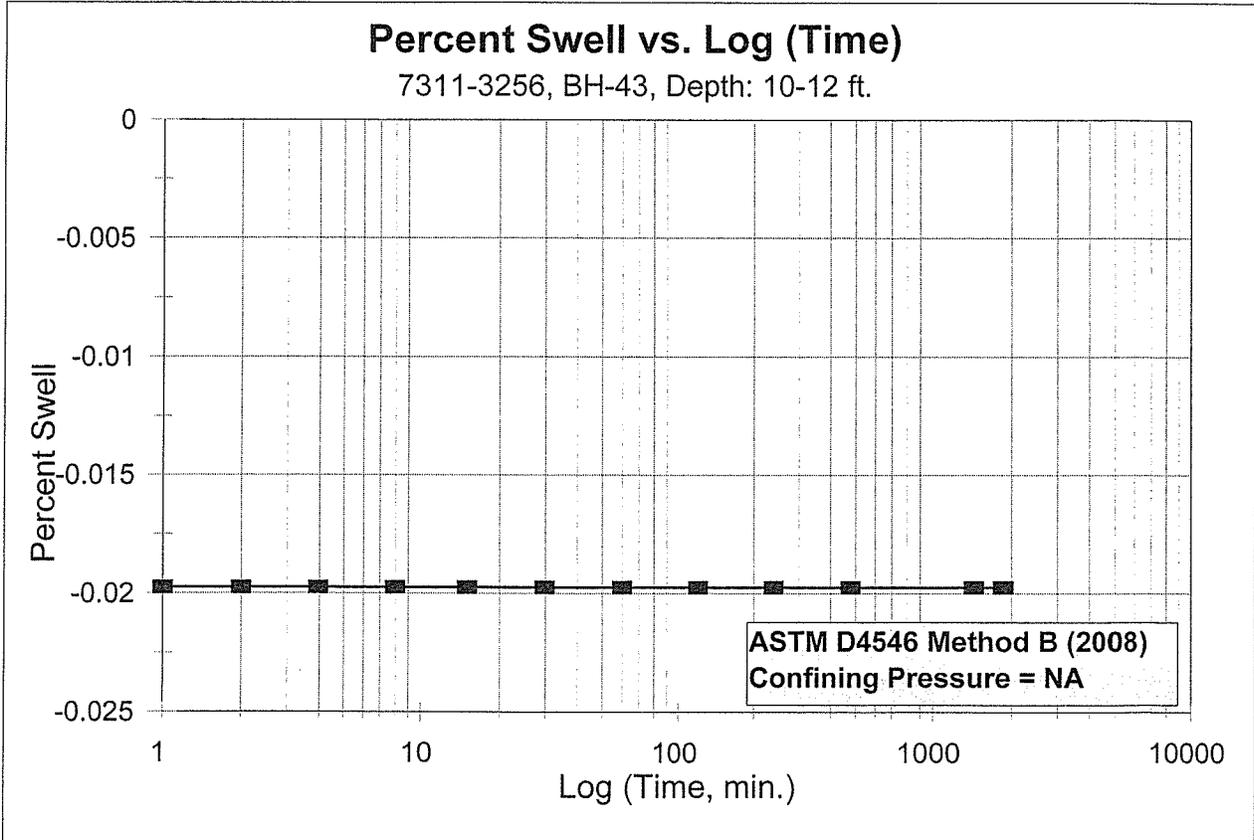


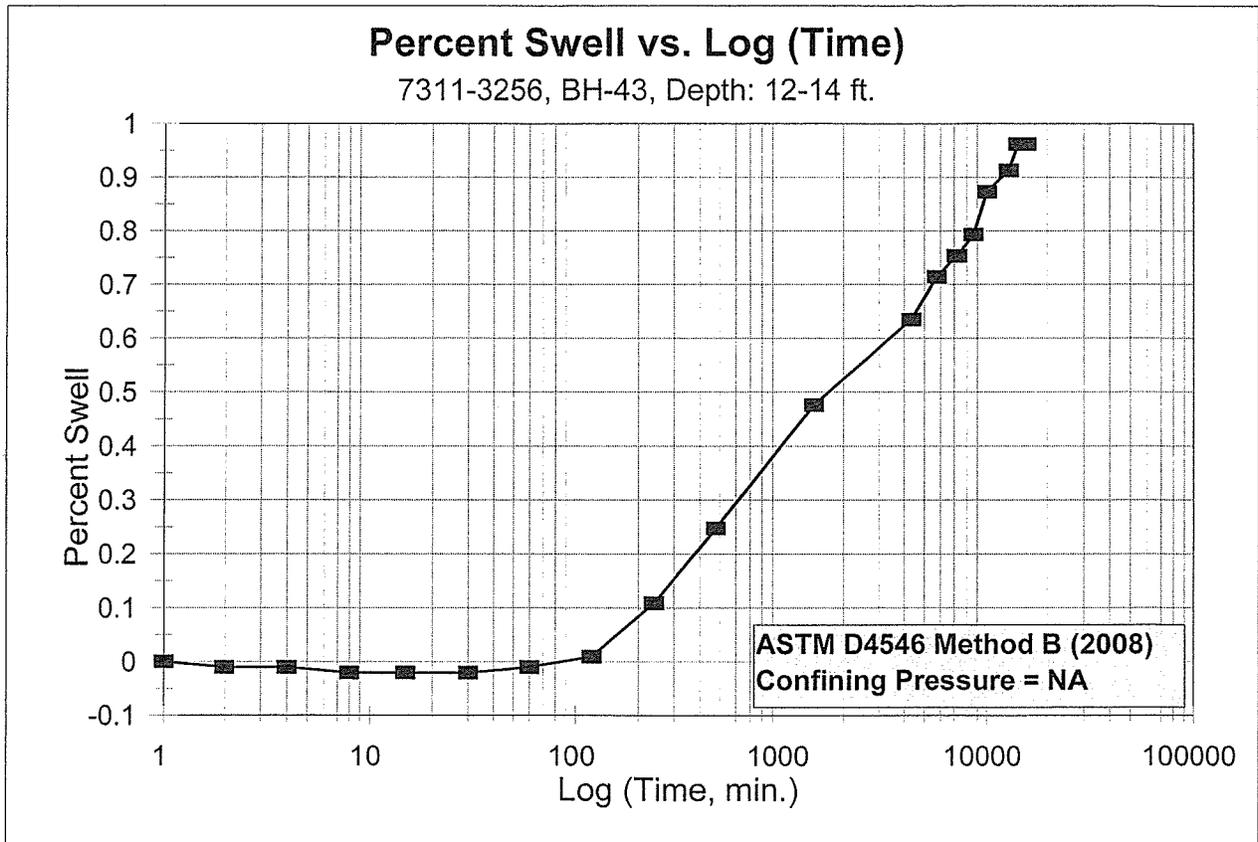




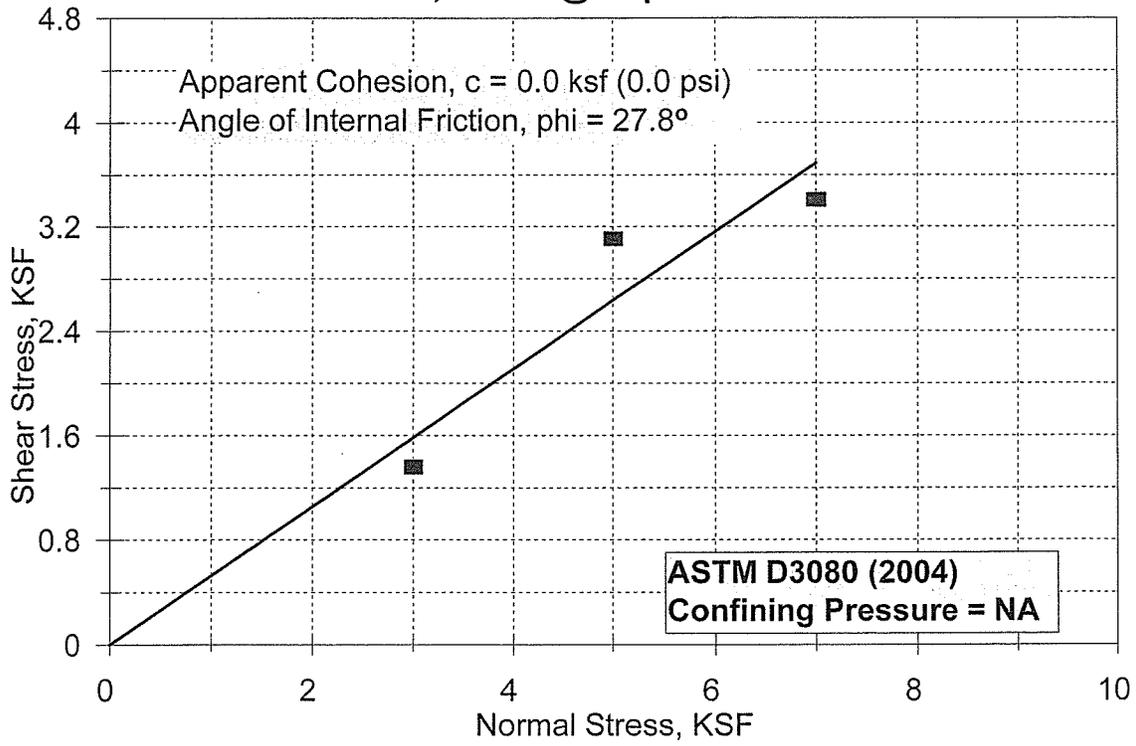








Direct Shear Test Results
7311-3256, BH-34 @ Depth: 12.5-14.5'



CORPORATE OFFICE and CENTRAL LABORATORY
3400 N. Lincoln Blvd., Oklahoma City, OK 73105 (405) 528-0541
CA77 Exp. 06/30/11

Area Offices

5358 S. 125th E. Ave., Ste. B	Tulsa, OK 74146	(918) 459-2700
902 Trails West Loop	Enid, OK 73703	(580) 237-3130
202 SE "J" Ave.	Lawton, OK 73501	(580) 353-0872

File No.: 7311-3256

Report Date: 03/01/11

Project: Ft. Sill TEMF

Location: Lawton, Oklahoma

Date Sampled: 02/08/11

Sampled By: Johnny Jarman

REPORT: DIRECT SHEAR TEST OF SOILS UNDER
CONSOLIDATED-DRAINED CONDITIONS

LAB NO: 7311-3256

TEST METHOD: ASTM D3080

TEST RESULTS

Sample I.D.	BH-34F (1) Depth (ft.): 12.5-14.5		
Shear Device	Humbolt HM-2500		
Specimen Description	Light Brown Sandy Clay		
Specimen Condition	Thin-Walled Tube Sample		
Dry Mass, g	120.1		
Diameter, in	2.5		
Normal Stress, ksf	3.0		
Rate of Deformation, in/min	0.0033		
	Initial	After Consolidation	After Shear
Height, in	1.054	0.99105	0.972
Water Content, %	28.8		44.9
Moist Unit Weight, pcf	113.7		138.7
Dry Unit Weight, pcf	88.2	93.9	95.7
Response at Maximum Nominal Shear Stress			
Nominal Shear Stress, ksf	1.36		
Lateral Displacement, %	6.00		
Change from Consolidated Height, %	-8.05		

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CA77 Exp. 06/30/11

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902 Trails West Loop	Enid, OK 73703	(580) 237-3130
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File No.: 7311-3256

Report Date: 03/01/11

Date Sampled: 02/08/11

Project: Ft. Sill TEMF

Sampled By: Johnny Jarman

Location: Lawton, Oklahoma

REPORT: DIRECT SHEAR TEST OF SOILS UNDER.
CONSOLIDATED-DRAINED CONDITIONS

LAB NO: 7311-3256
TEST METHOD: ASTM D3080

TEST RESULTS

Sample I.D.	BH-34F (2) Depth (ft.): 12.5-14.5		
Shear Device	Humbolt HM-2500		
Specimen Description	Light Brown Sandy Clay		
Specimen Condition	Thin-Walled Tube Sample		
Dry Mass, g	130.7		
Diameter, in	2.5		
Normal Stress, ksf	5.0		
Rate of Deformation, in/min	0.0033		
	Initial	After Consolidation	After Shear
Height, in	0.999	0.99205	0.992
Water Content, %	26.4		33.7
Moist Unit Weight, pcf	128.1		136.5
Dry Unit Weight, pcf	101.3	102.0	102.1
Response at Maximum Nominal Shear Stress			
Nominal Shear Stress, ksf	3.11		
Lateral Displacement, %	2.80		
Change from Consolidated Height, %	-0.74		

CORPORATE OFFICE and CENTRAL LABORATORY
3400 N. Lincoln Blvd., Oklahoma City, OK 73105 (405) 528-0541
CA77 Exp. 06/30/11

Area Offices

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902 Trails West Loop	Enid, OK 73703	(580) 237-3130
202 SE "J" Ave.	Lawton, OK 73501	(580) 353-0872

File No.: 7311-3256

Report Date: 03/01/11

Date Sampled: 02/08/11

Project: Ft. Sill TEMF

Sampled By: Johnny Jarman

Location: Lawton, Oklahoma

REPORT: DIRECT SHEAR TEST OF SOILS UNDER
CONSOLIDATED-DRAINED CONDITIONS

LAB NO: 7311-3256
TEST METHOD: ASTM D3080

TEST RESULTS

Sample I.D.	BH-34F (3) Depth (ft.): 12.5-14.5		
Shear Device	Humbolt HM-2500		
Specimen Description	Light Brown Sandy Clay		
Specimen Condition	Thin-Walled Tube Sample		
Dry Mass, g	122.8		
Diameter, in	2.5		
Normal Stress, ksf	7.0		
Rate of Deformation, in/min	0.0033		
	Initial	After Consolidation	After Shear
Height, in	1.01	0.9465	0.941
Water Content, %	29.2		41.2
Moist Unit Weight, pcf	121.6		142.7
Dry Unit Weight, pcf	94.2	100.5	101.0
Response at Maximum Nominal Shear Stress			
Nominal Shear Stress, ksf	3.41		
Lateral Displacement, %	2.80		
Change from Consolidated Height, %	-0.53		

Client: **Mr. Jieliang Pan**
 Standard Testing
 3400 N. Lincoln
 Oklahoma City, OK 73105

Project: Ft. Sill TEMF

Analytical Results

Client Sample ID: **7311-3256 Composite #1** ETI ID: 1
 Sample Collected : **03/15/2011 @ 16:00** Matrix: **Solids**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Analyzed On</u>	<u>Analyst</u>	<u>Method</u>
Redox	180	mV	03/21/2011 11:30:00 AM	DS	

Client Sample ID: **7311-3256 Composite #2** ETI ID: 2
 Sample Collected : **03/15/2011 @ 16:00** Matrix: **Solids**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>	<u>Analyzed On</u>	<u>Analyst</u>	<u>Method</u>
Redox	188	mV	03/21/2011 11:30:00 AM	DS	

Respectfully Submitted:



Russell Britten
President

Unless ETI receives prior notification, all sample material not consumed in analysis will be retained for a period of 30 days before disposal.

APPENDIX E

Residual Heave Analysis Results
PCASE Pavement Analysis Results

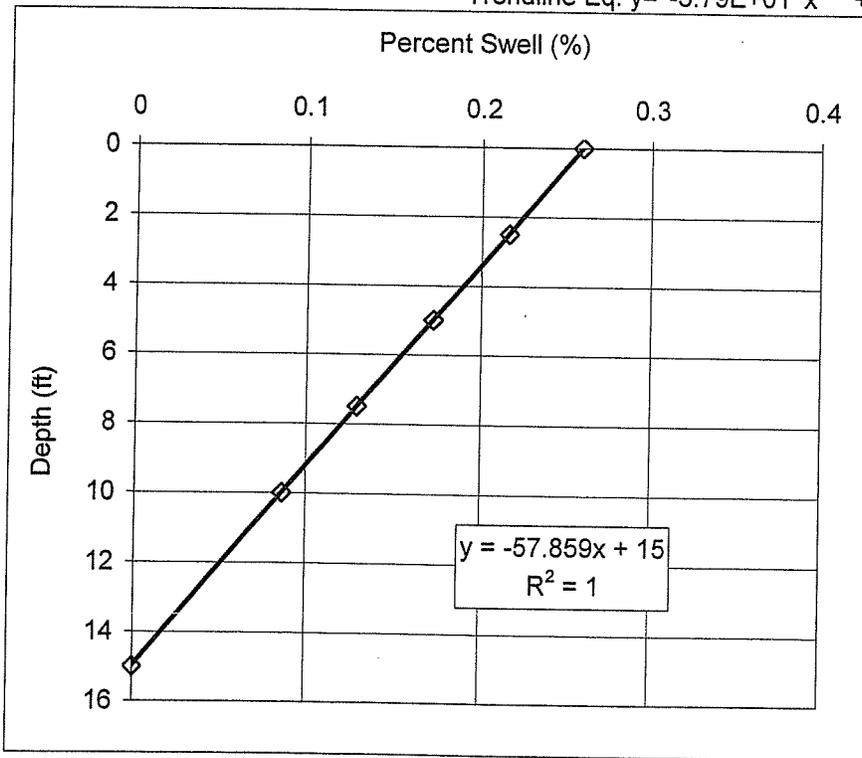
Project No.: 7311-3256
 Project Name: Ft. Sill TEMF
 Project Location: Lawton, Oklahoma

Boring No.: BH-3E Sample Depth: 8-10 ft.
 Swell Pressure (P_{sp} , tsf) = 0.65 Calculated Heave Active Depth (ft.) = 9
 Heave Active Depth (ft) = 15 Max. Heave Active Depth

$e_{v0} = 0.7461$ $e_0 = 0.7443$ P_0 (tsf) = 0.54
 $P_{sp} / P_0 = 1.204$ $\text{LOG} (P_{sp}/P_0) = 0.081$
 $C_r = 0.0225$ P_c (tsf) = 0.65 $C_c = 0.1475$

Depth (ft)	Mid. Depth (ft)	P_0 (tsf)	%Swell	Sample Depth (ft.) =
0	1.25	0.090	0.259	9
2.5	3.75	0.270	0.216	%Swell = 0.1037
5	6.25	0.450	0.173	Surface %Swell = 0.259
7.5	8.75	0.630	0.130	
10	12.5	0.900	0.086	
15	15	0.650	0.000	
15				

Trendline Eq. $y = -5.79E+01 x + 15$



Total Heave
 0.233 inches

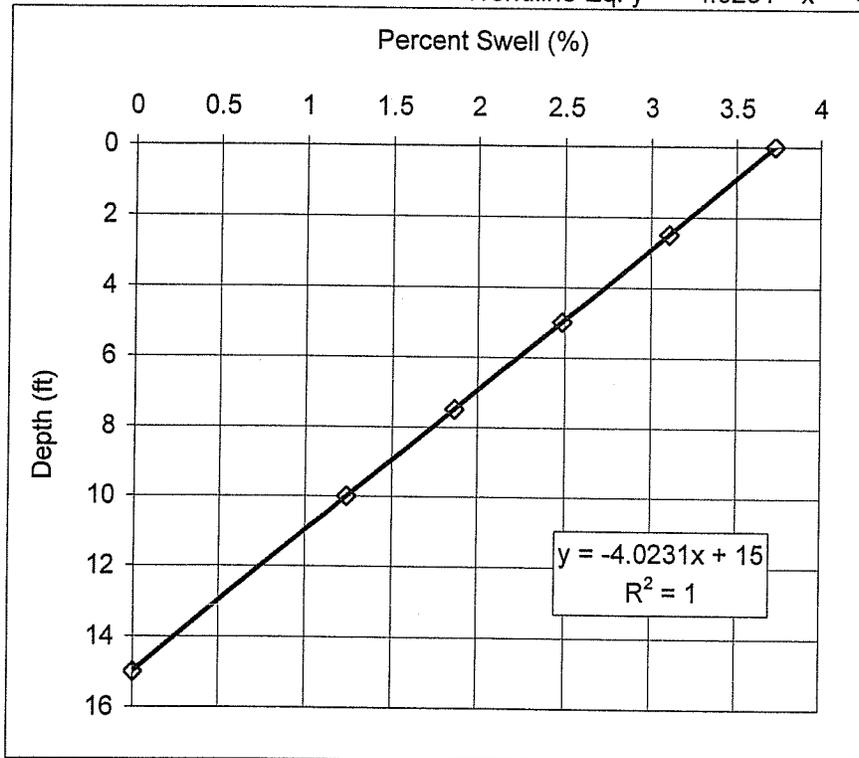
Project No.: 7311-3256
 Project Name: Ft. Sill TEMF
 Project Location: Lawton, Oklahoma

Boring No.: BH-9D Sample Depth: 6-8 ft.
 Swell Pressure (P_{sp} , tsf) = 2.00 Calculated Heave Active Depth (ft.) = 28
 Heave Active Depth (ft) = 15 Max. Heave Active Depth

$e_{v0} = 1.1206$ $e_0 = 1.0793$ P_0 (tsf) = 0.42
 $P_{sp} / P_0 = 4.762$ $\text{LOG}(P_{sp}/P_0) = 0.678$
 $C_r = 0.0610$ P_c (tsf) = 2.00 $C_c = 0.2978$

Depth (ft)	Mid. Depth (ft)	P_0 (tsf)	%Swell	Sample Depth (ft.) =
0	1.25	0.090	3.728	7
2.5	3.75	0.270	3.107	%Swell = 1.9885
5	6.25	0.450	2.486	Surface %Swell = 3.728
7.5	8.75	0.630	1.864	
10	12.5	0.900	1.243	
15	15	2.000	0.000	
15				

Trendline Eq. $y = -4.0231x + 15$



$Y = 0$
 $X = 3.728$

Total Heave
 3.356 inches

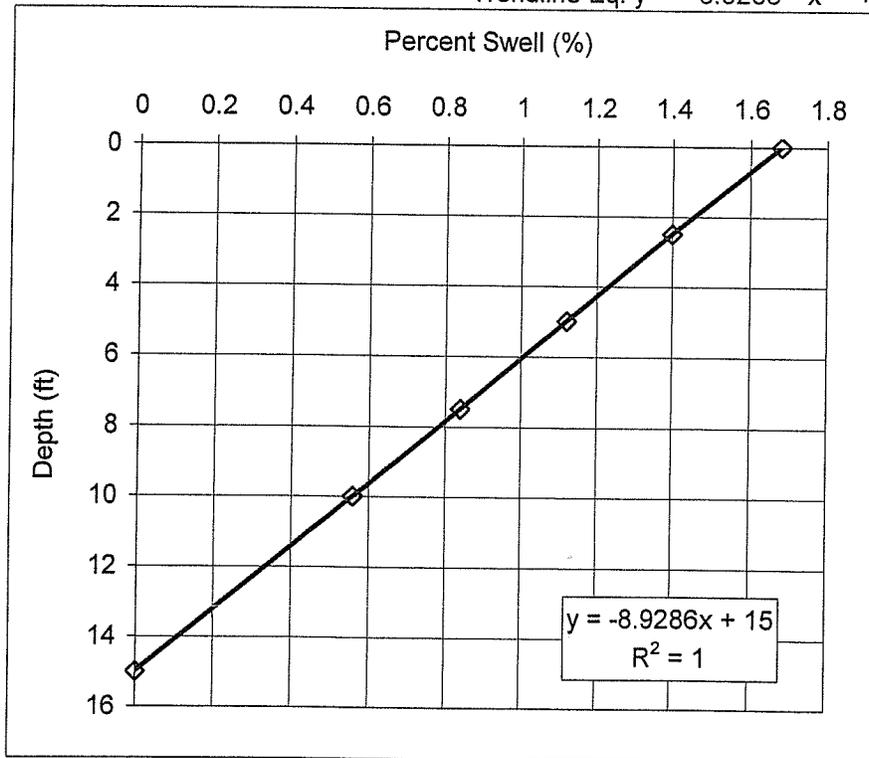
Project No.: 7311-3256
 Project Name: Ft. Sill TEMF
 Project Location: Lawton, Oklahoma

Boring No.: BH-21B Sample Depth: 2-4 ft.
 Swell Pressure (P_{sp} , tsf) = 0.58 Calculated Heave Active Depth (ft.) = 8
 Heave Active Depth (ft) = 15 Max. Heave Active Depth

$e_{v0} = 0.9862$ $e_0 = 0.9599$ P_0 (tsf) = 0.18
 $P_{sp} / P_0 = 3.222$ $\text{LOG} (P_{sp}/P_0) = 0.508$
 $C_r = 0.0518$ P_c (tsf) = 0.79 $C_c = 0.0518$

Depth (ft)	Mid. Depth (ft)	P_0 (tsf)	%Swell	Sample Depth (ft.) = 3
0	1.25	0.090	1.680	%Swell = 1.3440
2.5	3.75	0.270	1.400	Surface %Swell = 1.680
5	6.25	0.450	1.120	
7.5	8.75	0.630	0.840	
10	12.5	0.900	0.560	
15	15	0.580	0.000	
15				

Trendline Eq. $y = -8.9286x + 15$



$Y = 0$
 $X = 1.680$
Total Heave
 1.512 inches

Pavement Thickness Report
 U.S. Army Corps of Engineers
 PCASE Version 2.08
 Ft. Sill TEMF - Composite #1

Design Name : FT SILL FLEX PARKING
 Design Type : Roads
 Pavement Type : Flexible
 Traffic Area : N/A
 Road Type : Road
 Terrain Type : Flat
 Analysis Type : CBR
 Depth of Frost (in) : 0
 SCI : 0
 Wander Width (in) : 33.35
 % Load Transfer : 0
 Effective K (pci) : 0
 Reduced Sub Effective K (pci) : 0
 Design Index : 4
 Design Class : E
 Layers Count : 4
 Seasons Count : 1

Layer Type	Material Type	Frost Code	Moisture Content	Dry Weight (lb/cu ft)	Density (lb/cu ft)
Asphalt	Asphalt	NFS	0	0	0
Base	Unbound Base	NFS	0	0	0
Stabilized Subbase	LIME Stab-ML,MH,CL,CH	NFS	0	0	0
Natural Subgrade	Cohesive Cut	NFS	0	0	0

Section:

Pattern Name : FTSILLFLEXPARKING
 Analysis Type : Mixed
 Pavement Type : Flexible
 Subgrade Category : Cat D
 Traffic Area : Area A
 Traffic Count : 1

Vehicles
 AXLE, 18 KIP
 Weight (lb) : 18000
 Passes per Life Span : 73000
 Equivalent Passes : 73000

Pavement Thickness Report
 U.S. Army Corps of Engineers
PCASE Version 2.08
Ft. Sill TEMF - Composite #1

Flexural Strength (psi)	CrCb	% Steel	Analysis	Minimum Thickness (in)	Required Thickness (in) Above Layer	Non frost Design Thickness (in)
0	0	0	Compute	1.5	0	1.5
0	0	0	Compute	4	0.15	4
0	0	0	Compute	4	1.48	27.98
0	0	0	Manual	0	33.48	0

Section:

Pavement Thickness Report
 U.S. Army Corps of Engineers
 PCASE Version 2.08
 Ft. Sill TEMF - Composite #1

Equivalent Thickness (in)	Reduced Subgrade Strength (in)	Limited Subgrade Penetration (in)	Calculate at this Depth	Base Equivalency factor
1.5	0	0	No	1.15
4	0	0	N/A	1
27.98	0	0	N/A	1
0	0	0	No	1

Section:

Pavement Thickness Report
U.S. Army Corps of Engineers
PCASE Version 2.08
Ft. Sill TEMF - Composite #1

Subbase Equivalency Factor	CBR Strength	Modulus (psi)	Pr	Slip
2.3	0	350000	0.35	0
2	100	30000	0.35	0
1	50	550000	0.25	0
1	1.3	15000	0.4	0

Section:

Pavement Thickness Report
 U.S. Army Corps of Engineers
PCASE Version 2.08
Ft. Sill TEMF - Composite #1

Design Name : FT SILL FLEX ACCESS
 Design Type : Roads
 Pavement Type : Flexible
 Traffic Area : N/A
 Road Type : Road
 Terrain Type : Flat
 Analysis Type : CBR
 Depth of Frost (in) : 0
 SCI : 0
 Wander Width (in) : 33.35
 % Load Transfer : 0
 Effective K (pci) : 0
 Reduced Sub Effective K (pci) : 0
 Design Index : 4
 Design Class : E
 Layers Count : 4
 Seasons Count : 1

Layer Type	Material Type	Frost Code	Moisture Content	Dry Weight (lb/cu ft)	Density (lb/cu ft)
Asphalt Base	Asphalt	NFS	0	0	0
Stabilized Subbase	Unbound Base	NFS	0	0	0
Natural Subgrade	LIME Stab-ML,MH,CL,CH Cohesive Cut	NFS	0	0	0
		NFS	0	0	0

Section:

Pattern Name : FTSILLFLEXACCESS
 Analysis Type : Mixed
 Pavement Type : Flexible
 Subgrade Category : Cat D
 Traffic Area : Area A
 Traffic Count : 1

Vehicles
 AXLE, 18 KIP
 Weight (lb) : 18000
 Passes per Life Span : 1100000
 Equivalent Passes : 1100000

Pavement Thickness Report
 U.S. Army Corps of Engineers
 PCASE Version 2.08
 Ft. Sill TEMF - Composite #1

Flexural Strength (psi)	CrCb	% Steel	Analysis	Minimum Thickness (in)	Required Thickness (in) Above Layer	Non frost Design Thickness (in)
0	0	0	Compute	1.5	0	1.5
0	0	0	Compute	4	0.15	4
0	0	0	Compute	4	1.52	29.01
0	0	0	Manual	0	34.51	0

Section:

Pavement Thickness Report
 U.S. Army Corps of Engineers
 PCASE Version 2.08
 Ft. Sill TEMF - Composite #1

Equivalent Thickness (in)	Reduced Subgrade Strength (in)	Limited Subgrade Penetration (in)	Calculate at this Depth	Base Equivalency factor
1.5	0	0	No	1.15
4	0	0	N/A	1
29.01	0	0	N/A	1
0	0	0	No	1

Section:

Pavement Thickness Report
 U.S. Army Corps of Engineers
PCASE Version 2.08
Ft. Sill TEMF - Composite #1

Subbase Equivalency Factor	CBR Strength	Modulus (psi)	Pr	Slip
2.3	0	350000	0.35	0
2	100	30000	0.35	0
1	50	550000	0.25	0
1	1.3	15000	0.4	0

Section:

Pavement Thickness Report
 U.S. Army Corps of Engineers
PCASE Version 2.08
Ft. Sill TEMP - Composite #1

Design Name : FT SILL RIGID PARKING
 Design Type : Roads
 Pavement Type : Rigid
 Traffic Area : N/A
 Road Type : Road
 Terrain Type : Flat
 Analysis Type : K
 Depth of Frost (in) : 0
 SCI : 0
 Wander Width (in) : 33.35
 % Load Transfer : 0
 Effective K (pci) : 46
 Reduced Sub Effective K (pci) : 0
 Design Index : 5
 Design Class : E
 Layers Count : 3
 Seasons Count: 1

Layer Type	Material Type	Frost Code	Moisture Content	Dry Weight (lb/cu ft)	Density (lb/cu ft)
PCC	N/A	NFS	0	0	0
Base	Unbound Base	NFS	0	0	0
Natural Subgrade	Cohesive Cut	NFS	0	0	0

Pattern Name : FTSILLRIGIDPARKING

Analysis Type : Mixed
 Pavement Type : Rigid
 Subgrade Category : Cat D
 Traffic Area : Area A
 Traffic Count : 1

Vehicles AXLE, 18 KIP	Weight (lb) 18000	Passes per Life Span 1095000	Equivalent Passes 1095000
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Section:

Pavement Thickness Report
 U.S. Army Corps of Engineers
PCASE Version 2.08
Ft. Sill TEMP - Composite #1

Flexural Strength (psi)	CrCb	% Steel	Analysis	Minimum Thickness (in)	Required Thickness (in)	Above Layer	Non frost Design Thickness (in)
650	0	0	Compute	6	7.83	7.83	7.83
0	0	0	Manual	4	4	0	4
0	0	0	Manual	0	0	0	0

Section:

Pavement Thickness Report
 U.S. Army Corps of Engineers
PCASE Version 2.08
Ft. Sill TEMP - Composite #1

Equivalent Thickness (in)	Reduced Subgrade Strength (in)	Limited Subgrade Penetration (in)	Calculate at this Depth	Base Equivalency factor
7.83	0	0	N/A	1
0	0	0	N/A	0
0	0	0	No	1

Section:

Pavement Thickness Report
U.S. Army Corps of Engineers
PCASE Version 2.08
Ft. Sill TEMP - Composite #1

Subbase Equivalency Factor	K Strength (pci)	Modulus (psi)	Pr	Slip
1	0	400000	0.15	1000
0	0	30000	0.35	0
1	40	15000	0.4	0

Section:

Pavement Thickness Report
 U.S. Army Corps of Engineers
PCASE Version 2.08
Ft. Sill TEMF - Composite #1

Design Name : FT SILL RIGID ACCESS
 Design Type : Roads
 Pavement Type : Rigid
 Traffic Area : N/A
 Road Type : Road
 Terrain Type : Flat
 Analysis Type : K
 Depth of Frost (in) : 0
 SCI : 0
 Wander Width (in) : 33.35
 % Load Transfer : 0
 Effective K (pci) : 46
 Reduced Sub Effective K (pci) : 0
 Design Index : 5
 Design Class : E
 Layers Count : 3
 Seasons Count : 1

Layer Type	Material Type	Frost Code	Moisture Content	Dry Weight (lb/cu ft)	Density (lb/cu ft)
PCC	N/A	NFS	0	0	0
Base	Unbound Base	NFS	0	0	0
Natural Subgrade	Cohesive Cut	NFS	0	0	0

Pattern Name : FTSILLRIGIDACCESS

Section:

Analysis Type : Mixed
 Pavement Type : Rigid
 Subgrade Category : Cat D
 Traffic Area : Area A
 Traffic Count : 1

Vehicles
 AXLE, 18 KIP
 Weight (lb) : 18000
 Passes per Life Span : 1650000
 Equivalent Passes : 1650000

Pavement Thickness Report
 U.S. Army Corps of Engineers
PCASE Version 2.08
Ft. Sill TEMF - Composite #1

Flexural Strength (psi)	CrCb	% Steel	Analysis	Minimum Thickness (in)	Required Thickness (in)	Above Layer	Non frost Design Thickness (in)
650	0	0	Compute	6	7.94	7.94	7.94
0	0	0	Manual	4		0	4
0	0	0	Manual	0		0	0

Section:

Pavement Thickness Report
 U.S. Army Corps of Engineers
 PCASE Version 2.08
 Ft. Sill TEMF - Composite #1

Equivalent Thickness (in)	Reduced Subgrade Strength (in)	Limited Subgrade Penetration (in)	Calculate at this Depth	Base Equivalency factor
7.94	0	0	N/A	1
0	0	0	N/A	0
0	0	0	No	1

Section:

Pavement Thickness Report
 U.S. Army Corps of Engineers
 PCASE Version 2.08
 Ft. Sill TEMF - Composite #1

Subbase Equivalency Factor	K Strength (pci)	Modulus (psi)	Pr	Slip
1	0	4000000	0.15	1000
0	0	30000	0.35	0
1	40	15000	0.4	0

Section:

Pavement Thickness Report
 U.S. Army Corps of Engineers
 PCASE Version 2.08
 Ft. Sill TEMF - Composite #2

Design Name : FT SILL FLEX PARKING
 Design Type : Roads
 Pavement Type : Flexible
 Traffic Area : N/A
 Road Type : Road
 Terrain Type : Flat
 Analysis Type : CBR
 Depth of Frost (in) : 0
 SCI : 0
 Wander Width (in) : 33.35
 % Load Transfer : 0
 Effective K (pci) : 0
 Reduced Sub Effective K (pci) : 0
 Design Index : 4
 Design Class : E
 Layers Count : 4
 Seasons Count : 1

Layer Type	Material Type	Frost Code	Moisture Content	Dry Weight (lb/cu ft)	Density (lb/cu ft)
Asphalt	Asphalt	NFS	0	0	0
Base	Unbound Base	NFS	0	0	0
Stabilized Subbase	LIME Stab-ML,MH,CL,CH	NFS	0	0	0
Natural Subgrade	Cohesive Cut	NFS	0	0	0

Section:

Pattern Name : FTSILLFLEXPARKING
 Analysis Type : Mixed
 Pavement Type : Flexible
 Subgrade Category : Cat D
 Traffic Area : Area A
 Traffic Count : 1

Vehicles
 AXLE, 18 KIP
 Weight (lb) : 18000
 Passes per Life Span : 730000
 Equivalent Passes : 730000

Pavement Thickness Report
 U.S. Army Corps of Engineers
 PCASE Version 2.08
 Ft. Sill TEMF - Composite #2

Flexural Strength (psi)	CrCb	% Steel	Analysis	Minimum Thickness (in)	Required Thickness (in)	Above Layer	Non frost Design Thickness (in)
0	0	0	Compute	1.5		0	1.5
0	0	0	Compute	4		0.15	4
0	0	0	Compute	4		1.48	22.56
0	0	0	Manual	0		28.06	0

Section:

Pavement Thickness Report
 U.S. Army Corps of Engineers
 PCASE Version 2.08
 Ft. Sill TEMF - Composite #2

Equivalent Thickness (in)	Reduced Subgrade Strength (in)	Limited Subgrade Penetration (in)	Calculate at this Depth	Base Equivalency factor
1.5	0	0	No	1.15
4	0	0	N/A	1
22.56	0	0	N/A	1
0	0	0	No	1

Section:

Pavement Thickness Report
U.S. Army Corps of Engineers
PCASE Version 2.08
Ft. Sill TEMF - Composite #2

Subbase Equivalency Factor	CBR Strength	Modulus (psi)	Pr	Slip
2.3	0	350000	0.35	0
2	100	30000	0.35	0
1	50	550000	0.25	0
1	1.8	15000	0.4	0

Section:

Pavement Thickness Report
 U.S. Army Corps of Engineers
 PCASE Version 2.08
 Ft. Sill TEMF - Composite #2

Design Name : FT SILL FLEX ACCESS
 Design Type : Roads
 Pavement Type : Flexible
 Traffic Area : N/A
 Road Type : Road
 Terrain Type : Flat
 Analysis Type : CBR
 Depth of Frost (in) : 0
 SCI : 0
 Wander Width (in) : 33.35
 % Load Transfer : 0
 Effective K (pci) : 0
 Reduced Sub Effective K (pci) : 0
 Design Index : 4
 Design Class : E
 Layers Count : 4
 Seasons Count : 1

Layer Type	Material Type	Frost Code	Moisture Content	Dry Weight (lb/cu ft)	Density (lb/cu ft)
Asphalt	Asphalt	NFS	0	0	0
Base	Unbound Base	NFS	0	0	0
Stabilized Subbase	LIME Stab-ML, MH, CL, CH	NFS	0	0	0
Natural Subgrade	Cohesive Cut	NFS	0	0	0

Section:

Pattern Name : FTSILLFLEXACCESS
 Analysis Type : Mixed
 Pavement Type : Flexible
 Subgrade Category : Cat D
 Traffic Area : Area A
 Traffic Count : 1

Vehicles
 AXLE, 18 KIP
 Weight (lb) : 18000
 Passes per Life Span : 110000
 Equivalent Passes : 110000

Pavement Thickness Report
 U.S. Army Corps of Engineers
PCASE Version 2.08
Ft. Sill TEMF - Composite #2

Flexural Strength (psi)	CrCb	% Steel	Analysis	Minimum Thickness (in)	Required Thickness (in) Above Layer	Non frost Design Thickness (in)
0	0	0	Compute	1.5	0	1.5
0	0	0	Compute	4	0.15	4
0	0	0	Compute	4	1.52	23.44
0	0	0	Manual	0	28.94	0

Section:

Pavement Thickness Report
 U.S. Army Corps of Engineers
 PCASE Version 2.08
 Ft. Sill TEMF - Composite #2

Equivalent Thickness (in)	Reduced Subgrade Strength (in)	Limited Subgrade Penetration (in)	Calculate at this Depth	Base Equivalency factor
1.5	0	0	No	1.15
4	0	0	N/A	1
23.44	0	0	N/A	1
0	0	0	No	1

Section:

Pavement Thickness Report
 U.S. Army Corps of Engineers
 PCASE Version 2.08
 Ft. Sill TEMF - Composite #2

Subbase Equivalency Factor	CBR Strength	Modulus (psi)	Pr	Slip
2.3	0	350000	0.35	0
2	100	30000	0.35	0
1	50	550000	0.25	0
1	1.8	15000	0.4	0

Section:

Pavement Thickness Report
 U.S. Army Corps of Engineers
PCASE Version 2.08
Ft. Sill TEMF - Composite #2

Design Name : FT SILL RIGID PARKING
 Design Type : Roads
 Pavement Type : Rigid
 Traffic Area : N/A
 Road Type : Road
 Terrain Type : Flat
 Analysis Type : K
 Depth of Frost (in) : 0
 SCI : 0
 Wander Width (in) : 33.35
 % Load Transfer : 0
 Effective K (pci) : 58
 Reduced Sub Effective K (pci) : 0
 Design Index : 5
 Design Class : E
 Layers Count : 3
 Seasons Count : 1

Layer Type	Material Type	Frost Code	Moisture Content	Dry Weight (lb/cu ft)	Density (lb/cu ft)
PCC	N/A	NFS	0	0	0
Base	Unbound Base	NFS	0	0	0
Natural Subgrade	Cohesive Cut	NFS	0	0	0

Pattern Name : FTSILLRIGIDPARKING

Analysis Type : Mixed
 Pavement Type : Rigid
 Subgrade Category : Cat D
 Traffic Area : Area A
 Traffic Count : 1

Vehicles
 AXLE, 18 KIP
 Weight (lb) : 18000
 Passes per Life Span : 1095000
 Equivalent Passes : 1095000

Section:

Pavement Thickness Report
 U.S. Army Corps of Engineers
PCASE Version 2.08
Ft. Sill TEMF - Composite #2

Flexural Strength (psi)	CrCb	% Steel	Analysis	Minimum Thickness (in)	Required Thickness (in) Above Layer	Non frost Design Thickness (in)
650	0	0	Compute	6	7.71	7.71
0	0	0	Manual	4	0	4
0	0	0	Manual	0	0	0

Section:

Pavement Thickness Report
 U.S. Army Corps of Engineers
PCASE Version 2.08
Ft. Sill TEMF - Composite #2

Equivalent Thickness (in)	Reduced Subgrade Strength (in)	Limited Subgrade Penetration (in)	Calculate at this Depth	Base Equivalency factor
7.71	0	0	N/A	1
0	0	0	N/A	0
0	0	0	No	1

Section:

Pavement Thickness Report
 U.S. Army Corps of Engineers
 PCASE Version 2.08
 Ft. Sill TEMF - Composite #2

Subbase Equivalency Factor	K Strength (pci)	Modulus (psi)	Pr	Slip
1	0	400000	0.15	1000
0	0	30000	0.35	0
1	50	15000	0.4	0

Section:

Pavement Thickness Report
 U.S. Army Corps of Engineers
 PCASE Version 2.08
 Ft. Sill TEMF - Composite #2

Design Name : FT SILL RIGID ACCESS
 Design Type : Roads
 Pavement Type : Rigid
 Traffic Area : N/A
 Road Type : Road
 Terrain Type : Flat
 Analysis Type : K
 Depth of Frost (in) : 0
 SCI : 0
 Wander Width (in) : 33.35
 % Load Transfer : 0
 Effective K (pci) : 58
 Reduced Sub Effective K (pci) : 0
 Design Index : 5
 Design Class : E
 Layers Count : 3
 Seasons Count : 1

Layer Type	Material Type	Frost Code	Moisture Content	Dry Weight (lb/cu ft)	Density (lb/cu ft)
PCC	N/A	NFS	0	0	0
Base	Unbound Base	NFS	0	0	0
Natural Subgrade	Cohesive Cut	NFS	0	0	0

Pattern Name : FTSILLRIGIDACCESS

Analysis Type : Mixed
 Pavement Type : Rigid
 Subgrade Category : Cat D
 Traffic Area : Area A
 Traffic Count : 1

Vehicles
 AXLE, 18 KIP
 Weight (lb) : 18000
 Passes per Life Span : 1650000
 Equivalent Passes : 1650000

Section:

Pavement Thickness Report
 U.S. Army Corps of Engineers
PCASE Version 2.08
Ft. Sill TEMF - Composite #2

Flexural Strength (psi)	CrCb	% Steel	Analysis	Minimum Thickness (in)	Required Thickness (in)	Above Layer	Non frost Design Thickness (in)
650	0	0	Compute	6	7.82	7.82	7.82
0	0	0	Manual	4	4	0	4
0	0	0	Manual	0	0	0	0

Section:

Pavement Thickness Report
 U.S. Army Corps of Engineers
 PCASE Version 2.08
 Ft. Sill TEMF - Composite #2

Equivalent Thickness (in)	Reduced Subgrade Strength (in)	Limited Subgrade Penetration (in)	Calculate at this Depth	Base Equivalency factor
7.82	0	0	N/A	1
0	0	0	N/A	0
0	0	0	No	1

Section:

Pavement Thickness Report
U.S. Army Corps of Engineers
PCASE Version 2.08
Ft. Sill TEMF - Composite #2

Subbase Equivalency Factor	K Strength (pci)	Modulus (psi)	Pr	Slip
1	0	400000	0.15	1000
0	0	30000	0.35	0
1	50	15000	0.4	0

Section:

Appendix B
List of Drawings
Not Used

Appendix C

Utility Connections

See Appendix J Drawings

Appendix D
Results of Fire Flow Test

Date	Time	Flow Hydrant #	Residual Hydrant #	Static Pressure (psi)	Residual Pressure (psi)	c coefficient	Hydrant outlet diameter (d) (in)	Pitot Reading (psi)	sqrt	Qf Observed Flow (gpm)
4/25/2011	1335	3316	3303	50	48	0.9	2.5	37	6.082763	1021
4/25/2011	1320	3322	3324	58	56	0.9	2.5	44	6.63325	1113
4/25/2011	1415	3418	3438	50	48	0.9	2.5	44	6.63325	1113
4/25/2011	1345	3421	3438	50	48	0.9	2.5	44	6.63325	1113

Appendix E
Environmental Information

IMWE-SIL-PWE

21 Apr 09

MEMORANDUM FOR DPW, ATTN: IMWE-SIL-PWM (F. LePine)

SUBJECT: Record of Environmental Consideration (REC) – PN64753, Fires Brigade (BDE) Complex

1. Upon receipt of the documentation for the subject project, the Environmental Quality Division (EQD), Directorate of Public Works (DPW) initiated an environmental review. This review was based on the documentation provided (Enclosures 1 thru 3) by the DPW Master Planning Division on 8 January and 27 March 2009. If the scope, location or conditions of this project change, an additional review will be required. EQD concurs with this construction project provided the following comments are complied with and resolved in their entirety. It is the project manager / addressee's responsibility to confirm and document compliance with all of EQD's comments.

a. All National Environmental Policy Act (NEPA) requirements have been evaluated and determined not to meet the threshold requiring that a formal Environmental Assessment (EA) or Environmental Impact Statement (EIS) be drafted. This is based upon:

(1) Provided documentation (Enclosure 2) indicates that the purpose for this construction project is to support the Army transformation of the 75th BDE and 214th BDE. The reconfiguration of these units is identified as a Discretionary Action within the *Final Environmental Assessment, Implementation of Base Realignment and Closure Recommendations at Fort Sill, Oklahoma* (BRAC EA) dated August 2006 (Enclosure 4) located at the EQD Environmental Support Branch office (Building 2930). A discretionary action is one taken by the Army outside of the prescriptions of the BRAC Commission recommendations, enabling it to better carry out assigned missions.

(2) This project's location is identified in the *Final Environmental Assessment, Implementation of Base Realignment and Closure Recommendations at Fort Sill, Oklahoma* dated August 2006 in Figure 2-1 "Proposed Project Locations" (Enclosure 5) and Figure 4-3 "Proposed Land Use" (Enclosure 6) under the title "Fires BDEs & 31st ADA". The project location is clearly within the identified area of "future projects".

(3) In accordance with 32 CFR 651.12 (2) "if the proposed action is adequately covered within an existing EA or EIS, a REC is prepared to that effect". This construction project is in support of an action specifically addressed within the BRAC EA. In addition the location is clearly labeled for BRAC usage under the title "Fires BDEs & 31st ADA". In this instance, a REC is the appropriate documentation for this action and will be attached to the record copy of the BRAC EA.

Questions should be directed to John Bumgarner (EQD) at 580-442-3274. The criteria provided in this document must be followed.

IMWE-SIL-PWE

SUBJECT: Record of Environmental Consideration (REC) – PN64753, Fires Brigade (BDE) Complex

b. This project will require cultural resources consultation with the Oklahoma State Historic Preservation Office, Oklahoma Archeological Survey, the Fort Sill affiliated Native American tribes and the public IAW Section 106 of the National Historic Preservation Act as implemented under 36 CFR 800. It is imperative that the project proponent adheres to the requirements of the aforementioned regulations.

1) To initiate consultation, the Areas of Potential Effect (APE) will need to be identified. The APE is in two forms, **Direct** (definitive location and extent of all ground disturbance required to complete construction) and **Indirect** (visual effects from historic districts or buildings eligible for the National Register of Historic Places). The information required from the proponent includes, but is not limited to, the building (dimensions and height), support buildings, parking areas, driveways, utilities (from the point of connection from existing utilities to the new facility), materials and equipment laydown areas, grading, landscaping, etc. Building elevations are also required. This information is initially provided to the SHPO for concurrence prior to coordinating with the remaining consulting parties. This information should be provided to Kevin Christopher (EQD) at 580-442-5671.

2) Once the SHPO has concurred with the APEs, Fort Sill can then coordinate with the remaining consulting parties and public to 1) solicit their input, 2) resolve potential effects, and 3) provide them the final determination. Provided the SHPO approves, Fort Sill will pursue an expedited consultation process which will still take a minimum of 150 days. Be advised that if the project undergoes substantial changes from what is represented to the consulting parties, it could potentially extend the consultation period. Also, if any consulting parties have questions or issues, the consultation period is still subject to being extended and potentially result in a determination of potential effects requiring mitigation to the project plans.

3) Furthermore, be advised that the speed at which this office can initiate consultation is predicated upon its current workload at that time. Unless directed otherwise by the DPW chain of command, project consultation is initiated in the order by which the aforementioned information, in its entirety, is received from the project proponents. Work on this project shall not commence until the project manager/addressee has been provided correspondence from this office confirming completion of cultural resources consultation. Any changes in the basic design/footprint of the facility will result in consultation delays.

c. All subsurface utility lines, new and old, should be located and marked. If Asbestos Containing Material (ACM) is present (subsurface underground piping, etc.) and requires removal, it should be performed by an individual or firm trained in asbestos abatement and licensed with the State of Oklahoma. Questions should be directed to Darek Quickle (EQD) at 580-442-5671.

IMWE-SIL-PWE

SUBJECT: Record of Environmental Consideration (REC) – PN64753, Fires Brigade (BDE) Complex

d. These buildings do not qualify as a target houses or child-occupied facilities under the Oklahoma Department of Environmental Quality, Lead-Based Paint Management regulation. However, if paint is to be disturbed (eg. substrate demolition or surface preparation for painting such as sanding, scraping or other such activities that generate lead dust) its lead content should first be determined thru testing the impacted surfaces. If lead is present in the paint, the Contractor shall adhere to the Occupation Safety and Health Administration regulation 29 CFR 1926.62. All paint chip residue shall be turned-in to EQD for disposal (all of which is at the expense of the proponent). New paint shall be water-based latex as any other type may generate hazardous waste requiring turn-in to EQD. It is advised that you read the attached memorandum dated 1 November 2004 regarding “Painting of Buildings” (Enclosure 7) and implement accordingly should these concerns/conditions apply to the subject project. Questions should be directed to Darek Quickle (EQD) at 580-442-5671.

e. Be advised that 40 CFR 61.145(a) instructs to “thoroughly inspect the affected facility or part of the affected facility where the demolition or renovation operation will occur.” All asbestos records are the responsibility of the Directorate of Public Works, Operations and Maintenance Division and the accuracy of these surveys may be limited due to their age. If determined that asbestos-containing material is present and requires removal, a National Emission Standard for Hazardous Air Pollutants (NESHAPs) notification (40 CFR 61, Subpart M) shall be completed, signed and provided to EQD (attn: Darek Quickle) at least four weeks prior to initiating removal. The NESHAPs notification is also required for building demolitions (regulatory definition - “the wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations or the intentional burning of any facility”) regardless of whether asbestos is or is not present. The EQD will review the notification and forward to the Oklahoma Department of Environmental Quality – Air Quality Division (ODEQ). Furthermore, all asbestos abatement at Fort Sill shall be performed by Oklahoma Department of Labor licensed abatement contractors, abatement supervisors and workers. Questions should be directed to Darek Quickle (EQD) at 580-442-5671

f. No products or materials that contain asbestos at any concentration shall be used in this project. Be advised that there are a number of asbestos products which are manufactured to include, but not be limited to, asbestos-cement corrugated sheet, asbestos-cement flat sheet, pipeline wrap, roofing felt, vinyl-asbestos floor tile, floor tile mastic, asbestos cement shingle, millboard, asbestos-cement pipe, roofing coatings as well as non-roofing coatings. Furthermore, sheetrock which is imported into the United States may contain asbestos fibers at unknown concentrations. Questions or concerns should be directed to Darek Quickle (EQD) at 580-442-3274.

g. All solid waste and construction debris shall be delivered to the Fort Sill Landfill. The contractor can use the Fort Sill Landfill at no cost, as long as, they participate in Fort Sill’s

IMWE-SIL-PWE

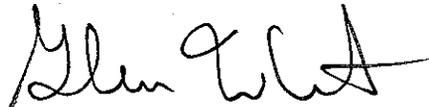
SUBJECT: Record of Environmental Consideration (REC) – PN64753, Fires Brigade (BDE) Complex

Construction and Demolition waste management program, which includes creating a waste management plan and reporting waste reuse and recycle quantities each month (Enclosure 8). Questions or concerns shall be directed to Gary Jarnagin (EQD) at 580-442-1041.

h. The area north of Mow-Way Road and west of Sheridan Road is part of a former range. EOD responses have occurred just west of Building 3393 and additional investigations will be conducted within the 25 acres just north of Mow-Way Road. MEC construction support is recommended anytime excavation occurs within this area. Based on the findings of the U.S. Army Environmental Command Site Investigation (SI) Report August 2005, as well as extensive development and maintenance activities (ex: landscaping, mowing, etc.), the other sub-sites investigated in this SI, including Camp Doniphan, the 8,000 Yard and 14,500 Yard Artillery Ranges, and the Rifle Range (ca 1906) as well as the other developed portions of the Cantonment Area MR Site footprint, do not represent a significant concern and are not recommended for further investigation. Questions shall be directed to Robert Rowden (EQD) 580-442-4651.

i. There are numerous oil-water separators located in this area that must be emptied prior to demolition. Most discharge, via gravity or a large pump station, to the central wash facility for make-up water. Currently, none are known to be leaking, however if some contamination is encountered during demolition, EQD should be contacted for advisement. Question shall be directed to Lee Silverstrim (EQD) 580-442-1144 / 3266.

2. Other questions or concerns can be directed to the undersigned at 580-442-5445 or John Bumgarner at 580-442-3274.



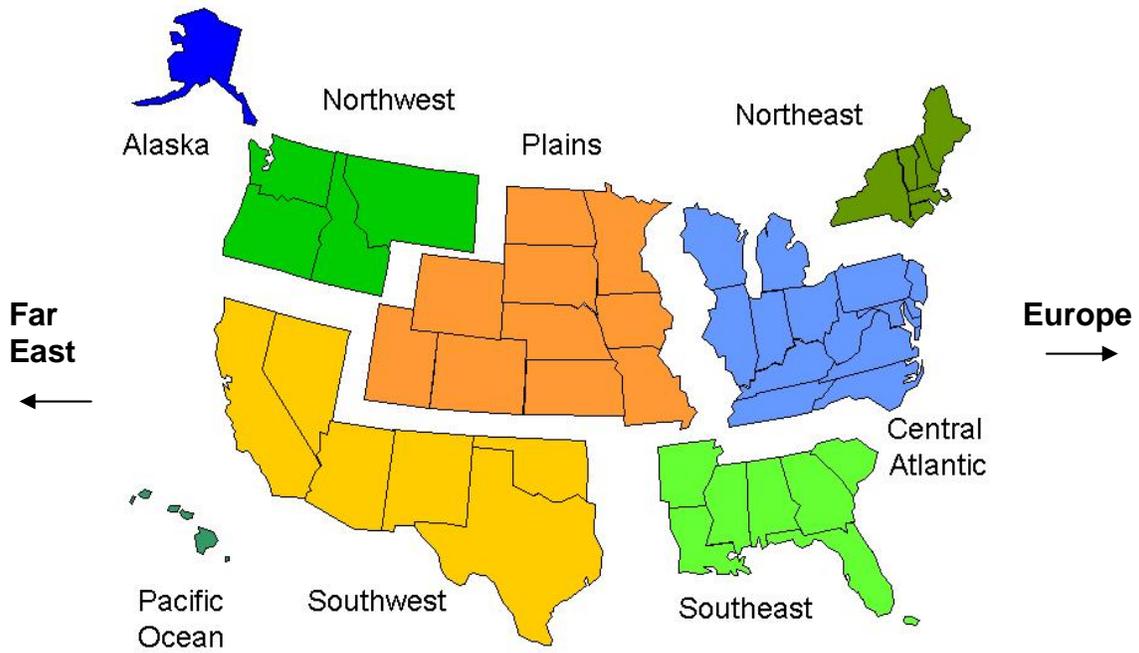
GLEN WHEAT
Chief, Environmental Quality Division
Directorate of Public Works

ENCLS

1. DPW Email – 8 Jan 09
2. DPW Email – 27 Mar 09
3. Project Location Map
4. BRAC EA – pgs 2-5 & 2-7
5. BRAC EA – Figure 2-1
6. BRAC EA – Figure 4-3
7. Lead Based Paint Memo
8. Waste Management Plan

Appendix F
Conceptual Aesthetic Considerations

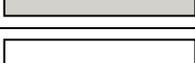
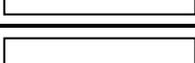
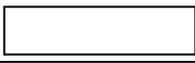
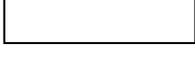
Appendix L
**EXTERIOR
COLOR
CHARTS**

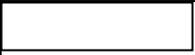


Southwest USA

L.1 Colors schemes and building materials are critical design elements in relating adjacent buildings and creating a compatible visual environment within an installation. This section identifies the Army standard palate of colors that will unify installations. A sufficient color palate range is provided to allow for variety. General direction on the use and application of materials and their colors follows --

- Avoid cluttered, cosmetic application of a number of different materials on a façade. Use materials consistently on all facades of a building.
- Select materials based upon their appropriateness to the building type, climatic conditions, and prevailing architectural design and landscape character of the installation.
- Utilize materials distinctive to an architectural character worthy of merit consistently throughout an installation.
- Relate buildings with compatible material and similar colors.
- Select colors for material from the Army color standard on the basis of the desired appearance, function, attractiveness of the building, and its compatibility with adjacent building colors.
- Limit exterior building colors to the Army established color palette. This provides each area a coordinated palette of similar colors that are subdued and harmonious. Avoid strong, loud colors.

<div style="display: flex; justify-content: space-between;"> EXTERIOR COLOR CHART <i>Southwest USA</i> </div>				
Building Design Element		Required Color Standard	Color Sample	Notes (Hyperlinked)
Walls	Base (primary) material	Tan Brick or native stone		
	Secondary material	Almond 5910W or Tan 23717		
		Mocha 20372		
Roof	Sloped areas	Metal Bronze or Terracotta		
		Clay Terracotta		
		Fiberglass Shingle Gray/White		
	“Flat” areas	White		
Fenestration	Doors	Wood: White 5770W		
		Steel: Dark Brown 5225N		
	Storm Doors	White		
	Door & Window Frames	Brown 20313		
	Storm window or sash	White		
	Window	White		
Trim Items	Fascia	White		
	Soffit	White		
	Gutters and D.S.	Brown 20313		
	Awnings and canopies	23717		
	Stair or balcony railings, balusters and related trim	Chocolate		
	Handrails	Brown 20313		

Building Design Element		Required Color Standard	Color Sample	Notes
Trim Items	Fire Escapes	Chocolate		
	Grilles and louvers	Brown 20313		
	Coping	Brown 20313		
	Roof ventilators	Blend to match roof		
Related Site Structures	Courtyard enclosure walls, retaining walls, fences, dumpster enclosures	Red Brick or Chocolate	 	
	Porch crawl space enclosure	White		

NOTES	
Note 1	<i>Installation: Enter notes where applicable</i>
Note 2	<i>Installation: Tab to expand note listings</i>
Note 3	Identify type, color and texture of local brick, stone, to include mortar color and joint style

A blue rectangular graphic with white text. The text reads "Section 8" in a serif font, followed by "BUILDINGS DESIGN STANDARDS" in a bold, sans-serif font.

Section 8
**BUILDINGS
DESIGN
STANDARDS**

8.1 INTRODUCTION

8.1.1 The design character of an installation's buildings affect the installations 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 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 add to an installation's character and provide a sense of heritage.

8.1.3 The visual analysis of structure also includes concern 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.

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 more complete discussion on Sustainable Design.

8.2.2 Building Design Objectives:

8.2.2.1 Adapt building designs to natural site conditions (Fig 8.1).

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.

8.2.2.9 Consider adaptive reuse of buildings once their initial use is no longer required.

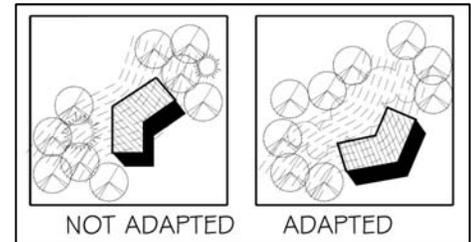


Fig. 8.1 - Adapt Building Design to Site Conditions



Fig. 8.2 - Use Indigenous Construction Materials Reduces Transportation Cost

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. 8.3). 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.

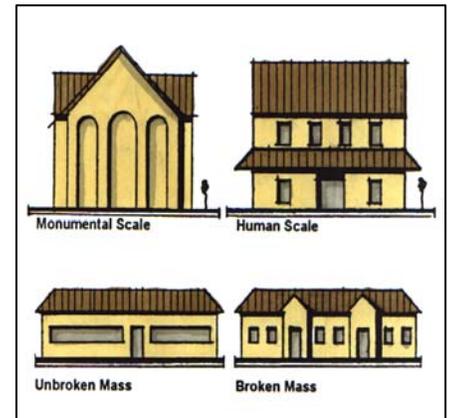


Fig. 8.3 – Structure Scale and Massing

8.3.3.2 Massing. Massing refers to the overall bulk or volume of a building or buildings (Fig. 8.3). 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 impact. The result is a more aesthetically pleasing environment.

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. 8.4). 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 materials of similar texture in buildings helps to provide visual continuity for the installation

8.3.3.6 Materials. The use of the same materials in the exterior finish and trim of buildings helps provide visual continuity.

8.3.3.6 Fenestration. Building fenestration includes features such as doors, windows, and building decoration details. These features should be similar in arrangement, design, size and proportion for architectural compatibility and visual consistency and continuity (Fig. 8.5).

8.4 BUILDING ENTRANCES

8.4.1 A building entrance is a primary feature of any building design. The entrance should be defined and recognizable as the point of entry regardless of the size or importance of the building (Fig. 8.6).

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 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 screened as an enclosure by



Fig. 8. - Color and Form Contribute to a Sense of Place



Undesirable: Continuous Unbroken Mass



Projections and Residential Scale Openings Break Up Mass

Fig. 8.5 - Fenestration breaks up mass

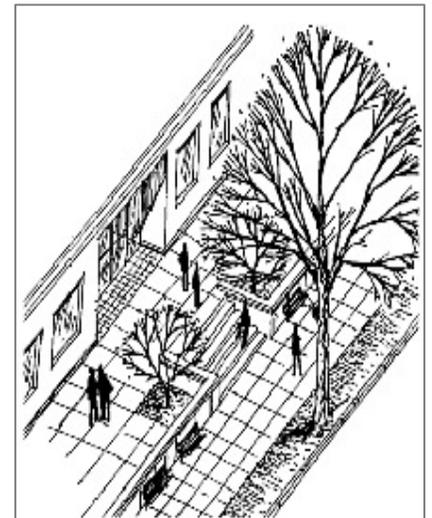


Fig. 8.6 - Entrance is Positive Visual

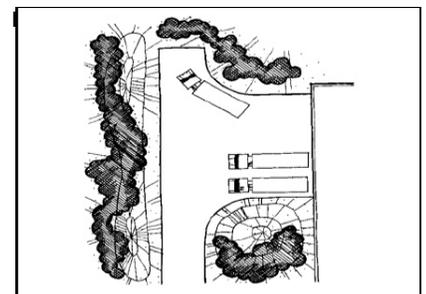


Fig. 8.7 - Plants and Berms in Service Area Presents a Positive Visual Image

using walls and landscaping. Screen walls should be between six and eight feet high and should be in harmony with the adjacent building.

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. They will be placed a minimum of 10 meters (33 feet) from all other inhabited structures ([UFC 4-010-01](#), Table B-1).

8.6 BUILDING ACCESSIBILITY

8.6.1 All structures or facilities, other than the exceptions mentioned below, must meet the [Americans with Disabilities Act Accessibility Guidelines \(ADAAG\)](#) and the [Uniform Federal Accessibility Standards \(UFAS\)](#) accessibility standards. The more stringent standards apply in the event of conflicting guidelines (Fig. 8.8).

8.6.1.1 Any building or facility that is specifically restricted by occupancy classification to use only by able-bodied personnel during the expected useful life of the building or facility need not be accessible [military exclusion is provided by [UFAS 4.1.4 \(2\)](#)], but accessibility is recommended since the intended use of the facility may change with time.

8.6.1.2 In particular, the following facilities need not be designed to be accessible: unaccompanied personnel housing, closed messes, vehicle and aircraft maintenance facilities.

8.7 SEISMIC POLICY

8.7.1 The minimum performance objective for Army facilities is Substantial Life-Safety. To ensure compliance, seismic evaluations and mitigation of unacceptable seismic risks shall be performed. Higher levels of seismic protection for mission essential facilities will be considered in the evaluation.

8.7.2 Seismic evaluation. Guidance for the seismic evaluation of existing facilities is given in [TI 809-05, *Seismic Design Evaluation and Rehabilitation for Buildings*](#). Buildings will have a seismic evaluation performed when:

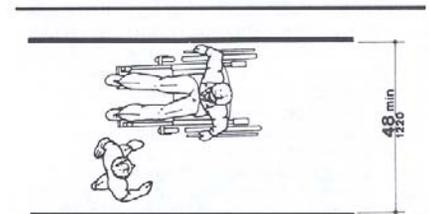


Fig. 8.8 - Facilities Must Meet UFAS Standards

- A change in the building's use causes a change in the occupancy category, as defined in [TI 809-04, Seismic Design for Buildings](#), to a category of greater importance (lower category number).
- A project is planned which causes the capacity of the structural system or components to be reduced to 90 percent or less of original stability and strength.
- A project will significantly extend the facility's useful life or will significantly increase the facility's value and the cost exceeds 50 percent of the current replacement value.
- A facility is damaged or is deemed to be an exceptionally high risk to occupants or to the public.

8.7.3 Exceptions to Seismic Evaluations. Existing facilities are exempt from seismic evaluation if:

- The original design was done according to the provisions of the 1982 or later edition of [TM 5-809-10](#), or the 1988 or later edition of TM 5-809-1.
- Replacement is scheduled within 5 years.
- The facility is intended only for minimal human occupancy, and occupied by persons for a total of less than 2 hours a day.
- The facility is a one or two family dwelling, two stories or less, located in zone 1 or 2, as shown in [TM 5-809-10](#).
- The gross area is less than 3000 square feet (275 square meters). Mitigation of unacceptable seismic risks. If the seismic evaluation determines that the facility does not meet Substantial Life-Safety or higher performance standards, as appropriate, unacceptable seismic risks will be mitigated. Rehabilitation will be performed in accordance with [TI 809-05](#).

8.7.4 New Facilities or Additions or Extension of Existing Facilities.

8.7.4.1 New facilities and additions or extension of existing facilities will be designed to provide the level of seismic protection required by [TI 809-04](#).

8.8 INDIGENOUS STRUCTURES

Sustainability in the design and construction of buildings includes incorporating time-proven building designs that are indigenous to the region (Fig. 8.X). Indigenous design elements should be utilized in the design of new buildings.

8.9 HISTORIC ARCHITECTURE

8.9.1 The visual integrity of historic buildings or districts on the installation will be preserved and protected. The Army's management of historic properties is pursuant to the duties and responsibilities established by Congress under the National Historic Preservation Act (NHPA). The NHPA also created the National Register of Historic Places as the official listing of the nation's historic properties considered worthy of preservation. When working with historic properties the Army uses the following three categories:

8.9.1.1 Historic Buildings or Structures. These are significant buildings or structures, which are listed in or eligible for listing in the National Register of Historic Places.

8.9.1.2 Historic District. A distinct group of buildings, structures, or landscapes that possesses significance and are listed in or eligible for listing in the National Register.

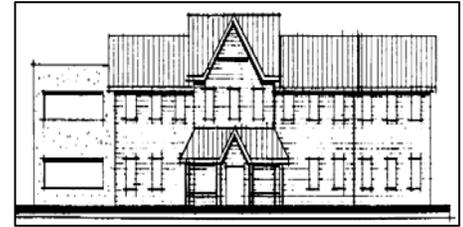
8.9.1.3 National Historic Landmarks. Buildings, structures, or landscapes listed in the National Register, but also recognized as nationally significant. National Historic Landmarks can either be listed individually or as a district.

8.9.2 For further guidance use [Army Regulation 200-4](#) and [Department of the Army Pamphlet 200-4](#). Specific requirements and recommendations for the treatment of historic properties, are available in the National Park Service's [Secretary of the Interior's Standards for the Treatment of Historic Properties](#). A working awareness of historic preservation policies and procedures followed by the Army Corp of Engineers can be found in the [Technical Instruction \(TI\) 800-01, Design criteria, Chp. 16, Preservation of Historic Structures](#).

8.9.3 See [Appendix M, Historic Preservation Guidelines](#).

8.10 RENOVATIONS AND ADDITIONS

When existing buildings are renovated or additions are constructed, the architectural character of the renovation or addition should be compatible with the architectural character of the existing building and the adjacent buildings (Fig. 8.9). This compatibility includes the use of materials, color, shape, size, scale and massing in the addition or renovation that blends with the architectural character of the existing structure. However, when renovating or adding to historical buildings one should be able to differentiate between the historic fabric and the new material.



Not This

This

Fig. 8.9 - Renovation/Additions should be Compatible

8.11 PLAZAS AND COURTYARDS

Plazas and courtyards can be located as part of the primary entrance to a building, or as an extension of non-primary entrance areas to the outside (Fig. 8.10). Wide, paved entrance plazas need vehicular barriers.

8.12 BUILDING MAINTENANCE

Buildings designed and constructed to incorporate sustainable design criteria should minimize life cycle, energy and maintenance costs through proper selection of forms, materials and construction details.

8.13 INTERIOR DESIGN

8.13.1 Introduction. Inhabited spaces, that require the selection of furnishings or equipment, should be designed by professional interior designers. Interior design impacts the functioning and productivity of people. People spend the majority of their time inside, working, eating, sleeping, and relaxing. The productivity, comfort, and safety of the personnel living, working, or relaxing in the facilities they inhabit is directly related to the quality of interior design provided within the facility.

8.13.2 Interior design is required on building construction and renovation projects regardless of the funding source. General interior design guidance and interior design

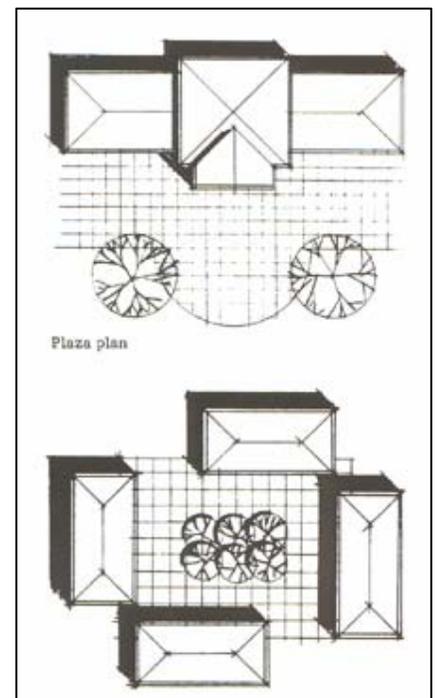


Fig. 8.10 - Plazas and Courtyards

guidance for medical facilities and family housing is provided at the following websites.

- General Guidance. [Design Guide \(DG\) 1110-3-122, Design Guide for Interiors.](#)
- Medical Facilities. Interior design guidance for medical facilities is furnished in [Military Handbook 1191, Medical Military Construction Program Facilities Design and Construction Criteria.](#)
- Family Housing. Interior design for family housing will be in accordance with [Technical Instruction \(TI\) 801-02, Family Housing.](#)

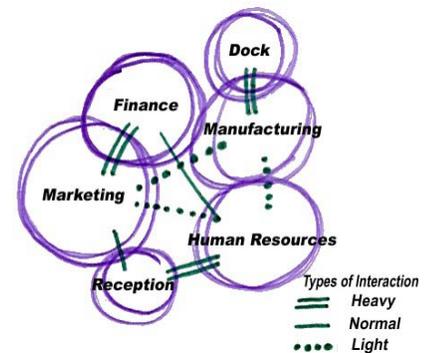
8.13.3 [Engineering Regulation \(ER\) 1110-345-122, Engineering and Design, Interior Design](#), defines projects that require interior design, design requirements and responsibilities of participants, and methods and funding for execution of interior design. For cost estimating see [Air Force Interior Design Guides, Chap. 3, Cost Estimating Guide](#)

8.13.4 Space Planning.

8.13.4.1 Space planning is the basic building block of the facilities program for administration and operational facilities. [Army Regulation \(AR\) 405-70, Utilization of Real Property](#) (Appendix D) provides numerical planning allowances and addresses the quantities for programming space for personnel and equipment.

8.13.4.2 Space planning takes into consideration the following; who will be using a space, how this space will be used, what activities will take place there, and the interaction of other people in the building. Professionally trained interior designers are best at gathering the required information to formulate a space utilization plan.

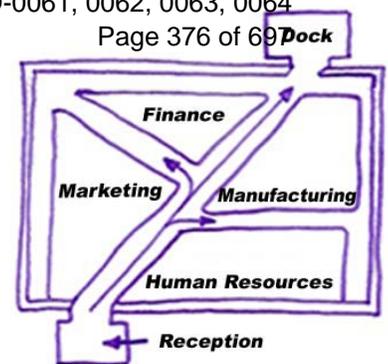
8.13.4.2.1 Bubble Diagrams. Bubble diagrams show the working relationship of one group to another (Fig 8.11). They do not represent a space plan or floor plan, but the relationship of organizations to one another. The adjacency requirements for individuals, user groups, and support functions to accomplish the product of service provided is analyzed. Bubble diagrams assist in organizing an existing facility as well as a new facility.



8.11 - A typical Bubble Diagram Indicating Group Relationships

8.13.4.2.2 Blocking Diagram. An extension of the bubble diagram is the block diagram. The blocking diagram is made more regular and is for fit inside the proposed floor plan(Fig. 8.12).

8.13.4.2.3 The next step in the process is the development of the actual space plan. The layout of the space plan is detailed to the workstation level.



8.12 - A Typical Blocking Diagram Demonstrating The Fit Into The Floor Plan

8.13.5 Electrical and Communications.

8.13.5.1 Electrical. Electrical power supply in the United States is available in a number of configurations, the most common of which are 120/240 volt single-phase three wire, 120/208 volt 3-phase 4-wire, and 277/480 volt 3-phase 4 wire.

8.13.5.1.1 Design standards for interior electrical systems are found in [Unified Facilities Criteria \(UFC\) 3-520-01, Interior Electrical Systems](#). Compliance with this UFC is mandatory for the design of interior electrical systems. This UFC:

- Establishes criteria for the design of interior electrical systems.
- Establishes system-level design criteria.
- Establishes facility-level criteria for interior electrical systems,
- Provides a starting point for determining the applicable design criteria for a facility.

8.13.5.1.2 Facilities outside the United States must comply with the applicable host nation standards; refer to [Technical Manual 5-688, Foreign Voltages and Frequencies Guide](#), for additional information.

8.13.5.2 Communications. Communications systems handle the transport of telephone and data networks (e.g. video, multi-media, teleconferencing, data transfer, facsimile transmission, and voice conversation).

8.13.5.2.1 The design criteria for interior wiring of communications and information system is found in the Installation Information Infrastructure Architecture (I3A) Design and Implementation Guide. This guide shall be used as the basis for designing both the premises distribution system (inside plant) and the outside plant cable distribution system for all new construction and renovation projects. The Installation Information Infrastructure Architecture (I3A) Design and Implementation Guide is Appendix A of [U.S. Army Corps of Engineers engineering technical letter \(ETL\) 1110-3-502, Telephone and Network Distribution System Design and Implementation Guide.](#)

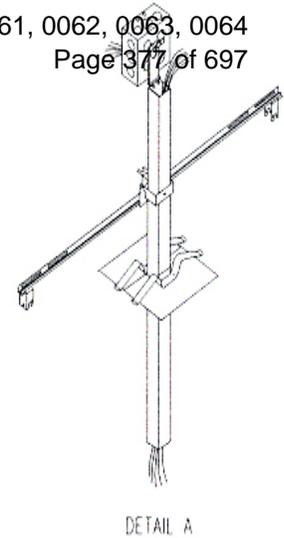


Fig. 8.13 - System furniture utility column for electrical and communication distribution

8.13.5.3 Distribution. Distribution of electrical and electronic systems through a building is generally accomplished through branched distribution. A central chase or trunk will run the length or height of the facility, then horizontal distribution systems run from a central connection closet to the end user. This distribution may be overhead or underfoot, in many instances it is a combination of the two (Fig. 8.13).

8.13.6 Color.

8.13.6.1 Color plays an important role in the design of interior environments. Color has a large impact on how we feel and behave in a space. Its quality affects emotions directly and immediately. Successful interior designs harmonize form, space, light, and color.

8.13.6.2 Information on color and light, optical effects, basic color theory, color schemes, and applying color in facilities can be found in Corps of Engineers, [Design Guide \(DG\) 1110-3-122, Design Guide for Interiors](#), Chap. 3, Light and Color and in the Air Force Interior Design Guides, Chap. 9, Color Principles, [Part 1](#) and [Part 2](#).

8.13.7 Acoustics.

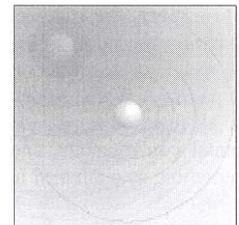
8.13.7.1 Acoustics as an environmental variable significantly impacts the human impression of an interior environment. Productivity, speech intelligibility, privacy, safety, positive user attitude and response, and environmental comfort all depend on proper acoustic design. The interior designer is concerned with reducing unwanted noise and preserving desirable sound in a space. Sound can be controlled in the following three ways: eliminate the source, isolate the



Elimination



Isolation



Masking

Fig. 8.14 - Control Noise Sources

source, i.e. provide a barrier between the user and the source or mask the offending sound.

8.13.7.2 A discussion of the dynamics and control of acoustics can be found in the [Design Guide \(DG\) 1110-3-122, Design Guide for Interiors](#), Chap. 5.

8.13.8 Interior Lighting.

8.13.8.1 Lighting will be designed with the work activities being performed in mind. Always supplement overhead lighting with task lighting and use architectural lighting in entrances, corridors, waiting rooms, and other spaces to light artwork and provide interest.

8.13.8.2 For Army installation buildings to achieve a high quality lighting environment, lighting equipment/systems selected must satisfy both performance and aesthetics (Fig 8.15). Factors for consideration in this selection are based on the following: lumens per watt, color temperature, color rendering index, life and lumen maintenance, availability, switching, dimming capability, and cost.

8.13.8.3 Lighting design approaches and lighting applications can be found in the following publications:

- [Technical Instructions \(TI\) 811-16, Lighting Design; Design Guide for Interiors, DG 1110-3-122](#) Chp. 5
- [Air Force Interior Design Guides, Chp. 10](#)
- [Unified Facilities Criteria \(UFC\) 3-520-01, Interior Electrical Systems](#), Appendix F.

8.13.8.4 Lighting Maintenance, Types, and Problem Solving. Information on lighting maintenance, types, and lamp trouble-shooting is found in [TM 5-683, Electrical Interior Facilities, Chp. 9](#).

8.13.9 Finishes. Interior finish standardization is important for administrative and financial reasons. Standardization presents a unifying element throughout all buildings that is more cost effective, efficient, and easy to maintain.

8.13.10 Installation Finishes Standards. Installation finishes standards are found in [Appendix I, Interior Finishes Standards](#) of this guide.

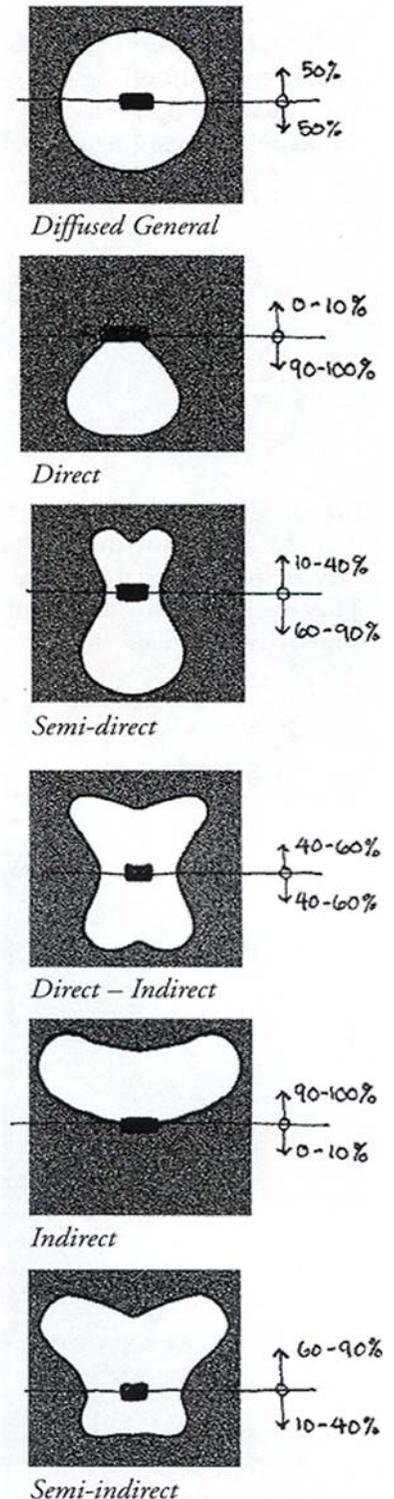


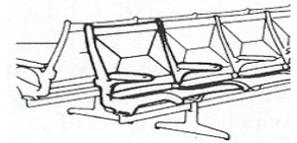
Fig. 8.15 - Typical Distribution of Light

8.13.11 Furnishings. Furnishings are elements added to a building for utility or ornamentation following construction. These include furniture such as chairs, desks, sofas, and tables and also cabinetry, window treatments, signage, accessories, art, and plants (Fig. 8.16). When selecting furnishings for an interior environment, care should be taken to include their design as an integral part of the overall concept and to ensure coherency between architecture, materials, furniture, art, and signage. The following paragraphs discuss the various furnishings components and give guidance on the programming, acquisition, functionality, and maintenance of the various components.

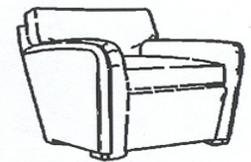


Fig. 8.16 - Conventional Casegoods

8.13.11.1 Furniture. Furniture systems are a wide range of furniture types comprised of components to create a custom designed work environment to meet specific functional needs. Furniture includes seating and casegoods. Casegoods are furniture elements constructed from box-like components. These include desks credenzas, file cabinets, etc. Case goods fall under two major categories: conventional and modular. Conventional casegoods are delivered as pre-assembled, ready-to-use products. Modular casegoods are manufactured as separate pieces that may be grouped into a number of different arrangements.



Multiple seating



Lounge seating



Side chair



Desk/conference chair

8.13.11.1.1 Systems Furniture. Systems furniture is ergonomically designed to meet a variety of conditions and requirements. Careful planning is critical during the initial stages of designing new systems furniture layouts. Power and communications requirements must be determined and planned so they are available at the locations where they are needed. Provisions for furniture systems electrical and data requirements must be made a part of the construction documents. See paragraphs 8.13.5.1.1 and 8.13.5.2.1 for interior design standards for electrical and communications wiring respectively. Surface mounted conduit and power poles are unsightly and should be avoided.

8.13.11.1.2 For a detailed discussion on the Army Interior Design Process (planning and programming, procurement, and design services) and Planning for Administrative Work Environments (data collection, analysis, space planning, layout, design coordination, documentation, and

Fig. 8.17 - Contract Seating,
Various Chair Classes

implementation) see Appendix A and Appendix B of [Design Guide for Interiors, DG 110-3-122](#) respectively.

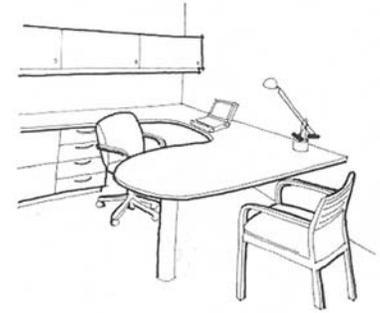
8.13.11.1.3 Budgeting for Furniture Systems. Furniture systems represent a significant percentage of a project. Furniture systems are O&M funded and should be included in the project scope along with such items as built-in casework. Furniture systems are listed on the DD Form 1391 as a non-add entry in Block 9 for "Equipment Provided for Other Appropriations". In Block 12b, the furniture systems should be as an O&M funded item, the fiscal year the funds are requested and the line item cost. Accessories can amount for a significant portion of the furniture systems package and should be budgeted with the basic system components.

8.13.11.1.4 Systems Furniture Design Guidelines.

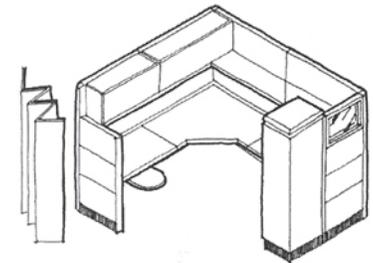
8.13.11.1.4.1 General.

- During the initial planning of new systems furniture, consider the condition and appearance of existing paint, wall coverings, carpet, and base of the area.
- When planning the location of office equipment and break areas, do not place heat generating devices, such as coffee makers or copiers, near a thermostat.
- Circulation paths should be clear and easy to navigate.
- Topics that should be considered when designing new systems furniture layouts include:
 - Function of the office
 - Adjacencies of personnel and activities
 - Meeting and conference room requirements
 - Individual storage needs
 - Areas for common use office equipment such as the copier and fax
 - Reception area with waiting and guest seating space

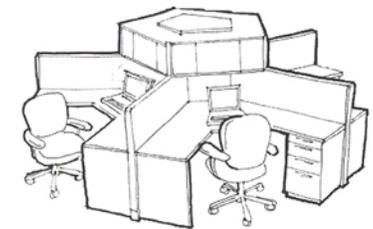
Wall-Based Systems



Stackable Panel System



Clusters



Desk-Based Systems



Fig. 8.18 - Systems Furniture

- Special furniture or needs of a particular office, such as drafting tables or extra storage space
- Communications equipment
- Task lighting, daylight, and ambient lighting
- Special security requirements
- Budget constraints
- Flexibility to allow future changes
- Schedules of design, delivery, and installation
- Air conditioning
- Acoustic performance requirements

8.13.11.1.4.2 Panels.

- Full height panels should be used only in areas with a specific need for increased privacy or separation, such as conference rooms, break areas, and certain private offices.
- Provide glass panels in corners and at windows to open up the space and allow natural light to filter into the center of the space
- Provide access panels in the systems furniture to allow for communications connection
- Panels should generally not exceed 66 inches in height in an open office area. Taller panels cut off air circulation, block views and natural light, and create a closed-in feeling.
- The location and use of taller panels must be carefully planned and coordinated because they can interfere with the proper functioning of air conditioning diffusers, fire sprinklers and smoke detectors, lighting fixtures, switches, thermostats, and sensors.
- Panels should not block service access to mechanical, electrical, or telephone equipment.

- Do not install panels in front of windows, as they will block natural light for the entire area. Panels installed perpendicular to windows should be installed at a window mullion.

8.13.11.1.4.3 Color and Texture.

- To maintain a professional atmosphere, the style and types of systems furniture should be consistent throughout the area.
- The materials and colors of the panels and chairs should be durable. They should be heavy-duty and stain resistant.
- The fabric on the systems furniture panels should harmonize with the overall building color scheme.

8.13.11.2 Window Treatments.

8.13.11.2.1 Window treatments serve many purposes in an interior environment. They provide privacy, light and sun control, reduced energy consumption, and decreased sound transmission. The type of treatment, as well as the type of material used, will determine the effective of the treatment in and give instance. The following should be taken into consideration when selecting fabric type:

- Sheer or semi-sheer fabrics will provide minimum privacy, shade, and energy conservation.
- Heavy, opaque fabric and hard treatments should be used only where total light exclusion is required.
- Full, soft treatments will absorb more sound than hard treatments.

8.13.11.2.2 Window treatments should complement and support the interior design of a space (Fig. 8.19). Window treatments also conceal architectural defects, or change the apparent size, shape and character of a room. Consider the following factors when making a window treatment selection:

- Light control requirements
- Architectural style

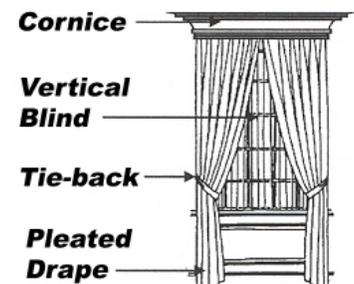


Fig. 8.19 - Window Treatments Should Complement the Interior Space

- Historical context

8.13.11.3 Signage.

8.13.11.3.1 Signage may be informational, directional, or regulatory. Informational signage provides the user with information and includes room or area labels, bulletin boards, menus, artwork descriptions, and emergency information. Directional signage directs circulation and provides orientation. It includes entry directories, directional arrows, and maps. The purpose of regulatory signage is control: providing prohibitions, warnings, emergency instructions, and use restrictions (Fig. 8.20).

8.13.11.3.2 Interior signage is covered in detail in [Technical Manual \(TM\) 5-807-10, Signage](#). The manual includes graphics for the following: directional, identification signs, information, and pictograms.

8.13.11.4 Accessories.

8.13.11.4.1 Accessories may be either functional or decorative. Whatever the purpose, accessories serve to make a room appear inviting and personal.

8.13.11.4.2 Functional Accessories. These accessories include letter trays, coat racks, lamps, product displays, magazine racks, brochure racks, and message boards. This group of accessories should be selected for utilitarian aspects as well as aesthetic qualities that may contribute to the total design concept. Repetitive elements can act as unifiers and help tie the accessories to the design theme.

8.13.11.4.3 Decorative Accessories. Decorative accessories are objects such as artwork and plants.

8.13.11.5 Art. The preparation of artwork to be displayed and positioned in an interior space involves many important decisions. The designer must work closely with the user to determine placements that are satisfactory for both functional and visual composition. Some of the factors to be taken into consideration in the selection of are:

- Quality (posters, prints, original art),
- Subject matter,

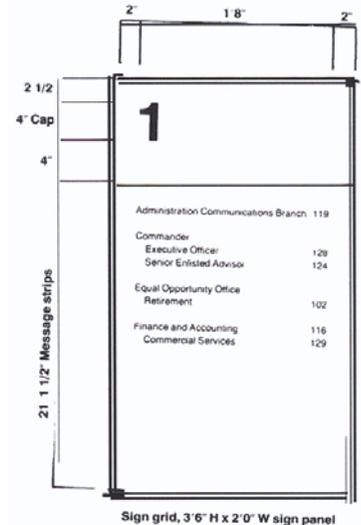


Fig. 8.20 - Directional Signal Directs Circulation

- Medium (photography, paper, oil, etc.),
- Size,
- Placement,
- Method of display (permanent collection or rotating program),
- Lighting, and
- Integration with design scheme.

8.13.11.6 Plants.

8.13.11.6.1 Plants add color, texture, and variety of form and shape to the interior. They bring a natural element to an interior space. They are used for focal points, screen, and for psychological effect. Increasingly, plants are being incorporated into the interior environment for the health and well-being of the user, as well as enrichment of the space.

8.13.11.6.2 When selecting plants, their light, water, and temperature needs, continuing care requirements, and ease of replacement must all be considered. Also, the types and amount of light the space has (direct or indirect) daylight, fluorescent, or incandescent must be considered. Plants should not be positioned such that their location presents a problem when watering.

8.13.11.6.3 Detailed information on interior planting to include design considerations (light requirements, temperature, atmosphere considerations, and planters), plant maintenance, and a listing of recommended plants can be found at the following web locations (Air Force Interior Design Guides, Chapter 8):

- [Design Considerations](#)
- [Maintenance](#)
- [Recommended Plant List](#)

8.13.12 Unified Facilities Guide Specifications. See the "Division 12 - Furnishings" section on the [Construction Criteria Base](#) website for Unified Facilities Guide Specifications for furnishings.

8.13.13 Installation Furnishings Standards. Installation furnishings standards are found in [Appendix J, Interior Furnishings Standards](#) of this guide.

8.13.14 Interior Operations Policies. To preserve the quality of facilities, operations policy is set between the user and the installation management. The user is responsible for preserving the visual appearance of the facility, and installation management is responsible for providing maintenance needed to preserve facility quality. Interior operations policies address the following issues (See [Appendix N, Housekeeping Rules \(Example\)](#)):

- Housekeeping responsibilities.
- Policy to prevent and eliminate visual clutter.
- Carpet cleaning, repair, and replacement policy.
- Height restrictions for partitions and furniture.
- Policy on buildings modifications including: partitions, painting, window treatment, HVAC, lighting, and the installation of communications and electric wiring.
- Maintenance of directories and signage.
- Smoking and eating locations.
- Procurement information on matching or compatible furniture.
- Policy on personalization and plants.

8.13.15 Interior Appearance Policy. The following are Army standards to follow. Keep work areas cleared of clutter. Cleanup, throw away.

- Avoid hanging things in the work area. Find another way to refer to organization charts, personnel listings, and calendars, other than having them hung on walls or partitions except framed artwork, diplomas, awards, etc.
- Notes and references hung on partition walls should be kept below the height of the partitions. Some things may be mounted on the partitions by hooking

into the metal supports between the partitions, but not by hooking into the fabric.

- Anything not contributing to the overall décor of the work area should be put in a drawer or on a shelf behind a closed door.
- Do not overwhelm the work area décor with an excess of plants or personal artifacts.
- Thin out your files.
- Keep walkways into work areas open and free of clutter. Do not store things on the floor, or on top of shelves, or partitions.
- Office chiefs should consider the overall office appearance and visual contrasts between work areas.
- Be sure that anything you do in your work area contributes to color coordination, rather than detracts from it.
- Keep vacant workstations and common areas clean. Do not use them as a dumping area for things you do not know what to do with.

8.14 EXTERIOR BUILDING MATERIALS AND COLOR

8.14.1 Exterior Building Materials.

8.14.1.1 Building materials make a major contribution to the scale, color, texture and character of a military installation. A limited palette of durable, low maintenance materials should be used that, while encouraging a variety of expression, provides a cohesive and consistent architectural character through the installation and within each visual zone. Material should reflect the function of a building, and its hierarchy within the installation.

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.

8.14.1.2.4 Use pre-finished material where possible - gutters, window frames, doorframes, etc.

8.14.1.2.5 Use blended colors on pitched roofs.

8.14.2 [Appendix K, Exterior Materials Charts](#) list the building materials applicable to the visual zones listed in the following paragraphs:

8.14.2.1 *Fort Sill visual zone applicable materials will be listed at a later date.*

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.](#))

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 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.



Fig.8.22 - The Geographical Areas for Exterior Colors

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 that is built in attractive neighborhoods.

8.15.2.2 The Military Housing Privatization Initiative (MHPI) legislation allows developers to build 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 a ["Quality Standards for New and Replacement Residential Communities Initiative \(RCI\) Family Housing"](#) to be used as reference points during CDMP preparation.

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 Department of the Army (DA), Facilities Standardization Program.

8.15.3.1 Under the DA Facilities Standardization program, standard design packages are developed for facility types that are repetitively designed and constructed at Army installations. These design packages are developed to the definitive design level (10%-15%) and once approved are mandatory for Army MILCON.

8.15.3.2 Currently, there are thirty one (31) DA standard design packages. Headquarters, U.S. Army Corps of Engineers has established eight (8) Centers of Standardization to develop and maintain the definitive and design packages. See [Appendix P, DA Facilities Standardization Program Centers of Standardization](#) for a list of the various centers and the facility type assigned to each center. ([Centers of Standardization](#) homepage.)

8.15.4 Unaccompanied Personnel Housing (Army Barracks Modernization Program).

8.15.4.1 The Army's Barracks Modernization Program is based upon a whole community approach providing modernized private living and sleeping areas for soldiers as well as a more functional work environment. This is being realized with the construction and renovation of barracks, and associated Company Operations Facilities (COF), Battalion Headquarters (BN HQ) and Brigade Headquarters (BDE HQ), and Dining Facilities (DEFAC). For a detailed discussion of the Army Barracks Modernization Program see the [Army Barracks Master Plan](#). The Army Barracks Master Plan only includes requirements for activity duty permanent party soldiers' barracks.

8.15.4.2 Army Barracks Standards. The Army Barracks Modernization Program design criteria gives commanders and contractors the direction to incorporate best business practices around a modular floor plan. The [Army Barracks Master Plan, Appendix I, Army Barracks Standards](#), promotes barracks with an appropriate balance between private and common areas. The Vice Chief of Staff of the Army (VCSA) specified the "New Army Barracks Construction Criteria" in his [Memorandum Subject: New Barracks Construction Criteria, dated 11 July 2002](#) in which he strongly endorsed the new standards. The criteria was further revised in [Memorandum Subject: Revised Barracks Construction Criteria, dated 1 May 2003](#) which makes the following four changes to the Army Barracks Standards:

- Establishes the two-bedroom/one bath module as the standard module;
- Requires installation of a stove or cook top;
- Requires laundries in the barracks; and
- Eliminates the separate soldier community building.

See the above memorandum for detailed guidance.

8.15.4.3 Furnishings.

8.15.4.3.1 Acquisition of new furnishings is planned and accomplished in concert with the facility design and

construction schedule so that delivery of the new furnishings coincides with the beneficial occupancy date (BOD).

8.15.4.3.2 The U.S. Army Interior Design Manual (IDM) for Single Soldiers provides guidance to help furniture managers prepare order packages. The manual uses standard Army furniture specifications; i.e. medium oak wood furnishings or acceptable wood/steel alternatives; construction and fabric specification, and specific information for authorized items of furniture. The manual also contains standard living/sleeping room arrangements, and SCB plans with color schemes. The manual includes information on waiver requirements, the procurement process, order forms, and final inspection checklist.

8.15.4.4 Construction design criteria for COFs, BBN HQ buildings, BDE buildings, and DEFAC facilities can be viewed on the web at [ProjNet](#).

8.15.5 Army Lodging.

8.15.5.1 The Army Lodging Standards promote economies in serving the Army traveler, but not at the expense of quality or service. The standards define the facilities and the level of service the Army traveler should expect.

8.15.5.2 The following standards provide the level of service that a guest should expect when they travel to an Army installation. That expected level of service should be consistent from installation to installation. The following documents provide the service, operations, and facilities standards for Army Lodging.

- [Army Lodging Standards for Service](#)
- [Army Lodging Standards for Operations](#)
- [Army Lodging Standards for Facilities](#)

8.15.6 Morale, Welfare, and Recreation (MWR) Branded Theme Operations.

8.15.6.1 The U.S. Army Community and Family Support Center (CFSC) through its Theme Operations, offers comprehensive theme packages pertaining to restaurants and entertainment centers. The packages are customized to the installation.

8.15.6.2 CFSC will conduct an assessment for market viability, provide architectural designs, and other promotional items. Information on the CFSC Branded Theme Operations to include how to get a theme operation, management support and food service support is located on the CFSC website at the [Army Brand Theme Operations Home Page](#).

8.15.7 Range Standards.

8.15.7.1 The Army Sustainable Range Program (SRP), proponent is HQDA Office Deputy Chief of Staff Operations, ODCSOPS/G3 (DAMO-TRS), phone number (703) 692-6410. To contact SRP technical support call (256) 895-1535 or e-mail RTLP@HND01.usace.army.mil.

8.15.7.2 The SRP develops and manages standard designs for Army Ranges in accordance with AR 210-21 and Training Circular 25-8 Army Training Ranges. The Range Standards are available on the following web pages.

- Design Manual for Remoted Target Systems (RETS) Ranges, [CEHCN 1110-1-23 Manual](#).
- [Revised Range Design/Construction Interface Standards](#)
- Unexploded Ordinance Considerations in the Planning, Design, and Construction of Ranges, [Supplement to CEHNC 1110-1-23 Manual](#)

8.16 PHYSICAL SECURITY REQUIREMENTS

To assure the required physical measures are met the installation Provost Marshall or Physical Security Officer will be coordinated with during the planning, design, and construction of all construction projects. ([AR 190-13, The Army Physical Security Program](#), Para 1-26) See [Section 12, Force Protection](#) for a more detailed discussion regarding Antiterrorism measures.

8.17 SALE AND OUTLEASE OF ARMY ASSETS

8.17.1 In an effort to offset some of the impacts of constrained resources, the Army has implemented initiatives that improve cost effectiveness and efficiency of installation operations. To the extent permitted by law, funds that become available as a result of these initiatives are retained by, or returned to, garrison commanders.

8.17.2 The Office of the Assistant Secretary of the Army for Financial Management and Comptroller (OASA (FM&C)) has developed the "[Sales and Outlease of Army Assets - Installation Guide](#)" to assist garrison commanders in using the sales and outlease program. The guide provides an overview of major policies, procedures, and responsibilities pertaining to the following three major initiatives of the program:

- Sale of Real Property;
- Outlease of Real Property; and
- Outlease of Personal Property.

The guide provides hyperlinks to Sale and Outlease governing regulations and legal and informational references.

8.18 ARMY STANDARDS

8.17.1 The cited Army Standards shall be met.

- [Army Regulation \(AR\) 420-70, Buildings and Structures](#)
- [Unified Facilities Criteria \(UFC\) 3-520-01, Interior Electrical Systems](#)
- [Unified Facilities Criteria \(UFC\) 4-010-01, DoD Minimum Antiterrorism Standards for Buildings](#)
- [Americans with Disabilities Act Accessibility Guidelines \(ADAAG\)](#)

- [Uniform Federal Accessibility Standards \(UFAS\)](#)
- [Secretary of the Interior's Standards for the Treatment of Historic Properties](#)
- [U.S. Army Corps of Engineers Engineering Technical Letter \(ETL\) 1110-3-502, Telephone and Network Distribution System Design and Implementation Guide](#)
- [Standards of Seismic Safety for Existing Federally Owned and Leased Buildings](#)
- [Army Barracks Master Plan, Appendix I, Army Barracks Standards](#)
- [Memorandum Subject: Revised Barracks Construction Criteria, dated 1 May 2003](#)
- [Quality Standards for New and Replacement Residential Communities Initiative \(RCI\) Family Housing](#)
- [Army Lodging Standards](#)
- Design Manual for Remoted Target Systems (RETS) Ranges, [CEHCN 1110-1-23 Manual](#)
- Unexploded Ordinance Considerations in the Planning, Design, and Construction of Ranges, [Supplement to CEHNC 1110-1-23 Manual](#)
- [Revised Range Design/Construction Interface Standards](#)

8.19 REFERENCES

8.18.1 The following references are provide for guidance.

- [Army Regulation \(AR\) 190-13, *The Army Physical Security Program*](#)
- [Army Regulation \(AR\) 200-1, *Environmental Protection and Enhancement*](#)

- [Army Regulation \(AR\) 200-2, *Environmental Effects of Army Actions*](#)
- [Army Regulation \(AR\) 200-4, *Cultural Resources Management*](#)
- [Army Regulation \(AR\) 405-45, *Real Property Inventory Management*](#)
- [Army Regulation \(AR\) 405-70, *Utilization of Real Property*](#)
- [Unified Facilities Criteria \(UFC\) 2-600-01, *Installation Design, Chap 8*](#)
- [Unified Facilities Criteria \(UFC\) 1-200-01, *Design: General Building Requirements*, 31 July 2002](#)
- [Engineering Regulation \(ER\) 1110-345-122, *Engineering and Design, Interior Design*](#)
- [Department of the Army Pamphlet \(DA PAM\) 200-4, *Cultural Resources Management*](#)
- [U.S. Army Corps of Engineers, Design Guide \(DG\) 1110-3-122, *Design Guide for Interiors*](#)
- [Department of Defense \(DoD\) Interior Design Website](#)
- [Military Handbook 1191, *Medical Military Construction Program Facilities Design and Construction Criteria*](#)
- [Technical Instructions \(TI\) 800-01, *Design Criteria*](#)
- [Technical Instructions \(TI\) 809-04, *Seismic Design for Buildings*](#)
- [Technical Instructions \(TI\) 809-05, *Seismic Design Evaluation and Rehabilitation for Buildings*](#)
- [Technical Instructions \(TI\) 811-16, *Lighting Design*](#)
- [Technical Manual \(TM\) 5-683, *Electrical Interior Facilities*](#)
- [Technical Manual \(TM\) 5-688, *Foreign Voltage and Frequencies Guide*](#)

- [Technical Manual \(TM\) 5-809-10/Navy NAVFAC P-355/Air Force AFM 88-3, Chap 13, *Seismic Design for Buildings*](#)
- [Technical Manual \(TM\) 5-809-10-2/Navy NAVFAC P-355.2/Air Force AFM 88-3, Chap 13, Sec B, *Seismic Design Guidelines for Upgrading Existing Buildings*](#)
- [Army Barracks Master Plan](#)
- [Air Force Sustainable Facilities Guide](#)
- [Air Force Interior Design Guides](#)
- Office of the Assistant Secretary of the Army for Financial Management and Comptroller (OASA (FM&C)) [Sales and Outlease of Army Assets - Installation Guide](#)
- [Assistant Chief of Staff for Installation Management, Sustainable Design and Development Website](#)
- U.S Army Corps of Engineers, Engineering Research and Development Center, Construction Engineering Research Laboratory (CERL), [Sustainable Design and Development Website](#)
- [U.S. Army Corps of Engineers Engineering Technical Letter \(ETL\) 1110-3-502, Telephone and Network Distribution System Design and Implementation Guide](#)
- [Whole Building Design Guide](#)
- Unified Facilities Guide Specifications (UFGS), "Division 12 - Furnishings", [Construction Criteria Base](#)

Links

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Appendix G

GIS Data



Fort Sill GIS (Geographic Information Systems) Deliverable Specifications

This document establishes the requirements for geospatial data deliverables produced as part of a contract. It includes description of the:

- **Deliverables**
- **Coordinate System and Datums:**
- **Data Quality Standard:**
- **SDSFIE-Compliant GIS Deliverable Specifications:**
- **FGDC compliant Metadata**

Deliverables

The intent of the GIS Deliverable set is to provide Fort Sill with comprehensive geospatial information about the facility footprint and site features that exist outside the building (s). The electronic deliverables must be in the file format and data standard used by Fort Sill and defined below.

File or Personal Geodatabase **ESRI 9.3.1** format or **ESRI 9.3.1** Shapefile format unless otherwise communicated through COR and stated in SOW.
 SDSFIE-Compliant GIS Deliverable Specification;
 FGDC Compliant Metadata;
 Coordinate System and Datum's in this document.

Coordinate System and Datums

Acceptable coordinate systems are standardized by (USAEC) U.S. Army Environmental Command.

All geospatial deliverables whether obtained via survey or any other collection process, shall be measured in [feet or meters]. The coordinate system for all geospatial data will be:

Coordinate System: GCS_WGS_1984
 Projection: UTM (Universal Transverse Mercator), Zone 14N.
 Horizontal Datum: WGS84 (World Geodetic Survey) 1984
 Vertical Datum: NAVD88 (North American Vertical Datum) 1988

Specifications:

Projected Coordinate System: WGS_1984_UTM_Zone_14N
 Projection: Transverse Mercator
 False_Easting: 500000.00000
 False_Northing: 0.00000
 Central_Meridian: -99.00000
 Scale_Factor: 0.999600
 Latitude_of_Origin: 0.00000
 Linear_Unit: Meter

Geographic Coordinate System: GCS_WGS_1984
 Datum: D_WGS_1984
 Prime Meridian: Greenwich
 Angular Unit: Degree



Data Quality Standard

Topology and positional accuracy are the first components of data quality that will be assessed by Fort Sill. These components are grouped together because changing either component has a direct effect on the other. Topology will be checked prior to positional accuracy, and positional accuracy will only be assessed if the data are topologically sound.

If a data layer is submitted a second time for Fort Sill review, both positional accuracy and topology will be reassessed. The data can only be reported as being topologically correct *and* positionally accurate. Reporting the data as meeting one requirement but not the other is not possible.

Positional accuracy is the difference between the location of features in the GIS data layer and their true locations on the ground. Positional accuracy applies in both the horizontal and vertical plane. The minimum acceptable horizontal and vertical accuracy of each data layer where vertical coordinates are collected is +/- 2cm.

Topology is how point, line, and polygon features share geometry. Fort Sill will verify that each data layer adheres to the topology rules defined below. The contractor shall utilize a topology build and clean routine and assure that the following:

Point features

- Must be inside polygons of "Parent" feature class, if applicable.
- Should be digitized as points, not graticules, cells, symbols or icons.

Line features

- Must not have erroneous self overlap, self intersect, overshoots, undershoots or dangles.
- Lines should all be continuous, i.e. do not create dashed lines with many small line segments
- Lines shall be surveyed at a minimum of two (2) points along every straight run, at every change of direction, at every tie in point, and at any change in line size.

Polygon features

- Must not have erroneous self overlap or gaps.
- Must be covered by the installation_area feature class unless SOW states differently.
- Must contain points of the "Child" feature class, if applicable.
- Digital representation of the common boundaries for all graphic features must be coincident, regardless of feature layers.

The contractor shall use conventional surveying and other methods, such as a total station or GPS for field data collection at an accuracy level in accordance with: "Geospatial Positioning Accuracy Standards, Part 4: Architecture, Engineering Construction, and Facilities Management."

Published by the FGDC and available at

http://www.fgdc.gov/standards/standards_publications/index.html.

Fort Sill has determined that the contractor may use industry-accepted standard procedures for preparing drawings showing the location of site features as constructed. The contractor must include in the metadata a brief discussion of the methods used and the resulting horizontal and vertical accuracy of the data.

Fort Sill preference is for the contractor to certify that all features as mapped are accurate within [+/- 0.5 meters] as determined through procedures in accordance with:

"Geospatial Positioning Accuracy Standards, Part 4: Architecture, Engineering Construction, and Facilities Management."

Published by the FGDC and available at

http://www.fgdc.gov/standards/standards_publications/index.html.



SDSFIE (Spatial Data Standards for Facilities, Infrastructure and Environment)-Compliant Deliverable Specification

Geodatabase Template

Upon request Fort Sill will provide the contractor with an SDSFIE 2.606 -compliant GIS geodatabase template to be used for populating the GIS deliverables required under the contract, or the contractor may download a complete SDSFIE compliant database model from:

<http://www.sdsfie.org/SDSFIEHome/tabid/36/Default.aspx>

The contractor shall populate the layers without modifying the template. The contractor shall ensure that layers to be delivered, but not included in the template are compliant with the current SDSFIE 2.606 standard.

There may be circumstances in which SDSFIE compliance cannot be maintained. In such circumstances, proposed deviations with the standard must be communicated by the contractor and reviewed by Fort Sill.

SDSFIE Browser and Browser Lite are available downloads from:

<http://www.sdsfie.org/SDSFIEHome/tabid/36/Default.aspx>

These browsers are invaluable tools that contain definition by structure, feature, alias, keyword, attribute or data source. These browsers contain the answers of where layers are stored, the required attributes, domain values and symbology required by Fort Sill and other DOD agencies.

Also available for download is the ESRI GeoDB Builder Tool. This tool allows the contractor to define what layers are needed and populate these layers with applicable attribute tables according to SDSFIE standard formatting.

FGDC Compliant Metadata

Metadata is data about data. All metadata generated by or for Federal agencies must meet the Federal Geographic Data Committee (FGDC) Content Standards for Digital Geospatial Metadata (CSDGM). A metadata file is considered complete when all required fields are populated with valid values. Metadata accuracy is a measure of how well the data creator documented the data creation process.

The contractor shall prepare metadata conforming to Federal Geographic Data Committee (FGDC) Content Standards for Digital Geospatial Metadata (CSDGM) most Current version (<http://www.fgdc.gov/metadata/contstan.html>).

Metadata content will accompany all electronic geospatial data submissions.

This includes both CADD and GIS formats.

A metadata file shall accompany, at minimum, each CADD file and each GIS-format geospatial data layer delivered by the contractor. Metadata should be prepared to FGDC standards and delivered in XML format readable by software applications that use the FGDC XML format standard (such as ESRI ArcCatalog v9.x SML-format metadata files). The digital metadata files shall be provided to Fort Sill along with each product deliverable.

Metadata Standards for Army Installation Geospatial Data

Section 1 – Identification

CSDGM Element Number	CSDGM Element Name	Description	Valid Values
1.1 Citation			
1.1 (Citation 8.1)	Identification (Data Set Originator)	The name of the office/branch/section and/or program that created the data set. This will contain USA, a single space, office/branch/section and/or program, a single space, followed by the installation/site name.	<i>Example values:</i> “USA Master Planning Office Fort x”
1.1 (Citation 8.2)	Identification (Data Set Publication Date)	The date of release or current version of the file. This represents the date that a given overlay layer and associated metadata file were “locked” for approval by the base-level command authority. Lineage: The data when the source was published or otherwise made available for release.	<i>Format:</i> yyyymmdd
1.1 (Citation 8.4)	Identification (Data Set Title)	The name by which the data set is referred. For all Army installations data this will contain the SDSFIE Entity Type name followed by the installation/facility name. To enhance searchability all underscores will be replaced with spaces. Lineage: The name by which the source of the layer is known. This could be the name of a local study, a national data set, a standard business process by which the data are generated, etc.	<i>Example values:</i> “Installation Area Fort x” “Military Range Area Fort x” “Flood Zone Area Camp x” “Wetland Area Fort x” “Mil Qty Distance Arc Area Fort x” “Noise Zone Area Camp x” Free text. Ex. “Short-Range Component”, “National Hydrology Dataset”
1.1 (Citation 8.6)	Geospatial Data Presentation Form	The mode in which geospatial data depicted in a layer were represented.	“Vector Digital Data”
1.1 (Citation 8.8.2)	Identification (Data Set Publisher)	The name of the Army component or program that published the data set.	<i>Valid Values:</i> “OACSIM IGI&S”, “USAR”, “USARNG” “SRP”, “AEC”

Metadata Standards for Army Installation Geospatial Data

CSDGM Element Number	CSDGM Element Name	Description	Valid Values
1.2 Description			
1.2.1	Description, Abstract	A brief narrative of the data set. For all Army installation data the SDSFIE Entity Type Definition will be used.	Valid values: SDSFIE Entity Type Definition Ex. Land and water currently owned or used by the military installation or facility
1.2.2	Description, Purpose	A summary of the intentions with which the data set was developed. <i>Note: Each program should develop a standard purpose to fit within their program.</i>	<i>As defined by Army Program Leads (ARNG, AEC, OACSIM, IMA..etc)</i>
1.3 Time Period of Content			
1.3 (Citation 9.1.1)	Time Period of Content (Single Calendar Date)	The latest date to which the data content represents conditions on the ground (that is, when the “real world” looked the way it is described in the data). If the data content represents features presented from an image or map product and are not verified to current real world conditions this data must be the date of the image or map product source. Note: This assumes the image or map product source date represents ground conditions for that date. If only the month and year of the date are known enter zeros (“0”) in the place of “dd” (for day) as shown. Ex. 20050400 represents April 2005.	<i>Format:</i> yyyymmdd
1.3.1	Time Period of Content, Currentness Reference	Reference for the Time Period of Content. For all Army installation data this value will be “ground condition”.	<i>Valid Value:</i> “Ground Condition”
1.4 Status			
1.4.1	Status, Progress	The state of the data set. Note: Data sets required for reporting to the Army GISR are not	<i>Valid Values:</i> “Complete” “In-Work”

Metadata Standards for Army Installation Geospatial Data

CSDGM Element Number	CSDGM Element Name	Description	Valid Values
		complete until approved by the designated Command Authority.	
1.4.2	Status, Maintenance and Update Frequency	<p>The frequency with which changes and additions are made to the data set after the initial data set is completed.</p> <p>Note: Data sets required for reporting to the Army GISR will have the update frequency defined by regulation.</p>	<p><i>Valid Values:</i> “Bianually”</p>
1.5 Spatial Domain			
1.5.1	Spatial Domain, Bounding Coordinates	<p>The outermost limits of coverage of a data set expressed by latitude and longitude values in the order western-most (CSDGM element 1.5.1.1), eastern-most (1.5.1.2), northern-most (1.5.1.3), and southern-most (1.5.1.4).</p>	<p><i>Valid Values:</i> <i>Latitude:</i> -90.00 to 90.00 <i>Longitude:</i> -180.00 to 180.00</p>
1.6 Keywords			
1.6.1.1	Theme Keyword Thesaurus	Reference to a formally registered thesaurus or a similar authoritative source of theme keywords.	<p><i>Valid Value:</i> “Spatial Data Standard for Facilities, Infrastructure, and Environment” (version number).</p>
1.6.1.2	Theme Keyword	Common-use words or phrase words used to describe the subject of the data set. Must include the installation name, entity type, entity class and entity set in addition to one or more of the remaining values in the list.	<p><i>Required Keyword Values:</i> { installation name } { service component } { entity type } { entity class } { entity set }</p> <p><i>Plus one or more of the following:</i> “boundaries” “farming” “climatologyMeteorologyAtmosphere” “biota” “economy” “planningCadastre” “society” “elevation” “environment”</p>

Metadata Standards for Army Installation Geospatial Data

CSDGM Element Number	CSDGM Element Name	Description	Valid Values
			"structure" "geoscientificInformation" "health" "imageryBaseMapsEarthCover" "inlandWaters" "location" "intelligenceMilitary" "oceans" "transporation" "utilitiesCommunication"
	Place Keywords	Geographical location of a dataset. This should include: country, state or territory, region, city, garrison, installation or site.	
1.7 Access Constraints			
1.7	Access Constraints	Restrictions and legal prerequisites for accessing the data set. These include any access constraints applied to assure the protection of privacy or intellectual property, and any special restrictions on obtaining the data set.	Valid Value: Data are to be used by Army personnel and Army support personnel only unless a written request to the IGI&S Government POC has been approved.
1.8 Use Constraints			
1.8	Use Constraints	Restrictions and legal prerequisites for using the data set after access is granted. These include constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations on using the data set.	<i>As defined by Army Program Leads (ARNG, AEC, OACSIM, IMA..etc)</i>
1.9 Point of Contact			
<p><i>The point of contact should be the Subject Matter Expert (SME) who identified the data source, and shall not be the base-level GIS/mapping POC (unless the POC authoring the metadata file is the same person as the subject matter expert responsible for source selection). In the event the SME expert is a contractor, the organizational information should reflect the government office for which the contractor works, not the contractor company information.</i></p> <p><i>The name of the individual/organization responsible for creating the metadata file is recorded in CSDGM element 7.4, Metadata Contact.</i></p>			
1.9 (Citation 10.1.1)	Point of Contact (Contact Person)	Name of Subject Matter Expert responsible for selecting the source for the given layer	Free text field Ex: "John Smith"

Metadata Standards for Army Installation Geospatial Data

CSDGM Element Number	CSDGM Element Name	Description	Valid Values
1.9 (Citation 10.1.2)	Point of Contact (Contact Organization)	Organization name (or office symbol for military organizations) of the subject matter expert.	Free text field Ex: "Fort Drum Dept of Public Works", "Fort Monmouth Directorate of Public Safety"
1.9 (Citation 10.3)	Point of Contact (Contact Position/Title)	Title of the subject matter expert.	Free text field
1.9 (Citation 10.4.1)	Point of Contact (Address Type)	The type of address provided. Must be one of the following valid values:	<i>Valid Values:</i> "mailing" "physical" "mailing and physical" "po box" Other (describe)
1.9 (Citation 10.4.2)	Point of Contact (Address)	Address line for the subject matter expert.	Free text field Ex: "1230 Main Street"
1.9 (Citation 10.4.3)	Point of Contact (City)	The address city for the subject matter expert.	Free text field Ex: "Honolulu", "San Diego"
1.9 (Citation 10.4.4)	Point of Contact (State or Territory)	The address state or territory for the subject matter expert. Use accepted two-letter Postal state/territory codes for this field.	Free text field Ex: "NY", "VA", "PR"
1.9 (Citation 10.4.5)	Point of Contact (Postal/ZIP Code)	The ZIP code for the subject matter expert. Nine digit ZIP codes, with dashes, preferred, but five digit zip codes will be accepted.	Free text field Ex: "22030-1260"
1.9 (Citation 10.4.6)	Point of Contact (Country)	Subject matter expert address country.	Free text field Ex: "USA"
1.9 (Citation 10.5)	Point of Contact (Telephone Number)	Subject matter expert Telephone number, including all applicable area codes and extensions. Commercial numbers are preferred, and should be preceded with "COMM" as shown. However, if only DSN numbers are	Free text field <i>Ex:</i> COMM 123-456-7890 DSN 123-4567

Metadata Standards for Army Installation Geospatial Data

CSDGM Element Number	CSDGM Element Name	Description	Valid Values
		available, enter that number here and precede the number with "DSN" as shown:	
1.9 (Citation 10.8)	Point of Contact (EMAIL address)	The email address for the subject matter expert.	Free text field Ex: "John.Smith@us.army.mil"
1.12 Security Information			
1.12.1	Security Classification System	The name of the classification system.	<i>Valid Values:</i>
1.12.2	Security Classification	The name of the handling restrictions on the data set.	<i>Valid Values:</i> "FOUO" "Unclassified" "Sensitive"

Section 2 – Data Quality Information

CSDGM Element Number	CSDGM Element Name	Description	Valid Values
2. Data Quality Information			
2.1 Attribute Accuracy			
2.1.1	Attribute Accuracy Report	Assessment of the accuracy of assigned values in the dataset. Detailed explanation of the accuracy of the dataset values, tests utilized to obtain these accuracy values and a date when the test was executed.	Attribute value domains and ranges are verified against a set domain of values according to SDSFIE. Content is populated according to the Standard Operating Procedures for that layer. Specific value content is verified by an authority with site knowledge and access to other sources.
2.2	Logical Consistency Report	Logical consistency describes how the geometry was	Free text field

Metadata Standards for Army Installation Geospatial Data

CSDGM Element Number	CSDGM Element Name	Description	Valid Values
		captured and explains any topological test that may have been performed. Since most commercial GIS software structures data topologically, simply describing the process of how the data was captured addresses this report.	Ex: Topology verified using the ArcINFO clean command.
2.3	Completeness Report	<p>Information about omissions, selection criteria, generalizations, definitions used, and other rules to derive the dataset.</p> <p>Use this field to record if any features (e.g., wetland polygon, floodplain polygon, APZ or ESQD clear zone, noise contour, or installation boundary element) were excluded from the data set for any reason.</p> <p>Note: This report should include all feature types that are present in the dataset.</p>	<p><i>If no omissions are present – Valid Value:</i> “Complete data set”</p> <p><i>If omissions are present – Valid Value:</i> Free text, describing any map features/elements that exist on the ground but have been omitted from the dataset due to classification constraints.</p> <p><i>Example Values:</i> “Wetlands from 1999 restoration study not included because {provide justification}” “New boundary from 2003 land transfer to {jurisdiction] not shown as the boundary re-survey has not yet been performed.”</p>
2.4 Positional Accuracy			
2.4.1.1	Horizontal Positional Accuracy Report	<p>A narrative explanation of the accuracy of the horizontal coordinate measurements. Use this field to record the horizontal positional accuracy of digital geospatial data sources and the published map scale of hardcopy/paper map sources, as stated on the selected source.</p> <p>Valid values must be stated in one of the following two fashions:</p> <ul style="list-style-type: none"> • Circular error, as defined by FGDC STD 007.3-1998, NSSDA, (digital sources) or • Meeting National Map Accuracy Standards (NMAS) at a given printed map scale (hardcopy/paper sources). 	<p><i>Example Values:</i></p> <p><i>Circular Error Format:</i> “4-meter CE 90 (1-meter imagery)” “25-meter CE 90 (5-meter imagery)”</p> <p><i>National Map Accuracy Standards:</i> “Meets National Map Accuracy Standards at {map scale}”</p> <p><i>If the layer was created using “heads-up” digitizing techniques and another image or overlay layer was used as reference:</i> “Referenced to {imagery or overlay layer name}”</p> <p><i>If horizontal positional accuracy is unknown:</i></p>

Metadata Standards for Army Installation Geospatial Data

CSDGM Element Number	CSDGM Element Name	Description	Valid Values
			“Unknown”
2.4.2.1	Vertical Positional Accuracy Report	Explanation of achieved accuracy, methods for ascertaining the accuracy values and dates of tests utilized to obtain those results.	Valid Values: Free text field or “NA”
<h3>2.5 Lineage</h3> <p><i>The following section may be repeated numerous times in the event that multiple sources were selected and used to develop any given layer. Most metadata management applications (including ESRI ArcCatalog and the USACE CorpsMet application) can accommodate numerous source citations.</i></p> <p><i>A set of Lineage, Process Description and Process Point of Contact elements are used to record the GIS technical point of contact.</i></p> <p><i>An additional set of Process Description elements are used to record the process and contact information for the data validation (signature) process.</i></p> <p><i>The following Lineage elements are used to record the source data information for the data set described.</i></p>			
2.5.1.1 (Citation 8.1)	Lineage, Source Citation (Source Originator)	The name of the individual or organization that developed the source of the data set.	Valid Values: {Source originator name}
2.5.1.1 (Citation 8.2)	Lineage, Source Citation (Source Publication Date)	The date when the source was published or otherwise made available for release. If only the month and year are known, but not specific day within the given month, enter zeros (“0”) in the place of “dd” as shown. Must be one of the following valid values:	Valid Values: “Unknown” “Unpublished material” {date} Date Format: yyyymmdd Example date values: “20020101” (representing 01 Jan 02) “20031128” (representing 28 Nov 03) “19980100” (representing Jan 98, where the specific day is not provided)
2.5.1.1 (Citation 8.4)	Lineage, Source Citation (Source Title)	The name by which the source of the layer is known. This could be the name of a local study, a national data set, a standard business process by which the data are generated, etc.	Valid Values: {source name} Example values: “National Wetlands Inventory”

Metadata Standards for Army Installation Geospatial Data

CSDGM Element Number	CSDGM Element Name	Description	Valid Values
			“USACHPPM Noise Study” “FEMA Flood Insurance Study for {jurisdiction}”
2.5.1.1 (Citation 8.6)	Lineage, Source Citation (Geospatial Data Presentation Format)	The mode in which geospatial data depicted in the layer were represented in the source document(s). Must be one of the following valid values:	<i>Valid Values:</i> “Diagram” “Map” “Model” “Profile” “Raster digital data” “Spreadsheet” “Tabular digital data” (e.g., coordinates) “vector digital data” Other (specify)
2.5.1.1 (Citation 8.8.2)	Lineage, Source Citation (Publisher)	The name of the individual or organization that published the data set source. Must be one of the following valid values:	<i>Valid Values:</i> {publisher name/organization} “Unknown” “N/A”
2.5.1.6	Lineage, Source Contribution	An indicator of which source for the data set was used.	<i>Example Values for Layers:</i> Values vary by layer type and by which source was chosen.
<i>The following Process Description elements describe the actions performed against the above sources in order to create the data. The POC listed below is the GIS technical point of contact.</i>			
2.5.2.1	Lineage, Process Description	General description of the process used to convert or create the data.	Free text field
2.5.2.3	Process Date	Date for the completion of data compilation.	
2.5.2.6 (Citation 10.1.1)	Process Point of Contact (Contact Person)	Party or parties responsible for the computation of the processing step information.	Free text field Ex. “John Smith”
2.5.2.6 (Citation 10.1.2)	Process Point of Contact (Contact Organization)	Organization name (or office symbol for military organizations) of the POC.	Free text field Ex: “Fort Drum Dept of Public Works”, “Fort Monmouth Directorate of Public Safety”
2.5.2.6 (Citation 10.3)	Process Point of Contact (Contact Position/Title)	Title of the point of contact.	Free text field

Metadata Standards for Army Installation Geospatial Data

CSDGM Element Number	CSDGM Element Name	Description	Valid Values
2.5.2.6 (Citation 10.4.1)	Process Point of Contact (Address Type)	The type of address provided. Must be one of the following valid values:	<i>Valid Values:</i> "mailing" "physical" "mailing and physical" "po box" Other (describe)
2.5.2.6 (Citation 10.4.2)	Process Point of Contact (Address)	Address line for the point of contact.	Free text field Ex: "1230 Main Street"
2.5.2.6 (Citation 10.4.3)	Process Point of Contact (City)	The address city for the point of contact.	Free text field Ex: "Honolulu", "San Diego"
2.5.2.6 (Citation 10.4.4)	Process Point of Contact (State or Territory)	The address state or territory for the point of contact. Use accepted two-letter Postal state/territory codes for this field.	Free text field Ex: "NY", "VA", "PR"
2.5.2.6 (Citation 10.4.5)	Process Point of Contact (Postal/ZIP Code)	The ZIP code for the point of contact. Nine digit ZIP codes, with dashes, preferred, but five digit zip codes will be accepted.	Free text field Ex: "22030-1260"
2.5.2.6 (Citation 10.4.6)	Process Point of Contact (Country)	Point of contact address country.	Free text field Ex: "USA"
2.5.2.6 (Citation 10.5)	Process Point of Contact (Telephone Number)	Point of contact telephone number, including all applicable area codes and extensions. Commercial numbers are preferred, and should be preceded with "COMM" as shown. However, if only DSN numbers are available, enter that number here and precede the number with "DSN" as shown:	Free text field <i>Ex:</i> COMM 123-456-7890 DSN 123-4567
2.5.2.6 (Citation 10.8)	Process Point of Contact (EMAIL address)	The email address for the point of contact.	Free text field Ex: "John.Smith@us.army.mil"
<i>The following lineage section represents the metadata elements that should be populated for the Signature Authority process and point of contact.</i>			
2.5.2.1	Lineage, Process Description	Description of the signature process.	<i>Valid Values:</i>
2.5.2.3	Process Date	Date the data was validated through signature (signature date).	
2.5.2.6	Signature Authority Point of	Name of the individual appointed as the Signature	Free text field

Metadata Standards for Army Installation Geospatial Data

CSDGM Element Number	CSDGM Element Name	Description	Valid Values
(Citation 10.1.1)	Contact (Contact Person)	Authority.	Ex. "John Smith"
2.5.2.6 (Citation 10.1.2)	Signature Authority Point of Contact (Contact Organization)	Organization name (or office symbol for military organizations) of the Signature POC.	Free text field Ex: "Fort Drum Dept of Public Works", "Fort Monmouth Directorate of Public Safety"
2.5.2.6 (Citation 10.3)	Signature Authority Point of Contact (Contact Position/Title)	Title of the Signature Authority.	Free text field
2.6	Cloud Cover	Area of data set obstructed by clouds expressed as a percentage of the spatial extent. Applicable to raster imagery only.	<i>Valid Values:</i> 0-100%

Section 3 – Spatial Data Organization Information

Not required

Section 4 – Spatial Reference Information

CSDGM Element Number	CSDGM Element Name	Description	Valid Values
4.1 Horizontal Coordinate System Definition			
<i>The Spatial Reference Information should be defined using one of the following Horizontal Coordinate Systems (4.1.1 Geographic or 4.1.2 Planar {UTM}).</i>			
4.1.1	Geographic	The quantities of latitude and longitude which define the position of a point on the Earth's surface with respect to a reference spheroid.	
4.1.1.1	Latitude Resolution	The minimum difference between two adjacent latitude values expressed in Geographic Coordinate Units of measure.	<i>Valid Value:</i> <i>Value > 0.0</i>
4.1.1.2	Longitude Resolution	The minimum difference between two adjacent longitude values expressed in Geographic Coordinate Units of measure.	<i>Valid Value:</i> <i>Value > 0.0</i>

Metadata Standards for Army Installation Geospatial Data

CSDGM Element Number	CSDGM Element Name	Description	Valid Values
4.1.1.3	Geographic Coordinate Units	Measurement units for horizontal coordinates. Must be the following value:	<i>Valid Value:</i> "Decimal Degrees"
4.1.4.1	Horizontal Datum Name	Name of the reference system used for defining horizontal coordinates. Must be the following value:	<i>Valid Value:</i> "World Geodetic System of 1984 (WGS 84)"
<i>The following Spatial Reference information should be used to define a Universal Transverse Mercator (UTM) Coordinate System.</i>			
4.1.2	Planar	The quantities of distances, or distances and angles, which define the position of a point on a reference plane to which the surface of the Earth has been projected.	
4.1.2.2	Grid Coordinate System, Grid Coordinate System Name	A plane-rectangular coordinate system usually based on, and mathematically adjusted to, a map projection so that geographic positions can be readily transformed to and from plane coordinates. The name of the grid coordinate system should be "Universal Transverse Mercator" (UTM). This is a grid system based on the transverse mercator projection, applied between latitudes 84 degrees north and 80 degrees south on the Earth's surface and consisting of zones numbered from 1-60.	<i>Valid Value:</i> "Universal Transverse Mercator"
4.1.2.2.1	UTM Zone Number	The identifier for the UTM Zone	<i>Valid Value:</i> 1 <= UTM Zone Number <= 60 for the northern hemisphere; -60 <= UTM Zone Number <= -1 for the southern hemisphere
4.1.2.1.23.17	Scale Factor at Central Meridian	A multiplier for reducing a distance obtained from a map by computation or scaling to the actual distance along the central meridian.	<i>Valid Value:</i> <i>Value > 0.0</i>
4.1.2.1.23.2	Longitude of Central Meridian	The line of longitude at the center of a map projection generally used as the basis for constructing the projection.	<i>Valid Value:</i> <i>-180.0 <= Longitude of Central Meridian < 180.0</i>
4.1.2.1.23.3	Latitude of Projection Origin	The latitude chosen as the origin of rectangular	<i>Valid Value:</i>

Metadata Standards for Army Installation Geospatial Data

CSDGM Element Number	CSDGM Element Name	Description	Valid Values
		coordinates for a map projection.	<i>-90.0 <= Latitude of Projection Origin <= 90.0</i>
4.1.2.1.23.4	False Easting	The value added to all “x” values in the rectangular coordinates for a map projection. This value frequently is assigned to eliminate negative numbers. Expressed in the unit of measure identified in Planar Coordinate Units.	<i>Valid Value: Free Text</i>
4.1.2.1.23.5	False Northing	The value added to all “y” values in the rectangular coordinates for a map projection. This value frequently is assigned to eliminate negative numbers. Expressed in the unit of measure identified in Planar Coordinate Units.	<i>Valid Value: Free Text</i>
4.1.2.4.2.1	Abscissa Resolution	The (nominal) minimum distance between the “x” or column values of two adjacent points, expressed in Planar Distance Units of measure. <i>NOTE: This field is auto-populated in ArcCatalog.</i>	<i>Valid Value: Value > 0.0</i>
4.1.2.4.4	Planar Distance Units	Units of measure used for distances.	<i>Valid Values: “meters”</i>
4.1.4.1	Horizontal Datum Name	Name of the reference system used for defining horizontal coordinates. Must be the following value:	<i>Valid Value: “World Geodetic System of 1984 (WGS 84)”</i>

Section 5 – Entity and Attribute Information

CSDGM Element Number	CSDGM Element Name	Description	Valid Values
5.1.1 Entity Type			
5.1.1.1	Entity Type Label	The name by which the data set is referred. For all Army installation data the SDSFIE Entity Type name will be used. To enhance searchability all underscores will be replaced with spaces.	<i>Valid Values: SDSFIE Entity Type (ex: firing line, military range area, noise contour line)</i>

Metadata Standards for Army Installation Geospatial Data

CSDGM Element Number	CSDGM Element Name	Description	Valid Values
5.1.1.2	Entity Type Definition	The definition of the entity type.	<i>Valid Values:</i> SDSFIE Entity Type Definition Ex: The designated hazard area that follows the projected trajectory of a munition.
5.1.1.3	Entity Type Definition Source	The source of the entity type definition.	<i>Valid Value:</i> “Spatial Data Standards for Facilities, Infrastructure, and Environment” (enter version number)
5.1.2 Attribute			
5.1.2.1	Attribute Label	The name of the attribute	<i>Valid Value:</i> SDSFIE attribute name, common name EX: “Attribute Name: hgt_dim, Common Name: Height dimension”
5.1.2.2	Attribute Definition	The definition of the attribute	<i>Valid Value:</i> SDSFIE attribute definition Ex: “The height of the target.”
5.1.2.3	Attribute Definition Source	The attribute definition source	<i>Valid Value:</i> SDSFIE (enter version number)
5.2 Overview Description			
5.2.1	Entity and Attribute Overview	Statement summarizing the attribute table for the layer. Note: If the dataset is in SDSFIE Advance Compliancy, any additional fields in the table must be detailed.	<i>Example Value:</i> “Attributes organized by the Spatial Data Standards for Facilities, Infrastructure, and Environment (SDSFIE), NCITS 353, Version 2.4. Attribute table structure meets basic compliance guidelines as defined by the CADD-GIS Technology Center. “Several custom fields have been added to store additional information because this

Metadata Standards for Army Installation Geospatial Data

CSDGM Element Number	CSDGM Element Name	Description	Valid Values
			information does not fit within the current SDSFIE”.

Section 6 – Distribution Information

CSDGM Element Number	CSDGM Element Name	Description	Valid Values
6.2 Resource Description			
6.2	Resource Description	The identifier by which the distributor knows the data set. Must be one of the following values:	<i>Valid Values:</i> “Live Data and Maps” “Downloadable Data” “Map Files” “Static Map Images” “Other Documents” “Applications” “Geographic Services” “Clearinghouses” “Geographic Activities”
6.4 Standard Order Process			
6.4.2.1.1	Format Name	The name of the data file format. This field can be free text or a value may be selected from the domain table.	Free text field or select a value from the drop down list.
6.4.2.1.7	Transfer Size	The size, or estimated size, of the transferred data set in megabytes.	<i>Valid Value:</i> Transfer size >X

Section 7 – Metadata Reference Information

CSDGM Element Number	CSDGM Element Name	Description	Valid Values
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Metadata Standards for Army Installation Geospatial Data

CSDGM Element Number	CSDGM Element Name	Description	Valid Values
7.1 Metadata Date			
7.1	Metadata Date	Date the metadata file was created or last updated.	<i>Format:</i> yyyymmdd
7.2	Metadata Review Date	Date of the latest review of the metadata entry.	
7.4 Metadata Contact			
<i>The Metadata Point of Contact (POC) will be the individual responsible for authoring the metadata file. The mission knowledge expert responsible for source selection will be recorded in CSDGM element 1.9, Point of Contact.</i>			
7.4 (Citation 10.1.1)	Point of Contact (Contact Person)	Name of individual responsible for preparing the metadata file.	Free text field Ex: "John Smith"
7.4 (Citation 10.1.2)	Point of Contact (Contact Organization)	Organization name (or office symbol for military organizations) of the POC.	Free text field Ex: "Fort Drum Dept of Public Works", "Fort Monmouth Directorate of Public Safety"
7.4 (Citation 10.3)	Point of Contact (Contact Position/Title)	Title of the metadata author.	Free text field
7.4 (Citation 10.4.1)	Point of Contact (Address Type)	The type of address provided. Must be one of the following valid values:	<i>Valid Values:</i> "mailing" "physical" "mailing and physical" "po box" Other (describe)
7.4 (Citation 10.4.2)	Point of Contact (Address)	Address line for the metadata author.	Free text field Ex: "1230 Main Street"
7.4 (Citation 10.4.3)	Point of Contact (City)	The address city for the metadata author.	Free text field Ex: "Honolulu", "San Diego"
7.4 (Citation 10.4.4)	Point of Contact (State or Territory)	The address state or territory for the metadata author. Use accepted two-letter Postal state/territory codes for this field.	Free text field Ex: "NY", "VA", "PR"
7.4	Point of Contact	The ZIP code for the metadata author. Nine digit ZIP	Free text field

Metadata Standards for Army Installation Geospatial Data

CSDGM Element Number	CSDGM Element Name	Description	Valid Values
(Citation 10.4.5)	(Postal/ZIP Code)	codes, with dashes, preferred, but five digit zip codes will be accepted.	Ex: "22030-1260"
7.4 (Citation 10.4.6)	Point of Contact (Country)	Metadata author address country.	Free text field Ex: "USA"
7.4 (Citation 10.5)	Point of Contact (Telephone Number)	Metadata author telephone number, including all applicable area codes and extensions. Commercial numbers are preferred, and should be preceded with "COMM" as shown. However, if only DSN numbers are available, enter that number here and precede the number with "DSN" as shown:	Free text field Ex: COMM 123-456-7890 DSN 123-4567
7.4 (Citation 10.8)	Point of Contact (EMAIL address)	The email address for the metadata author.	Free text field Ex: "John.Smith@us.army.mil"
7.5 Metadata Standard Name			
7.5	Metadata Standard Name	The name of the metadata standard used to document the data set. Must be the following value:	<i>Valid Value:</i> "US Army Installation Geospatial Data Standard tailoring of the FGDC Content Standards for Digital Geospatial Metadata"
7.6 Metadata Standard Version			
7.6	Metadata Standard Version	Identification of the version of the metadata standard used to document the data set. Must be the following value:	<i>Valid Values:</i> "Version 2 - 1998 (FGDC-STD-001 June 1998)" "Version 1 – 2005 (OACSIM IGI&S November 2005)"
7.10 Metadata Security Information			
7.10.1	Metadata Security Classification System	The name of the classification system for the metadata.	<i>Valid Value:</i>

Metadata Standards for Army Installation Geospatial Data

CSDGM Element Number	CSDGM Element Name	Description	Valid Values
7.10.2	Metadata Security Classification	The name of the handling restrictions on the metadata.	<i>Valid Values:</i> "FOUO" "Unclassified" "Sensitive"

Section 8 – Citation Information

Please see Section 1.1 (Citation)

Section 9 – Time Period Information

Not required

Section 10 – Contact Information

Please see Section 7.4 (Metadata Contact)

Appendix H

Exterior Signage

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11.4 SIGNS

11.4.1 Signs are used to visually communicate information. They are highly visible features that should be attractive and compatible with their surroundings. Careful consideration must be given to what a sign says, how it is said, its visual appearance and organization, its location, structural support system, and relation to other signs within the installation. Standardized signage systems facilitate movement, provide a sense of orientation, and reinforce standards of excellence. Signage creates a unifying element throughout the installation that visually ties the installation themes together and builds a reference and continuity that translates into confidence and reassurance when traveling throughout the installation. The standards to apply for signage color,

type, and sizing is found in [Technical Manual \(TM\) 5-807-10, Signage](#).

11.4.2 Sign System Characteristics. There are several basic design characteristics that, by serving to convey necessary information clearly and attractively, are an integral part of any successful signage system.

11.4.2.1 Simplicity. An effective strategy provides only needed information, avoids redundancy and eliminates oversigning with resultant clutter and visual confusion. Sign messages must be clear, simple, and easy for motorist to process quickly.

11.4.2.2 Continuity. It is essential that the system be applied uniformly and consistently throughout the entire installation. The importance of consistent implementation extends from the larger issues of sign type and size down to accurate color continuity and matching typestyles.

11.4.2.3 Visibility. Sign location is a very important ingredient within the system. Signs must be located at significant decision points and oriented to provide clear sight lines for the intended user. Close coordination of locations with respect to landscaping, utilities, adjacent signage, and various other street design elements is important to ensure long-term maximum visibility.

11.4.2.4 Legibility. Sign typestyle, line spacing, color, and size all combine to create the crucial design characteristics of legibility. This aspect of sign design should take into consideration users such as motorist, pedestrians or bicyclists, and the relative travel speed at which each type of user will be traveling when viewing the signs.

11.4.3 Vocabulary-Communications.

11.4.3.1 A common language has been created for establishing a signing system. The different components that create the sign package have been named and referred to within the total signing system.

11.4.3.2 The creation of a "signing language" helps generate a unified bond within sign types that make up a signing family.

- Reference

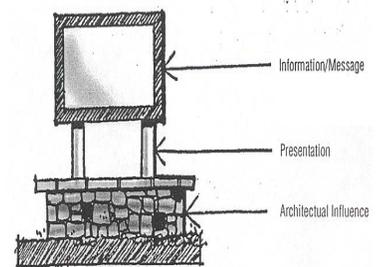


Fig. 11.18 - Signing Language Helps Establish A Signing System

- Information/Message
- Presentation
- Architectural Influence
- Graphic Architecture

11.4.4 Visual Hierarchy.

11.4.4.1 The entire signing system must communicate through a range of sign and typestyle sizes the relative importance of the individual activity that the sign identifies. The system should follow a logical progression from a point of origin to the desired destination.

11.4.4.2 A stated ranking method supports the visual standard of hierarchy within the signing system. Signs can be organized within assigned classes with emphasis on the function and image of the installation.

11.4.4.3 Within each class, the level of architectural influence evokes the importance of the sign to the installation. This is also critical to the idea of progression. The importance of a sign must be presented in its size and level of detail.

11.4.4.4 As individuals move closer to their destination on the installation, the scale of the sign becomes progressively smaller and the level of the message more detailed.

11.4.5 Types of Signs.

11.4.5.1 Information / Identification Signs.

These are signs that identify entrances to the installation, areas within the installation, major tenants, buildings and organizational or functional components (Fig. 11.20). They identify a location, and greet the visitor to that location. They should be compatible in scale and character with the architecture and also blend with the natural surroundings (Fig. 11.20). These signs are designed to include the following:

11.4.5.1.1 Typeface: Lettering is self-adhesive backing material.

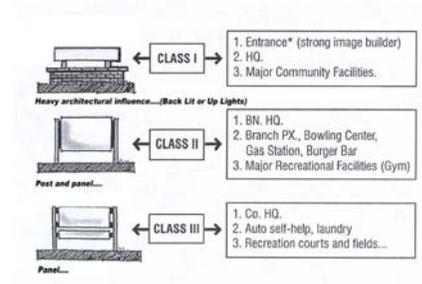


Fig. 11.19 - Signs Can Be Organized Into Classes Within The Visual Hierarchy

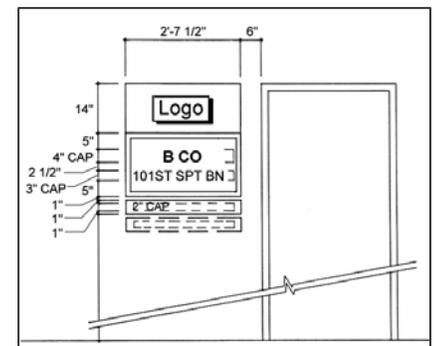


Fig. 11.20 - Building Mounted Information Sign

- Building Title: Helvetica Medium, Upper and lower case
- Building Numbers: Helvetica regular
- Building Addresses: Helvetica Medium, Upper and lower case

11.4.5.1.2 Color:

- Panel: Dark Brown
- Lettering: White
- Post: Dark Brown
- Exposed panel backs and edges: Dark Brown
- All paint semi gloss



Fig. 11.20 – Use of Street Addresses

11.4.5.1.3 Materials

- Panel: Double-face 1/8” thick aluminum
- Post: Steel Pipe
- Foundation: Concrete pier or direct burial
- Building numbers: Concealed mechanical fasteners at each corner of panel into building wall (Fig. 11.21).

11.4.5.1.4 Building Identification.

11.4.5.1.4.1 Street Addresses. The addressing procedures prescribed in [DoD 4525.8-M](#), [DoD Official Mail Manual](#) are mandatory for use by all DoD components. DoD 4525.8-M, Chapter 3 prescribes the following:

- All DoD address shall be assigned so they are compatible with the United States Postal Services automated delivery point sequencing. (C3.3)
- The DoD installation is responsible for assigning city-style, street address on the installation. (C3.3.2.2)
- Street addresses shall be assigned and used even though a DoD activity may deliver the mail to the addressee. (C3.3.2.2.1)

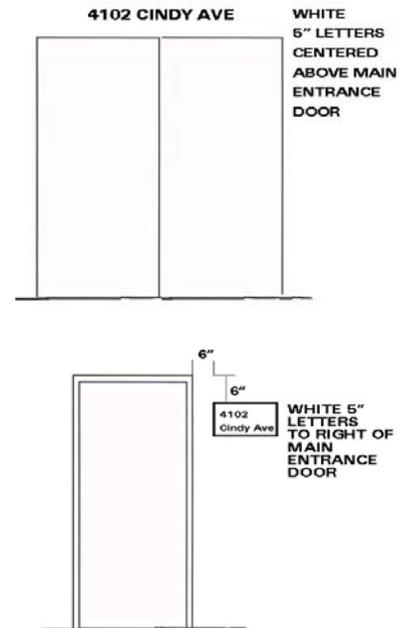


Fig. 11.21 - Street Address Location at Entrance Doors

- Only geographically locatable civilian-style street address (such as 4102 Cindy Avenue, Fig. 11.21) shall be used. (C3.3.2.2.4)
- Installations shall not use one street address for the entire installation and then use secondary unit designators such as "Building 123" to designate the delivery addresses on the installation. (C3.3.2.2.5)
- Addresses such as "Building 123 Roberts Street" are not a valid address format and shall not be used. (C3.3.2.2.6)

11.4.5.1.4.2 Address Placement.

- Place addresses by the front entrance of the building so they can be seen. (C3.3.2.3.1)
- Place both the street name and address number on the building if both the building number and street address are visible from the street.
- Building identification signs will use street addresses (Fig. 11.21).
- Buildings without identification signs shall have the address number and street name centered above the main entrance or located to the right side (Fig. 11.21).

11.4.5.1.4.2 Building Numbers. Where necessary building numbers will be located at a building corner, if visible from the main street and on building side facing parking lots. The size of the sign should be appropriate for the scale of the building and mounting height. See [Technical Manual \(TM\) 5-807-10, Signage](#), para 3-5h, for various sign grid specifications.

11.4.5.1.5 Housing Areas.

11.4.5.1.5.1 The sign should be complimentary to the architectural setting of the housing area and approved by the installation Real Property Planning Board.

11.4.5.1.5.2 Housing numbers should be placed on the curb in front of the respective house and on the house where lighting will effectively light the numbering.

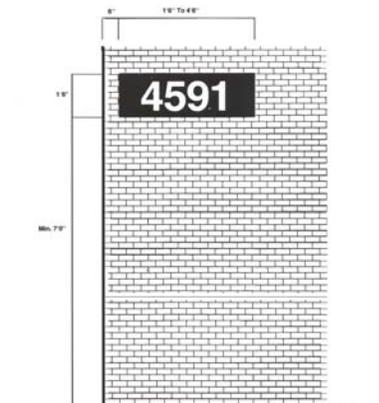


Fig. 11.22 - Dimensions for Building Number Corner Location, Where Necessary

11.4.5.1.6 Installation Identification Signs.

11.4.5.1.6.1 Installation identification signs name the installation and display the official US Army plaque (Fig. 11.23). The designation "United States Army" must appear at the top of the sign in accordance with [AR 420-70](#), para 2-7h. Every installation entrance shall have an installation identification sign displaying only the US Army plaque, with the words "United States Army, Fort (Name of Fort), and gate name as indicated in "Figure 11.23 - Installation Entrance Signs". The placement of Senior Mission Commander logo, unit crest, and other installation identification signs, monuments or displays shall be located inside the installation beyond the cleared area of the Access Control Point of entry. When used service-wide, these signs convey a uniform image of strength and stability to the public. Emblems, branch colors, unit mottos, names and titles of individuals are not to be displayed.

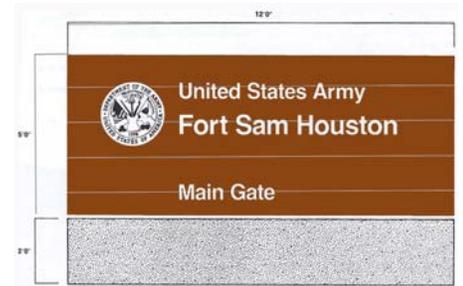


Fig. 11.23 - Installation Entrance Signs

11.4.5.1.6.2 Installation identification signs consist of three types:

- Sign type A1, main entrance sign, identifies the principal visitor entrance.
- Sign type A2, secondary entrance sign, identifies entry points with relatively high volumes of visitor traffic.
- Sign type A3, limited access entry gate signs, identifies entry points with limited public access.

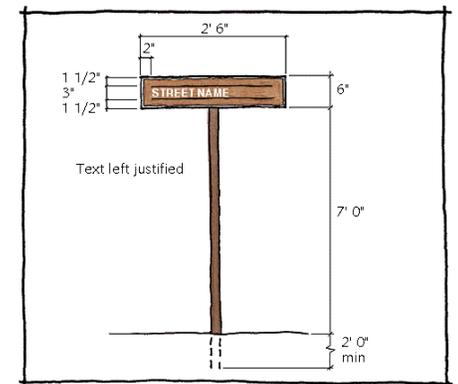


Fig. 11.24 - Typical Street Signs

11.4.5.1.6.3 See [Technical Manual \(TM\) 5-807-10, Signage](#), paragraph 3-3, for sign specifications and paragraph 3-11 for sign placement guidelines.

11.4.5.1.6 Street Signs.

Street name identification signs should be designed with the same lettering, color and materials as other information signs.

11.4.5.1.7 Wheeled Electrical Signs.

Wheeled electrical signs will have an attractive presentation. Temporary landscape elements should be used whenever possible. The siting of this type of sign will be approved by

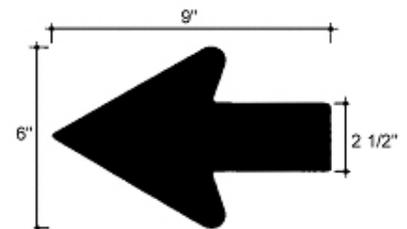


Fig. 11.25 - Typical Arrow For Use On All Destination Signs

the RPPB. No sign of this type will be left in place for longer than six (6) months. After which time, the sign will be removed or turned into a permanent sign.

11.4.5.2 Directional Signs.

These signs guide the motorist or pedestrian in, around, and out of the installation (Fig. 11.26). The legibility and placement of these signs, as well as the ordering of information, is critical to their effectiveness. These signs should be placed in central locations and at major decision points along circulation routes (Fig. 11.26). These signs are designed to include the following:

11.4.5.2.1 Typeface: Lettering is self-adhesive backing material.

- Helvetica Medium upper and lower case

11.4.5.2.2 Arrow:

- Place at end indicating direction.
- Stroke width: Helvetica Medium cap

11.4.5.2.3 Color:

- Panel: Dark Brown
- Lettering: White
- Post: Dark Brown
- Exposed panel backs and edges: Dark Brown
- All paint semi gloss

11.4.5.2.4 Materials

- Panel: Double-face 1/8" thick aluminum
- Post: Steel Pipe
- Foundation: Concrete pier or direct burial

11.4.5.3 Regulatory Signs.

These signs provide the rules for travel and parking on the installation. They include speed signs, turning and lane use signs, warning signs, parking control signs, etc. (Fig. 11.27). Related to these signs are pavement markings and traffic signals. These signs are designed to include the following:

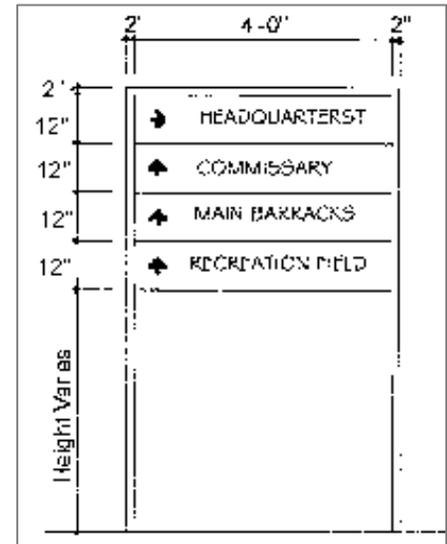


Fig. 11.26 - Direction Sign

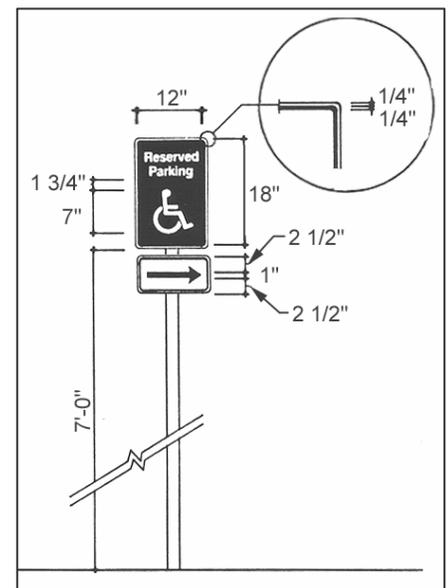


Fig. 11.27 - Regulatory Sign

11.4.5.3.1 Typeface: Lettering is self-adhesive backing material.

- Helvetica Medium upper and lower case

11.4.5.3.2 Color:

- Panel: Dark Brown
- Lettering: White
- Post: Dark Brown
- Exposed panel backs and edges: Dark Brown
- All paint semi gloss

11.4.5.3.3 Materials

- Panel: Double-face 1/8" thick aluminum
- Post: Steel Pipe
- Foundation: Concrete pier or direct burial

11.4.5.3.4 Traffic Control Signs.

11.4.5.3.4.1 CONUS Installations. National highway standards will be used for signs to regulate vehicular traffic on CONUS installation ([AR 420-72, Transportation Infrastructure And Dams](#), Para 2-15f). These standards are described in the [Manual of Uniform Traffic Control Devices \(MUTCD\)](#). Also see [MTMC Pamphlet 55-14, Traffic Engineering for Better Signs and Markings](#). This pamphlet clarifies existing standards and provides definite guidelines for installation officials to conform to the MUTCD. These standards shall be used installation wide to include installation Access Control Points.

11.4.5.2.4.2 OCONUS Installations. OCONUS installation streets and roads are to be considered extensions of the road system of the host nation and shall use traffic control device standards and criteria of the host nation ([AR 420-72, Transportation Infrastructure and Dams](#), Para 2-15e).

11.4.5.3.5 Prohibitory (Warning) Signs. This category of signage is intended to maintain security and safety on the installation perimeter and at other specific secure areas. These signs notify visitors of restrictions, as well as other security procedures. The guidelines for design, fabrication, and placement of warning signs are found in [Technical Manual \(TM\) 5-807-10, Signage](#), para 3-9.

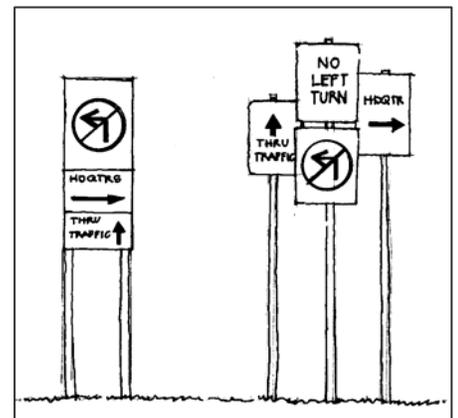


Fig. 11.28 – Sign should be Simple, Legible and Combined

11.4.6 Electronic Exterior Signs

All exterior flashing signs, traveling lights, or signs animated by lights of changing degrees of intensity or color are prohibited.

11.4.7 Sign Placement

Placement of signs differs according to the type of sign and the specific site constraints. The following guidelines apply to placement of the majority of signs.

- Do not place more than one sign at any location. Traffic rules are the exception to this rule (Fig. 11.28).
- Place signs in areas free of visual clutter and landscape materials.
- Place signs in locations that allow enough time for the user to read and react to the message.
- Signs should not be placed to block sight lines at intersections.
- Place signs approximately 1.2 meters (4 feet) above ground level to be within 10 degrees the driver's line of vision (Fig 11.29). Provide proper placement to avoid a hazard to children.

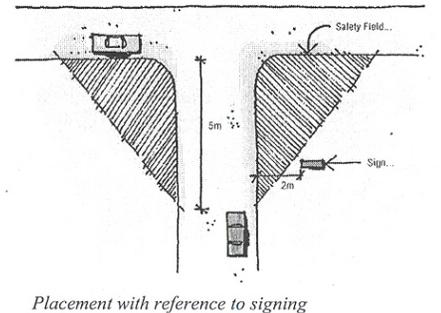
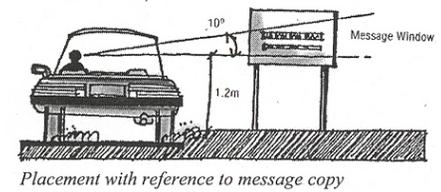


Fig. 11.29 - Placement Is Critical To Ensure Easy Readability

11.4.8 Sign System Typography.

11.4.8.1 Military Emblems. The Army has a rich tradition of military heraldry. Military emblems are an important part of the soldiers' identity and the emblems have been carefully crafted over the years to express unit pride and unique history and function of the unit. The care and use of organizational emblems in a signage system can add visual interest as well as build pride and a sense of history. However, the overuse of miscellaneous emblems can lead to clutter and a dilution of their importance. Colors for military emblems must be in accordance with the Institute of Heraldry.

11.4.8.2 Department of the Army Plaque. The plaque should be displayed on installation identification signage to emphasize the heritage and professionalism of the United States Army. The design of the plaque must be in accordance with [Army Regulation \(AR\) 840-1, Department of](#)

[the Army Seal, and Department of the Army Emblem and Branch of Service Plaques](#), and must be reproduced in full color.

11.4.8.3 Insignias. The use of branch insignia, shoulder sleeve insignia, coat of arms and/or distinctive insignia on headquarters signs is permitted. All military emblems must appear in full color. Motivational symbols or motifs will not be used.

11.4.9 Reduce Visual Clutter.

11.4.9.1 Over-signing detracts from a uniform sign system and if left uncontrolled will eventually destroy the integrity of the system.

11.4.9.2 Clutter creates confusion and ineffectiveness. Often motorists and pedestrians are confused by the bombardment of messages that have no relationship to each other, or the communication is on such a minimal level that the sign serves no purpose.

11.4.10 Location Maps.

11.4.10.1 The location map is an integral element of an installation entrance. The location map display provides information and sense of place to the viewer. The design and construction should be of compatible architectural materials found throughout the installation.

11.4.10.2 The location map should contain the following characteristics within the design.

- Plexiglas covered map for protection
- Architectural compatible materials used for the base
- Paved walk-up area
- Litter receptacle
- Provide parking adjacent
- Provide current takeaway maps

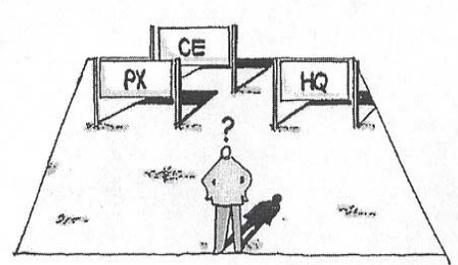


Fig. 11.30 - Visual Clutter Causes Confusion

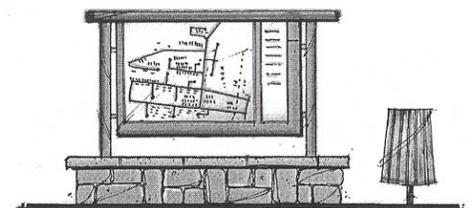


Fig. 11.31 - Location Maps Provide a Sense of Place

Appendix I
Acceptable Plant List

A blue rectangular graphic with white text. The text reads "Section 10" in a serif font, followed by "LANDSCAPE DESIGN STANDARDS" in a bold, sans-serif font.

Section 10
**LANDSCAPE
DESIGN
STANDARDS**

10.1 INTRODUCTION

10.1.1 The Landscape Design Standards includes the 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.

10.1.3 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.

10.1.2 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 urban trees, forest lands, and detailed planting features such as shrubs and groundcovers.

10.2.1.2 Improve the overall visual quality of the installation through the use of native plant material to (Fig. 10.1):

10.2.1.2.1 Blend to 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.

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. 10.1 - Use native Plants to Improve Visual Quality



Fig. 10.2 - Provide Comfort to Pedestrian Environment



Fig. 10.3 - Landscaping Reinforces Circulation Hierarchy

10.3 PRINCIPLES OF LANDSCAPE DEVELOPMENT

10.3.1 Landscape design is based on the following principles (Fig. 10.4).

10.3.1.1 Unity. The selection and placement of plant material can be used to 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. Plant material can be selected and placed to provide visual equilibrium or balance through the use of either a symmetrical or asymmetrical planting scheme. Symmetrical plantings are generally more formal while asymmetrical plantings are informal.

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 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 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. Plant material should be grouped in beds with simple edges that are easy to mow. Small turf areas should be avoided because of the difficulty of mowing. The use of annuals should be minimal because of the high maintenance involved.

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.

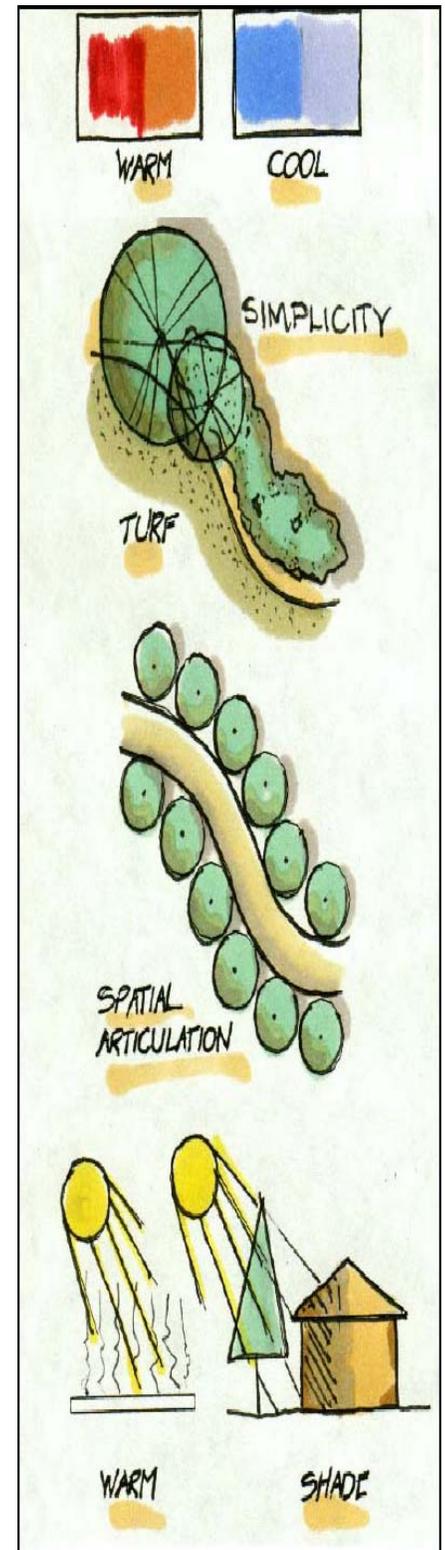


Fig. 10.4 - Principles of Design Illustrated

10.4 Sustainable landscape development

10.4.1 The use of plant material on the installation promotes the sustainability of the development. Trees, shrubs, groundcover, and vines provide aesthetic appeal as well as preservation of fauna and flora, energy conservation, climate modification, erosion control, air purification, and noise abatement (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.

10.5.2 The following paragraphs present landscaping guidelines for the various locations of plant material use.

10.5.2.1 Foundation Planting. Foundation planting provides a green background for additional plantings, adds scale and character to the building, helps to integrate the building with its surroundings, screens HVAC and other utilities and helps create a sense of arrival (Fig.10.6). When developing foundation planting plans consideration should be given Antiterrorism measures (See paragraph 10.11).

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.

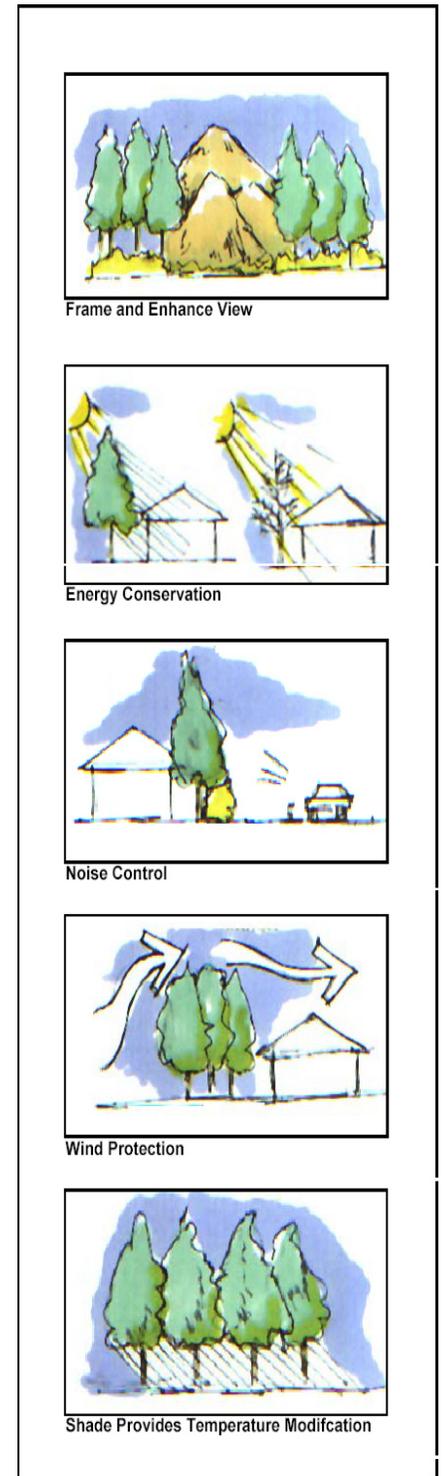


Fig. 10.5 Plant Material Promotes Sustainability

10.5.2.1.4 Trees shall be setback from the building walls to provide space for mature growth and to prevent root systems from damaging the foundation.

10.5.2.1.5 A symmetrical foundation planting design should be used for a symmetrical building.

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. 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 Screening of Dumpsters. Landscape planting should be used to supplement wood fence and masonry wall dumpster enclosures (Fig. 10.7).

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.

10.5.2.4 **Open Space Planting.** Enhance open space areas with planting. Use a mix of evergreen, deciduous, and flowering trees. Plant the same kind of trees in massive groupings to impact the vast open areas (Fig. 10.8).

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. 10.9). 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.

10.5.2.5.1 Use formal street trees in single rows to visually reinforce primary and secondary roads. Use regularly

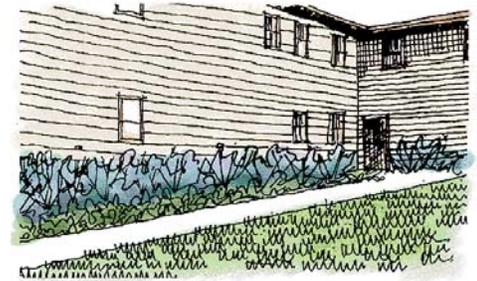


Fig. 10.6 - Foundation Plantings Help Screen Utilities

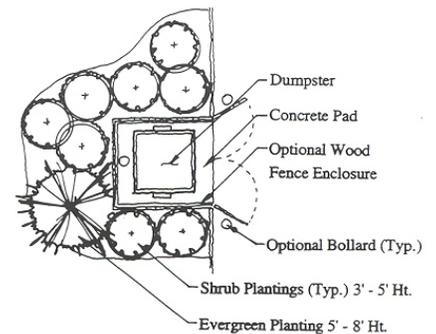


Fig. 10.7 - Screen Dumpsters



Fig. 10.8 - Enhance Open Spaces with Plantings

spaced and uniformly shaped deciduous trees to provide a regimented appearance.

10.5.2.5.2 Use informal groupings of street trees along tertiary routes. Utilize medium size deciduous trees to screen on-street parking along roadways. Set trees 1 to 2 meters (3 to 6 feet) from the back of curbs (Fig. 10.10). Spacing should be uniform, except where curb cuts interrupt regular spacing.

10.5.2.5.3 As a general rule, street trees should be deciduous species, 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 in locations where they may hang over the roadway 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 as well as help define circulation and reduce heat gain during summer months (Fig. 10.10).

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.

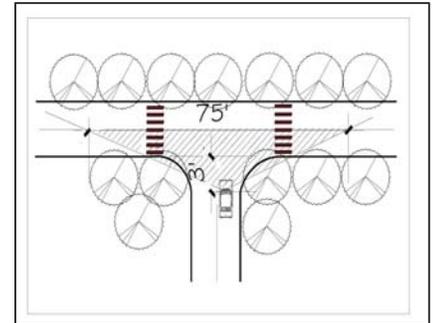


Fig. 10.9 - Use Street Trees to Visually Reinforce Roadway Hierarchy

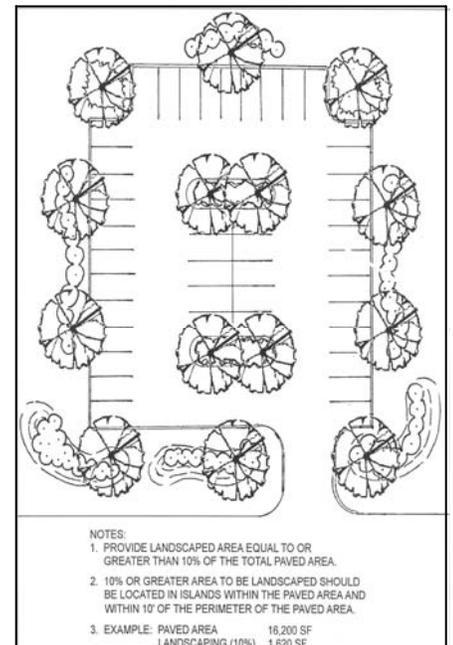


Fig. 10.10 - Provide Parking Lot Planting to Reduce Heat Gain

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 (Fig. 10.11).

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.

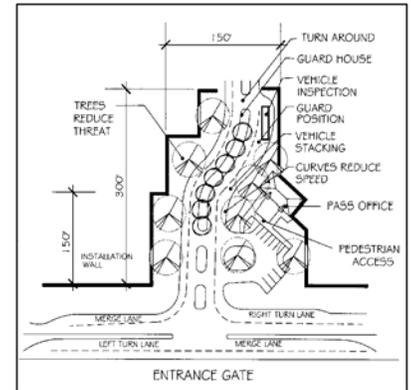


Fig. 10.11 - Landscaping at Entrance Gates will Meet AT/FP Requirements

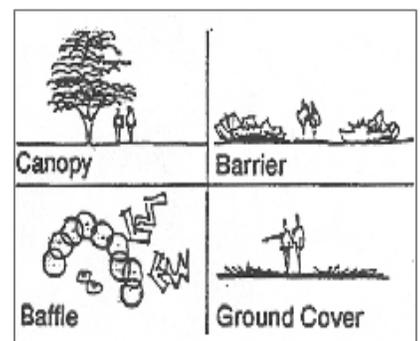


Fig. 10.12 Basic Design Categories

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 seasonal interest as well as maintain views required to ensure force protection measures. Large evergreen trees are discouraged in these locations because they may obstruct sightlines and impact the need for force protection. Adequate lines of sight must be maintained for guard personnel to observe vehicular and pedestrian traffic approaching the gate.

10.5.2.10 **Zeroscaping.** Where appropriate, to conserve water and lower maintenance consider zeroscaping.

10.5.2.11 **Xeriscape.** Xeriscape is the conservation of water and energy through creative and adaptive landscape design. Xeriscape landscapes provide attractive solutions that save money, water, and maintenance. The following website provides guidance on specific design principles of the xeriscape design process and xeriscape design application:

- [USAF Landscape Design Guide, Xeriscape](#)

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.

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.

Plant Categories

Cultural Characteristics

[Growth Rate–Rapid](#)

[Growth Rate–Medium](#)

[Growth Rate–Slow](#)

[Disease/Pest Resistance](#)

Environmental Characteristics

[Acidic Soil Tolerant](#)

[Alkaline Soil Tolerant](#)

[Dry Soil Tolerant](#)

[Moist Soil Tolerant](#)

[Poor/Rocky Soil Tolerant](#)

[Salt Tolerant](#)

[Shade Tolerant](#)

[Summer Wind Tolerant](#)

[Urban Condition Tolerant](#)

Ornamental Characteristics

[Blue Flowers](#)

[Ornamental Bark](#)

Fig. 10.13 – Plant Categories

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 10.13):

- Canopy
- Barrier
- Screen (or Baffle)
- Groundcover

10.7 PLANT PALETTE AND PLANT CATEGORIES

10.7.1 The plant palette and categories are designed to help the designer choose the best plant for each particular set of design requirements. The plants that appear on the palette and in the categories were selected for their hardiness and their ability to survive in this geographical area. To use them effectively, the design requirements must be well defined for the specific site.

10.7.2 The Plant Palette.

10.7.2.1 A select group of plant materials has been divided into the following six categories:

- deciduous trees
- coniferous trees
- deciduous shrubs
- coniferous shrubs
- broadleaf evergreen shrubs
- groundcover and vines

10.7.2.2 On the palette, the plants appear in alphabetical order by their botanical name, followed by their common

Plant Categories Cont.

Ornamental Characteristics

[Pink/Purple Flowers](#)

[Red/Crimson Flowers](#)

[White/Cream Flowers](#)

[Yellow/Orange Flowers](#)

[Yellow/Orange/Red Fall Color](#)

Functional Characteristics

[Erosion Control/Bank Stabilizer](#)

[Foundation Plants](#)

[Large Hedges \(+25'\)](#)

[Medium Hedges \(10-20'\)](#)

[Low Hedges \(4-10'\)](#)

[Naturalizing/Conservation](#)

[Park Trees](#)

[Large Street Trees \(+35'\)](#)

[Small Trees \(15-35'\)](#)

[Thorny Plants](#)

Fig. 10.13 – Plant Categories

name, design characteristics, cultural information, recommended use and miscellaneous notes. The plant palette is presented in a matrix format in [Appendix O](#).

10.7.3 The Plant Categories.

10.7.3.1 Plants from the plant palette with similar characteristics have been cataloged in the Plant Categories (Fig. 10.13). These characteristics could be cultural (e.g., upright, narrow form), environmental (e.g., shade tolerant), ornamental (e.g., red fall color), or functional (e.g., screening plant). Characteristics include: Cultural Conditions (mature height and spread, form and growth rate, disease and pest resistance), Environmental Conditions (sun/shade, pH range, soil moisture required, and wind/sun), and Ornamental Characteristics (flower color, autumn color, fruit color, and/or summer leaf color).

10.7.3.2 Each category describes a list of plants that share a similar quality. For example, materials that are shade tolerant would be placed in the Shade Tolerant group under the "Environmental Conditions" heading. To further explain the Categories, under the "Environmental Conditions" heading, in the Shade Tolerant group, all shade tolerant deciduous

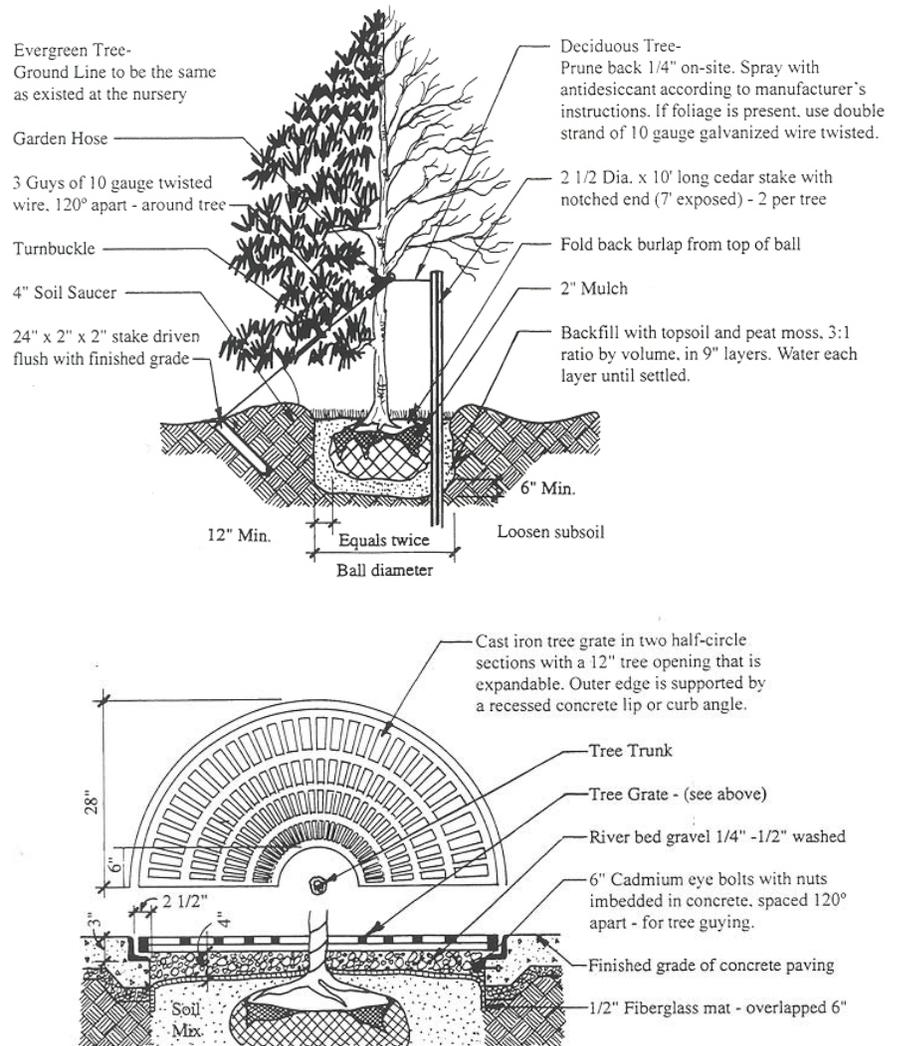


Fig. 10.14 - Install Plant Material According to Industrial Standards

trees would be listed under "Deciduous Trees"; all shade tolerant Coniferous trees would be listed under "Coniferous Trees"; and so on.

10.8 PLANT MATERIAL INSTALLATION

10.8.1 A key step in assuring successful planting is to select plants of the highest quality. Plant material should be of the size, genus, species, and variety to comply with the recommendations and requirements of the "American Standard for Nursery Stock" ANSI Z60.1.

10.8.2 As part of the design process and prior to plant installation, review the installation's Master Plans, Basic Information Maps or As Built Drawings for utility locations and verify with the Directorate of Public Works or equivalent.

10.8.3 The planting and establishment of trees, shrubs, ground covers, and vines is detailed in [TM 5-803-13](#), Chapter 3.

10.8.4 General Guidelines for Plant Installation.

10.8.4.1 At planting time, thin plants by removing one-third of the vegetative material.

10.8.4.2 Spray all evergreens with an antidesiccant within 24 hours of planting.

10.8.4.3 Water all plants thoroughly during the first 24-hour period after planting.

10.8.4.4 Site all plants and stakes plumb.

10.8.4.5 Space plants according to their mature size (Fig. 10.X).

10.8.4.6 Install plant materials in groups for greater impact (Fig. 10.17).

10.8.4.6 Installation of Lawn Areas.

10.8.4.7 Installation techniques for turf is detailed in [TM 5-803-13](#), Chapter 4. The details include site evaluation, site

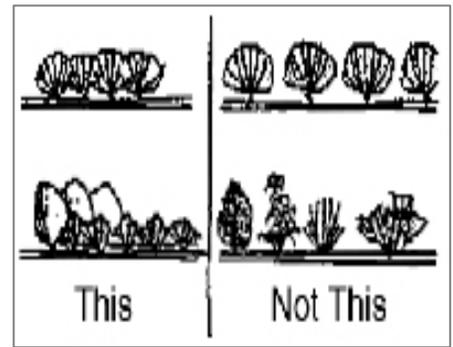


Fig. 10.15 – Space Plants According to their Mature Size

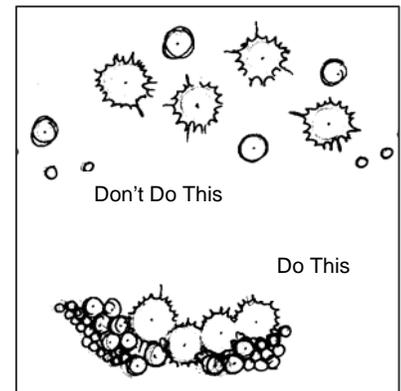


Fig. 10.16 – Grouped Plants Have Greater Impact

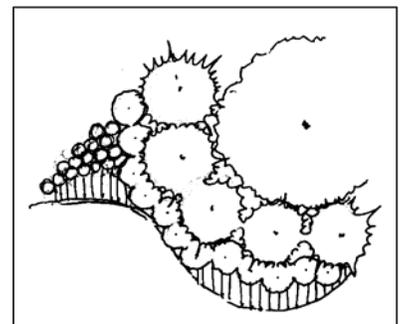


Fig. 10.17 – Group Plants in Mulched Beds to Reduce

preparation, selection of turf, and maintenance requirements.

10.9 MAINTENANCE OF PLANT MATERIAL

10.9.1 The ease of maintenance should be one of the primary goals when considering the success of any planting design.

10.9.2 Pruning. In general plant material should be allowed to conform to its natural shape. This practice allows the plant to mature in a health manner, and saves the time and energy required for trimming. The pruning of trees and shrubs is done to maintain overall plant health, direct plant growth, maintain a desired shape, and increase flower or fruit development.

10.9.2.1 Pruning Shrubs.

- Do not prune shrubs flat across the top.
- Prune branches yearly on thick-branched shrubs and at the base of the shrub.
- When pruning deciduous shrubs prune shrub stems as close to the ground as possible and shrub branches as close to the stem as possible.
- When "thinning out" deciduous shrubs prune about one-third of all branches where they meet their main stem.

10.9.2.2 Pruning Trees.

- Remove a large limb by making three cuts as follows:
- Make the first cut at the bottom of the branch 12-24" from the branch attachment (Cut A, Fig 10.18).
- Make the second cut on the top of the branch within 1" of the undercut (Cut B, Fig 10.18).
- Make the final cut just beyond the outer portion of the branch collar (Cut C, Fig 10.18). The first two

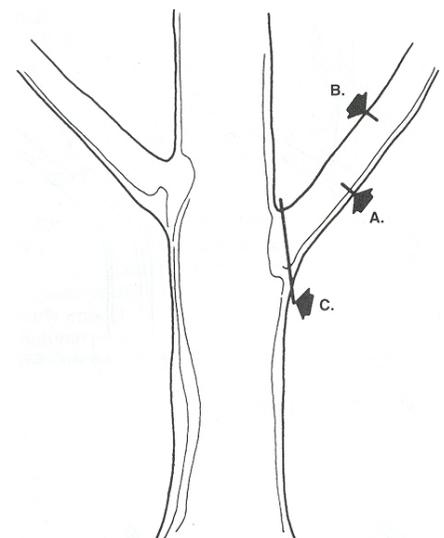


Fig. 10.18 - Proper Tree Pruning Procedures

cuts were necessary to remove the weight of the branch to allow cut #3 to be clean without ripping the bark.

- Never cut the central leader of the tree.
- Coniferous evergreens trees should be pruned, during the spring, by snipping off new growth. Avoid geometrically shaping plant material while pruning.

10.9.3 Mulching.

- Use mulch around the base of plant material to provide for greater moisture and help inhibit the growth of weeds and grasses. Mulch should be maintained at a depth of two (2) to four (4) inches.
- The best time to mulch for water conservation is in the late spring. Apply mulch immediately to new fall plantings.

10.9.4 Ground Cover Maintenance. Although ground covers do not require pruning, they may be periodically dug up in the spring or fall for propagation and to prevent overcrowding in their beds.

10.9.5 Landscape Maintenance Schedule. The general objective of a landscape maintenance schedule is to ensure an orderly and efficient care of the grounds. The landscape maintenance schedule included in the Installation Design Guide ([See Appendix F.](#)) identifies times throughout the year when specified maintenance should be undertaken. Use of the landscape maintenance schedule will improve all aspects of landscape on the installation. Materials and supplies can be ordered in a timely fashion, manpower needs can be calculated and anticipated, and a correlation between the level of maintenance and appropriate cost can be derived.

10.10 TREE PROTECTION AND PRESERVATION

10.10.1 Existing urban trees and forest should be preserved if they are in good health. Construction should be planned to provide for the preservation of significant trees.

10.10.2 During the clearing and construction process, trees should be protected from damage. Construction barricades should be erected to protect the existing trees to be preserved. The barricades should be no closer to the trunk of the tree than one-half the distance from the trunk to the drip line. Existing trees that cannot be preserved should be considered for transplanting to a different location on site or to a different site.

10.10.3 Changes in the grade of the soil around trees can cause extensive root damage and eventually death of the tree. To prevent damage to the tree, it is important to maintain the existing grade for least the size of the three canopy. (the drip line) (Fig. 10.19).

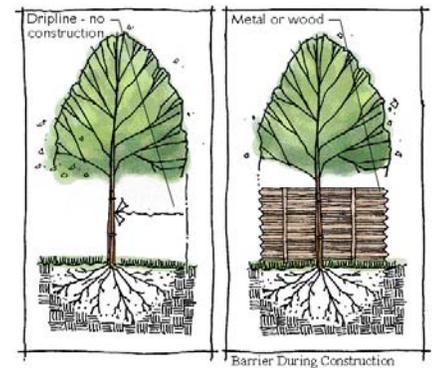


Fig 10.19 - Construct a Barrier at Drip Line During Construction to Maintain Grade

10.11 ANTI-TERRORISM/FORCE PROTECTION CONSIDERATIONS

10.11.1 The presence of vegetation on an installation can have both beneficial and detrimental impacts on security. The selection and placement of landscape plant material on Army installations is an integral element in the provision of protective measures to reduce the threat of terrorism.

10.11.2 Proper selection and placement of trees and shrubs can be utilized to provide visual screening without creating concealment for covert activity. The landscape architect responsible for tree placement should work closely with installation force protection experts to design a landscape plan that provides visual screening without compromising Antiterrorism measures (Fig. 10.20).

10.11.3 The plant material must allow building occupants to see out, but must not allow outside forces to monitor interior activity. The landscape architect should incorporate the following aspects into the design:

- Avoid conditions within 10 meters (33 feet) of inhabited structures that permit concealment of aggressors or obscure the view of objects or packages 150-millimeters (6 inches) in height from the view of security personnel. This results in the placement of shrubs and trees that are

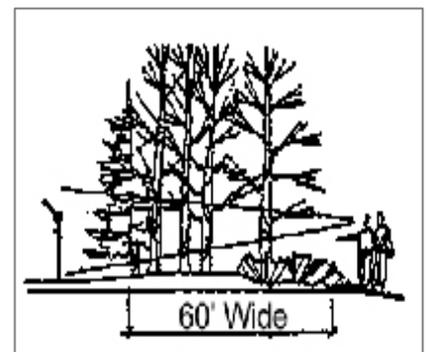


Fig. 10.20 - Establish a Visual Barrier in Perimeter Setback

loose rather than dense in growth habit and possess multiple small stems rather than a single trunk that will obscure a 150 mm (6 inch) package.

- Vegetation groupings provide reduction of blast effect.
- Plant material selection and placement shall minimize potential hiding places for bombs and aggressors.
- Provide vegetation screens for play areas and outdoor recreation areas to obscure from off-installation view.
- Use trees to obscure sight lines of on-installation buildings from off-installation buildings (Fig. 10.21).

10.12 ARMY STANDARDS

10.12.1 The cited Army Standards shall be met.

- [Army Regulation \(AR\) 420-70, Buildings and Structures](#)
- [Technical Manual \(TM\) 5-630, Natural Resources Land Management](#)
- [Technical Manual \(TM\) 5-803-13, Landscape Design and Planting](#)
- American Standard for Nursery Stock, ANSI Z60.1
- Overseas (Host Nation Standards)

10.13 REFERENCES

10.13.1 The following references are provided for guidance.

- [Unified Facilities Criteria \(UFC\) 2-600-01, Installation Design, Chap 10](#)
- [USAF Landscape Design Guide](#)
- C. Brickell and D. Joyce. *Pruning and Training*, 1996.

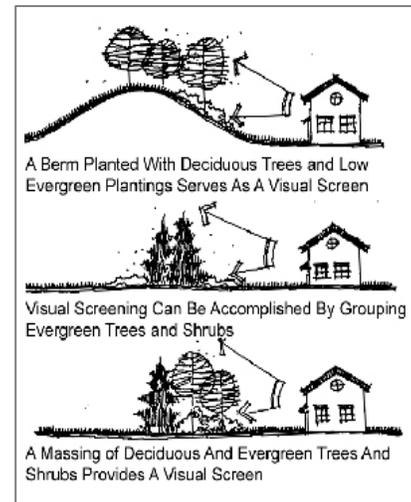


Fig. 10.21 – Use Trees to Obscure Sight Lines

Links

[Go to Section 11](#)

[Go to Table of](#)

APPENDIX J
DRAWINGS

PROVIDED SEPARATELY

Appendix K
Fuel Cost Information

IMWE-SIL-RMO

24 January 2011

MEMORANDUM FOR: Fort Sill Utility and Refuse Customers

SUBJECT: Change of Utility Rate Schedule

1. In compliance with United States Army Center for Public Works, Technical Note 420-41-1, the required Annual review of utility cost to the government has been completed. The revised rate will be in effect on your January billing.
2. The FY11 rates are calculated from receipt of FY10 cost experience and completion of year-end reporting. In the event that the rates need to be re-evaluated due to the local market a notice will be sent out immediately.
3. The following rates supersede the rates set forth on all past contract modifications or basic contracts.

	A rate	B rate	H rate
Electric	0.0618 KWH	0.0649 KWH	0.0483 KWH
Gas	11.1410 MCF	11.6981 MCF	10.7178 MCF
Water	8.0113 KGAL	8.4118 KGAL	6.5884 KGAL
Sewage	6.3431 KGAL	6.6603 KGAL	3.8979 KGAL
Refuse	0.0267 LB	0.0314 LB	
Refuse Rate A per Ton		\$53.33	
Refuse Rate B per Ton		\$62.72	

4. The (A) rate is the cost to the government including operation, privatization and maintenance costs plus losses/infiltration in transmission. Chargeable to other Federal Government activities, applicable DFMWR activities, and commissaries.
5. The (B) rate is the cost to the government including operation, privatization and maintenance cost, losses/infiltration in transmission, capital charges, and administrative overhead. Chargeable to on post non-federal government activities, lessees of industrial facilities, contractors (MCA, OMA, RDT&E), and direct sales concessionaires. Rate B is also chargeable to off-post non-federal government activities when it is greater than the prevailing rate (LPR) applicable to the customer class.
6. The (H) rate is the cost to the government including normal operation, privatization and maintenance costs plus losses/infiltration in transmission. The maintenance cost excludes major one-time or non-recurring cost maintenance and repair projects (abnormal maintenance). Rate H is chargeable to privatized contractors of housing and lodging or Government employees renting Government quarter's on-post. Rate excludes capital maintenance projects that are not solely beneficial to the customer.
7. Point of contacts for this action are Claudia Ragsdale (580) 442-3181 and Peggy McConnell (580)442-3267, IMCOM-RMO, Budget and Accounting Division, Garrison Resource Management Office.



RANDALL J. BUTLER, P.E.
Director of Public Works

Appendix L
LEED Project Credit Guidance

APPENDIX L

LEED Project Credit Guidance (DEC 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). Except where indicated otherwise, provide an outdoor designated smoking area (with signage but no structure) which will be at least 50 feet from common points of ingress/egress, building air intakes and operable windows. Designated smoking area will not be located in an area that is commonly used by nonsmokers.
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

04 MAY 10

 Appendix M

Owner's Project Requirements Document for LEED Fundamental Commissioning

Project: _____

Approved: _____	_____	_____
Name	Owner's Representative	Date
_____	_____	_____
Name	Design Agent's Representative	Date

Overview and Instructions

The purpose of this document is to provide clear and concise documentation of the Owner's goals, expectations and requirements for commissioned systems, and shall be utilized throughout the project delivery and commissioning process to provide an informed baseline and focus for design development and for validating systems' energy and environmental performance.

The Owner's Project Requirements Document is a required document for LEED-NC EA Prerequisite Fundamental Commissioning of the Building Energy Systems. It shall be completed by the Corps District/Design Agent based on coordination with the Installation/User/Proponent and shall be approved by the Installation/User/Proponent representative.

The intent of the Owner's Project Requirements Document is to detail the functional requirements of a project and the expectations of the building's use and operation as it relates to commissioned systems. This template contains the basic recommended components indicated in the LEED Reference Guide. It should be adapted as needed to suit the project, remaining reflective of the LEED intent.

The Owner's Project Requirements Document should ideally be completed before the start of design and furnished to the design team. It must be completed prior to the approval of Contractor submittals of any commissioned equipment or systems to meet LEED requirements.

Updates to the Owner's Project Requirements Document throughout the course of project delivery shall be made by the Corps District/Design Agent based on decisions and agreements coordinated with and agreed to by the Installation/User/Proponent.

The Owner's Project Requirements Document shall be included in the project's LEED documentation file under EA PR1, Fundamental Commissioning of the Building Energy Systems.

04 MAY 10

Owner's Project Requirements Document for LEED Fundamental Commissioning

Table of Contents

1. Owner and User Requirements
 - Primary Purpose, Program and Use
 - Project History
 - Broad Goals
2. Environmental and Sustainability Goals
 - Energy Efficiency Goals
 - General
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 - Building Façade
 - Building Fenestration
 - Building Envelope
 - Roof
 - Other
3. Indoor Environmental Quality Requirements
 - Intended Use
 - Occupancy Schedule
 - Accommodations for After-Hours Use
 - Lighting, Temperature, Humidity, Air Quality, Ventilation, Filtration
 - Acoustics
 - Occupant Ability to Adjust System Controls
 - Types of Lighting
4. Equipment and Systems Expectations
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 - Refrigeration
 - HVAC Controls
 - Domestic Hot Water
 - Lighting Controls
 - Daylighting Controls
 - Emergency Power
 - Other
5. Building Occupant and O&M Personnel Requirements
 - Facility Operation
 - EMCS
 - Occupant Training and Orientation
 - O&M Staff Training and Orientation

TABLE 1

04 MAY 10

1. Owner and User Requirements

What is the primary purpose, program and use of this project? (example: office building with data center)

Describe pertinent project history. (example: standard design development)

Broad Goals

What are the broad goals relative to program needs?

What are the broad goals relative to future expansion?

What are the broad goals relative to flexibility?

What are the broad goals relative to quality of materials?

What are the broad goals relative to construction costs?

What are the broad goals relative to operational costs?

Other broad goals: *(Insert as applicable)*

04 MAY 10

2. Environmental and Sustainability Goals

What are the project goals relative to sustainability and environmental issues? (example: LEED Silver rating)

What are the project goals relative to energy efficiency? (example: Meet EPACT)

What are the project goals and requirements for building siting that will impact energy use?

What are the project goals and requirements for building facade that will impact energy use?

What are the project goals and requirements for building fenestration that will impact energy use?

What are the project goals and requirements for building envelope that will impact energy use?

What are the project goals and requirements for building roof that will impact energy use?

Other: *(Insert as applicable)*

04 MAY 10

3. Indoor Environmental Quality Requirements

What is the intended use for all spaces? For all spaces that have an intended use that is not readily apparent from the space name, provide this information in Table 1.

What is the anticipated occupancy schedule (numbers of occupants and time frames) for all occupied spaces? Indicate the default occupancy schedule below and for all spaces that have an occupancy schedule that differs from the default, provide this information in Table 1.

What accommodations for after-hours use are required? (example: access control, lighting controls, HVAC controls) Indicate general accommodations required below and for all spaces that have special requirements, provide this information in Table 1.

What are the lighting, temperature, humidity, air quality, ventilation and filtration requirements for all spaces? Indicate the default requirements below and for all spaces that have a requirement that differs from the default, provide this information in Table 1.

Lighting: _____

Temperature: _____

Humidity: _____

Air Quality: _____

Ventilation: _____

Filtration: _____

What are the acoustical requirements for all spaces? Indicate the default acoustical requirements below and for all spaces that have a requirement that differs from the default, provide this information in Table 1.

What is the desired level of occupant ability to adjust systems controls? Indicate the default desired levels below and for all spaces that have a desired level that differs from the default, provide this information in Table 1.

Lighting: _____

04 MAY 10

Temperature: _____

Humidity: _____

Air Quality: _____

Ventilation: _____

What, if any, specific types of lighting are desired? (example: fluorescent in 2x2 grid, accent lighting, particular lamps)

4. Equipment and System Expectations

(Complete for each category as applicable or indicate "none identified" or "N/A". Add desired features information for other anticipated commissioned systems as applicable)

Indicate desired features for the following commissioned system: Space Heating

Desired Type: _____

Quality: _____

Preferred Manufacturer: _____

Reliability: _____

Automation: _____

Flexibility: _____

Maintenance Requirements: _____

Efficiency Target: _____

Desired Technologies: _____

Indicate desired features for the following commissioned system: Ventilation

Desired Type: _____

Quality: _____

Preferred Manufacturer: _____

Reliability: _____

Automation: _____

Flexibility: _____

Maintenance Requirements: _____

Efficiency Target: _____

Desired Technologies: _____

Indicate desired features for the following commissioned system: Air Conditioning

04 MAY 10

Desired Type: _____

Quality: _____

Preferred Manufacturer: _____

Reliability: _____

Automation: _____

Flexibility: _____

Maintenance Requirements: _____

Efficiency Target: _____

Desired Technologies: _____

Indicate desired features for the following commissioned system: Refrigeration

Desired Type: _____

Quality: _____

Preferred Manufacturer: _____

Reliability: _____

Automation: _____

Flexibility: _____

Maintenance Requirements: _____

Efficiency Target: _____

Desired Technologies:

Indicate desired features for the following commissioned system: HVAC Controls

Desired Type: _____

Quality: _____

Preferred Manufacturer: _____

Reliability: _____

Automation: _____

Flexibility: _____

Maintenance Requirements: _____

Efficiency Target: _____

Desired Technologies: _____

Indicate desired features for the following commissioned system: Domestic Hot Water

Desired Type: _____

Quality: _____

Preferred Manufacturer: _____

Reliability: _____

Automation: _____

04 MAY 10

Flexibility: _____
 Maintenance Requirements: _____
 Efficiency Target: _____
 Desired Technologies: _____

Indicate desired features for the following commissioned system: Lighting Controls

Desired Type: _____
 Quality: _____
 Preferred Manufacturer: _____
 Reliability: _____
 Automation: _____
 Flexibility: _____
 Maintenance Requirements: _____
 Efficiency Target: _____
 Desired Technologies: _____

Indicate desired features for the following commissioned system: Daylighting Controls

Desired Type: _____
 Quality: _____
 Preferred Manufacturer: _____
 Reliability: _____
 Automation: _____
 Flexibility: _____
 Maintenance Requirements: _____
 Efficiency Target: _____
 Desired Technologies: _____

Indicate desired features for the following commissioned system: Emergency Power

Desired Type: _____
 Quality: _____
 Preferred Manufacturer: _____
 Reliability: _____
 Automation: _____
 Flexibility: _____
 Maintenance Requirements: _____
 Efficiency Target: _____
 Desired Technologies: _____

04 MAY 10

Indicate desired features for the following commissioned system: Other - _____

Desired Type: _____

Quality: _____

Preferred Manufacturer: _____

Reliability: _____

Automation: _____

Flexibility: _____

Maintenance Requirements: _____

Efficiency Target: _____

Desired Technologies: _____

5. Building Occupant and O&M Personnel Requirements

How will the facility be operated? Who will operate the facility?

Will the facility be connected to an EMCS? If so, what are the interface requirements? (example: monitoring points, control points, scheduling)

What is the desired level of training and orientation for building occupants to understand and use the building systems?

What is the desired level of training and orientation for O&M staff to understand and maintain the building systems?

04 MAY 10

Appendix M

Owner's Project Requirements Document for LEED Fundamental Commissioning

Project: _____

Approved: _____	_____	_____
Name	Owner's Representative	Date
_____	_____	_____
Name	Design Agent's Representative	Date

Overview and Instructions

The purpose of this document is to provide clear and concise documentation of the Owner's goals, expectations and requirements for commissioned systems, and shall be utilized throughout the project delivery and commissioning process to provide an informed baseline and focus for design development and for validating systems' energy and environmental performance.

The Owner's Project Requirements Document is a required document for LEED-NC EA Prerequisite Fundamental Commissioning of the Building Energy Systems. It shall be completed by the Corps District/Design Agent based on coordination with the Installation/User/Proponent and shall be approved by the Installation/User/Proponent representative.

The intent of the Owner's Project Requirements Document is to detail the functional requirements of a project and the expectations of the building's use and operation as it relates to commissioned systems. This template contains the basic recommended components indicated in the LEED Reference Guide. It should be adapted as needed to suit the project, remaining reflective of the LEED intent.

The Owner's Project Requirements Document should ideally be completed before the start of design and furnished to the design team. It must be completed prior to the approval of Contractor submittals of any commissioned equipment or systems to meet LEED requirements.

Updates to the Owner's Project Requirements Document throughout the course of project delivery shall be made by the Corps District/Design Agent based on decisions and agreements coordinated with and agreed to by the Installation/User/Proponent.

The Owner's Project Requirements Document shall be included in the project's LEED documentation file under EA PR1, Fundamental Commissioning of the Building Energy Systems.

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Owner's Project Requirements Document for LEED Fundamental Commissioning

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TABLE 1

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1. Owner and User Requirements

What is the primary purpose, program and use of this project? (example: office building with data center)

Describe pertinent project history. (example: standard design development)

Broad Goals

What are the broad goals relative to program needs?

What are the broad goals relative to future expansion?

What are the broad goals relative to flexibility?

What are the broad goals relative to quality of materials?

What are the broad goals relative to construction costs?

What are the broad goals relative to operational costs?

Other broad goals: *(Insert as applicable)*

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2. Environmental and Sustainability Goals

What are the project goals relative to sustainability and environmental issues? (example: LEED Silver rating)

What are the project goals relative to energy efficiency? (example: Meet EPACT)

What are the project goals and requirements for building siting that will impact energy use?

What are the project goals and requirements for building facade that will impact energy use?

What are the project goals and requirements for building fenestration that will impact energy use?

What are the project goals and requirements for building envelope that will impact energy use?

What are the project goals and requirements for building roof that will impact energy use?

Other: *(Insert as applicable)*

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3. Indoor Environmental Quality Requirements

What is the intended use for all spaces? For all spaces that have an intended use that is not readily apparent from the space name, provide this information in Table 1.

What is the anticipated occupancy schedule (numbers of occupants and time frames) for all occupied spaces? Indicate the default occupancy schedule below and for all spaces that have an occupancy schedule that differs from the default, provide this information in Table 1.

What accommodations for after-hours use are required? (example: access control, lighting controls, HVAC controls) Indicate general accommodations required below and for all spaces that have special requirements, provide this information in Table 1.

What are the lighting, temperature, humidity, air quality, ventilation and filtration requirements for all spaces? Indicate the default requirements below and for all spaces that have a requirement that differs from the default, provide this information in Table 1.

Lighting: _____

Temperature: _____

Humidity: _____

Air Quality: _____

Ventilation: _____

Filtration: _____

What are the acoustical requirements for all spaces? Indicate the default acoustical requirements below and for all spaces that have a requirement that differs from the default, provide this information in Table 1.

What is the desired level of occupant ability to adjust systems controls? Indicate the default desired levels below and for all spaces that have a desired level that differs from the default, provide this information in Table 1.

Lighting: _____

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Temperature: _____

Humidity: _____

Air Quality: _____

Ventilation: _____

What, if any, specific types of lighting are desired? (example: fluorescent in 2x2 grid, accent lighting, particular lamps)

4. Equipment and System Expectations

(Complete for each category as applicable or indicate "none identified" or "N/A". Add desired features information for other anticipated commissioned systems as applicable)

Indicate desired features for the following commissioned system: Space Heating

Desired Type: _____

Quality: _____

Preferred Manufacturer: _____

Reliability: _____

Automation: _____

Flexibility: _____

Maintenance Requirements: _____

Efficiency Target: _____

Desired Technologies: _____

Indicate desired features for the following commissioned system: Ventilation

Desired Type: _____

Quality: _____

Preferred Manufacturer: _____

Reliability: _____

Automation: _____

Flexibility: _____

Maintenance Requirements: _____

Efficiency Target: _____

Desired Technologies: _____

Indicate desired features for the following commissioned system: Air Conditioning

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Desired Type: _____

Quality: _____

Preferred Manufacturer: _____

Reliability: _____

Automation: _____

Flexibility: _____

Maintenance Requirements: _____

Efficiency Target: _____

Desired Technologies: _____

Indicate desired features for the following commissioned system: Refrigeration

Desired Type: _____

Quality: _____

Preferred Manufacturer: _____

Reliability: _____

Automation: _____

Flexibility: _____

Maintenance Requirements: _____

Efficiency Target: _____

Desired Technologies:

Indicate desired features for the following commissioned system: HVAC Controls

Desired Type: _____

Quality: _____

Preferred Manufacturer: _____

Reliability: _____

Automation: _____

Flexibility: _____

Maintenance Requirements: _____

Efficiency Target: _____

Desired Technologies: _____

Indicate desired features for the following commissioned system: Domestic Hot Water

Desired Type: _____

Quality: _____

Preferred Manufacturer: _____

Reliability: _____

Automation: _____

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Flexibility: _____

Maintenance Requirements: _____

Efficiency Target: _____

Desired Technologies: _____

Indicate desired features for the following commissioned system: Lighting Controls

Desired Type: _____

Quality: _____

Preferred Manufacturer: _____

Reliability: _____

Automation: _____

Flexibility: _____

Maintenance Requirements: _____

Efficiency Target: _____

Desired Technologies: _____

Indicate desired features for the following commissioned system: Daylighting Controls

Desired Type: _____

Quality: _____

Preferred Manufacturer: _____

Reliability: _____

Automation: _____

Flexibility: _____

Maintenance Requirements: _____

Efficiency Target: _____

Desired Technologies: _____

Indicate desired features for the following commissioned system: Emergency Power

Desired Type: _____

Quality: _____

Preferred Manufacturer: _____

Reliability: _____

Automation: _____

Flexibility: _____

Maintenance Requirements: _____

Efficiency Target: _____

Desired Technologies: _____

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Indicate desired features for the following commissioned system: Other - _____

Desired Type: _____

Quality: _____

Preferred Manufacturer: _____

Reliability: _____

Automation: _____

Flexibility: _____

Maintenance Requirements: _____

Efficiency Target: _____

Desired Technologies: _____

5. Building Occupant and O&M Personnel Requirements

How will the facility be operated? Who will operate the facility?

Will the facility be connected to an EMCS? If so, what are the interface requirements? (example: monitoring points, control points, scheduling)

What is the desired level of training and orientation for building occupants to understand and use the building systems?

What is the desired level of training and orientation for O&M staff to understand and maintain the building systems?

Appendix N

LEED Requirements for Multiple Contractor Combined Projects

(Not Used)

Appendix O
LEED Strategy Tables

Burns & McDonnell

LEED-NC 2009 Building Design & Construction - Planning Checklist

Project Name: Tactical Equipment Maintenance Facility (TEMF) Complex - Master Site
 Client: USACE, Tulsa District
 Date: July 2011
 Certification Goal: Silver

Yes	?	No	Avail	Exp
7	9	7	26	

Note: Refer to LEED-NC Reference Guide for Specific Requirements for Credits & Prerequisites

Notes

Sustainable Sites				
Y			0	
Prereq 1 C Construction Activity Pollution Prevention				
Erosion & Sedimentation Control Plan shall conform to EPA Construction General Permit (comply with NPDES)			Project will comply	
1			1	
Credit 1 D Site Selection				
Do not develop on the following: farmland, previously undeveloped land 5' below 100 yr flood, endangered species habitat, w/in 100' of wetlands, previously undeveloped land w/in 50' of water body & public parkland			Site meets all criteria	
	5		5	+
Credit 2 D Development Density & Community Connectivity				
Previously developed site with density of 60,000 sf/acre OR within 1/2 mile of residential zone (or average density of 10 units/acre) and 10 basic services w/ pedestrian access (exemplary for 120,000 sf/acre)			Verify distance from barracks and number of services available when construction is complete	
			1	R
Credit 3 D Brownfield Redevelopment				
Defined as contaminated by ASTM E1903-97 Phase II Environmental Site Assessment, local voluntary cleanup program or government agency			D-B scope: lead/asbestos abatement part of building demolition	
		6	6	+
Credit 4.1 D Alternative Transportation, Public Transportation Access				
Must have pedestrian/bike access AND within 1/2 mile of light rail OR 1/4 mile of 2+ bus lines (exemplary for comprehensive plan OR 2+ light rail lines OR 4+ bus lines AND 200+ transit rides per day)			No public transportation available at this time	
			1	
Credit 4.2 D Alternative Transportation, Bicycle Storage & Changing Rooms				
Bike racks for 5% of peak building users AND showers for 0.5% employees			D-B scope: verify FTE, no showers	
3			3	
Credit 4.3 D Alternative Transportation, Low-Emitting and Fuel-Efficient Vehicles				
Preferred/discounted parking for 5% parking capacity OR refueling stations for 3% parking capacity OR low-emitting/fuel-efficient vehicles for 3% FTE OR access to LEV/FEV vehicle-sharing program for 3% FTE			Site project includes several centralized parking lots (preferred parking for 3% FTE - coord. w/ D-B)	
	2		2	
Credit 4.4 D Alternative Transportation, Parking Capacity				
Meet minimum zoning AND provide preferred parking OR 20% discount for carpools for 5% parking capacity OR provide no new parking			Site project includes several centralized parking lots - confirm zoning (preferred parking for 3% FTE - coord. w/ D-B)	
		1	1	R+
Credit 5.1 C Site Development, Protect or Restore Habitat				
<u>Greenfield</u> : limit site disturbance (40' bldg, 10' walks/parking, 15' roads/main utilities, 25' constructed permeable surfaces); <u>Previously Developed</u> : native landscape for 50% (excluding building footprint) or 20% (including building footprint) of site, whichever is greater (exemplary for 75%)			Native/drought-tolerant landscaping, but will not meet 50% requirement	
1			1	+
Credit 5.2 D Site Development, Maximize Open Space				
Exceed zoning by 25% OR equal to building footprint if no zoning OR 20% of site if no open space required by zoning (exemplary for double)			Open space to exceed area of building footprints included in LEED boundary (campus boundary)	
1			1	+
Credit 6.1 D Stormwater Design, Quantity Control				
<u>Existing imperviousness less than 50%</u> : post-development rate and quantity less than pre-development OR stream channel protection; <u>Existing imperviousness greater than 50%</u> : decrease runoff by 25%			Campus site plan results in less impervious area than existing conditions	
	1		1	R+
Credit 6.2 D Stormwater Design, Quality Control				
Use BMPs to capture & treat 90% avg annual rainfall and remove 80% TSS			Bid option for rainwater collection from building roofs and re-use for irrigation, verify calcs	
	1		1	+
Credit 7.1 C Heat Island Effect, Non-Roof				
50% hardscape shaded OR pavement with SRI 29+ OR open grid paving OR 50% parking covered by material with SRI 29+ (exemplary for 100%)			Bid option for trees to shade asphalt parking lots (shaded area + new concrete must exceed asphalt)	
			1	+
Credit 7.2 D Heat Island Effect, Roof				
75% of roof SRI 78+ for low-slope (<=2:12) / SRI 29+ for steep-slope OR 50% vegetated roof OR combination (exemplary for 100% vegetated roof)			D-B scope	
1			1	
Credit 8 D Light Pollution Reduction				
Limit light trespass from interior, exterior lighting power density to meet ASHRAE 90.1-2007, reduce sky-glow and light trespass at project boundary			Photometric study at LEED boundary	

Yes	?	No	Avail	Exp
4	0	0	10	

Water Efficiency

Y			0	
Prereq 1 D Water Use Reduction, 20% Reduction				
Reduction based on EPA 2005 baseline - fixture type and controls (wc: 1.6 gpf; urinals: 1.0 gpf; public lavs: 0.5 gpm; private lavs, kitchen & janitor sinks: 2.2 gpm; showers: 2.5 gpm) AND/OR non-potable water use			D-B scope: verify FTE, m:f ratio	

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4	R	Credit 1	D Water Efficient Landscaping, 50% (2 pts) or No Potable/No Irrigation (4 pts) <i>Reduce potable water use for irrigation by plant species selection and irrigation efficiency AND/OR use of captured rainwater, recycled wastewater/greywater or non-potable public water system OR install landscaping that requires no permanent irrigation system</i>	<i>No potable water used for irrigation (bid option for landscaping and rainwater harvest/reuse)</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2	R+	Credit 2	D Innovative Wastewater Technologies <i>Reduce potable water use by 50% for sewage conveyance through fixture type/non-potable water use OR treat/infiltrate 50% wastewater on-site (exemplary: 100% reduction in potable water use OR 100% reuse/infiltration)</i>	<i>D-B scope: verify calcs - waterless urinals</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4	+	Credit 3	D Water Use Reduction, 30% (2 pts), 35% (3 pts) or 40% (4 pts) <i>Reduction based on EPAAct 2005 baseline - fixture type and controls AND/OR non-potable water use (exemplary for 45%)</i>	<i>D-B scope: waterless urinals, 1.28 gpf toilets, .5 gpm lavs, 1.5 gpm showers, 1.5 gpm kitchen sinks</i>

Yes	?	No	Avail	Exp
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	35	

Energy & Atmosphere

<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0		Prereq 1	C Fundamental Commissioning of the Building Energy Systems <i>CxA to review OPR and BOD, develop/incorporate commissioning requirements into construction documents, develop/implement commissioning plan, verify installation/performance of systems to be commissioned AND complete summary commissioning report</i>	<i>D-B scope</i>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0		Prereq 2	D Minimum Energy Performance <i>10% improvement for new buildings (5% for renovations) based on ASHRAE 90.1-2007 baseline (building envelope, HVAC, lighting, etc.) OR Prescriptive Compliance Path by ASHRAE Advanced Energy Design Guide or Advanced Buildings Core Performance Guide</i>	<i>D-B scope</i>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0		Prereq 3	D Fundamental Refrigerant Management <i>Zero CFC-based refrigerants OR phase-out plan for existing equipment</i>	<i>D-B scope</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	19	+	Credit 1	D Optimize Energy Performance <i>Improve proposed building performance compared to ASHRAE 90.1-2007 baseline by whole building simulation OR Prescriptive Compliance Path by ASHRAE Advanced Energy Design Guide (1 pt max) or Advanced Buildings Core Performance Guide (1-3 pts max)</i>	<i>D-B scope</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<ul style="list-style-type: none"> <input type="checkbox"/> 12% New Buildings or 8% Existing Building Renovations <input type="checkbox"/> 14% New Buildings or 10% Existing Building Renovations <input type="checkbox"/> 16% New Buildings or 12% Existing Building Renovations <input type="checkbox"/> 18% New Buildings or 14% Existing Building Renovations <input type="checkbox"/> 20% New Buildings or 16% Existing Building Renovations <input type="checkbox"/> 22% New Buildings or 18% Existing Building Renovations <input type="checkbox"/> 24% New Buildings or 20% Existing Building Renovations <input type="checkbox"/> 26% New Buildings or 22% Existing Building Renovations <input type="checkbox"/> 28% New Buildings or 24% Existing Building Renovations <input type="checkbox"/> 30% New Buildings or 26% Existing Building Renovations <input type="checkbox"/> 32% New Buildings or 28% Existing Building Renovations <input type="checkbox"/> 34% New Buildings or 30% Existing Building Renovations <input type="checkbox"/> 36% New Buildings or 32% Existing Building Renovations <input type="checkbox"/> 38% New Buildings or 34% Existing Building Renovations <input type="checkbox"/> 40% New Buildings or 36% Existing Building Renovations <input type="checkbox"/> 42% New Buildings or 38% Existing Building Renovations <input type="checkbox"/> 44% New Buildings or 40% Existing Building Renovations <input type="checkbox"/> 46% New Buildings or 42% Existing Building Renovations <input type="checkbox"/> 48% New Buildings or 44% Existing Building Renovations 	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7	R+	Credit 2	D On-Site Renewable Energy <i>Based on annual building energy cost as calculated in EA Credit 1 - consider solar, wind, geothermal, hydro, biomass, bio-gas, etc. (exemplary for 15%)</i>	<i>D-B scope</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<ul style="list-style-type: none"> <input type="checkbox"/> 1% On-Site Renewable Energy <input type="checkbox"/> 3% On-Site Renewable Energy <input type="checkbox"/> 5% On-Site Renewable Energy <input type="checkbox"/> 7% On-Site Renewable Energy <input type="checkbox"/> 9% On-Site Renewable Energy <input type="checkbox"/> 11% On-Site Renewable Energy <input type="checkbox"/> 13% On-Site Renewable Energy 	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2	+	Credit 3	C Enhanced Commissioning <i>In addition to EA p1: CxA to review design documents prior to mid-construction document phase, review contractor submittals, develop systems manual for O&M staff, verify training for O&M staff & occupants AND review building operation within 10 months after substantial completion</i>	<i>D-B scope</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2		Credit 4	D Enhanced Refrigerant Management <i>No refrigerants OR requires calculation of refrigerant ozone depletion and global warming potentials (LCGWP + LCODP x 10⁻⁵ ≤ 100)</i>	<i>D-B scope</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3		Credit 5	C Measurement & Verification <i>Requires M&V Plan to monitor and evaluate building and/or energy systems performance for minimum 1 year post-construction occupancy AND corrective action plan if results show savings are not being achieved</i>	<i>D-B scope</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2	+	Credit 6	C Green Power <i>Provide 35% of building's electricity use (from EA Credit 1) through two-year renewable energy contract (exemplary for 70% or four-year contract)</i>	<i>D-B scope</i>

Yes	?	No	Avail	Exp	
0	0	0	14		Materials & Resources
Y			0		Prereq 1 D Storage & Collection of Recyclables <i>Include area to collect and store recyclables including paper, corrugated cardboard, glass, plastics AND metals</i> D-B scope
			3		Credit 1.1 C Building Reuse-Structure: Maintain Existing Walls, Floors & Roof <i>Maintain existing structure (structural floor and roof decking) and envelope (exterior skin and framing, excluding window assemblies and non-structural roofing) - if project includes an addition over 2x the sf of existing building, credit is not applicable (55%=1 pt, 75%=2 pts, 95%=3 pts)</i> D-B scope
			1		Credit 1.2 C Building Reuse-Interior: Maintain 50% of Non-Structural Elements <i>Includes int. walls, doors, floor coverings, clg systems, etc. - if project includes addition over 2x the sf of existing building, credit is not applicable</i> D-B scope
			2	+	Credit 2 C Construction Waste Management, Divert 50% (1 pt), 75% (2 pts) <i>Recycle or salvage construction and demolition debris - calculations based on weight or volume but must be consistent (exemplary for 95%)</i> D-B scope
			2	+	Credit 3 C Materials Reuse, 5% (1 pt), 10% (2 pts) <i>Salvaged, refurbished or reused materials - calculations based on total materials cost for Div. 3-10 (exemplary for 15%)</i> D-B scope
			2	+	Credit 4 C Recycled Content, 10% (1 pt), 20% (2 pts) <i>Recycled content = post-consumer + 1/2 pre-consumer : consider steel, concrete, gypsum, carpet, acoustic ceiling tiles, etc. - calculations based on total materials cost for Div. 3-10 (exemplary for 30%)</i> D-B scope
			2	+	Credit 5 C Regional Materials, 10% (1 pt), 20% (2 pts) <i>Use products extracted, harvested or recovered, processed AND manufactured within 500 miles of project site - calculations based on total materials cost for Div. 3-10 (exemplary for 30%)</i> D-B scope
			1	+	Credit 6 C Rapidly Renewable Materials, 2.5% <i>Use products made from plants typically harvested within ten-year cycle or shorter - consider bamboo, wool, cotton insulation, agrifiber, linoleum, wheatboard, strawboard, cork, etc. (exemplary for 5%)</i> D-B scope
			1	+	Credit 7 C Certified Wood <i>Minimum 50% of wood must be FSC certified - based on total wood material cost only (exemplary for 95%)</i> D-B scope

Yes	?	No	Avail	Exp	
0	0	0	15		Indoor Environmental Quality
Y			0		Prereq 1 D Minimum IAQ Performance <i>Meet ASHRAE 62.1-2007 minimum outdoor air ventilation rates</i> D-B scope
Y			0		Prereq 2 D Environmental Tobacco Smoke (ETS) Control <i>No smoking in building or within 25' of all entries, outdoor air intakes and operable windows OR separate designated smoking rooms with direct outside exhaust, deck-to-deck partitions and negative pressure</i> D-B scope
			1		Credit 1 D Outdoor Air Delivery Monitoring <i>CO2 sensors (in spaces with greater than 25 people per 1000 sf / less than 40 sf per occupant) AND direct outdoor airflow measurement devices</i> D-B scope
			1		Credit 2 D Increased Ventilation <i>30% beyond ASHRAE 62.1-2007 minimum outdoor air ventilation rates</i> D-B scope
			1		Credit 3.1 C Construction IAQ Management Plan, During Construction <i>Contractor to develop & implement IAQ Plan based on SMACNA guidelines AND protect stored & installed absorptive materials from moisture damage AND use MERV 8 filters at each return air grille if air handlers used during construction AND replace all filters immediately prior to occupancy</i> D-B scope
			1		Credit 3.2 C Construction IAQ Management Plan, Before Occupancy <i>Building flush-out (14,000 cu.ft. of outdoor air per sf) while maintaining at least 60 °F and less than 60% relative humidity OR occupancy after partial flush-out (3,500 cu.ft. per sf) while continuing flush-out OR air quality testing</i> D-B scope
			1		Credit 4.1 C Low-Emitting Materials, Adhesives & Sealants <i>VOC limits for site-applied interior adhesives, sealants and sealant primers (SCAQMD Rule 1168) and aerosol adhesives (GS-36)</i> D-B scope
			1		Credit 4.2 C Low-Emitting Materials, Paints & Coatings <i>VOC limits for site-applied interior paints, coatings and primers (GS-11: flats 50 g/L; non-flats 150 g/L), anti-corrosive and anti-rust paints applied to interior ferrous metal substrates (GS-03: 250 g/L) and wood finishes, floor coatings, stains, etc. (SCAQMD Rule 1113)</i> D-B scope
			1		Credit 4.3 C Low-Emitting Materials, Flooring Systems <i>Requirements for interior carpet (CRI Green Label Plus), carpet cushions (CRI Green Label), carpet adhesives (EQ Credit 4.1 VOC limit of 50 g/L), hard surface flooring (FloorScore), concrete / wood / bamboo / cork finishes (SCAQMD Rule 1113) and tile setting adhesive / grout (SCAQMD Rule 1168)</i> D-B scope
			1		Credit 4.4 C Low-Emitting Materials, Composite Wood & Agrifiber Products <i>No composite wood products or laminating adhesives with added urea-formaldehyde resins (on-site and shop-applied)</i> D-B scope

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1			Credit 5 D Indoor Chemical & Pollutant Source Control 10' entryway system at regularly used entries AND direct exhaust (0.50 cfm/sf) w/ neg. pressure (5 Pa avg, 1 Pa w/ closed doors) AND self-closing doors & hard lid clg where gas/chemicals used AND install MERV 13 filters at regularly occupied spaces (return & outdoor air) AND containment for hazardous liquid waste from chem. mixing (janitor, housekeeping, labs, etc.)	D-B scope
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1			Credit 6.1 D Controllability of Systems, Lighting Controls for 90% occupants (individual task lighting in open work spaces) AND lighting system controllability for all shared multi-occupant spaces	D-B scope
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1			Credit 6.2 D Controllability of Systems, Thermal Comfort Temperature controls for 50% of occupants (including open work spaces) AND controls for all shared multi-occupant spaces	D-B scope
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1			Credit 7.1 D Thermal Comfort, Design Meet ASHRAE 55-2004, Thermal Comfort Conditions for Human Occupancy	D-B scope
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1			Credit 7.2 D Thermal Comfort, Verification Achieve credit above AND implement occupant survey with corrective action AND install permanent monitoring system	D-B scope
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1	+		Credit 8.1 D Daylight & Views, Daylight 75% of Spaces For all regularly occupied areas: computer simulation (daylight illumination level 25 fc to 500 fc) OR calculated prescriptive daylight zone ratio (VLT x WFR = 0.150 to 0.180) OR measurement of indoor light level (25 fc) AND glare control required for all options	D-B scope
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1	+		Credit 8.2 D Daylight & Views, Views for 90% of Spaces Vision glazing between 2'-6" and 7'-6" AFF for 90% of all regularly occupied spaces - demonstrated by horizontal (section) view and plan view	D-B scope

Yes	?	No	Avail	Exp
1	1	0	6	

Innovation & Design Process

<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1			Credit 1.1 D Innovation in Design or Exemplary Performance SSc5.2 Site Development, Maximize Open Space (double building footprint)	Evaluate increasing open space
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1			Credit 1.2 D Innovation in Design or Exemplary Performance TBD	D-B scope
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1			Credit 1.3 D Innovation in Design or Exemplary Performance TBD	D-B scope
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1			Credit 1.4 D Innovation in Design TBD	D-B scope
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1			Credit 1.5 D Innovation in Design TBD	D-B scope
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1			Credit 2 C LEED® Accredited Professional At least one principal participant of the project team shall be a LEED AP (include copy of certificate)	Several LEED APs on team

Yes	?	No	Avail	Exp
1	1	0	4	

Regional Priority Credits (project zip code: 73503)

<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1			Credit 1.1 D Regional Priority: WEc1 Water Efficient Landscaping (Opt. 2, No Irrigation)	See credit description above
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1			Credit 1.2 D Regional Priority: WEc2 Innovative Wastewater Technologies	See credit description above
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1			Credit 1.3 D Regional Priority: SSc6.2 Stormwater Design, Quality	See credit description above
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1			Credit 1.4 D Regional Priority: EAc2 On-Site Renewable Energy (1%)	See credit description above
							Regional Priority: SSc5.1 Site Development, Protect Restore Habitat	See credit description above
							Regional Priority: SSc3 Brownfield Redevelopment	See credit description above

Yes	?	No	Total Possible
13	11	7	110

Project Totals (pre-certification estimates)

Certified 40-49 points Silver 50-59 points Gold 60-79 points Platinum 80-110 points

Appendix P
USGBC Registration

The Fort Sill TEMF Complex was registered as a block under LEED-NC 2009 and will follow the USGBC “2010 LEED Application Guide for Multiple Buildings and On-Campus Building Projects” (2010 AGMBC). LEED Online access will be provided to the D-B Contractor upon award of project.

The 2010 AGMBC was developed to streamline the certification process for multiple building and campus projects, while providing direction for applying the LEED rating system to projects on a shared site. USGBC and GBCI recognize these projects require unique guidance in order to:

- encourage a holistic, sustainable approach
- capture economies of scale in the certification process through shared credits
- address the unique challenges and opportunities inherent in campus projects

The A-E registered the “PN 64753 Ft Sill TEMF Complex” block to act as a grouping mechanism and allow individual project registrations to be linked together. As part of the block registration, a “Master Site” project was included to pre-approve applicable credits achieved through shared infrastructure. The TEMF and two SSA buildings were registered individually and will reference the “Master Site” to utilize pre-approved campus credits. The D-B Contractor is responsible for GBCI review fees for the “Master Site” review, as well as LEED certification fees for the three individual buildings.

Please see the 2010 AGMBC for additional information and current pricing.

Carrie Bradley | SITE USER | Log Off

LEED ONLINE™

My Projects | My Archives | Register New Project | Project Transfer

Projects | **Blocks** | Volume | Pending Invitations | Search | Formal Inquiries

PN 64753 Ft Sill TEMF Complex (1000016107)

Block Admin: Carrie Bradley
Access ID: 1318986863183046

Add Project / Pay

To register a new project in this Block, click "Add Project":

To complete the registration process for projects in this block, click "Pay Now":

Projects under Block

Click the project title to enter the Home Page of the designated project. Note: Only projects which you have registered or joined will appear in the list below.

Block Projects | Block Team Administration | Block Summary

Project Title	Project ID	Project Status	Rating System
PN 64753 Ft Sill TEMF Master Site	1000016108	Setup Incomplete	LEED-NC v2009
PN 64753 Ft Sill TEMF TEMF	1000016109	Setup Incomplete	LEED-NC v2009
PN 64753 Ft Sill TEMF SSA 1	1000016110	Setup Incomplete	LEED-NC v2009
PN 64753 Ft Sill TEMF SSA 2	1000016111	Setup Incomplete	LEED-NC v2009

Row 1 of 4

Add Project

To add a project to this block, enter the appropriate access id below and click "Add Project".

Enter Project Access ID:

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
Preliminary Submittal Register

RMS SUBMITTAL REGISTER INPUT FORM

TITLE AND LOCATION			CONTRACT NUMBER											DESIGN ORDER											
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					X					
01 10 00	5.2.3.1	(if concrete pavement) Joint Layout Plan with design drawings					X								X	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 Information		X										X						X	X			X	
01 10 00	5.8.3	BAS Performance Verification Test					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 10	3.4.1	Preliminary Project Schedule	X											X	X					X					
01 32 01.00 10	3.4.2	Initial Project Schedule	X											X	X					X					
01 32 01.00 10	3.4.3	Design Package Schedule	X											X	X					X					
01 32 01.00 10	3.6.1	Periodic schedule updates from the Contractor	X											X	X					X					
01 32 01.00 10	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 Proposal		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. Substantiation					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. Substantiation					X									X				X	X				
01 33 16	3.7.5	DD Form 1354 (Transfer of Real Property)										X				X				X					
01 33 16	3.7	Independent Technical Review					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					
01 33 16	F-3.1.3	BIM Model and data					X									X				X	X				
01 45 04.00 10	3.2	Design and Construction QC Plan	X													X				X					
01 57 20.00 10	1.2	Environmental Protection Plan	X													X				X					
01 78 02.00 10	1.2.1	Final as-Built Drawings/ BIM Model											X		X					X					
01 78 02.00 10	1.2.3.11	Non-Hazardous Solid Waste Diversion Reports							X				X		X					X					
01 78 02.00 10	1.2.7	Provide final as-built CADD and BIM Model files											X		X					X					
01 78 02.00 10	1.2.9	Provide scans of all other docs in Adobe.pdf format											X		X					X					
01 78 02.00 10	1.3.1	Equip-in-Place list of all installed equip and cost											X		X					X					
01 78 02.00 10	1.3.2	Data on equip not addressed in O&M manuals											X		X					X					
01 78 02.00 10	1.3.3	Final as-built specs - electronic files											X		X					X					
01 78 02.00 10	1.4.2.1	Warranty management plan - FAR 52.246-21											X		X					X					
01 78 02.00 10	1.4.2.1	Certificates of Warranty for extended warranty items											X		X					X					
01 78 02.00 10	1.4.2.1	Contractor's POCs for implementing warranty process											X		X					X					
01 78 02.00 10	1.4.2.1	List of each warranted equip, item, feature or system											X		X					X					
01 78 02.00 10	1.5	See also Section 01 10 00 par. 5.8.4 and 5.8.5											X		X					X					
01 78 02.00 10	1.6.1.2	Equipment O&M Manuals - 1 electronic / 2 hard copies											X		X					X					
01 78 02.00 10	1.7	Field Training DVD Videos										X		X						X					
01 78 02.00 10	1.8	Pricing of CF/CI and GF/CI Property											X	X						X					
01 78 02.00 10	1.11	List of Completed Cleanup Items																							

Appendix S

REV 1.1 JUL 2011.

**Manufacturing Performance Requirements for Plumbing Fixtures From
The Energy Policy Act of 1992 (PL 102-486)
(Including Exceptions for Projects Registered for LEED 3.0 or higher)**

Note: This information is for use in establishing the Baseline to calculate flow rate reductions from said Baseline, where required by the contract.

Subtitle C--Appliance and Equipment Energy Efficiency Standards**SEC. 123. ENERGY CONSERVATION REQUIREMENTS FOR CERTAIN LAMPS AND PLUMBING PRODUCTS.**

... (j) STANDARDS FOR SHOWERHEADS AND FAUCETS- (1) The maximum water use allowed for any showerhead manufactured after January 1, 1994, is 2.5 gallons per minute when measured at a flowing water pressure of 80 pounds per square inch. Any such showerhead shall also meet the requirements of ASME/ANSI A112.18.1M-1989, 7.4.3(a).

`(2) The maximum water use allowed for any of the following faucets manufactured after January 1, 1994, when measured at a flowing water pressure of 80 pounds per square inch, is as follows:

`Lavatory faucets: 2.5 gallons per minute **(BUT SEE BELOW**)**

`Lavatory replacement aerators: 2.5 gallons per minute

`Kitchen faucets : 2.5 gallons per minute

`Kitchen replacement aerators: 2.5 gallons per minute

`Metering faucets: 0.25 gallons per cycle

`(k) STANDARDS FOR WATER CLOSETS AND URINALS- (1)(A) Except as provided in subparagraph (B), the maximum water use allowed in gallons per flush for any of the following water closets manufactured after January 1, 1994, is the following:

`Gravity tank-type toilets --1.6 gpf.

`Flushometer tank toilets --1.6 gpf.

`Electromechanical hydraulic toilets --1.6 gpf.

`Blowout toilets --3.5 gpf.

`(B) The maximum water use allowed for any gravity tank-type white 2-piece toilet which bears an adhesive label conspicuous upon installation consisting of the words `Commercial Use Only' manufactured after January 1, 1994, and before January 1, 1997, is 3.5 gallons per flush.

`(C) The maximum water use allowed for flushometer valve toilets, other than blowout toilets, manufactured after January 1, 1997, is 1.6 gallons per flush.

`(2) The maximum water use allowed for any urinal manufactured after January 1, 1994, is 1.0 gallon per flush.

**** EXCEPTIONS for Projects Registered under LEED 3.0 or higher.**

1. Any exceptions identified in the applicable LEED criteria.
2. Public lavatory faucets shall deliver a maximum flow rate of 0.5 gallons per minute, when tested in accordance with ASME A 112.18/CSA B125. Use that flow rate as the Baseline figure for calculating any required reductions from the Baseline.

APPENDIX T FUNCTIONAL AREA LIGHTING CONTROL STRATEGY (FALCS)

A. GENERAL LIGHTING CONTROL SYSTEM ENERGY MANAGEMENT STRATEGIES

SUMMARY: This appendix describes various lighting energy management strategies to utilize across functional areas. These strategies are intended to supplement and NOT supersede the requirements of ASHRAE 90.1.

1. Consider **LIGHT LEVEL TUNING** to maintain the appropriate light level for a given space. Initial light levels are set high to compensate for light depreciation over time. Where dimming ballasts or dimmable LED drivers are used, they shall be digital and addressable in nature (where available) that can provide individual fixture light level tuning and reconfigurability that dims the light level to the target level, saving the energy that otherwise would be used to compensate for future light depreciation. Provide a life-cycle cost-benefit analysis (LCCBA) of light level tuning for all spaces where the general lighting luminaires are equipped with digital addressable dimming ballasts or LED drivers. The LCCBA shall follow the methodology contained in the IESNA Lighting Handbook. Provide light level tuning where the LCCBA shows it to be economical.
2. Use **OCCUPANCY/VACANCY SENSORS** to automatically turn off lighting a specified time after all occupants leave the space. The off time shall be adjustable settable to 1, 5, 15, or 30 minutes. Select the type (single or dual technology, wired or wireless) based on the use and configuration of the space. Lighting control system shall have the capability to manage both hard-wired and wireless sensors where applicable. Single technology solutions shall incorporate signal processing technology that distinguishes between background noise and actual motion without automatically changing their sensitivity threshold. To maximize energy savings potential, all occupancy sensors shall be either **MANUAL ON – AUTOMATIC OFF** (vacancy sensor) or **AUTOMATIC ON** (to a specified light level of 50% or less) – **AUTOMATIC OFF** to maximize energy savings. Occupancy/Vacancy sensors properly located in the space and set appropriately can offer typical lighting energy savings of 15% or more.
3. Use **DAYLIGHT HARVESTING** to control lighting in areas within at least two window head heights (head height is the distance from the floor to the top of the glazing) adjacent to exterior view windows. Typical daylight penetrates three times the window head height into the space. To maximize energy savings, daylight dimming strategies need to penetrate beyond the first row of luminaires (first daylight zone). When daylighting installed fluorescent or LED luminaires, accomplish daylight harvesting by digitally addressable dimming ballasts or drivers. As the natural light in the space increases, the artificial light level should dim gradually to maintain a uniform light level and prevent disruption to the occupants. One daylight sensor must be able to control multiple daylighting zones (cross-zoning) without the need of adding more sensors. All controls (daylight sensors, occupancy sensors, wall stations) shall have the capability to connect to the system via hard wire or wireless. Apply the same daylighting strategies to areas where skylights are available (refer to ASHRAE 189.1 daylight zone definitions). Daylighting systems properly tuned and calibrated can offer typical lighting energy savings of 15% or more.
4. Consider **AUTOMATED SHADING** in spaces utilizing daylight harvesting to maximize the energy savings of the day lighting system. The shades shall be controlled to reduce glare and unwanted heat gain while still allowing natural light to enter the space. When utilizing automated shading consider the following :
 - A. For ease of use and space aesthetics, operate the automated shades by common controls, wired or wireless (i.e. same appearance and design) with the lighting control system.
 - B. For maximum energy savings the automated shading system shall predictably position the shades based on a combination of time of day, façade direction, and sky conditions.
 - C. For maximum design flexibility and ease of installation, shade system should have the capability to address and control each shade individually.
 - D. The shading system shall have a manual override that allows the occupant to temporarily adjust the shades to any desired position. The system will revert back to automatic control after a specified period of time.

Provide a life-cycle cost-benefit analysis (LCCBA) of automated shading for all spaces where daylight harvesting is provided. The LCCBA shall follow the methodology contained in the IESNA Lighting Handbook. Provide automated shading where the LCCBA shows it to be economical.

5. Use SCENE BASED DIMMING in multiple-use areas including auditoriums, conference rooms and classrooms. Also provide scene based dimming in dining rooms and gymnasiums with multiple functions. One button preset touch recall shall allow multiple zones of light within a space to go to the appropriate light levels, known as a scene, for a specific task or use. Scene based control shall allow the integration of AV controls, shading/projection screens and lighting to work seamlessly with one button preset touch (i.e. lights dim, projection screen lowers, and shades go down). If dimming ballasts or LED drivers are used, they shall also be digital and addressable in nature (where available) to take advantage of installation and life-cycle reconfiguration benefits.
6. Provide PERSONAL CONTROL of lighting in spaces to allow the user of the space to vary the general light level based on the task at hand. Personal control can be achieved by wall mounted controls (hard wired or wireless), Infrared or Radio Frequency (RF) wireless devices, or via computer. Digital addressable ballasts and LED drivers allow the control flexibility of personal dimming of installed lighting on the occupant's work area (i.e. dim the luminaire over their cubicle to the appropriate light level).
7. Consider WIRELESS lighting control options for all installations, including retrofit projects (easy installation, lower installed cost, no power packs necessary). Wireless products shall include but not be limited to occupancy / vacancy sensors, daylight sensors, local wall controls, plug in switching and dimming appliance and parasitic load modules. To avoid interference, wireless products should communicate in an FCC frequency band that does not allow continuous transmissions and is free of Wi-Fi devices.

B. FUNCTIONAL TESTING AND MANUFACTURER SUPPORT

SUMMARY: This section describes functional testing to be performed on the lighting control system and the support required from the lighting control manufacturer.

1. Hire an independent agent with no less than three years experience in testing of complex lighting control systems to conduct and certify functional testing of lighting control devices and control systems. The testing agent shall not be directly involved in either the design or construction of the project and shall certify the installed lighting controls meet or exceed all requirements of ASHRAE 90.1 and all documented performance criteria. The lighting control manufacturer's authorized technical representative may serve as the testing agent. Submit qualifications of the testing agent for approval. Submit copies of test results to the Government.
2. LIGHTING CONTROL MANUFACTURER SUPPORT shall include technical phone support located in the United States. The technical phone support shall be available 24 hours a day, 365 days a year.

Appendix AA
Fort Sill IDG Excerpts

Signage.

Signage may be informational, directional, or regulatory. Informational signage provides the user with information and includes room or area labels, bulletin boards, menus, artwork descriptions, and emergency information. Directional signage directs circulation and provides orientation. It includes entry directories, directional arrows, and maps. The purpose of regulatory signage is control: providing prohibitions, warnings, emergency instructions, and use restrictions (Fig. 8.19).

Interior signage is covered in detail in [Technical Manual \(TM\) 5-807-10, Signage](#). The manual includes graphics for the following: directional, identification signs, information, and pictograms.

I.7.4 Interior Signage.

I.7.4.1 Scope. The standards identified herein are applicable to all interior facilities signage in use on Fort Sill and its sub-installations. Signage for training, special events, exercises, conferences, and other temporary signage is specifically excluded.

I.7.4.2 Policy.

I.7.4.2.1 All requirements for installation of new or replacement of existing deteriorated or missing signs shall be reviewed and approved by the DPW prior to accomplishment.

I.7.4.2.2 All approved facility signs shall be listed in a Building Sign Inventory.

I.7.4.2.3 Unauthorized facility signs shall be removed when found.

I.7.4.2.4 Authorized facility signs which fail to conform to standards but which otherwise are serviceable shall not be replaced solely to conform to standards (AR 420-70).

I.7.4.2.5 Signs for facilities authorized as construction shall be fabricated and installed solely by the DPW. As these type signs become unserviceable, they shall be replaced by the DPW as part of the normal maintenance and repair process.

I.7.4.2.6 All other interior facility signs shall be fabricated and installed as Equipment in Place (EIP). If accomplished by the DPW, fabrication and installation shall be on a cost reimbursable basis. Requestors may, upon approval of the DPW, fabricate and install EIP facility signs. Regardless of the source for fabrication and installation, all interior signs shall conform to standards as identified in this Installation Design Guide. Facility signs provided as EIP shall not be replaced by the DPW as normal maintenance and repair. They shall be removed when they become serviceable and replaced only after receipt, review, and approval of a funded request from the user.

I.7.4.3 Interior sign types authorized as construction are:

I.7.4.3.1 Type BB-4, Room Number Sign. Mandatory for all facilities.

I.7.4.3.2 Type BB-7, Restroom Sign. Mandatory for all facilities with a restroom.

I.7.4.3.3 Type DD-1 or DD-2, Mandatory, Prohibitory Sign. Mandatory for fire extinguisher and fire system locations. This sign is also mandatory for identification of permanent non-smoking areas, such as corridors, public assembly areas, toilets, mechanical areas, stairwells, etc.

I.7.4.3.4 Type AA-5 or AA-6, Directional Signs. These signs may be used to display room numbers only in facilities with complex floor plans.

I.7.4.3.5 Type AA-1, Building Directory. One of these signs is authorized for multi-story buildings or for buildings with complex floor plans.

I.7.4.3.6 Type AA-3, Area or small directory. This sign is optional for multi-story facilities and is limited to areas adjacent to locations of entry to the floor, such as stairwell and elevator doors. Only Sign Grid 2 is authorized.

I.7.4.3.7 Type CC-1, Building Information Sign, Map. This sign is optional for buildings with complex floor plans, is limited to one per floor, and must reflect permanent type facility fixtures, such as areas separated by fire walls, toilets, mechanical rooms, etc.

I.7.4.3.8 Type CC-2, Bulletin Board. This sign is limited to one per facility. If additional CC-2 signs are provided, they shall be provided as Equipment in Place (EIP).

I.7.4.4 Room Schedules. For the purpose of locating the Type BB-4 signs, all projects that involve additional rooms or revisions to the size of existing rooms shall incorporate a room schedule as part of the design package. The room schedule shall incorporate, as a minimum, the following information.

I.7.4.4.1 Room number. The following criteria shall apply to room numbers:

I.7.4.4.1.1 Each individual room shall be assigned a unique room number. The use of a pure numerical designation system is preferred to an alpha-numeric designation system.

I.7.4.4.1.2 Each individual room shall have a single function/purpose. Where there is an open or semi-open area that includes differing purposes, a separate room number shall be identified for each area and some form of structural or architectural demarcation shall be provided between the areas.

I.7.4.4.1.3 Where there is an existing room number system, the room number system utilized in the room schedule shall be an extension of the existing room number schedule. If the work is sufficiently extensive that an extension of the existing room number schedule is impractical, the project scope shall include a complete renumbering of all rooms in the facility and Type BB-4 signs for all rooms.

I.7.4.4.2 Net square feet.

I.7.4.4.3 Room function/purpose.

I.7.4.4.4 Ceiling height at wall.

Appendix BB
ONG Requirements



NEW SERVICE LINE POLICY EXPLANATION

FORM 1931

New rules approved by the Oklahoma Corporation Commission allow Oklahoma Natural Gas Company (ONG) to put the natural gas meter next to your house and to install the natural gas piping between the property line and your house. The following is a summary of your options and rights and responsibilities, as well as those of ONG.

ONG will:

1. Discuss your options with you and work out a mutually agreeable location for the meter near the outside wall of the first building to be served.
2. Install a service line, at ONG's cost up to a maximum allowable investment based on anticipated revenue, under normal conditions. This includes installations of service to new homes, replacement of deteriorated yard lines, and replacement of lines damaged during excavation, provided prudent care was taken during such excavation.
3. Locate distribution mains and service lines, upon request, beginning January 1, 2001.
4. Perform periodic main and service line leakage surveys according to ONG policy.
5. Inspect and test ONG's piping system, as well as your piping system, for leakage or other purposes as necessary.
6. Repair any leaks on our service line and meter and replace them when necessary.
7. Make reasonable efforts to restore your yard, but ONG cannot be responsible for normal construction damages.

You, the owner, will:

1. Provide a suitable location for the meter, away from potential hazards.
2. Grant ONG reasonable access to your property to install the service line and meter and to perform maintenance and repair.
3. Be responsible for any extraordinary construction costs, such as replacing pavement, patios, and decks, modifying your house piping to meet local building codes, excavating in hard rock or frozen ground, installing footage of service line, or installing a service line greater than 1-1/4" diameter.
4. Be responsible for any additional lines to gas grills, gas lights, additional buildings, etc., as well as for any yard line you might need to install between the meter and your home.
5. Advise ONG if there are any changes on, or to, your property, that might place the meter in a potentially hazardous situation.
6. Notify ONG prior to building any permanent structures over the service line.
7. Be required to pay for any relocation of ONG's service line or meter due to your construction.
8. Refrain from enclosing the meter or any portion of ONG's aboveground piping.

YOU MAY REQUEST AN ALTERNATE METER LOCATION AWAY FROM THE BUILDING. You will, however, be responsible for the installation and maintenance of the line from the meter to the building. ONG will still respond to requests to locate your yard line and perform leakage surveys on the line.

Our goal is to provide you with safe, reliable gas service. Please call if I can be of further service.

ONG Representative _____

Phone Number _____

Wednesday, December 21, 2011

LINE EXTENSION DATA SHEET - FORT SILL				JOB ORDER NO/ ESTIMATE NO.							
<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">Main</td> <td style="width: 25%;">Main & Services</td> <td style="width: 25%;">Services Only</td> <td style="width: 25%;"></td> </tr> </table>				Main	Main & Services	Services Only		Ft Sill P/N _____			
Main	Main & Services	Services Only									
DATE OF APPLICATION _____ DATE REQUIRED _____ REMARKS OR SPECIAL REQUESTS? <input type="checkbox"/> NO <input checked="" type="checkbox"/> YES (See Remarks Below)				LEGAL DESCRIPTION _____ DRAWING ATTACHED _____ ATLAS PAGE NO. _____ WALL MAP NO. _____							
THIS JOB WILL SERVE THE FOLLOWING LOCATION:											
REMARKS											
REQUESTING ORGANIZATION											
P.O.C.											
CONTACT INFORMATION											
METER LOCATION											
PROJECTED LIFE OF PROJECT											
RESIDENTIAL / COMMERCIAL/INDUSTRIAL				Monthly Flat Rate		REVENUE					
RESIDENTIAL	Number of Meters	0		\$21.70		\$0.00					
COMMERCIAL 201	Number of Meters	0		\$113.23		\$0.00					
COMMERCIAL 202	Number of Meters	0		\$31.61		\$0.00					
INDUSTRIAL	Number of Meters	0		\$238.11		\$0.00					
TOTAL						\$0.00					
FITTINGS	QT	COST	TOTAL	LABOR AND EQUIP.	UNIT	RATE	TOTAL	METER INSTALL	UNIT	COST	
Excess Flow Valve	0	\$0.00	\$0.00	Labor (Hrs)	0	\$0.00	\$0.00	250	0	\$0.00	
Tapping Tee 2 X 3/4"	0	\$0.00	\$0.00	GP 4	0	\$0.00	\$0.00	425	0	\$0.00	
HV Tapping Tee 2 X 2"	0	\$0.00	\$0.00	GP 6	0	\$0.00	\$0.00	630	0	\$0.00	
HV Tapping Tee 4 X 2"	0	\$0.00	\$0.00	2/Ton with Trailer	0	\$0.00	\$0.00	800	0	\$0.00	
Pipe 3/4"	0	\$0.00	\$0.00	Backhoe	0	\$0.00	\$0.00	1.5 M	0	\$0.00	
Pipe 2"	0	\$0.00	\$0.00	Other	0	\$17.00	\$0.00	3 M	0	\$0.00	
Other	0		\$0.00	Other	0	\$18.00	\$0.00	5 M	0	\$0.00	
Other	0		\$0.00	Other	0	\$19.00	\$0.00	7 M	0	\$0.00	
Other	0		\$0.00	Other	0	\$20.00	\$0.00	11 M	0	\$0.00	
Other	0		\$0.00	Other	0	\$21.00	\$0.00	Other	0	\$0.00	
TOTAL				TOTAL			\$0.00	TOTAL		\$0.00	
*Note: All calculations are estimated. Customer Co-Payment will be based actual costs incurred by Contractor.				INSTALLATION COST (Main line, service lines, and metering)		\$0.00					
				MAXIMUM ALLOWABLE INVESTMENT BY CONTRACTOR		\$0.00					
				CUSTOMER CO-PAYMENT		\$0.00					
Oklahoma Natural Gas (Contractor) and Fort Sill Army Post (Government) understand and agree that 1. Government has received and read a copy of the company's New Service Line Policy Explanation, which explains the Contractor's and Government's rights and responsibilities regarding ownership, maintenance, ar repair of service lines and meters 2. Government agrees to provide Contractor appropriate access to Government premises for the purpose of installing, maintaining and repairing service lines and meter 3. The company will install measurement equipment at a suitable site on the Government's premise, which normal will be located at the building wall, but may be located at another mutually agreedupon site. Government : Contractor agree that the measurement equipment shall be located at site listed above											
Authorizing Agent: _____ _____ Signature				Date _____ _____							
Contractor Representative: _____ _____ Signature				Date _____ _____							

SERVICE ADDRESS		ACCOUNT NO.
TENANT NAME	DAY PHONE	EVENING PHONE
OWNER NAME	DAY PHONE	EVENING PHONE
BILLING ADDRESS	STREET ADDRESS	
	CITY/STATE/ZIP CODE	

COST CALCULATION		
Total Length: _____ Ft.	SERVICE LINE COST	ONG Labor / Materials \$0.00
Home Size _____ Sq. Feet	Labor (Manhours) _____ 0 Hours	Concrete Cut _____ \$0.00
Heating Only <input checked="" type="checkbox"/>	Pick-Up, Group 4 _____ 0 Hours	Other _____ \$0.00
Heat & Water Heat <input checked="" type="checkbox"/>	Pick-Up, Group 6 _____ 0 Hours	Other _____ \$0.00
Heat, Water, & Cooking <input checked="" type="checkbox"/>	2-Ton w/Trailer _____ 0 Hours	Other _____ \$0.00
Electric Heat Pump / Gas Backup <input checked="" type="checkbox"/>	Backhoe _____ 0 Hours	Other _____ \$0.00
Other _____ 100 Dth <input checked="" type="checkbox"/>	Pipe - 1/2" _____ 0 Feet	Other _____ \$0.00
COMMERCIAL LOAD <input checked="" type="checkbox"/>	Pipe - 3/4" _____ 0 Feet	Other _____ \$0.00
Total Load Dth/Hr _____ 1.500	Pipe - 1 1/4" _____ 0 Feet	Other _____ \$0.00
Max Daily (MDQ) _____ 15.00	Pipe - 2" _____ 0 Feet	Other _____ \$0.00
Total Annual Dth _____ 1,500	Pipe - 4" _____ 0 Feet	Other _____ \$0.00
Number of Meters _____ 0	METER INSTALLED COST	CONSTRUCTION COST \$0.00
FITTINGS	Meter - 250 _____ 0	LESS ALLOWABLE REVENUE CREDIT \$424.73
Excess Flow Valves (EFV) _____ 0	Meter - AL 425 _____ 0	PLUS CREDIT \$300.00
Tapping Tee 2" x 3/4" _____ 0	Meter - AL 800 _____ 0	LIHEAP QUALIFIED Yes <input type="checkbox"/> \$0.00
Tapping Tee 4" x 3/4" _____ 0	Meter - AL 1000 _____ 0	TOTAL OWNER COST** \$0.00
Tee, Service, Trans 1"x3/4" _____ 0	Meter - 3M _____ 0	LESS PAYMENT RECEIVED \$0.00
	Meter - 5M _____ 0	REMAINING BALANCE \$0.00

* An experienced construction employee should estimate extraordinary construction barriers or pipe size requirements larger than 1 1/4 inch.

FINANCE AGREEMENT

** If the Total Owner cost exceeds \$300.00, the owner may make a downpayment of \$100.00, and pay the remaining balance in installments for a period not to exceed 12 months. The monthly installments shall be equal to the greater of 1/12 of the remaining balance owed or \$50.00. If owner pays less than the Total Owner Cost at the time of signing this agreement, owner shall be deemed to have elected the monthly payment option. Any payment obligation will be added to owner's gas bill.

SERVICE LINE AGREEMENT

The undersigned property owner ("Owner"), _____ has authorized Oklahoma Natural Gas Company ("Company") to install a service line or replace the Owner's existing service line and/or yardline and to place the gas measurement equipment on the Owner's property.

The Company and the Owner understand and agree that:

1. Owner has received and read a copy of the Company's New Service Line Policy Explanation, which explains the Company's and Owner's rights and responsibilities regarding ownership, maintenance, and repair of service lines and meters.
2. Owner agrees to provide the Company appropriate access to Owner's premises for the purpose of installing, maintaining, and/or repairing service lines and meters.
3. The Company will install measurement equipment at a suitable site on the Customer's premise, which normally will be located at the building wall, but may be located at another mutually agreed-upon site. Owner and Company agree that the measurement equipment shall be located at the following location:

LOCATION DESCRIPTION: _____

OWNER(S)

OKLAHOMA NATURAL GAS COMPANY

DATE

DATE

Distribution: Operating - Accounting - Customer

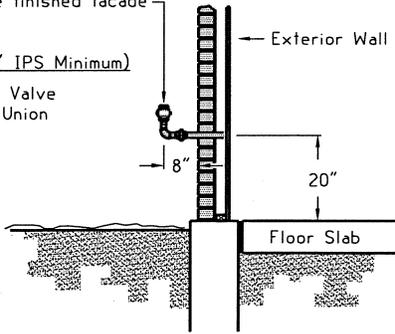
NEW CONSTRUCTION

Rev. Date: 09/28/04

Customer Convenience Valve should extend no more than 8" from the finished facade

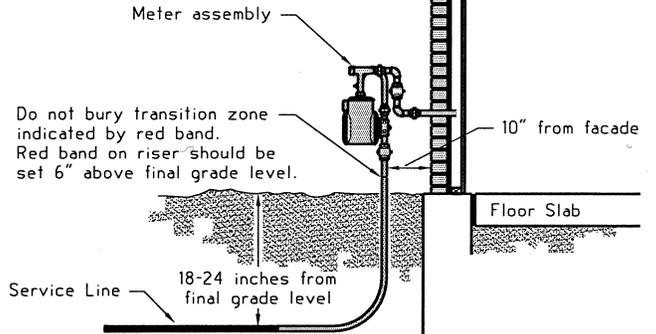
Material List: (1" IPS Minimum)

- 1) Full Port Ball Valve
- 2) Ground Joint Union
- 3) 90° Elbow
- 4) Nipples
- 5) Plug



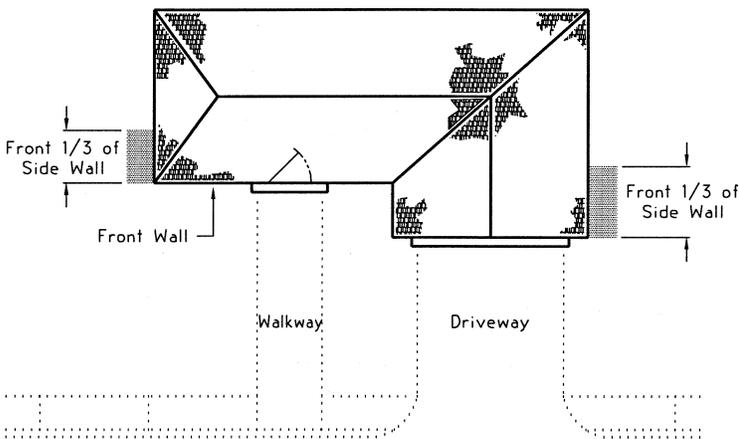
**Customer Gas Piping Location
Figure G-2401.5a**

Relief vent should not be installed under dripline

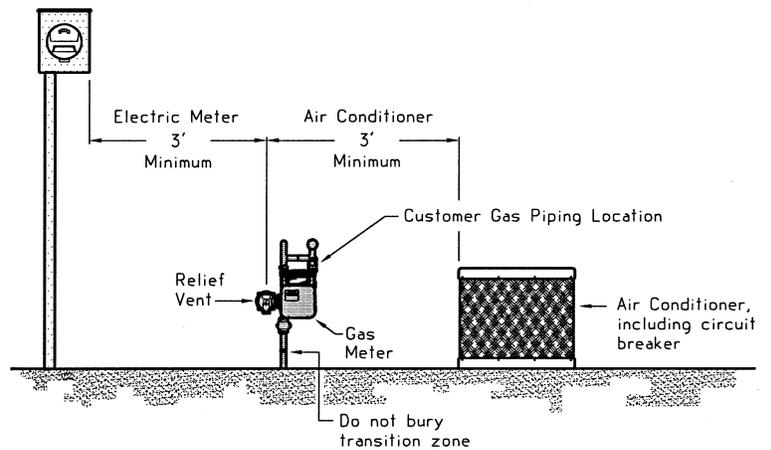


**Customer Gas Piping Location
Figure G-2401.5b**

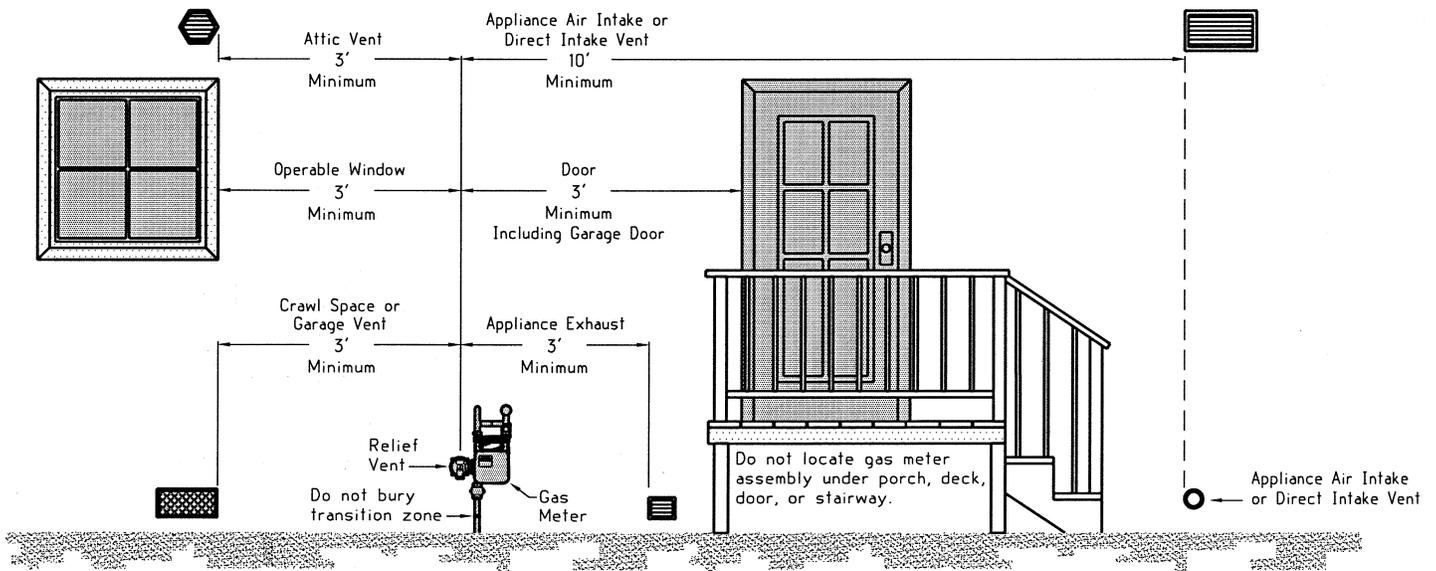
The normal location of the meter assembly shall be within the front 1/3 of either side wall, typically 3 to 10 feet from the front of the structure.



**Meter Location
Figure G-2401.5c**



**Gas Meter Clearances
Figure G-2401.5d**



**Gas Meter Clearances
Figure G-2401.5e**



2106-04

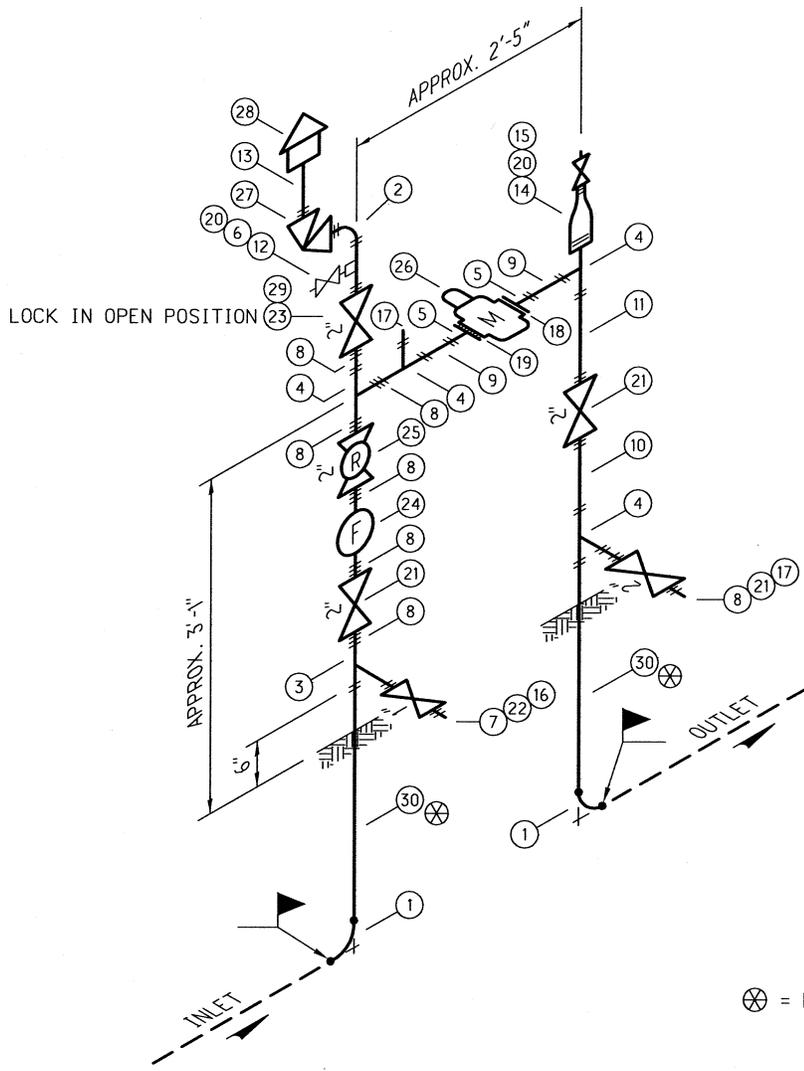
Form 789

GOSM - Standard Drawings Manual

Subject: **Rotary Meter Setting, MP (60 Psig and Less) Inlet Design**
3-M Meter, Measurement via Oz or PCI Index, Threaded Outlet

Issued: 03-01-97
 Revised: 12-22-04

ITEM	QTY	SIZE	DESCRIPTION OF MATERIAL REQUIRED	ITEM	QTY	SIZE	DESCRIPTION OF MATERIAL REQUIRED
1	2	2"	ELL, STD, SMLS. B, 90° LR	17	2	2"	PLUG, PIPE, STEEL
2	1	2"	ELL, STREET, M.I., 90°, 150# W.P. (Sc.)	18	1	2"	GASKET, NON-ASBESTOS, ANSI 150
3	1	2"x2"x1"	TEE, REDUCING, M.I., 150# W.P. (Sc.)	19	1	2"	INSULATING SET, ANSI 150, 285# W.P.
4	4	2"	TEE, STD, M.I., 150# W.P. (Sc.)	20	2	1/2"	VALVE, BALL, 1000# W.P. MIN. (Sc.)
5	2	2"	FLANGE, FF FLG'D, ANSI 150, 285# W.P. (Sc.)	21	3	2"	VALVE, BALL or NON-LUB. PLUG, 175# W.P. MIN. (Sc.)
6	1	1/2"x2 1/2"	NIPPLE, STD, STEEL, 500# W.P. (Sc.)	22	1	1"	VALVE, BALL or NON-LUB. PLUG, FULL CAPACITY, (Sc.) 175# W.P. MIN.
7	1	1"x3"	NIPPLE, STD, STEEL, 500# W.P. (Sc.)	23	1	2"	VALVE, BALL or NON-LUB. PLUG, FULL CAPACITY, (Sc.) 175# W.P. MIN.
8	7	2"x3"	NIPPLE, STD, STEEL, 500# W.P. (Sc.)	24	1	2"	FILTER, 175# W.P. MIN. (Sc.)
9	2	2"x6"	NIPPLE, STD, STEEL, 500# W.P. (Sc.)	25	1	2"	REGULATOR, SERVICE (Sc.) (SIZE ON FORM 761)
10	1	2"x10"	NIPPLE, STD, STEEL, 500# W.P. (Sc.)	26	1	2"	METER, ROTARY, 3M-175 w/ COATED BOLTS, 175# W.P. MIN.
11	1	2"x12"	NIPPLE, STD, STEEL, 500# W.P. (Sc.)	27	1	2"	VALVE, RELIEF (Sc.) (SIZE ON FORM 761)
12	1	2"x6"	NIPPLE, TEST, STEEL (Sc.) w/ 1/2" COUPLING & PLUG	28	1	2"	VENT CAP
13	1	2"x6"	NIPPLE, STD, SMLS. B, 800# W.P., T.O.E.	29	1	-	LOCKING DEVICE
14	1	2"x1/2"	NIPPLE, SWAGE, X-HVY, SMLS. B, 2000# W.P. (Sc.)	30	9 FT.	2 3/8" O.D.	PIPE, 3.65# (0.154" W.T.), SMLS. B, FBE COATED, PRETESTED
15	1	1/2"	PLUG, PIPE, STEEL				
16	1	1"	PLUG, PIPE, STEEL				





2106-06

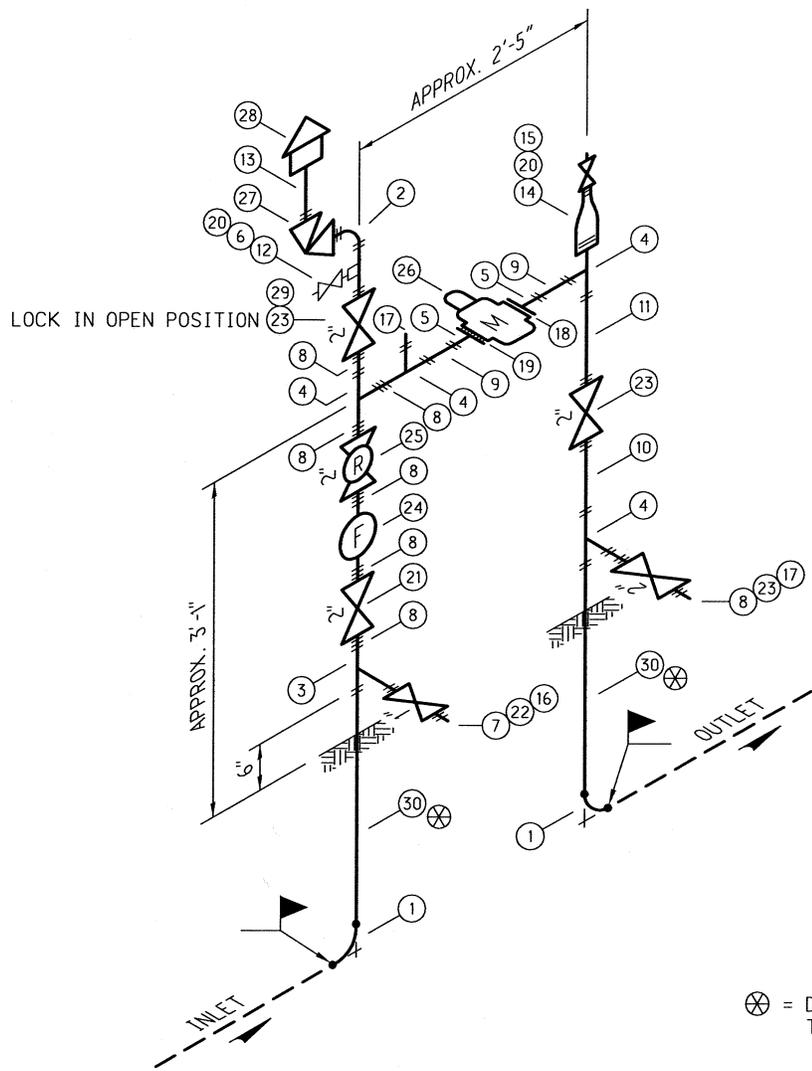
Form 789

GOSM - Standard Drawings Manual

Subject: **Rotary Meter Setting, MP (60 Psig and Less) Inlet Design**
5-M Meter, Measurement via Oz or PCI Index, Threaded Outlet

Issued: 03-01-97
 Revised: 12-22-04

ITEM	QTY	SIZE	DESCRIPTION OF MATERIAL REQUIRED	ITEM	QTY	SIZE	DESCRIPTION OF MATERIAL REQUIRED
1	2	2"	ELL, STD, SMLS. B, 90° LR	17	2	2"	PLUG, PIPE, STEEL
2	1	2"	ELL, STREET, M.I., 90°, 150# W.P. (Sc.)	18	1	3"	GASKET, NON-ASBESTOS, ANSI 150
3	1	2"x2"x1"	TEE, REDUCING, M.I., 150# W.P. (Sc.)	19	1	3"	INSULATING SET, ANSI 150, 285# W.P.
4	4	2"	TEE, STD, M.I., 150# W.P. (Sc.)	20	2	1/2"	VALVE, BALL, 1000# W.P. MIN. (Sc.)
5	2	2"x7 1/2"	FLANGE, REDUCING, FF FLG'D, ANSI 150, 285# W.P. (Sc.)	21	1	2"	VALVE, BALL or NON-LUB. PLUG, 175# W.P. MIN. (Sc.)
6	1	1/2"x2 1/2"	NIPPLE, STD, STEEL, 500# W.P. (Sc.)	22	1	1"	VALVE, BALL or NON-LUB. PLUG, FULL CAPACITY, (Sc.) 175# W.P. MIN.
7	1	1"x3"	NIPPLE, STD, STEEL, 500# W.P. (Sc.)	23	3	2"	VALVE, BALL or NON-LUB. PLUG, FULL CAPACITY, (Sc.) 175# W.P. MIN.
8	7	2"x3"	NIPPLE, STD, STEEL, 500# W.P. (Sc.)	24	1	2"	FILTER, 175# W.P. MIN. (Sc.)
9	2	2"x6"	NIPPLE, STD, STEEL, 500# W.P. (Sc.)	25	1	2"	REGULATOR, SERVICE (Sc.) (SIZE ON FORM 761)
10	1	2"x10"	NIPPLE, STD, STEEL, 500# W.P. (Sc.)	26	1	3"	METER, ROTARY, 5M-175 w/ COATED BOLTS, 175# W.P. MIN.
11	1	2"x12"	NIPPLE, STD, STEEL, 500# W.P. (Sc.)	27	1	2"	VALVE, RELIEF (Sc.) (SIZE ON FORM 761)
12	1	2"x6"	NIPPLE, TEST, STEEL (Sc.) w/ 1/2" COUPLING & PLUG	28	1	2"	VENT CAP
13	1	2"x6"	NIPPLE, STD, SMLS. B, 800# W.P., T.O.E.	29	1	-	LOCKING DEVICE
14	1	2"x1/2"	NIPPLE, SWAGE, X-HVY, SMLS. B, 2000# W.P. (Sc.)	30	9 FT.	2 3/8" O.D.	PIPE, 3.65# (0.154" W.T.), SMLS. B, FBE COATED, PRETESTED
15	1	1/2"	PLUG, PIPE, STEEL				
16	1	1"	PLUG, PIPE, STEEL				





2106-08

Form 789

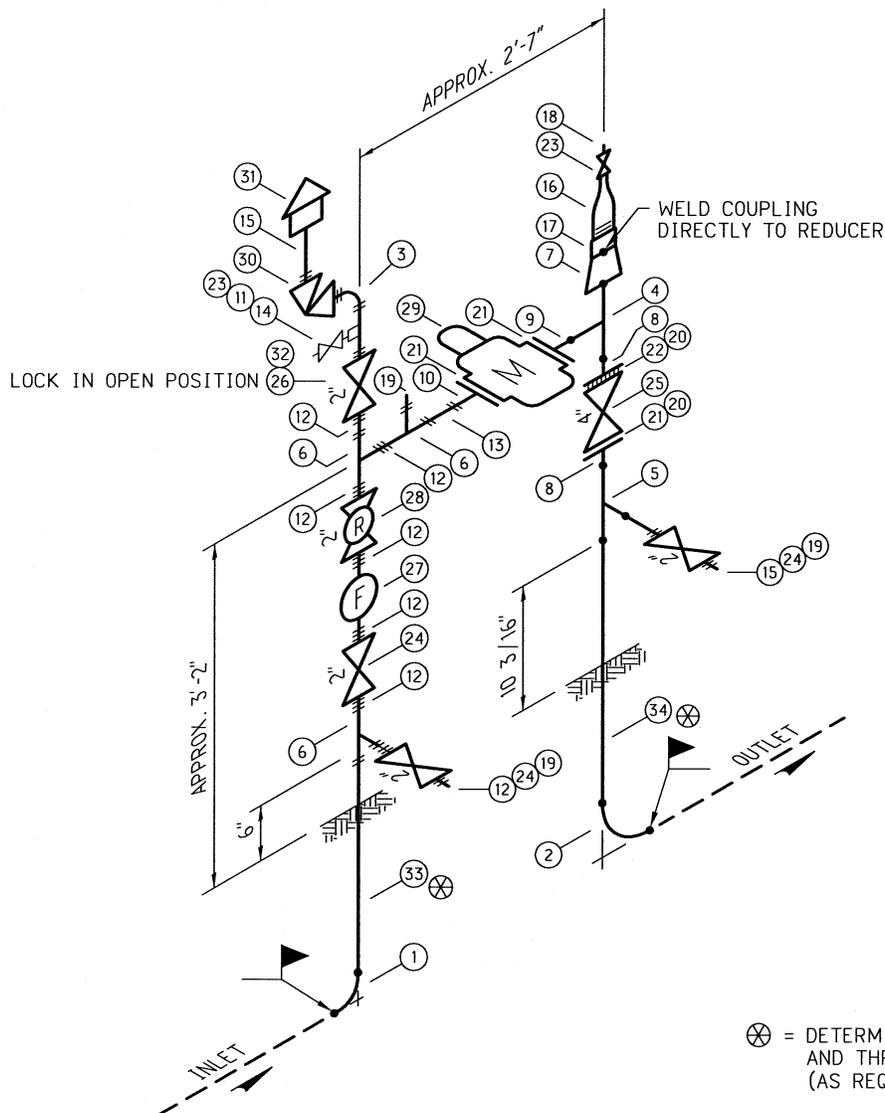
GOSM - Standard Drawings Manual

Subject: **Rotary Meter Setting, MP (60 Psig and Less) Inlet Design**
11-M Meter, Measurement via Oz or PCI Index

Issued: **03-01-97**

Revised: **12-22-04**

ITEM	QTY	SIZE	DESCRIPTION OF MATERIAL REQUIRED	ITEM	QTY	SIZE	DESCRIPTION OF MATERIAL REQUIRED
1	1	2"	ELL, STD, SMLS. B, 90° L.R.	19	3	2"	PLUG, PIPE, STEEL
2	1	4"	ELL, STD, SMLS. B, 90° L.R.	20	16	5/8"x3 3/4"	BOLT, STUD, w/ 2 HEX NUTS
3	1	2"	ELL, STREET, M.I., 90°, 150# W.P. (Sc.)	21	3	4"	GASKET, NON-ASBESTOS, ANSI 150
4	1	4"	TEE, STD, SMLS. B	22	1	4"	INSULATING SET, ANSI 150, 285# W.P.
5	1	4"x4"x2"	TEE, REDUCING, STD, SMLS. B	23	2	1/2"	VALVE, BALL, 1000# W.P. MIN. (Sc.)
6	3	2"	TEE, STD, M.I., 150# W.P. (Sc.)	24	3	2"	VALVE, BALL or NON-LUB. PLUG, 175# W.P. MIN. (Sc.)
7	1	4"x2"	REDUCER, STD, SMLS. B	25	1	4"	VALVE, BALL or NON-LUB. PLUG, RF FLG'D., 175# W.P. MIN.
8	2	4"	FLANGE, WN RF, ANSI 150, 285# W.P.	26	1	2"	VALVE, BALL or NON-LUB. PLUG, FULL CAPACITY, (Sc.) 175# W.P. MIN.
9	1	4"	FLANGE, WN FF, ANSI 150, 285# W.P.	27	1	2"	FILTER, 175# W.P. MIN. (Sc.)
10	1	2"x9"	FLANGE, REDUCING, FF FLG'D, ANSI 150, 285# W.P. (Sc.)	28	1	2"	REGULATOR, SERVICE (Sc.) (SIZE ON FORM 761)
11	1	1/2"x2 1/2"	NIPPLE, STD, STEEL, 500# W.P. (Sc.)	29	1	4"	METER, ROTARY, 11M-175 w/ COATED BOLTS, 175# W.P. MIN.
12	7	2"x3"	NIPPLE, STD, STEEL, 500# W.P. (Sc.)	30	1	2"	VALVE, RELIEF (Sc.) (SIZE ON FORM 761)
13	1	2"x6"	NIPPLE, STD, STEEL, 500# W.P. (Sc.)	31	1	2"	VENT CAP
14	1	2"x6"	NIPPLE, TEST, STEEL (Sc.) w/ 1/2" COUPLING & PLUG	32	1	-	LOCKING DEVICE
15	2	2"x6"	NIPPLE, STD, SMLS. B, 800# W.P., T.O.E.	33	5 FT.	2 3/8" O.D.	PIPE, 3.65# (0.154" W.T.), SMLS. B, FBE COATED, PRETESTED
16	1	2"x1/2"	NIPPLE, SWAGE, X-HVY, SMLS. B, 2000# W.P. (Sc.)	34	5 FT.	4 1/2" O.D.	PIPE, 10.79# (0.237" W.T.), SMLS. B, FBE COATED, PRETESTED
17	1	2"	COUPLING, F.S., 3000# W.P. (Sc.)				
18	1	1/2"	PLUG, PIPE, STEEL				





CONTACT LIST

APRIL, 2010

FOR EMERGENCIES DURING REGULAR WORKING HOURS 8:00 AM THRU
: 5:00 PM, CALL 1-800-551-6601 OR 1-405-247-2345. OR FOR FORT SILL: 580-
353-1985/ 580-695-0499

FOR AFTER HOUR EMERGENCIES CALL: 1-800-551-6601

CONTACTS IN ORDER:

ROBERT SIMS, MANAGER, FORT SILL:

OFFICE: 580-353-1985

CELL: 580-695-0499

HOME: 580-588-3333

DAVID BURNS: OPERATING TECH, FORT SILL

CELL: 405-933-1076

HOME: 405-247-9871

STEVE GIBSON: OPERATING SUPERVISOR

OFFICE: 405-247-1222

CELL: 580-515-1507

HOME: 405-247-2203

DAVID ALLEN: MEASUREMENT

OFFICE: 405-247-1232

CELL: 580-774-8708

HOME: 405-247-2654

RON TAYLOR, AREA MANAGER

OFFICE: 405-247-1231

CELL: 405-641-5969

HOME: 405-247-6709

Appendix CC

American Water Enterprises (AWE) Specifications

(<http://www.amwater.com/products-and-services/federal-services/military-services/design-specifications.html>)

Appendix DD
Fort Sill Fire Alarm Requirements

16 Nov 04

MEMORANDUM FOR: COE, DPW

Subject: Installation Guidelines for FA Systems

1. The following are guidelines for the installation/upgrade of fire alarm systems in all dormitories, hotels, apartments, or any sleeping type facilities other than family housing.
 - a. Smoke detectors/heat (rate of rise) will be installed in all sleeping rooms and will sound within the room (sounder base only) if activated by smoke and ensure that the detector (smoke-side) does not latch in place and send a general alarm through the panel.
 - b. If two or more adjacent rooms are activated it will ring the general alarm.
 - c. All hallway smoke detectors shall ring the general alarm.
 - d. All administrative type areas that are not separated from the sleeping room shall have smoke detectors that will activate the general alarm and all other areas, i.e., mechanical room, storage room, janitors closet will have a heat detector/fix temp unless the building is protected by a sprinkler system.
 - e. All activations (alarm or trouble) will require manual reset.
 - f. All fire alarm panels will activate a trouble signal/supervisory trouble signal through the transmitter (BTX-2) .
 - g. A smoke detector shall be installed above the fire alarm panel.
 - h. Class A addressable system shall be installed.
 - I. All devices must be labeled (indicating device address) on the exterior base in contrasting colors.
 - j. Access code for fire alarm panel shall indicate which area the building is located, (1, 2, 3, or 4) and must have enough access levels to disable devices.
 - k. Remote digital type enunciator shall be installed.
 - l. A 72 back up battery test shall be required in order to approve any new or upgraded system.

2. These guideline must be followed as much as possible. Any deviation shall be approved by the Fire Prevention Branch, 442-5911.
3. POC is Assistant Chief Landry, 442-5911.

HELEN LANDRY
A/C Fire Prevention
Department of Emergency Services

Appendix FF

Vehicle List

BRIGADE SUPPORT BATTALION

LIN	ERC	NOMENCLATURE	REQ100	AUTH100	REQ200	AUTH200	REQ300	AUTH300	REQ400	AUTH400
B83002	A	BED CARGO: DEMOUNTABLE PLS 8X20	2	2	54	54	0	0	54	54
G36237	A	GENERATOR SET DIESEL: 60HZ AC MEP-531A	2	2	0	0	0	0	2	2
G42170	A	GEN SET DED TM: 10KW 60HZ MTD ONM116A2 PU-798	1	1	1	1	1	1	3	3
G42238	A	GEN SET DED TM: 5KW 60HZ MTD ON M116A2 PU-797	1	1	0	0	0	0	1	1
G53778	A	GENERATOR SET DIESEL ENGINE TM: PU-802	0	0	0	0	3	3	3	3
J36383	A	GEN ST DSL ENG TM: 30KW 60HZ MTD ON M-200A1 PU-406	1	1	0	0	0	0	1	1
L28351	A	KITCHEN FIELD TRAILER MOUNTED: MTD ON M103A3 TRAILER	2	2	0	0	0	0	2	2
S70517	A	SEMITRAILER LOW BED: 25 TON 4 WHEEL W/E	0	0	7	7	0	0	7	7
S73372	A	SEMITRAILER TANK: 5000 GAL FUEL DISPENSING AUTOMOTIVE W/E	0	0	3	3	0	0	3	3
S75175	A	SEMITRAILER VAN: SUPPLY 12 TON 4 WHEEL W/E	0	0	0	0	1	1	1	1
T07543	A	TRUCK UTILITY: S250 SHELTER CARRIER 4X4 W/E (HMMWV)	2	2	0	0	0	0	2	2
T07679	A	TRUCK UTILITY: HEAVY VARIANT HMMWV 4X4 10000 GVW W/E	0	0	1	1	0	0	1	1
T40999	A	TRUCK CARGO: HEAVY PLS TRANSPORTER 15-16.5 TON 10X10	0	0	0	0	2	2	2	2
T41271	A	TRUCK VAN: EXPANSIBLE MTV W/E M1087A1	1	1	0	0	1	1	2	2
T49119	A	TRUCK LIFT FORK: DSL DRVN 10000 LB CAP 48IN LD CTR ROUGH TERRAIN	0	0	7	7	0	0	7	7
T58161	A	TRUCK TANK: FUEL SERVICING 2500 GALLON 8X8 HEAVY EXP MOB W/WINCH	0	0	1	1	0	0	1	1
T60081	A	TRUCK CARGO: 4X4 LMTV W/E	6	6	6	6	2	2	14	14
T60149	A	TRUCK CARGO: 4X4 LMTV W/E W/W	0	0	0	0	1	1	1	1
T61239	A	TRUCK TRACTOR: MTV W/E	0	0	3	3	1	1	4	4
T61307	A	TRUCK TRACTOR: MTV W/E W/W	0	0	7	7	0	0	7	7
T61494	A	TRUCK UTILITY: CARGO/TROOP CARRIER 1-1/4 TON 4X4 W/E (HMMWV)	16	16	5	5	8	8	29	29
T61630	A	TRUCK UTILITY: EXPANDED CAPACITY 4X4 W/E HMMWV M1113	3	3	0	0	3	3	6	6
T61704	A	TRUCK CARGO: MTV LWB W/E	0	0	0	0	3	3	3	3
T61908	A	TRUCK CARGO: MTV W/E	2	2	0	0	5	5	7	7
T63093	P	TRUCK WRECKER: TACTICAL 8X8 HEAVY EXPANDED MOBILITY W/WINCH	0	0	0	0	2	2	2	2
T87243	A	TRUCK TANK: FUEL SERVICING 2500 GALLON 8X8 HEAVY EXP MOB	0	0	2	2	0	0	2	2
T93484	A	TRUCK VAN: LMTV W/E	0	0	0	0	3	3	3	3
T93761	A	TRAILER: PALLETIZED LOADING 8X20	0	0	10	10	0	0	10	10
T94709	P	TRUCK WRECKER: MTV W/E W/W	0	0	0	0	1	1	1	1
T95555	A	TRAILER CARGO: MTV W/DROPSIDES M1095	0	0	0	0	3	3	3	3
T95924	A	TRAILER CARGO: HIGH MOBILITY 1-1/4 TON	4	4	1	1	0	0	5	5
T95992	A	LIGHT TACTICAL TRAILER: 3/4 TON	1	1	4	4	7	7	12	12
T96496	A	TRUCK CARGO: TACTICAL 8X8 HEAVY EXPANDED MOB W/LHS	0	0	11	11	0	0	11	11
T96564	A	TRAILER FLAT BED: M1082 TRLR CARGO LMTV W/DROPSIDES	2	2	5	5	2	2	9	9
W98825	A	TRAILER TANK: WATER 400 GALLON 1-1/2 TON 2 WHEEL W/E	2	2	1	1	1	1	4	4

HHB FIRES BRIGADE

LIN	ERC	NOMENCLATURE	REQ100	AUTH100
G18358	A	GEN SET: DED SKID MTD 3KW 60HZ	4	4
G42170	A	GEN SET DED TM: 10KW 60HZ MTD ONM116A2 PU-798	2	2
T38844	A	TRUCK AMBULANCE: 4 LITTER ARMD 4X4 W/E (HMMWV)	2	2
T41135	A	TRUCK CARGO: MTV W/E W/W	1	1
T60081	A	TRUCK CARGO: 4X4 LMTV W/E	5	5
T61494	A	TRUCK UTILITY: CARGO/TROOP CARRIER 1-1/4 TON 4X4 W/E (HMMWV)	14	14
T61630	A	TRUCK UTILITY: EXPANDED CAPACITY 4X4 W/E HMMWV M1113	14	14
T61908	A	TRUCK CARGO: MTV W/E	2	2
T92242	A	TRUCK UTILITY: ARMT CARRIER ARMD 1-1/4 TON 4X4 W/E (HMMWV)	11	11
T95555	A	TRAILER CARGO: MTV W/DROPSIDES M1095	1	1
T95924	A	TRAILER CARGO: HIGH MOBILITY 1-1/4 TON	15	15
T95992	A	LIGHT TACTICAL TRAILER: 3/4 TON	8	8
T96564	A	TRAILER FLAT BED: M1082 TRLR CARGO LMTV W/DROPSIDES	3	3
W98825	A	TRAILER TANK: WATER 400 GALLON 1-1/2 TON 2 WHEEL W/E	1	1

TARGET ACQUISITION BATTERY

LIN	ERC	NOMENCLATURE	REQ100	AUTH100
A41666	P	RADAR SET: AN/TPQ-37(V)9	2	2
G17460	A	GENERATOR SET: DIESEL TRL/MTD 60KW 400HZ PU806 CHASSIS W/FENDER	2	2
T41135	A	TRUCK CARGO: MTV W/E W/W	2	2
T60081	A	TRUCK CARGO: 4X4 LMTV W/E	1	1
T61494	A	TRUCK UTILITY: CARGO/TROOP CARRIER 1-1/4 TON 4X4 W/E (HMMWV)	4	4
T61562	A	TRUCK UTILITY: CARGO/TROOP CARRIER 1-1/4 TON 4X4 W/E W/W (HMMWV)	1	1
T61630	A	TRUCK UTILITY: EXPANDED CAPACITY 4X4 W/E HMMWV M1113	4	4
T61908	A	TRUCK CARGO: MTV W/E	2	2
T95924	A	TRAILER CARGO: HIGH MOBILITY 1-1/4 TON	3	3
W98825	A	TRAILER TANK: WATER 400 GALLON 1-1/2 TON 2 WHEEL W/E	1	1

SIGNAL COMPANY

LIN	ERC	NOMENCLATURE	REQ100	AUTH100
G42170	A	GEN SET DED TM: 10KW 60HZ MTD ONM116A2 PU-798	2	2
G42238	A	GEN SET DED TM: 5KW 60HZ MTD ON M116A2 PU-797	3	3
T07679	A	TRUCK UTILITY: HEAVY VARIANT HMMWV 4X4 10000 GVW W/E	8	8
T61494	A	TRUCK UTILITY: CARGO/TROOP CARRIER 1-1/4 TON 4X4 W/E (HMMWV)	7	7
T61630	A	TRUCK UTILITY: EXPANDED CAPACITY 4X4 W/E HMMWV M1113	1	1
T61908	A	TRUCK CARGO: MTV W/E	1	1
T95924	A	TRAILER CARGO: HIGH MOBILITY 1-1/4 TON	1	1
T95992	A	LIGHT TACTICAL TRAILER: 3/4 TON	7	7
W98825	A	TRAILER TANK: WATER 400 GALLON 1-1/2 TON 2 WHEEL W/E	1	1
Z00562	P	JOINT NODE NETWORK (JNN) CENTRAL OFC TELEPHONE AUTOMATIC: AN/TTC	1	1

Appendix GG

Requirements for Contractor Applied Pesticides

Requirements for information for contractor applied Pesticides
Minimum of 3 days prior to proposed application

1. Copy of current State License for company and applicator.
2. Copy of current company insurance verification for vehicle and Pesticide application coverage
3. Square footage of treatment area and linier feet of vertical (thickened slab GC must provide to subcontractor)
4. MSDS and label of Pesticide. The only Installation authorized pesticide for pre-treatment are:
 - TERMIDOR 80WG 80.00% (Fipronil)
 - TERMIDOR SC 9.10% (Fipronil)

Due to the effectiveness and low odor, AEC requires TERMIDOR 80WG or TERMIDOR SC be used.

5. Nomenclature of pump, and sprayer, (if possible- not required)
6. Mixing tank capacity
7. A written plan of application to include dilution calculations and application.
8. All chemical containers to be used will be unopened (seal and label intact) and inspected by Government Rep. or Installation Pest Management Coordinator
9. All empty containers shall be disposed of off-post.
10. All submittal requirements of the contract.
11. The Label is the Law. Label information shall be strictly followed!

21 days prior to proposed application

If a different chemical is requested for use, DPW pest management coordinator must have the MSDS and a copy of the label 3 weeks in advance of proposed treatment to see if chemical is legal in Oklahoma and attempt AEC approval.

Day of Application and submittal was approved

1. Demonstrate with water only, calibration of spray equipment and applicator
2. Government inspects unopened pesticide containers
3. Rain must not be expected the day of application (Label is the Law)
4. Contractor shall prepare a certification document to include Name of chemical, percent of active ingredient, pounds of active ingredients that were applied to the site, and total square footage / Linier footage (witch ever applies) that received pesticide. There shall be a signature line for the Applicator and the Government Representative.

Appendix HH

Draft Storm Water Pollution Prevention Plan (SWPPP)

The SSA Warehouse D/B Contractor is responsible for limited site work. The SSA Warehouse D/B Contract shall be responsible for the SWPPP for the SSA Warehouses.

The attached SWPPP example is excerpted from the TEMF solicitation documents.

Storm Water Pollution Prevention Plan (SWP3)

for the

Tactical Equipment Maintenance Facility Project in Fort Sill Comanche County, Oklahoma

prepared for

<XXXXX> Client

July 2011

Project No. 59520

prepared by

**Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri**

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* * * * *

1.0 INTRODUCTION

The Project will cover approximately XX acres, of which approximately XX acres will be disturbed. Construction is scheduled to begin in October 2011 and completed in October 2013. This Storm Water Pollution Prevention Plan (SWP3) encompasses the requirements of the Oklahoma Department of Environmental Quality's (DEQ) General Permit (OKR10) (Attachment A). Coverage under this permit is obtained by submitting a Notice of Intent (NOI) to the DEQ (Attachment B).

1.1 PROJECT OWNER AND OPERATOR

The Project owner and permittee, <XXXXXX> Client, will be the responsible entity for completing the Project. Their address and telephone number is:

<XXXXXX> Client
XXXXXX Street
XXXXXX, XX XXXXX
Phone: (XXX) XXX-XXXX

XXXXXX Company
XXXX Street
XXXXXX, XX XXXXX
Phone: (XXX) XXX-XXXX

The signatory authority for the Project is Mr. /Ms. Doe, _____ position for XXXX Company. Mr. /Ms. Doe can be contacted at (XXX) XXX-XXXX.

The permittee for the Project will have the responsibilities of implementing the SWP3, inspecting the Project site as required, maintaining pollution prevention structures and other best management practices (BMPs), keeping records of inspections and other activities, and periodic evaluation of the SWP3 provisions on-site.

1.2 SITE DESCRIPTION

1.2.1 Description of the Nature of the Construction Activity

The Project is located at the Fort Sill U.S. Army Post where a 128,715 ft² Tactical Equipment Maintenance Facility (TEMF) will be constructed, along with organizational vehicle parking, two organizational storage building, two oil and hazardous waste storage buildings, covered hardstand, and two Unmanned Aerial Vehicle (UAV) maintenance storage buildings. Special foundations will be

required for the project. Soil disturbing activities include the clearing of the area, demolition of 52 buildings and construction of the TEMF and auxiliary buildings in addition to a covered hardstand area.

The General Vicinity Map is located in Figure 1-1 on page 1-6 and the erosion control plans are located in Attachment C. These figures indicate the locations of the area of disturbance for the TEMF project. This SWP3 has been developed and submitted to cover construction activities for the Project. Construction is scheduled to begin in **October 2011, and be completed in October 2013.**

1.2.2 Description of Intended Sequence of Major Construction Activities

The following is a chronological list of the planned sequence of activities and implementation of temporary and permanent erosion and sediment controls for construction of the Project:

1. Install erosion and sediment control structures as shown on the Erosion Control Plans.
2. Demolition, grading, and tree removal, if necessary
3. Construct TEMF and auxiliary buildings.
4. Construct hardstand area, parking lots, and sidewalks.
5. After construction is completed, install final stabilization.
6. Upon achievement of final stabilization for the Project, complete and submit the Notice of Termination (NOT) to the DEQ

1.2.3 Estimate of Land Area to be Disturbed

The Project area at the Tactical Equipment Maintenance Facility Project covers **XX** acres, of which approximately **XX** acres will be disturbed for the Project. Before grading activities begin, all sediment and erosion control measures will be installed.

1.2.4 Soils

The Natural Resources Conservation Service (NRCS) Soil Survey is not retrievable due to the nature of the site. Despite the lack of accessibility, it is known that the site has urban soils that have previously been disturbed. The measures outlined in this document, specifically Section 2, should be employed to prevent erosion by wind and water.

1.2.5 Potential Pollutants

The primary pollutant sources on the construction site will be disturbed soils and subsequent surface water runoff. BMPs will be employed to control erosion and sedimentation.

Other potential pollutant sources include petroleum products required for the construction equipment, fertilizers, paints, solvents, etc.

1.2.6 Estimate of Runoff Coefficient

The runoff coefficient “C” is the ratio of the volume of storm water runoff from the site compared to the total volume of precipitation that falls on the site. An estimate of “C” is needed for runoff conditions before construction activities commence and after the area is stabilized.

Another major variable affecting “C” is rainfall intensity and duration. For a given terrain, the ratio of runoff to rainfall is expected to increase as storm intensity or duration increase. The Project area is approximately X acres and an estimated X acres may be disturbed. Based on site evaluations and available soils data, the pre-construction “C” value will be approximately 0.XX and the post-construction “C” value will be 0.XX. The “C” value was determined using the Rational Method from the *Design and Construction of Urban Stormwater Management Systems* (ASCE 1992).

1.2.7 General Location Map

The Project location map is included as Figure 1-1 on page 1-6.

1.2.8 Non-Storm Water Discharges

The following non-storm water discharges from active construction sites are authorized if the discharge is in compliance with Part 1.3.1.C. of OKR10:

- Fire hydrant flushings
- Waters used to wash vehicles where detergents are not used
- Water used to control dust in accordance with Part 4.5.2.C.2 of OKR10
- Potable water, including waterline flushing and initial pressure tests of newly constructed piping where the piping is clean and chemical agents have not been added to the test water or applied to the pipes
- Routine external building wash down which does not use detergents
- Pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used
- Uncontaminated air conditioning or compressor condensate
- Uncontaminated ground water or spring water
- Foundation or footing drains where flows are not contaminated with process materials such as solvents

- Landscape irrigation
- Discharge or flows from emergency fire fighting activities
- Uncontaminated flows from excavation dewatering activities, if operational and structural controls are used to reduce pollutant releases; these structural controls must be included in the SWP3

1.2.9 Name of Receiving Waters

Stormwater from the site will generally sheet flow southwest approximately 0.3 miles to the East Branch of Wolf Creek and 0.7 miles northeast to Sitting Bear Creek. Neither Wolf Creek, East Branch, nor Sitting Bear Creek is on Oklahoma’s 303(d) list for 2008 or on 2010’s proposed 303(d) list. Based on the use of Best Management Practices outlined in this document, the Project is not expected to contribute to a degradation of the existing stream conditions and the Project is expected to remain in compliance with Oklahoma Water Quality Standards. Furthermore, no Outstanding Resource Waters will be affected by the Project.

1.2.10 Threatened and Endangered Species

The Project site is located on an existing U.S. Army Post in an area with existing buildings; threatened or endangered species and their potential habitat will not be affected by the Project.

1.2.11 Cultural Resources

The Project site is located on an existing U.S. Army Post in an area with existing buildings; National Register of Historic Places (NRHP) properties will not be affected by the Project.

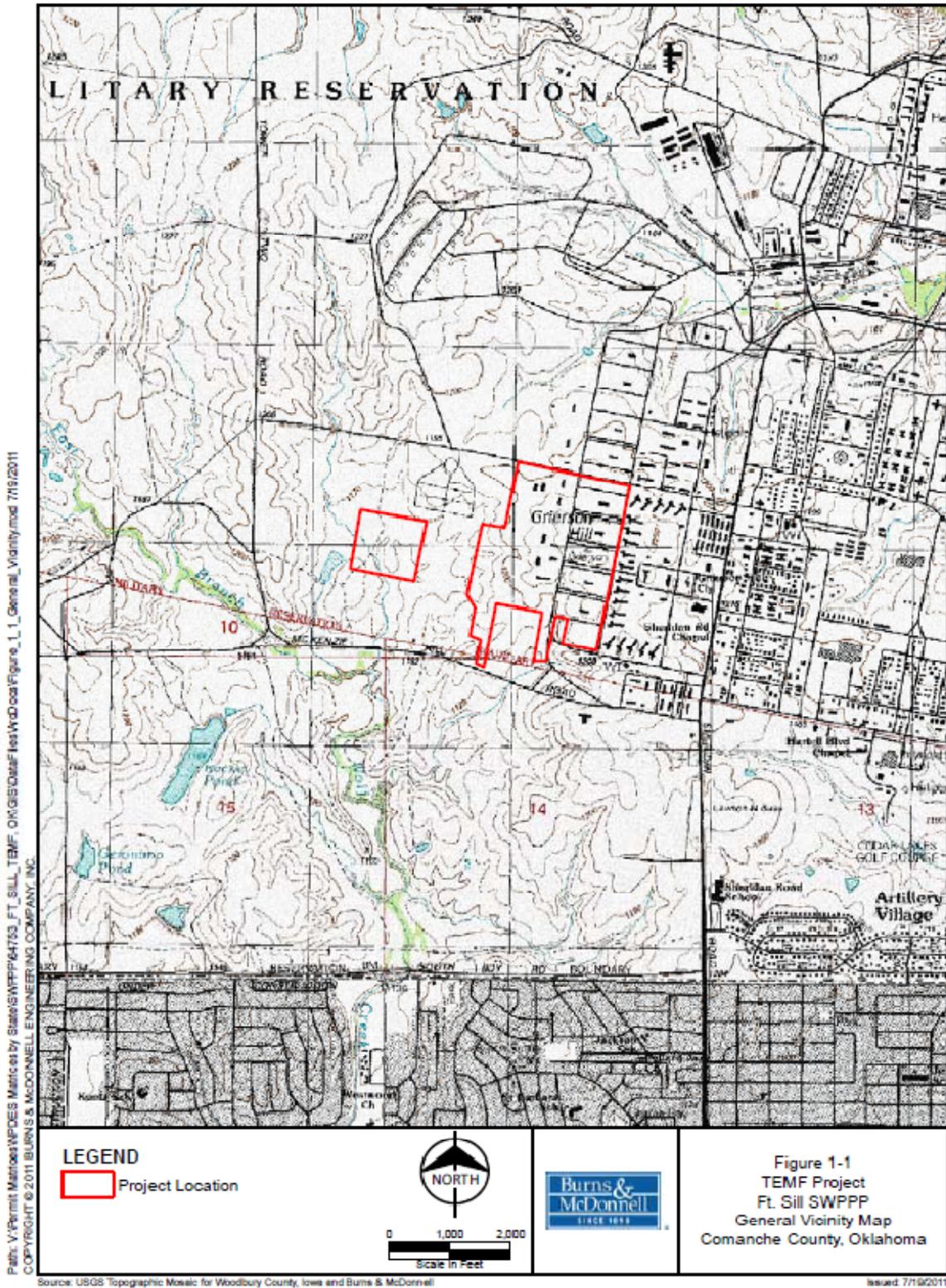
1.2.12 Posting

A copy of the DEQ NOI or the approved permit(s) and a Construction Site Notice will be posted at a publicly accessible location near the active part of the construction project until the Notice of Termination (Attachment I) has been filed.

A copy of this SWP3 will be kept for public inspection at the following address:

<XXXXXX> Client
XXXXXX
XXXXXX

XXXXX of the <XXXXX> Client, (XXX) XXX-XXXX, may be contacted to answer questions concerning the document.



2.0 CONTROLS - STRUCTURAL PRACTICES

2.1 TEMPORARY EROSION AND SEDIMENT CONTROL PRACTICES

Erosion and sediment control measures will be in place at the contractor/owner representative's discretion prior to soil-disturbing activities and will be maintained throughout construction. The contractor may need erosion control measures in other locations of the Project as work progresses to keep sediment from leaving the construction site. These measures will be determined by the contractor/owner's representative in the field; if measures are changed, the SWP3 must be modified in accordance with Section 5.0 of this document. Temporary erosion controls will be removed after the protected area is finally stabilized. In areas where construction has temporarily ceased, temporary stabilization practices must be installed within 14 days. If construction will resume within 21 days of temporary cessation, then temporary stabilization will not have to be installed within 14 days. The minimum temporary erosion and sediment control practices that will be used for the Project are discussed in the following sections. Details for these controls can be found in Attachment D.

2.1.1 Construction Access

Construction entrances installed on the Project site will be maintained throughout the duration of construction and soil remediation activities. The amount of sediment that is transported onto a public road surface or other paved areas by construction equipment or vehicles will be minimized. If sediment escapes the construction site, it will be removed at a frequency sufficient to minimize off-site impacts. Installation details are located in Attachment D.

2.1.2 Silt Fence Sediment Barriers

Silt fence will be used to intercept and retain sediment carried by sheet flow from disturbed areas and prevent sediment runoff from the Project site during construction. Silt fence will be placed perpendicular to the direction of water flow and as close to the contours as possible with the ends extending upslope. The devices will be placed downslope of disturbed areas where sheet or rill erosion would occur. Once individual areas are stabilized, silt fences can be removed. Silt fences will also be placed around stock piles. Location and installation details for silt fence are included in Attachments C and D.

2.1.3 Inlet Protection

If storm drain inlets have the potential of receiving stormwater runoff from the construction site, a temporary sediment control barrier may be placed around the storm drain inlets to prevent sediment from entering the storm drains. Assurance of timely inspection and maintenance allows for frequent removal

and adequate disposal of accumulated sediment. Location and installation details for silt fence are in Attachments C and D, respectively.

2.1.4 Dust Control

Preventative measures will be taken during times when the exposed soil is susceptible to wind erosion. In areas where bare soil is exposed, water or other dust palliatives will be applied to the soil to prevent it from being eroded by the wind. The soil will be covered with tarps in areas where the soil has been stockpiled for later use. Precautions will need to be taken to not over-water and erode soils. In addition, appropriate speed limits will be established within the construction site to minimize the generation of dust.

2.1.5 Concrete Washout

Concrete washout will not take place within road and ditch rights-of-way or within streams or wetlands. In particular, concrete washout systems will be located at least 50 feet from creeks, wetlands, ditches, karst features, and storm drains/manmade conveyance systems. See Attachment E for details on an acceptable concrete washout system. Other systems which contain the washout and allow it to dry without discharging may be used.

2.2 POST-CONSTRUCTION STORM WATER MANAGEMENT

As this is a previously developed site, post construction storm water runoff will follow the same treatment pattern as the site is currently receiving, by using existing storm drains. No post-construction stormwater management will be required once the area is stabilized.

* * * * *

3.0 CONTROLS - STABILIZATION PRACTICES

3.1 TEMPORARY STABILIZATION

Temporary measures will be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased. Areas where soil is exposed will be covered if construction activity will not resume in 14 days, except where:

- a. initiation of stabilization measures by the 14th day after construction activity temporary or permanently ceased is precluded by adverse climatological conditions (i.e. snow, ice, heavy rains, or drought); in this case, stabilization measures will be initiated as soon as practicable
- b. construction activity on a portion of the site is temporarily ceased, and earth-disturbing activities will be resumed within 21 days; in this case, temporary stabilization measures do not have to be initiated on that portion of the site

* * * * *

4.0 OTHER CONTROLS

Litter, construction debris, and construction chemicals exposed to storm water will be removed prior to each anticipated storm event.

4.1 WASTE MATERIALS

Solid and liquid waste (including sediment, asphalt, concrete millings, floating debris, paper, plastic, fabric, and construction and demolition debris) will be disposed of properly and in accordance with applicable disposal requirements. Waste material will be collected and stored in a secure container or removed from the Project area. The waste containers will be inspected regularly. Solid or liquid wastes will not be disposed of on-site (e.g. buried, poured), but will be taken off-site for proper disposal.

Contractors and subcontractors must comply with federal, state, and local sanitary sewer, portable toilet, or septic system regulations. Each contractor or subcontractor will provide sanitary facilities at the Project area throughout construction activities. The sanitary facilities should be used by construction personnel and be serviced regularly.

4.2 HAZARDOUS WASTE

Hazardous waste material will be disposed in the manner specified by the manufacturer and by local, state, and federal regulations. Site personnel must be made aware of this requirement.

* * * * *

5.0 MAINTENANCE AND INSPECTION

5.1 PROCEDURES

Inspection of the storm water controls will occur after precipitation events of approximately 0.5 inch or greater and once every 14 days. A report summarizing each inspection will be prepared including the name of the person making the inspection, failures of storm water controls, photographs of the site, and corrective actions implemented. Reports will be maintained for a minimum of three years from the date that the Project area is finally stabilized. A copy of the Inspection and Maintenance Report Form can be found in Attachment E.

If inspection results indicate a need to modify the SWP3, the plan will be revised and implemented, as appropriate, within seven calendar days following the inspection. Modifications will be noted on the Record of Revisions form located in Attachment E. The inspection reports will identify incidents of non-compliance with the Permit. Areas which must be inspected are:

1. Disturbed areas and areas used for the storage of materials that are exposed to precipitation must be inspected for evidence of, or the potential for, pollutants entering the storm water runoff from the site.
2. Erosion and sediment control measures must be observed to assure that they are operating correctly.
3. Where discharge locations or points are accessible, they must be inspected to ascertain whether erosion control measures are effective in preventing significant impact to receiving waters.
4. Locations where vehicles enter or exit the Project area must be inspected for evidence of off-site sediment tracking.
5. Based on the results of the inspection, the SWP3 will be modified (*within seven calendar days*), as necessary, to include additional or modified BMP's designed to correct problems identified. If additional BMP's are necessary, they will be implemented as soon as practicable, and preferably prior to the next storm event.
6. Vegetation and sediment control measures will be maintained in good working order until final stabilization has been accomplished.

on all unpaved areas. For those areas not covered by permanent control measures, an equivalent permanent stabilization measure (such as the use of rip-rap, gabions, or geotextiles) will be employed.

5.4 NOTICE OF TERMINATION

Permit coverage is terminated by submitting a Notice of Termination (NOT) to DEQ within 30 days of final stabilization and completeness of the Project. A copy of the NOT form is included in Attachment H.

* * * * *

6.0 SPILL PREVENTION AND CONTROL PLAN

This section comprises the Spill Prevention and Control Plan (SPCP), which describes measures to prevent, control, and minimize impacts from a spill of a hazardous, toxic, or petroleum substance during construction of the proposed Project. This plan describes the transport, storage, and disposal procedures for the potentially hazardous materials to be used during this Project, and outlines the procedures to be followed in the event of a spill of a contaminating or toxic substance.

As per 40 CFR 112, a Spill Prevention Control and Countermeasures Plan (SPCC) must be prepared if the construction site will have 1,320 gallons of aboveground storage capacity (or 42,000 gallons in underground storage not regulated by UST rules) or more in 55-gallon sized (or larger) containers. This would include temporary tanks or fueling trucks used to “store” petroleum on-site. The truck would be subject to the SPCC Plan rules when parked on the construction site and used for “storage.”

If, at any time, a subcontractor’s cumulative capacity exceeds 1,320 gallons, the subcontractor will develop and maintain a certified SPCC Plan in accordance with 40 CFR 112 and submit it to Burns & McDonnell for approval.

6.1 MATERIAL MANAGEMENT PRACTICES

Material management practices will be followed to reduce the risk of spills or other accidental exposure of materials and substances to storm water runoff.

XXXXXX of <XXXXXX> Client (XXX) XXX-XXXX, will be responsible for implementing the spill response plan.

- 1) Good housekeeping practices that will be followed on-site during the construction phase of the project include:
 - Hazardous materials, chemicals, fuels, and oils will not be stored within 100 feet of a stream bank, wetland, water supply well, spring, or other waterbody
 - Fueling of construction equipment will not be conducted within 100 feet of a stream bank, wetland, water supply well, spring, or other waterbody
 - Efforts will be made to store the minimum amount of hazardous materials on-site
 - Materials on-site will be stored in a neat, orderly manner in appropriate containers and, if possible, under a roof or other enclosure
 - Products will be kept in original containers with the original manufacturer’s label

- Substances will not be mixed with one another unless recommended by the manufacturer
- Whenever possible, all of a product will be used before disposing of the container
- Manufacturer's recommendations for proper use and disposal of a product will be followed
- If surplus product must be disposed of, manufacturer's or local and state recommended methods for proper disposal will be followed

2) The following product-specific practices will be followed while on-site:

a) Petroleum Products

No more than 1,000 gallons of diesel fuel will be stored on-site at a time. It is anticipated that no other chemicals or petroleum products will be stored on-site.

On-site vehicles will be monitored for leaks and receive regular maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers that are clearly labeled. Preferably, the containers will be stored in a covered truck or trailer that provides secondary containment for the products.

Bulk storage tanks having a capacity of greater than 55 gallons will be provided with secondary containment. Containment can be provided by a temporary earthen berm or other means. After each rainfall event, the contractor will inspect the contents of the secondary containment area for excess water. If no sheen is visible, the collected water can be pumped to the ground in a manner that does not cause scouring. If sheen is present, it must be treated prior to discharging the water. Otherwise, the contaminated water must be transported and disposed off-site in accordance with local, state, and federal requirements.

Bulk fuel or lubricating oil dispensers will not have a self-locking mechanism that allows for unsupervised fueling. Fueling operations will be observed to immediately detect and contain spills.

Waste oil or other petroleum-based products will not be disposed of on-site (e.g. buried, poured, etc.), but will be taken off-site for proper disposal.

b) Non-Petroleum Products

Due to the chemical makeup of specific products, certain handling and storage procedures are required to promote the safety of handlers and prevent the possibility of pollution. Care will

be taken to follow directions and warnings for products used on-site. Pertinent information can be found on the Material Safety Data Sheet (MSDS) for each product. The MSDS will be kept on-site.

3) Spill Control Practices:

In addition to the material management practices discussed previously, the following spill control and clean-up practices will be followed to prevent storm water pollution in the event of a spill:

- a) Personnel on-site will be made aware of clean-up procedures and the location of spill clean-up equipment
- b) Spills will be contained and cleaned up immediately after discovery
- c) Manufacturer methods for spill clean-up of a material will be followed as described on the material's MSDS
- d) Materials and equipment needed for clean-up procedures will be kept readily available on the site, either at an equipment storage area or on contractor's trucks; equipment to be kept on the site will include but not be limited to brooms, dust pans, shovels, granular absorbents, sand, saw dust, absorbent pads and booms, plastic and metal trash containers, gloves, and goggles
- e) Toxic, hazardous, or petroleum product spills required to be reported by regulation will be documented to the appropriate federal, state, and local agencies
- f) Spills will be documented and a record of the spills will be kept with this SWP3

The federal reportable spill quantity for petroleum products is defined in 40 CFR 110 as an oil spill that:

- i. Violates applicable water quality standards
- ii. Causes a film or sheen upon or discoloration of the water surface or adjoining shoreline
- iii. Causes a sludge or emulsion to be deposited beneath the surface of the water or adjoining shorelines

The federal reportable spill quantities for hazardous materials are listed in 40 CFR, Part 302.4 in the table entitled "List of Hazardous Substances and Reportable Quantities." A procedure for determining a

reportable spill is included in Attachment F, along with a copy of the Spill Report Form to be completed as the result of a reportable spill. If a Spill Report Form is not available at the time of the spill, the information required for the Spill Report Form in Attachment F will be recorded by the contractor and provided to the owner.

In the State of Oklahoma, a reportable spill of hazardous waste is defined the same as in the federal regulations. A reportable spill of oil is the quantity which causes a “film or sheen upon or discoloration of the surface of the water or adjoining shorelines or causes a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines.”

In the case of a spill, the contractor’s superintendent will, within 15 minutes of discovering the spill, contact **XXXXXX (XXX) XXX-XXXX** and Mr. or Ms. **XXXXXX** will contact the following authorities if necessary:

Federal: National Response Center – (800) 424-8802 or (202) 267-2675

State: Oklahoma DEQ, Environmental Complaints Program – (800) 522-0206

All spills, large or small, will be cleaned up as soon as possible. It will be determined by **<XXXXXX>** **Client** if the contractor or **<XXXXXX> Client** will be responsible for cleaning up spills. If **<XXXXXX>** **Client** chooses to clean up the spill they will use a qualified waste disposal company. If the contractor cleans up the spill, they will be responsible for modifying the SWP3 and outlining their spill response procedures using the Record of Revisions form in Attachment E.

If a reportable release occurs, a modification to the SWP3 must be made within 14 days. The modification will include:

- Date of the release
- Description of the release
- Explanation of why the spill happened
- Description of procedures to prevent future spills and/or releases from happening
- Description of response procedures if a second spill or release occurs within 14 days of the first release

A written description of the release must be submitted to the permitting authority that includes:

- Description of the release, including the date of the release, the type of material and the estimated amount of spill
- Explanation of why the spill happened
- Description of the steps taken to prevent and control future releases

These modifications to the SWP3 will be documented on the Record of Revisions form in Attachment E.

* * * * *

7.0 RETENTION OF RECORDS AND SWP3 CERTIFICATION

7.1 RETENTION OF RECORDS

A copy of the SWP3 will be maintained at the appropriate Project construction office(s) from the date of Project initiation to the date of Project completion. Records will be maintained for dates when major grading occurs, construction activities temporarily or permanently cease, stabilization measures are initiated, and final stabilization is achieved. The owner will retain the SWP3 for a minimum period of three years from the Project completion date. The permittee will retain copies of the SWP3, reports required by this permit, and records of data used to complete the NOI to be covered by this permit for a period of at least three years from the date that the site is finally stabilized. The time period may be extended at any time.

7.2 SWP3 CERTIFICATION

The permittee will certify the SWP3 by signing the Owner's Certification form (located below) and attaching it to any document, including the SWP3, required by Part VI.G of the DEQ's General Permit. By signing the Contractor's/Subcontractor's Certification form (located near the front of this document, copy as needed), each contractor and subcontractor signifies that he or she has read, understands, and will adhere to the SWP3 before conducting construction work that involves soil disturbance. The signed certification confirms that the permittee has notified the contractor or subcontractor that a SWP3 has been prepared for the Project and that they will perform the necessary actions that have been identified to comply with the SWP3 and the Permit. It may be necessary for the contractor to implement additional erosion control and pollution prevention measures that may not be indicated in this SWP3 to maintain compliance with the Permit.

I certify under penalty of law that this document and attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Authorized Official

Title

Signature

Date

* * * * *

ATTACHMENT A - GENERAL PERMIT

GENERAL PERMIT OKR10

**FOR STORM WATER DISCHARGES
FROM CONSTRUCTION ACTIVITIES
WITHIN THE STATE OF OKLAHOMA**

**OKLAHOMA DEPARTMENT OF
ENVIRONMENTAL QUALITY

WATER QUALITY DIVISION**

September 13, 2007



Storm Water General Permit for Construction Activities

Permit No. OKR10

Authorization to Discharge Under the Oklahoma Pollutant Discharge Elimination System Act (OPDES)

In compliance with the provisions under the OPDES, 27A O.S. 2-6-201 et seq., as amended, except as provided in Part 1.3.2 of this permit, owners/operators of storm water discharges from construction activities, located in an area specified in Part 1.2, are authorized to discharge in accordance with the conditions and requirements set forth herein. Only those owners/operators of storm water discharges from construction activities in the general permit area who submit a Notice of Intent (NOI) and receive an authorization to discharge in accordance with Part 2 of this permit are authorized under this general permit.

This permit is a reissuance by the Department of Environmental Quality (DEQ) and shall become effective on September 13, 2007. This permit replaces the permit issued on September 13, 2002. This permit and the authorization shall expire at midnight, September 12, 2012.

Signed:

___/Jon L Craig/___

Jon L. Craig, Director
Water Quality Division

_____/Mark Derichsweiler/_____

Mark Derichsweiler, P.E, Engineering Manager
Water Quality Division

**GENERAL PERMIT OKR10 FOR STORM WATER DISCHARGES
FROM CONSTRUCTION ACTIVITIES WITHIN THE STATE OF OKLAHOMA**

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OPDES General Permit for Storm Water Discharges From Construction Activities

Part 1. Coverage Under This Permit

1.1 Introduction

Under the authority of the Oklahoma Pollutant Discharge Elimination System Act (OPDES), the Oklahoma Department of Environmental Quality (DEQ) is issuing the general permit OKR10, which authorizes discharges of storm water associated with construction activity. This is a reissuance of the general permit for large and small construction activities and replaces the current permit issued on September 13, 2002.

1.2 Permit Area

Under EPA's approval of the OPDES program, the DEQ has had storm water permitting and enforcement responsibility for large and small construction activities since November 19, 1996, except for construction activities associated with oil & gas extraction and agricultural activity, or those construction activities located on Indian Country Lands¹.

**Table 1-1 Areas of Coverage Where the EPA is the Permitting Authority
Within the State of Oklahoma**

Any Construction Activity on Indian Country Lands ¹ in Oklahoma
Construction activity associated with Oil and gas extraction under SIC Group 13 (Note: The DEQ does have authority over the natural gas liquid extraction plants identified under SIC code 1321, and service company base operating stations identified under SIC 1389); Pipelines under SIC Group 46, except pipelines within certain facilities regulated by the DEQ; Natural gas transmission under SIC Group 492, except that the DEQ has jurisdiction over natural gas liquid extraction plants
Construction activities associated with Agricultural production and services under SIC Groups 01, 02 and 07; Forestry under SIC Group 08; Fishing, hunting and trapping under SIC Group 09, except the DEQ shall have jurisdiction over industry group number 092 (fish hatcheries and preserves).

If you desire an authorization to discharge storm water from a construction activity listed in Table 1-1 above, you must apply to the EPA at the following addresses:

For an electronic Notice of Intent (eNOI): <http://cfpub1.epa.gov/npdes/stormwater/enoi.cfm>

Or

For a paper Notice of Intent (NOI): Storm Water Notice of Intent (4203M)

¹ Under EPA's 1996 approval of the State of Oklahoma's permitting program, the State was not authorized to issue NPDES permits under the federal Clean Water Act in areas of Indian country, as defined in 18 U.S.C. § 1151, within the State. 61 Fed. Reg. 65047, 65049 (December 10, 1996). Therefore, this permit does not apply to discharges of storm water in Indian country. However, section 10211(a) of the Safe, Accountable, Flexible, Efficient Transportation Equity Act of 2005 ("SAFETEA"), Public Law 109-59, 119 Stat. 1144 (August 10, 2005), provides the State the opportunity to request approval from EPA to administer federal environmental regulatory programs, including the Clean Water Act NPDES program, in Indian country areas of the State. The submission, by the State, and review, by EPA, of this permit is without prejudice to the State's right to request such approval at any time.

US EPA
1200 Pennsylvania Avenue, NW
Washington, DC 20460

1.3 Eligibility

1.3.1 Authorized Discharges

- A. Permittees are authorized to discharge pollutants in storm water runoff associated with construction activities as defined in 40 CFR 122.26 (b)(14)(x) for construction sites of five or more acres, and 40 CFR 122.26 (b)(15)(i) for construction sites of more than one acre but less than five acres, including the disturbance of less than one acre of total land area that is part of a larger common plan of development or sale if the larger common plan will ultimately disturb land equal to or greater than one acre, and those construction site discharges designated by the Director as needing a storm water permit under 40 CFR 122.26 (a)(1)(v), or under 122.26 (a)(9) and 122.26 (g)(1)(i). Discharges identified under Part 1.3.2 are excluded from coverage. Any discharge authorized by a different OPDES permit may be commingled with discharges authorized by this permit.
- B. This permit also authorizes storm water discharges from support activities (e.g., concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, and borrow areas) provided:
1. The support activity is directly related to a construction site that is required to have OPDES permit coverage for discharges of storm water associated with construction activity;
 2. The support activity is not a commercial operation serving multiple unrelated construction projects by different operators, and does not operate beyond the completion of the construction activity at the last construction project it supports; and
 3. Appropriate controls and measures are identified in a Storm Water Pollution Prevention Plan (SWP3) covering the discharges from the support activity areas.
 4. The support activity is not located within the watershed of an Outstanding Resource Water (see Part 9 Definition and Addendum F Outstanding Resource Waters)
- C. The following allowable non- stormwater discharges are authorized by this permit:
1. Fire hydrant flushings;
 2. Waters used to wash vehicles where detergents are not used;
 3. Water used to control dust in accordance with Part 4.5.2.C.2;
 4. Potable water, including waterline flushing and initial pressure tests of newly constructed piping where the piping is clean and chemical agents have not been added to the test water or applied to the pipes;
 5. Routine external building wash down which does not use detergents;
 6. Pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used;
 7. Uncontaminated air conditioning or compressor condensate;
 8. Uncontaminated ground water or spring water;
 9. Foundation or footing drains where flows are not contaminated with process materials such as solvents;
 10. Landscape irrigation;

11. Discharge or flows from emergency fire fighting activities;
12. Uncontaminated flows from excavation dewatering activities will be allowed if operational and structural controls are used to reduce any pollutant releases in order to avoid or minimize the impacts on water quality. These controls must be included in your SWP3.

1.3.2 Limitations on Coverage

- A. *Post Construction Discharges*: This permit does not authorize storm water discharges that originate from the site after construction activities have been completed and the site, including any temporary support activity site, has undergone final stabilization. Industrial post-construction storm water discharges may need to be covered by a separate OPDES permit.
- B. *Discharges Mixed With Non-Storm Water*: This permit does not authorize discharges that are mixed with sources of non-storm water, other than those discharges that are identified in Part 1.3.1.C (Exceptions to prohibition on non-storm water discharges) and are in compliance with Part 4.5.9. (non-storm water discharges).
- C. *Discharges Covered by Another Permit*: This permit does not authorize storm water discharges associated with construction activity that have been covered under an individual permit or which require coverage under an alternative general permit in accordance with Part 6.12.
- D. *Discharges Threatening Water Quality*: This permit does not authorize storm water discharges from construction sites that the Director determines will cause, or have reasonable potential to cause or contribute to violations of water quality standards, including anti-degradation policy. Where such determinations have been made, the Director may notify the operator(s) that an individual permit application is necessary in accordance with Part 6.12. However, the Director may authorize coverage under this permit after appropriate controls and implementation procedures designed to bring the discharges into compliance with water quality standards have been included in the SWP3.
- E. *Discharges Not Protective of Listed Endangered Species*: This permit does not authorize storm water discharges, allowable non-storm water discharges, and storm water discharge-related activities that are not protective of Federal and State listed endangered and threatened species or designated critical habitat. See Part 11 for more information.
 1. For the purposes of complying with Part 1.3. eligibility requirements, storm water discharge-related activities include:
 - a. Activities that cause, contribute to, or result in point source storm water pollutant discharges, including but not limited to excavation, site development, grading, and other land disturbing activities; and
 - b. Measures to control storm water including the siting, construction, and operation of best management practices (BMPs) to control, reduce, or prevent storm water pollution.
 2. Coverage under this permit is available only if the applicant certifies that it meets at least one of the criteria in paragraphs a, b, c, d, or e below. Failure to continue to meet one of these criteria during the term of the permit will render an applicant ineligible for coverage under this permit.

- a. The proposed construction site or land disturbing activity is not located within any of the corridors of the Federal or State identified sensitive waters or watersheds, and further investigation is not required.
 - b. The proposed construction site or land disturbing activity is located within a corridor of a Federal or State identified sensitive water or watershed (Addendum A). The SWP3 describes this area in relation to the identified water or watershed and specifies the measures to be employed to protect the endangered or threatened species or their critical habitat.
 - c. If applicant's storm water discharges and storm water discharge-related activities meet the criteria under Part 1.3.2.E.2.a, b, d, or e, there is no need to contact the U.S. Fish and Wildlife Service (USFWS) for Federal sensitive waters and watersheds, or the Oklahoma Department of Wildlife Conservation (ODWC) for State sensitive waters (see Part 11). If one of those eligibility criteria cannot be met, applicants may contact those agencies to evaluate the effects on listed species and critical habitat of the applicant's storm water discharges and storm water discharge-related activities, resulting in either a no jeopardy or a written concurrence by the agency on a finding that the applicant's storm water discharges and storm water discharge-related activities are not likely to adversely affect listed species or critical habitat; or
 - d. The applicant's construction activities are authorized by the appropriate Federal or State agency and that authorization addresses the incidental taking of listed species by the applicant's storm water discharge or storm water discharge-related activities; or
 - e. The applicant's storm water discharges and storm water discharge-related activities were already addressed in another operator's certification of eligibility under Part 1.3.2.E.2.a, b, c, or d. that included the applicant's project area. By certifying eligibility under Part 1.3.2.E.2.e, the applicant agrees to comply with applicable measures or controls upon which the other operator's certification under Part 1.3.2.E.2.a, b, c, or d. was based.
3. The applicant must comply with any applicable terms, conditions, or other requirements developed in the process of meeting the eligibility requirements of Part 1.3.2.E.2.a, b, c, d, or e. above to remain eligible for coverage under this permit. Such terms and conditions must be incorporated in the applicant's SWP3.
 4. Applicants who choose to meet the eligibility requirements of Part 1.3.2.E.2.c. must submit a copy of the wildlife agency's report of findings to the DEQ Storm Water Section.
 5. This permit does not authorize any storm water discharges where the discharges or storm water discharge-related activities cause a prohibited "take" (as defined in Part 9) of endangered or threatened species.
 6. This permit does not authorize any storm water discharges where the discharges or storm water discharge-related activities are likely to jeopardize the continued existence of any species that are listed or proposed to be listed as endangered or threatened or result in the adverse modification or destruction of habitat that is designated or proposed to be designated as critical.
- F. *Construction on Indian Country Land*: This permit does not authorize storm water discharges that originate from construction activities on Indian Country Lands. Such discharges are regulated by the EPA Region 6 offices located in Dallas, Texas.

- G. *Construction Activities for Oil and Gas Operations and Pipelines*: The Energy Policy Act of 2005 amends the Clean Water Act with regard to oil and gas exploration, production, processing, and treatment activities. The June 12, 2006 final rule exempts the oil and gas industry, including associated construction activities, from NPDES storm water permits. Therefore, Facilities that are currently regulated under the DEQ's permit, such as Natural Gas Liquid Extraction Plants (NAICS 211112, CIS 1321) and Oil and Gas Field Services for Company Base Operating Stations (NAICS 213112, SIC 1389), are not required to obtain permit coverage. However, Facilities that have a discharge of a reportable quantity release or that contribute pollutants (other than non-contaminated sediment) to a violation of a water quality standard are required to obtain and maintain OPDES permit coverage for storm water for the entire operating life of the facility. The Director may authorize coverage under this permit for any construction activities within those facilities after appropriate controls and implementation procedures designed to bring the discharge into compliance with water quality standards unless and/or until termination requirements are met.
- H. *Construction Activities Related to Agriculture*: This permit does not authorize storm water discharges that originate from construction activities related to Agriculture, that are under the jurisdiction of the Oklahoma Department of Agriculture, Food, and Forestry. Such discharges are regulated by the EPA Region 6 offices located in Dallas, Texas.
- I. New sources or new discharges of constituents of concern to impaired waters are not authorized by this permit unless otherwise allowable under OAC 252:606 and applicable state law. Impaired waters are those that do not meet applicable water quality standards and are listed on the Clean Water Act Section 303(d) list. Pollutants of concern are those constituents for which the water body is listed as impaired. Oklahoma State 303(d) water body lists can be obtained from the Integrated Water Quality Assessment Report on the DEQ web site at http://www.deq.state.ok.us/WQDnew/305b_303d/index.html, or the DEQ GIS Map and Data Viewer at http://maps.scigis.com/deq_wq/.

Discharges of pollutants of concern to impaired water bodies for which there is an approved total maximum daily load (TMDL) or a watershed plan incorporated in Oklahoma's Water Quality Management Plan in lieu of a TMDL are not eligible for coverage under this permit unless they are consistent with the approved TMDL or watershed plan. Approved TMDL reports or watershed plans can be downloaded from the DEQ website at <http://www.deq.state.ok.us/WQDnew/tmdl/index.html>. Permittees must incorporate any limitations, conditions, or requirements applicable to their discharges necessary for compliance with the TMDL or watershed plan, including any monitoring or reporting required by the TMDL or watershed plan, into their SWP3 within the time specified in the TMDL or watershed plan in order to be eligible for coverage under this general permit

1.4 Obtaining Authorization

- 1.4.1. In order for storm water discharges from construction activities to be authorized under this general permit, an owner/operator must:
- A. Meet the Part 1.2. eligibility requirements;
 - B. Except as provided in Part 2.1.4, develop a Storm Water Pollution Prevention Plan (SWP3) covering either the entire site or all portions of the site where they are operators (see definition in Part 9) according to the requirements in Part 4.1 A "joint" SWP3 may be

developed and implemented as a cooperative effort where there is more than one operator at a site; and

- C. Submit a Notice of Intent (NOI) in accordance with the requirements of Part 2, using an NOI form provided by the Director in Addendum B (or a photocopy thereof) and also available at <http://www.deq.state.ok.us/WQDnew/stormwater/index.html>. Only one NOI need be submitted to cover all of the owner/operator's activities on a common plan of development or sale (e.g., you do not need to submit a separate NOI for each separate lot in a residential subdivision or for two separate buildings being constructed at a manufacturing facility, provided the SWP3 covers each area for which you are an operator). The SWP3 must be implemented upon commencement of construction activities.
 - D. Develop and implement a storm water pollution prevention plan (SWP3) according to the requirements in Part 4 of this permit. You are required to submit a copy of your complete SWP3 to the DEQ for review if your discharges meet the special conditions listed in Part 2.5 of the permit. If your discharges do not meet the special conditions listed in Part 2.5 of the permit, you are not required to submit a copy of the SWP3 when you submit your NOI.
 - E. Pay the applicable annual permit fee established in OAC 252:606 Appendix D. If not included with the NOI, a statement of the fee due will be sent to the applicant. The fee must be received before the authorization will be issued.
 - F. Receive an authorization from the DEQ.
- 1.4.2. Any new operator on site, including those who replace an operator who has previously obtained permit coverage, must submit an NOI to obtain permit coverage.
 - 1.4.3. Once authorization is issued by the DEQ, dischargers who submit an NOI in accordance with the requirements of this permit are authorized to discharge storm water from construction activities under the terms and conditions of this permit. The DEQ may deny coverage under this permit and require submittal of an application for an individual OPDES permit based on a review of the NOI or other information (see Part 6.12 of this permit).

1.5.Terminating Coverage

- 1.5.1. Permittees wishing to terminate coverage under this permit must submit a Notice of Termination (NOT) in accordance with Part 8 of this permit., using an NOT form provided by the Director and found in Addendum C of the permit (or a photocopy thereof), and available at <http://www.deq.state.ok.us/WQDnew/stormwater/index.html>. Compliance with this permit is required until an NOT is submitted. The permittee's authorization to discharge under this permit terminates at midnight of the day the NOT is signed.
- 1.5.2. All permittees must submit an NOT within thirty (30) days after one or more of the following conditions have been met:
 - A. Final stabilization (see definition Part 9) has been achieved on all portions of the site for which the permittee is responsible (including, if applicable, returning agricultural land to its pre-construction agricultural use);
 - B. For residential construction only: temporary stabilization has been completed and the residence has been transferred to the homeowner;
 - C. When another owner/operator has assumed control according to Part 6.7.3. over all areas of the site that have not been finally stabilized. The NOT must be submitted with the new owner/operator's NOI;

- 1.5.3. The DEQ will review NOTs for completeness and accuracy and inspect the site for which the NOT was submitted within 30 days of receipt of the NOT. Permittees can submit an Inspection Request Form (see Addendum E of the permit) to the DEQ for an inspection prior to submitting an NOT. The DEQ will schedule an inspection and provide any assistance necessary within 30 days of receipt of the written request. Upon completing the inspection, the DEQ will notify the permittee of any needed changes to the site conditions, or that the site has met the termination requirements under this permit. Only one Inspection Request Form can be submitted to the DEQ within a ninety (90) day period. Additional compliance inspections may occur within this 90 day period at the discretion of the DEQ. Enforcement actions may be taken if a permittee submits an NOT without meeting one or more of the conditions in Part 1.5.2.

Part 2. Notice of Intent Requirements

2.1. Deadlines for Notification

- 2.1.1. Parties defined as owners/operators (see definition in Part 9) due to their operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications and/or owners/operators with day-to-day operational control over construction activities at a project, which are necessary to ensure compliance with a storm water pollution prevention plan or other permit conditions must receive authorization from the DEQ (after submitting an NOI in accordance with the requirements) prior to the commencement of construction activities (i.e., the initial disturbance of soils associated with clearing, grading, excavation activities, or other construction activities).
- 2.1.2. For storm water discharges from construction projects where the operator changes, including instances where an operator is added after an NOI has been submitted under Part 2.1.1, the new operator must submit an NOI at least two (2) days before assuming operational control over site specifications or commencing work on-site.
- 2.1.3. Owners/operators are not prohibited from submitting late NOIs. When a late NOI is submitted, authorization is only for discharges that occur after permit coverage is granted. The Department reserves the right to take appropriate enforcement for any unpermitted activities that may have occurred between the time construction commenced and authorization of future discharges is granted.
- 2.1.4. Owners/operators of on-going construction projects as of the effective date of this permit that received authorization for storm water discharges under the DEQ General Permit OKR10 For Storm Water Discharges From Construction Activities Within the State of Oklahoma, issued September 13, 2002, must:
 - A. Submit an NOI within 90 days of the effective date of this permit. If the permittee is eligible to submit an NOT (e.g., construction is finished and final stabilization has been achieved) before the 90th day, a new NOI is not required to be submitted. Owners/Operators must remain in compliance with existing requirements of General Permit OKR10, issued September 13, 2002, until a new authorization is received or an NOT is submitted.
 - B. Update the SWP3 to comply with the requirements of Part 4 within 90 days after the effective date of this permit.
- 2.1.5. Owners/operators of on-going construction projects as of the effective date of this permit that did not receive authorization to discharge under the DEQ General Permit OKR10 issued September 13, 2002, who wish to discharge under this permit, must submit an NOI and obtain

authorization under this permit. A SWP3 must be developed to comply with the requirements of Part 4.

2.2.Contents of Notice of Intent (NOI)

Use of Revised NOI Form. The NOI form shall include the following information:

- 2.2.1. Indication of whether you are modifying your NOI;
- 2.2.2. The name, address, E-mail address, and telephone number of the owner/operator filing the NOI for permit coverage;
- 2.2.3. Indication of whether you are a Federal, State, Tribal, private, or other public entity;
- 2.2.4. The name (or other identifier), address, county, and latitude/longitude of the construction project or site;
- 2.2.5. Indication of whether the project or site is located on Indian Country lands. Note: Construction projects requiring permit coverage that are located on federally recognized Indian Country lands in Oklahoma are permitted by the U.S. EPA Region 6 Office located in Dallas, Texas (see Part 1.2 of the permit);
- 2.2.6. Confirmation that an SWP3 has been developed, and that the SWP3 will be compliant with any applicable local sediment and erosion control plans. Do not submit a copy of your SWP3 unless required by Part 2.5;
- 2.2.7. Availability of your SWP3 for viewing, the location where the SWP3 may be viewed, and the name and telephone number of a contact person for scheduling viewing times;
- 2.2.8. The name of the receiving water(s);
- 2.2.10. Indication of whether your receiving water is included on the DEQ's 303(d) list of impaired waters;
- 2.2.11. Indication of whether your discharge will be consistent with the conditions and requirements of EPA approved or established TMDLs or watershed plans;
- 2.2.12. Estimates of project start and completion dates, and estimates of the number of acres of the site on which soil will be disturbed;
- 2.2.13. Based on the instructions in Part 11 and Addendum A, determination of whether the proposed construction site or land disturbing activity is within the specified corridor of a Federal or State sensitive water or watershed
- 2.2.14. The applicant shall certify permit eligibility, in Endangered Species areas, by selecting a, b, c, d, or e of Part 1.3.2.E.2.

2.3.Where To Submit

NOIs must be signed in accordance with Part 6.7., and sent to the following address: Department of Environmental Quality, Environmental Complaints and Local Services, Storm Water Unit, P.O. Box 1677, Oklahoma City, OK 73101-1677, or Fax to (405) 702-6223.

2.4. Modification of an NOI

After issuance of an authorization, an amended NOI may be submitted by a permittee if circumstances change (e.g. the area to be disturbed has changed from 5 acres to 7 acres). The amended NOI shall include the facility's assigned permit number and request a change. The original authorization number will be retained. The DEQ will provide an acknowledgement by mail or e-mail

that the amended NOI has been received. Permittees must update their SWP3s to reflect the modification.

2.5. SWP3 Submittal

You must submit a copy of your SWP3 along with your signed NOI if any of these conditions apply:

- 2.5.1. Any area of your construction site is located within the watershed of an Outstanding Resource Water (see definition in Part 9 and Addendum F Outstanding Resource Waters);
- 2.5.2. Any area of your construction site is located within a sensitive water and watershed identified in Addendum A;
- 2.5.3. The area to be disturbed on your construction site is forty (40) acres or more.

Part 3. Special Conditions, Management Practices, and Other Non-Numeric Limitations

3.1. Prohibition on Non-Storm Water Discharges

- 3.1.1. Except as provided in Parts 1.3.1.B or 1.3.2 and 3.1.2 or 3.1.3, all discharges covered by this permit shall be composed entirely of storm water associated with construction activity;
- 3.1.2. Discharges of material other than storm water that are in compliance with an OPDES permit (other than this permit) issued for that discharge may be discharged or mixed with discharges authorized by this permit.
- 3.1.3. The non-storm water discharges listed in Part 1.3.1.C. of the permit are authorized by this permit provided the non-storm water component of the discharge is in compliance with Part 4.5.9 (non-storm water discharges).

3.2. Releases in Excess of Reportable Quantities

The discharge of hazardous substances or oil in the storm water discharge(s) from a facility shall be prevented or minimized in accordance with the applicable SWP3 for the facility. This permit does not relieve the permittee of the reporting requirements of 40 CFR 110, 40 CFR 117 and 40 CFR 302.

Where a release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under either 40 CFR 110, 40 CFR 117 or 40 CFR 302, occurs during a 24 hour period:

- 3.2.1. *Reporting a Reportable Spill:* The permittee is required to notify the National Response Center (NRC) (800-424-8802 in Washington, DC) in accordance with the requirements of 40 CFR 110, 40 CFR 117 and 40 CFR 302, and the DEQ Hotline (800-522-0206 statewide) as soon as the discharge is discovered.
- 3.2.2. *Storm Water Pollution Prevention Plan Requirements:* The SWP3 required under Part 4 of this permit must be modified within 14 calendar days of knowledge of the release to provide a description of the release, the circumstances leading to the release, and the date of the release. In addition, the plan must be reviewed to identify measures to prevent the reoccurrence of such releases and to respond to such releases, and the plan must be modified where appropriate.

3.3. Spills

This permit does not authorize the discharge of hazardous substances or oil resulting from an on-site spill.

3.4. Discharge Compliance with Water Quality Standards

Operators seeking coverage under this permit shall not be causing or have the reasonable potential to cause or contribute to a violation of a water quality standard. Where a discharge is already authorized under this permit and is later determined to cause or have the reasonable potential to cause or contribute to the violation of an applicable water quality standard, the Director will notify the operator of such violation(s). The permittee shall take all necessary actions to ensure future discharges do not cause or contribute to the violation of a water quality standard and document these actions in the SWP3. If violations remain or re-occur, then coverage under this permit may be terminated by the Director, and an alternative general permit or individual permit may be issued. Compliance with this requirement does not preclude any enforcement activity as provided by the Clean Water Act (CWA) for the underlying violation. If such violation is determined, the Director may require you to:

- 3.4.1. Develop a supplemental BMP action plan describing SWP3 modifications in accordance with Part 4.4 to address adequately the identified water quality concerns;
- 3.4.2. Submit valid and verifiable data and information that are representative of ambient conditions and indicate that the receiving water is attaining water quality standards; or
- 3.4.3. Cease discharges of pollutants from construction activity and submit an alternative general permit or individual permit application.

3.5. Responsibilities of Owner/Operators

Permittees may meet one or both of the operational control components in the definition of “owner/operator” found in Part 9. Either Parts 3.5.1 or 3.5.2 or both will apply depending on the type of operational control exerted by an individual permittee.

- 3.5.1. If you have operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications (e.g., developer, owner, or operator), you must ensure that:
 - A. The project specifications meet the minimum requirements of Part 4 (Storm Water Pollution Prevention Plans), and all other applicable permit conditions;
 - B. The SWP3 indicates the areas of the project where you have operational control over project specifications (including the ability to make modifications in specifications), and ensure all other permittees implementing portions of the SWP3 who may be impacted by any changes to the plan are notified of such modifications in a timely manner; and
 - C. The SWP3 for portions of the project where you are the operator indicates the name and DEQ permit number for parties with day-to-day operational control of those activities necessary to ensure compliance with the SWP3 or other permit conditions. If these parties have not been identified at the time the SWP3 is initially developed, the permittee with operational control over project specifications shall be considered to be the responsible party until such time as the authority is transferred to another party (e.g., general contractor) and the plan updated.
- 3.5.2. If you have operational control over day-to-day activities, you must ensure that:
 - A. The SWP3 for portions of the project where you are the operator meets the minimum requirements of Part 4 (SWP3) and identifies the parties responsible for implementation of control measures identified in the plan.

- B. The SWP3 indicates areas of the project where you have operational control over day-to-day activities.
 - C. The SWP3 for portions of the project where you are the operator indicates the name and OPDES permit number of the party(ies) with operational control over project specifications (including the ability to make modifications in specifications).
- 3.5.3. If you have operational control over a portion of a larger construction project (e.g., a utility contractor or one of four homebuilders in a subdivision), you are responsible for compliance with all applicable terms and conditions of this permit as it relates to your activities on your portion of the construction site, including protection of endangered species, implementation of BMPs, and other controls required by the SWP3. You must ensure either directly or through coordination with other permittees, that your activities do not render another party's pollution controls ineffective. You must either implement your portions of a common SWP3 or develop and implement your own SWP3.
- 3.5.4. If you have operational control over utility installation (e.g., telephone, electric, gas, cable TV, etc.), your activities must be covered under an SWP3, either a “joint SWP3” for the larger common plan of development or sale, or your own SWP3. You are responsible for maintenance of the SWP3 on the areas disturbed by your activities. You must ensure the protection of endangered species, implementation of BMPs, and final stabilization requirements. This applies to utility companies and their subcontractors. If you are a contractor and not meeting the definition of “owner/operator” (see Part 3.5.1, 2 and 3), you are not required to submit an NOI for the permit coverage. You may be covered by a “contractor certification” or similar arrangement (see Addendum D of the permit).

Part 4. Storm Water Pollution Prevention Plans (SWP3)

4.1 Storm Water Pollution Prevention Plan (SWP3)

- 4.1.1. An SWP3 must be prepared prior to submission of an NOI as required in Part 2 of the permit. At least one SWP3 must be developed for each construction project or site covered by this permit. For more effective coordination of BMPs and opportunities for cost sharing, a cooperative effort by the different operators at a site to prepare and participate in a comprehensive SWP3 is encouraged. Individual operators at a site may, but are not required to, develop separate SWP3s that cover only their portion of the project provided reference is made to other operators at the site. In instances where there is more than one SWP3 for a site, coordination must be conducted between the permittees to ensure the storm water discharge controls and other measures are consistent with one another (e.g., provisions to protect listed species and critical habitat).
- 4.1.2. SWP3s shall be prepared in accordance with good engineering practices. The SWP3 shall identify potential sources of pollution that may reasonably be expected to affect the quality of storm water discharges from the construction site. The SWP3 shall describe and ensure the implementation of practices that will be used to reduce the pollutants in storm water discharges associated with construction activity at the construction site and assure compliance with the terms and conditions of this permit.
- 4.1.3. When developing SWP3s, applicants must follow the procedures in Part 11 of this permit to determine whether listed endangered or threatened species or critical habitat would be affected by the applicant's storm water discharges or storm water discharge-related activities. Any information on whether listed species or critical habitats are found in proximity to the construction site must be included in the SWP3. Any terms or conditions that are imposed

under the eligibility requirements of Part 1.3.2.E. and Part 11 of this permit to protect listed species or critical habitat from storm water discharges or storm water discharge-related activity must be incorporated into the SWP3. Permittees must implement the applicable provisions of the SWP3 required under this part as a condition of this permit.

- 4.1.4. If your construction site discharges into a receiving water which has been listed on the Clean Water Act 303(d) list of impaired waters, and your discharges contain the pollutant(s) for which the waterbody is impaired, you must document in your SWP3 how the BMPs and other controls selected for your site will control the discharge of the pollutant(s) of concern.

If a TMDL or watershed plan has been approved for the waterbody, you must also describe how your SWP3 is consistent with any TMDL or watershed plan requirements applicable to your discharge. If a TMDL has not yet been approved and the proposed discharge meets the eligibility requirements of Part 1.3, you must describe how the BMPs and other controls selected for your SWP3 will reduce the discharge of the pollutant(s) of concern.

A list of 303(d) listed streams can be obtained from the Integrated Water Quality Assessment Report on the DEQ webpage at http://www.deq.state.ok.us/WQDnew/305b_303d/index.html, or the DEQ GIS Map and Data Viewer at http://maps.scigis.com/deq_wq/.

An approved TMDL report or watershed plan can be downloaded from the DEQ website at <http://www.deq.state.ok.us/WQDnew/tmdl/index.html>.

4.2 Deadlines for Plan Preparation and Compliance

The SWP3 shall:

- 4.2.1. Be completed prior to commencing construction to be covered under this permit (except as provided in Parts 2.1.4) and updated as appropriate.
- 4.2.2. Provide for compliance with the terms and schedule of the SWP3 beginning with the initiation of construction activities.

4.3. Signature, Plan Review and Making Plans Available

- 4.3.1 The SWP3 shall be signed in accordance with Part 6.7, and be retained on-site at the facility that generates the storm water discharge in accordance with Part 5 (Retention of Records) of this permit.
- 4.3.2. The permittee shall post a notice near the main entrance of the construction site with the following information:
- A. The OPDES permit number for the project or a copy of the NOI if a permit number has not yet been assigned;
 - B. The name and telephone number of a local contact person;
 - C. A brief description of the project; and
 - D. The location of the SWP3 if the site is inactive or does not have an on-site location to store the plan.

If posting this information near a main entrance is infeasible due to safety concerns, the notice shall be posted in a local public building. If the construction project is a linear construction project (e.g., pipeline, highway, etc.), the notice must be placed in a publicly accessible location near where construction is actively underway and moved as necessary. This permit

does not provide the public with any right to trespass on a construction site for any reason, including inspection of a site; nor does this permit require that permittees allow members of the public access to a construction site.

- 4.3.3. The permittee shall make SWP3s available upon request to: the Director of the DEQ and/or any State, Federal, or local agency approving sediment and erosion plans, grading plans, or storm water management plans; the U.S. Fish and Wildlife Service or the Oklahoma Department of Wildlife Conservation; local government officials; or the operator of a municipal separate storm sewer receiving discharges from the site. The copy of the SWP3 that is required to be kept on-site or locally available must be made available to the Director for review at the time of an on-site inspection. Also, in the interest of public involvement, the DEQ encourages permittees to make their SWP3s available to the public for viewing during normal business hours.
- 4.3.4. The Director may notify the permittee at any time that the SWP3 does not meet one or more of the minimum requirements of this Part. Such notification shall identify those provisions of this permit that are not being met by the SWP3 as well as those requiring modification in order to meet the minimum requirements of this Part. Within seven (7) calendar days of receipt of such notification from the Director (or as otherwise provided by the Director), the permittee shall make the required changes to the SWP3 and shall submit to the Director a written certification that the requested changes have been made. The Director may take appropriate enforcement action for the period of time the permittee was operating under a plan that did not meet the minimum requirements of this permit.

4.4 Keeping Plans Current

The permittee must amend the SWP3 whenever:

- 4.4.1. There is a change in design, construction, operation, or maintenance that has a significant effect on the discharge of pollutants to the waters of the State that has not been addressed in the SWP3; or
- 4.4.2. Inspections or investigations by site operators, local, State or Federal officials indicate the SWP3 is proving ineffective in eliminating or significantly minimizing pollutants from sources identified under Part 4.5.1.B of this permit, or is otherwise not achieving the general objectives of controlling pollutants in storm water discharges associated with construction activity.

4.5 Contents of Plan

The SWP3 shall include the following items:

4.5.1. Site and Activity Description

Each SWP3 shall provide a description of potential pollutant sources and other information as indicated below:

- A. A description of the nature of the construction activity (e.g., low density residential, shopping mall, highway, etc.);
- B. A description of the intended sequence of major activities that disturb soils for major portions of the site (e.g., grubbing, excavation, grading, utilities, and infrastructure installation);
- C. Estimates of the total area of the site and the total area of the site that is expected to be disturbed by excavation, grading, or other activities including off-site borrow and fill areas;

- D. An estimate of the runoff coefficient of the site for both the pre-construction and post-construction conditions and data describing the soil or the quality of any discharge from the site;
- E. A general location map (e.g., USGS quadrangle map, or a portion of a city or county map) with enough detail to identify the location of your construction site and the receiving waters within one mile of the site;
- F. A legible site map, showing the entire site, indicating the following: drainage patterns and approximate slopes anticipated after major grading activities; areas of soil disturbance; areas that will not be disturbed; locations of major structural and nonstructural controls identified in the SWP3; locations where stabilization practices are expected to occur; locations of off-site material, waste, borrow, or equipment storage areas; location of all surface waters (including wetlands); locations where storm water discharges to a surface water; and areas where final stabilization has been accomplished and no further construction-phase permit requirements apply;
- G. Location and description of any discharge associated with industrial activity other than construction at the site, including storm water discharges from dedicated asphalt plants and dedicated concrete plants, that are covered by this permit;
- H. The name of the receiving water(s) and the areal extent and description of wetlands or other special aquatic sites (as defined by 40 CFR 230.3(q-1)) at or near the site that will be disturbed or that will receive discharges from disturbed areas of the project;

4.5.2 A copy of the permit requirements

A copy of this permit and of the signed NOI that was submitted to the DEQ must be included in your SWP3.

4.5.3 Documentation of measures to protect endangered or threatened species

The SWP3 must include information on whether listed endangered or threatened species or critical habitat are found in proximity to the construction activity, and whether such species may be affected by the applicant's storm water discharges or storm water discharge-related activities. You must describe and implement the measures necessary to protect these endangered species and threatened habitat in the SWP3, including any conditions included in correspondence between the USFWS, ODWC or others (see Part 11).

4.5.4 Documentation of Federal, State or local historic preservation laws

The SWP3 must include information on whether storm water discharges or storm water discharge-related activities would have an affect on a property that is protected by Federal, State, or local historic preservation laws along with any written agreements reached with the State services (see Part 10) to mitigate those effects.

4.5.5 Documentation of Water Quality-Impaired Waters

The SWP3 must include information on whether storm water discharges or storm water discharge-related activities would have an affect on water quality impaired receiving waters. The permittee must describe how the BMPs and other controls selected for the site will reduce and avoid the discharges of pollutants of concern into any 303(d) impaired waters. The permittee must describe and implement any measures necessary to meet the requirements of an approved TMDL or watershed plan and/or associated implementation schedule established

in the TMDL or watershed plan. Monitoring and reporting of discharge quality may also be required if necessary to ensure compliance with an approved TMDL or watershed plan.

4.5.6 Controls to Reduce Pollutants

Each SWP3 shall include a description of appropriate control measures (i.e., BMPs) that will be implemented as part of the construction activity to control pollutants in storm water discharges. The SWP3 must clearly describe for each major activity identified in Part 4.5.1: appropriate control measures and the general timing (or sequence) during the construction process that the measures will be implemented; and which permittee is responsible for implementation (e.g., perimeter controls for one portion of the site will be installed by Contractor A after the clearing and grubbing necessary for installation of the pollution prevention measure, but before the clearing and grubbing for the remaining portions of the site; and perimeter controls will be actively maintained by Contractor B until final stabilization of those portions of the site up-gradient of the perimeter control; and temporary perimeter controls will be removed by the permittee after final stabilization). The description and implementation of control measures shall address the following minimum components.

A. Erosion and Sediment Controls.

1. *Short and Long Term Goals and Criteria:*
 - a. The construction-phase erosion and sediment controls should be designed to retain sediment on site to the extent practicable.
 - b. All control measures must be properly selected, installed, and maintained in accordance with the manufacturer's specifications and good engineering practices. If periodic inspections or other information indicates a control has been used inappropriately or incorrectly, the permittee must replace or modify the control for site situations.
 - c. If sediment escapes the construction site, off-site accumulations of sediment must be removed at a frequency sufficient to minimize offsite impact (e.g., fugitive sediment in street could be washed into storm sewers by the next rain and/or pose a safety hazard to users of public streets).
 - d. Sediment must be removed from sediment traps or sedimentation ponds when design capacity has been reduced by 50%.
 - e. Litter, construction debris, and construction chemicals exposed to storm water shall be prevented from becoming a pollutant source for storm water discharges (e.g. screening outfalls or picked up daily).
 - f. Offsite material storage areas (also including overburden and stockpiles of dirt, borrow areas, etc.) used solely by the permitted project are considered a part of the project and shall be addressed in the SWP3.
2. *Stabilization Practices:* The SWP3 must include a description of interim and permanent stabilization practices for the site, including a schedule of when the practices will be implemented. Site plans should ensure that existing vegetation is preserved where attainable and that disturbed portions of the site are stabilized. Stabilization practices may include but are not limited to: establishment of temporary vegetation, establishment of permanent vegetation, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of trees, preservation of mature vegetation, and other appropriate measures. Use of impervious surfaces for stabilization should be avoided.

The following records shall be maintained and attached to the SWP3: the dates when major grading activities occur; the dates when construction activities temporarily or permanently cease on a portion of the site; and the dates when stabilization measures are initiated.

Except as provided in Parts 4.5.6.A.2.a, b, and c below, stabilization measures shall be initiated within 14 days after the construction activity in that portion of the site has temporarily or permanently ceased.

- a. Where the initiation of stabilization measures by the 14th day after construction activity temporary or permanently ceased is precluded by adverse climatological conditions (i.e. snow, ice, heavy rains, or drought) stabilization measures shall be initiated as soon as practicable.
 - b. Where construction activity on a portion of the site is temporarily ceased, and earth disturbing activities will be resumed within 21 days, temporary stabilization measures do not have to be initiated on that portion of the site.
 - c. In arid areas (areas with an average annual rainfall of 0 to 10 inches), semiarid areas (areas with an average annual rainfall of 10 to 20 inches), and areas experiencing droughts where the initiation of stabilization measures by the 14th day after construction activity has temporarily or permanently ceased is precluded by seasonably arid conditions, stabilization measures shall be initiated as soon as practicable.
3. *Structural Practices:* The SWP3 must include a description of structural practices to divert flows from exposed soils, store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site to the degree attainable. Structural practices may include but are not limited to: silt fences, earth dikes, drainage swales, sediment traps, check dams, subsurface drains, pipe slope drains, level spreaders, storm drain inlet protection, rock outlet protection, reinforced soil retaining systems, gabions, and temporary or permanent sediment basins. Placement of structural practices in floodplains should be avoided to the degree attainable. The installation of these devices may be subject to Section 404 of the CWA.
- a. For common drainage locations that serve an area with ten (10) or more acres disturbed at one time, a temporary (or permanent) sediment basin that provides storage for a calculated volume of runoff from a 2 year, 24 hour storm from each disturbed acre drained, or equivalent control measures, shall be provided where attainable until final stabilization of the site. Where no such calculation has been performed, a temporary (or permanent) sediment basin providing 3,600 cubic feet of storage per acre drained, or equivalent control measures, shall be provided where attainable until final stabilization of the site. When computing the number of acres draining into a common location, it is not necessary to include flows from offsite areas and flows from onsite areas that are either undisturbed or have undergone final stabilization where such flows are diverted around both the disturbed area and the sediment basin.

In determining whether installing a sediment basin is attainable, the permittee may consider factors such as site soils, slope, available area on site, etc. In any event, the permittee must consider public safety, especially as it relates to children, as a design factor for the sediment basin and alternative sediment controls shall be used where site limitations would preclude a safe design. For drainage locations that serve ten (10) or

more disturbed acres at one time and where a temporary sediment basin or equivalent controls is not attainable, smaller sediment basins and/or sediment traps should be used. Where neither the sediment basin nor equivalent controls are attainable due to site limitations, silt fences, vegetative buffer strips, or equivalent sediment controls are required for all down slope boundaries of the construction area and for those side slope boundaries deemed appropriate as dictated by individual site conditions. The DEQ encourages the use of a combination of sediment and erosion control measures in order to achieve maximum pollutant removal.

- b. For drainage locations serving less than 10 acres, smaller sediment basins and/or sediment traps should be used. At a minimum, silt fences, vegetative buffer strips, or equivalent sediment controls are required for all down slope boundaries (and for those side slope boundaries deemed appropriate as dictated by individual site conditions) of the construction area unless a sediment basin providing storage for a calculated volume of runoff from a 2 year, 24 hour storm or 3,600 cubic feet of storage per acre drained is provided. The DEQ encourages the use of a combination of sediment and erosion control measures in order to achieve maximum pollutant removal.

B. Storm Water Management

A description of measures that will be installed during the construction process to control pollutants in storm water discharges that will occur after construction operations have been completed must be included in the SWP3. Structural measures should be placed on upland soils to the degree attainable. The installation of these devices may also require a separate permit under Section 404 of the CWA. Permittees are only responsible for the installation and maintenance of storm water management measures prior to final stabilization of the site, and are not responsible for maintenance after storm water discharges associated with construction activity have been eliminated from the site. However, post-construction storm water BMPs that discharge pollutants from point sources once construction is completed, may in themselves need authorization under a separate OPDES permit.

1. Such practices may include but are not limited to: storm water detention structures (including wet ponds); storm water retention structures; flow attenuation by use of open vegetated swales and natural depressions; infiltration of runoff onsite; and sequential systems (that combine several practices). The SWP3 shall include an explanation of the technical basis used to select the practices to control pollution where flows exceed predevelopment levels.
2. Velocity dissipation devices shall be placed at discharge locations and along the length of any outfall channel to provide a non-erosive flow velocity from the structure to a water course so that the natural physical and biological characteristics and functions are maintained and protected (e.g. no significant changes in the hydrological regime of the receiving water).

C. Other Controls

1. No solid materials, including building materials, shall be discharged to waters of the State, except as authorized by a permit issued under Section 404 of the CWA.
2. Off-site vehicle tracking of sediments and the generation of dust shall be minimized.
3. The SWP3 shall be consistent with applicable State and/or local waste disposal, sanitary sewer, or septic system regulations to the extent these are located within the permitted area.

4. The SWP3 shall include a description of construction and waste materials expected to be stored on-site with updates as appropriate. The SWP3 shall also include a description of controls to reduce pollutants from these materials, including storage practices to minimize exposure of the materials to storm water, and spill prevention and response.
5. The SWP3 shall include a description of pollutant sources from areas other than construction (including storm water discharges from dedicated asphalt plants and dedicated concrete plants), and a description of controls and measures that will be implemented at those sites to minimize pollutant discharges.
6. The SWP3 shall include a description of measures necessary to protect listed endangered or threatened species or critical habitat, including any terms or conditions that are imposed under the eligibility requirements of Part 1.3.2.E.2 of this permit, unless a determination indicated that no impact is imminent. Failure to describe and implement such measures will result in storm water discharges from construction activities that are ineligible for coverage under this permit.

D. Approved State or Local Plans

Permittees which discharge storm water associated with construction activities must ensure their SWP3 is consistent with requirements specified in applicable sediment and erosion site plans of site permits, or storm water management site plans, or site permits approved by State or local officials. The SWP3 must be updated as necessary to remain consistent with any changes applicable to protecting surface water resources in sediment erosion site plans or site permits, or storm water management site plans or site permits approved by State or local officials for which the permittee receives written notice.

4.5.7. Maintenance

All erosion and sediment control measures and other protective measures identified in the SWP3 must be maintained in effective operating condition. If site inspections required by Part 4.5.8 identify BMPs that are not operating effectively, maintenance shall be performed before the next anticipated storm event, or as necessary to maintain the continued effectiveness of storm water controls. If existing BMPs need to be modified or if additional BMPs are necessary for any reason, implementation must be completed before the next storm event whenever practicable. If maintenance prior to the next anticipated storm event is impracticable, the situation must be documented in the SWP3 and maintenance must be scheduled and accomplished as soon as possible.

4.5.8. Inspections

Qualified personnel (provided by the permittee or cooperatively by multiple permittees) shall inspect disturbed areas of the construction site that have not been finally stabilized, areas used for storage of materials that are exposed to precipitation, structural control measures, and locations where vehicles enter or exit the site, at least once every fourteen (14) calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater.

Where sites have been finally or temporarily stabilized, runoff is unlikely due to winter conditions (e.g., site is covered with snow, ice, or frozen ground exists), or during seasonal arid periods in arid areas (areas with an average annual rainfall of 0 to 10 inches) and semi-arid areas (areas with an average annual rainfall of 10 to 20 inches) such inspections shall be conducted at least once every month until the permit has been terminated.

Inspections should at a minimum consist of the following items:

- A. Disturbed areas and areas used for storage of materials that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Sediment and erosion control measures identified in the SWP3 shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Where discharge locations are inaccessible, nearby downstream locations shall be inspected to the extent that such inspections are practicable. Locations where vehicles enter or exit the site shall be inspected for evidence of off-site sediment tracking.
- B. Based on the results of the inspection, the SWP3 shall be modified as necessary (e.g., show additional controls on map required by Part 4.5.1; revise description of controls required by Part 4.5.6) to include additional or modified BMPs designed to correct problems identified. Revisions to the SWP3 shall be completed within 7 calendar days following the inspection. If existing BMPs need to be modified or if additional BMPs are necessary, implementation shall be completed before the next anticipated storm event. If implementation before the next anticipated storm event is impracticable, they shall be implemented as soon as practicable.
- C. A report summarizing the scope of the inspection, name(s) and qualifications of personnel making the inspection, the date(s) of the inspection, and major observations relating to the implementation of the SWP3 shall be made and retained as part of the SWP3 for at least 3 years from the date that the site is finally stabilized. Major observations should include: the location(s) of discharges of sediment or other pollutants from the site; location(s) of BMPs that need to be maintained; location(s) of BMPs that failed to operate as designed or proved inadequate for a particular location; and location(s) where additional BMPs are needed that did not exist at the time of inspection. Actions taken in accordance with Part 4.5.8.B of this permit shall be made and retained as part of the SWP3 for at least three (3) years from the date that the site is finally stabilized. Such reports shall identify any incidents of non-compliance. Where a report does not identify any incidents of non-compliance, the report shall contain a certification that the facility is in compliance with the SWP3 and this permit. The report shall be signed in accordance with Part 6.7 of this permit.

4.5.9. Non-Storm Water Discharges

Non-storm waters listed in Part 1.3.1.C of this permit that are combined with storm water discharges associated with construction activity must be identified in the SWP3. The SWP3 shall identify and ensure the implementation of appropriate pollution prevention measures for the non-storm water component(s) of the discharge.

4.6. Contractor Certifications

This procedure is initiated only at the discretion of the permittee with the cooperation and agreement of the contractor. The Contractor Certification form, Addendum D should be rewritten by the permittee to fit their specific objectives. Contractor Certification is recommended but is not a requirement of the DEQ.

- 4.6.1. Contractors, subcontractors, builders, installers, regular suppliers, support service companies or others who are not the permittee (hereinafter referred to in Part 4.5. as “contractor”) but are involved in construction activity, and have not been issued a construction general permit authorization, should execute a Contractor Certification, at the discretion of the permittee, which places the responsibility of complying with and abiding by the intent and purpose of the permit with the contractor for work performed under the authority and direction of the

contractor. Contractors must ensure that activities regulated by the Construction General Permit (Permit) are protective of endangered and threatened species and critical habitat according to Part 11.

- 4.6.2. Contractors must be thoroughly familiar with and adhere to the NOI, the SWP3, and BMPs. The SWP3 should clearly identify, for each control measure identified in the plan, the party which will implement the measure. The Permittee(s) should ensure that all contractors or others involved in construction activity are identified in the plan as being responsible for implementing storm water control measures, and sign a copy of the contractor certification, before performing any work in the area covered by the SWP3. All contractor certifications should be included with the SWP3.
- 4.6.3. The Contractor Certification should include the name and title of the person providing the signature, the name, address, and telephone number of the contracting firm; the address (or other identifying description) of the site; and the date the certification is made. An example of certification can be found in Addendum D of the permit.

Part 5 Retention of Records

5.1. Documents

The permittee shall retain copies of the SWP3 and all reports required by this permit, and records of all data used to complete the NOI to be covered by this permit, for a period of at least three years from the date that the site is finally stabilized. This period may be extended by request of the Director at any time.

5.2. Accessibility

The permittee shall retain a copy of the SWP3 required by this permit (including a copy of the permit language) at the construction site (or other local location accessible to the Director; a State or local agency approving sediment and erosion plans, grading plans, or storm water management plans; local government officials; or the operator of a municipal separate storm sewer receiving discharges from the site) from the date of project initiation to the date of final stabilization. Permittees with day-to-day operational control over SWP3 implementation shall have a copy of the SWP3 available at a central location on-site for the use of all operators and those identified as having responsibilities under the SWP3 whenever they are on the construction site.

5.3. Addresses

All written correspondence concerning this permit, including the submittal of NOIs and NOTs, shall be sent to the following address: Department of Environmental Quality, Environmental Complaints and Local Services, Storm Water Unit, P.O. Box 1677, Oklahoma City, OK 73101-1677.

Part 6 Standard Permit Conditions

6.1. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissue, or modification, or for denial of a permit renewal application. Penalties for violations of permit conditions are provided below:

6.1.1. Criminal

- A. *Negligent Violations*: The OPDES Act provides that any person who negligently violates permit conditions is subject to a fine of not less than \$2,500 nor more than \$25,000 per day of violation, or by imprisonment for not more than 1 year, or both (27A O.S. § 2-6-206 (G) (1)).
- B. *Knowing Violations*: The OPDES Act provides that any person who knowingly violates permit conditions is subject to a fine of not less than \$5,000 nor more than \$50,000 per day of violation, or by imprisonment for not more than 3 years, or both (27A O.S. § 2-6-206 (G) (2)).
- C. *Knowing Endangerment*: The OPDES Act provides that any person who knowingly violates permit conditions, and who knows at that time that he is placing another person in imminent danger of death or serious bodily injury, is subject to a fine of not more than \$250,000, or by imprisonment for not more than 15 years, or both (27A O.S. § 2-6-206 (G) (3)).
- D. *False Statement*: The OPDES Act provides that any person who knowingly makes any false material statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained under the OPDES, or who knowingly falsifies, tampers with, or renders inaccurate, any monitoring device or method required to be maintained under the OPDES, shall upon conviction, be punished by a fine of not more than \$10,000 or by imprisonment for not more than two years, or by both. If a conviction is for a violation committed after a first conviction of such person under this paragraph, punishment shall be by a fine of not more than \$20,000 per day of violation, or by imprisonment of not more than four years, or by both (27A O.S. § 2-6-206 (G) (4)).
- 6.1.2. *Civil Penalties*: The OPDES Act provides that any person who violates a permit condition is subject to a civil penalty not to exceed \$10,000 per day for each violation (27A O.S. § 2-6-206 (F)).
- 6.1.3. *Administrative Penalties*: The OPDES Act provides that any person who violates a permit condition is subject to an administrative penalty, not to exceed \$10,000 per violation nor shall the maximum amount exceed \$125,000 (27A O.S. § 2-6-206 (E)).

6.2. Continuation of the Expired General Permit

If this permit is not reissued or replaced prior to the expiration date, it will be administratively continued and remain in full force and effect. Any permittee who was granted permit coverage prior to the expiration date will automatically remain covered by the continued permit until the earlier of:

- 6.2.1. Reissue or replacement of this permit, at which time the permittee must comply with the Notice of Intent conditions of the new permit to maintain the authorization to discharge; or
- 6.2.2. The permittee's submittal of a Notice of Termination; or
- 6.2.3. Issuance of an individual permit for the permittee's discharges; or
- 6.2.4. A formal permit decision by the Director not to reissue this general permit, at which time the permittee must seek coverage under an alternative general permit or an individual permit.

6.3. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

6.4. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

6.5. Duty to Provide Information

The permittee shall furnish to the Director, or an authorized representative of the Director, any information that is requested to determine compliance with this permit or other information.

6.6. Other Information

When the permittee becomes aware that he or she failed to submit any relevant facts or submitted incorrect information in the NOI or in any other report to the Director, he or she shall promptly submit such facts or information.

6.7. Signatory Requirements

All Notices of Intent, Notices of Termination, reports, certifications (except the Contractor Certification under Part 4.6.) or information either submitted to the Director or the operator of an MS4, or that this permit requires be maintained by the permittee, shall be signed as follows:

6.7.1. All Notices of Intent and Notices of Termination shall be signed as follows:

- A. For a corporation: by a responsible corporate officer. For the purpose of this Section, a responsible corporate officer means: (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or their designee, or any other person who performs similar policy or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided the manager is authorized to make management decisions which govern the operation of the regulated facility, including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;
- B. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or
- C. For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official. For purposes of this Section, a principal executive officer of a Federal agency includes (i) The chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g. Regional Administrator of the EPA).

6.7.2 All reports required by this permit and other information requested by the Director or authorized representative of the Director shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

- A. The authorization is made in writing by a person described above and submitted to the Director;
- B. The authorization specifies either an individual or position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator, superintendent, or position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and

- C. The signed and dated written authorization must be included in the SWP3.
- 6.7.3 Changes to Authorization: If an authorization under Part 2.2 is no longer accurate because a different operator has responsibility for the overall operation of the construction site, a new NOI satisfying the requirements of Part 2.2 must be submitted to the Director prior to or together with any reports, information, or applications to be signed by an authorized representative. The change in authorization must be submitted within the time frame specified in Part 2.1.2 and sent to the address specified in Part 2.3.
- 6.7.4 Any person signing documents under Part 6.7 shall make the following certification:

“I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage this system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”

6.8 Penalties for Falsification of Reports

Section 27A O.S. § 2-6-206 G. 4. provides that any person who knowingly makes any false material statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than \$10,000, or by imprisonment for not more than two years, or by both.

6.9 Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Clean Water Act (CWA) or Section 106 of the Comprehensive Environmental Response, Compensation and Liability Act (“CERCLA”) of 1980, 42 USC § 9601 et. seq.

6.10 Property Rights

The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges, nor does it authorize any injury to private property nor any invasion of personal rights, nor any infringement of Federal, State, or local laws or regulations.

6.11 Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

6.12 Requiring an Individual Permit or an Alternative General Permit

- A. The Director may require any person authorized by this permit to apply for and/or obtain either an individual OPDES permit or an alternative OPDES general permit. Any interested person may petition the Director to take action under this paragraph. Where the Director requires a permittee authorized to discharge under this permit to apply for an individual OPDES permit, the Director

shall notify the permittee in writing that a permit application is required. This notification shall include a brief statement of the reasons for this decision, an application form, a statement setting a deadline for the permittee to file the application, and a statement that on the effective date of issuance or denial of the individual OPDES permit or the alternative general permit as it applies to the individual permittee, coverage under this general permit shall automatically terminate. Applications shall be submitted to the address in Part 2.3 of this permit. The Director may grant additional time to submit the application upon request of the applicant. If a permittee fails to submit in a timely manner an individual OPDES permit application as required by the Director under this paragraph, then the applicability of this permit to the individual OPDES permittee is automatically terminated at the end of the day specified by the Director for application submittal.

- B. Any permittee authorized by this permit may request to be excluded from the coverage of this permit by applying for an individual permit. In such cases, the permittee shall submit an individual application in accordance with the requirements of 40 CFR 122.26 (c) (1) (ii), with reasons supporting the request, to the Director at the address in Part 2.3 of this permit. The request may be granted by issuance of any individual permit or an alternative general permit if the reasons cited by the permittee are adequate to support the request.
- C. When an individual OPDES permit is issued to a permittee otherwise subject to this permit, or the permittee is authorized to discharge under an alternative OPDES general permit, the applicability of this permit to the individual OPDES permittee is automatically terminated on the effective date of the individual permit or the date of authorization of coverage under the alternative general permit, whichever the case may be. When an individual OPDES permit is denied to an operator otherwise subject to this permit, or the owner/operator is denied coverage under an alternative OPDES general permit, the applicability of this permit to the individual OPDES permittee is automatically terminated on the date of such denial, unless otherwise specified by the Director.

6.13. State/Tribal Environmental Laws

- 6.13.1. Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State/Tribal law or regulation under authority preserved by Section 510 of the Clean Water Act.
- 6.13.2. No condition of this permit shall release the permittee from any responsibility or requirements under other environmental statutes or regulations.
- 6.13.3. Construction activities on Indian Country Lands are regulated by the EPA Region 6 offices located in Dallas, Texas. Applicants seeking coverage for construction or surface disturbing activities located on Indian Country land should contact the EPA Region 6 office.

6.14. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions and requirements of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. Proper operation and maintenance requires the operation of backup or auxiliary facilities or similar systems, installed by a permittee only when necessary to achieve compliance with the conditions of this permit.

6.15. Inspection and Entry

The permittee shall allow the Director or an authorized representative of DEQ, or in the case of a construction site that discharges through a municipal separate storm sewer, an authorized representative of the municipal owner/operator of the separate storm sewer receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

- 6.15.1 Enter upon the permittee's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit;
- 6.15.2 Have access to and copy at reasonable times, any records that must be kept under the conditions of this permit; and
- 6.15.3 Inspect at reasonable times any facilities or equipment (including monitoring and control equipment).

6.16 Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

Part 7 Re-opener Clause

7.1 Potential to Cause or Contribute to a Violation

If there is evidence indicating that the storm water discharges authorized by this permit cause, or have the reasonable potential to cause, or contribute to, a violation of a water quality standard, the permittee may be required to obtain an individual permit or an alternative general permit in accordance with Part 6.12 of this permit, or the permit may be modified to include different limitations and/or requirements.

7.2 Permit Modification or Revocation

Permit modification will be conducted according to the Oklahoma Uniform Environmental Permitting Act at Oklahoma Statutes, Title 27A, Section 2-14-101 et. seq., the Oklahoma Administrative Code (OAC), 252:4-7 and 252:606 incorporating by reference Federal Regulations at 40 CFR 122.62, 122.63, 122.64, and 124.5.

The DEQ may propose a modification to this permit after further discussions between the Department and the Oklahoma Historical Society for the protection of historic properties.

Part 8 Termination of Coverage

8.1 Notice of Termination (NOT)

Permittees must submit a completed NOT that is signed in accordance with Part 6.7 of this permit when one or more of the conditions contained in Part 1.5.2. (Terminating Coverage) have been met at a construction project. The NOT form found in Addendum C will be used unless it has been replaced with a revised version by the Director.

8.1.1 The Notice of Termination shall include the following information:

- A. The OPDES permit number for the storm water discharge identified by the NOT;
- B. An indication of whether the storm water discharges associated with construction activity have been eliminated (i.e., regulated discharges of storm water are being terminated) or the permittee is no longer an operator at the site;

- C. The name, address, and telephone number of the permittee submitting the NOT;
- D. The name of the project and street address (or a description of location if no street address is available) of the construction site for which the notification is submitted;
- E. The latitude and longitude of the construction site.
- F. The information pertaining to the new operator if you are no longer an operator of the site, including the name, address, and phone number, and
- G. The following certification, signed in accordance with Part 6.7 (signatory requirements) of this permit. For construction projects with more than one permittee and/or operator, the permittee need only make this certification for those portions of the construction site where the permittee was authorized under this permit and not for areas where the permittee was not an operator:

“I certify under penalty of law that all storm water discharges associated with industrial/construction activity from the identified facility/site that was authorized by a general permit have been eliminated or that I am no longer the owner or operator of the facility/site. I understand that by submitting this notice of termination, I am no longer authorized to discharge storm water associated with industrial/construction activity under this general permit, and that discharging pollutants in storm water associated with industrial/construction activity to waters of the State of Oklahoma is unlawful under the Clean Water Act and OAC 252:606-1-3(b)(3)(L) where the discharge is not authorized by an OPDES permit. I also understand that the submittal of this Notice of Termination does not release me as an owner or operator from liability for any violations of this permit or the Clean Water Act.”

8.1.2 Elimination of Storm Water Discharged

For the purposes of this certification, elimination of storm water discharges associated with construction activity means that all disturbed soils at the portion of the construction site where the operator had control have been finally stabilized (as defined in Part 9) and temporary erosion and sediment control measures have been removed or will be removed at an appropriate time to ensure final stabilization is maintained, or that all storm water discharges associated with construction activities from the identified site that are authorized by an OPDES general permit have otherwise been eliminated from the portion of the construction site where the operator had control.

8.1.3 Address

All NOTs signed in accordance with Part 6.7 of this permit are to be submitted using the form provided by the Director (or a photocopy thereof), to the address found in 5.3.

Part 9 Definitions

- 1. Applicant** means any person who is contemplating or planning to submit an NOI for approval, or has submitted an NOI for approval and is waiting for authorization to discharge storm water under the provisions of this permit.
- 2. Best Management Practices (BMPs)** means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants to waters of the State. BMPs also include treatment requirements, operating procedures,

and practice to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

3. **Commencement of Construction** means the initial disturbance of soils associated with clearing, grading, or excavating activities or other construction activities.
4. **Control Measure** as used in this permit, refers to any BMP or other method used to prevent or reduce the discharge of pollutants to waters of the State.
5. **CWA** means the Clean Water Act or the Federal Water Pollution Control Act, 33 U.S.C. Section 1251 et seq.
6. **Dewatering Activities** means the discharge of water generated from the lowering of the groundwater table, the pumping of accumulated storm water from an excavation, or the pumping of surface water from a cofferdam.
7. **Director** means the Executive Director or chief administrator of the DEQ or an authorized representative.
8. **Discharge** when used without qualification means the “discharge of a pollutant.”
9. **Discharge of Storm Water Associated with Construction Activity** as used in this permit, refers to a discharge of pollutants in storm water runoff from areas where soil disturbing activities (e.g., clearing, grading, or excavation), construction materials or equipment storage or maintenance (e.g., fill piles, borrow area, concrete truck washout, fueling), or other industrial storm water directly related to the construction process (e.g., concrete or asphalt batch plants) are located.
10. **Ephemeral Stream** means an entire stream which flows only during or immediately after a rainfall event, and contains no refuge pools capable of sustaining a viable community of aquatic organisms.
11. **Facility or Activity** means any OPDES “point source” or any other facility or activity (including land or appurtenances thereto) that is subject to regulation under the OPDES program.
12. **Final Stabilization** means that:
 - 12.1. All soil disturbing activities at the site have been completed and either of the two following criteria is met:
 - A. A uniform (e.g., evenly distributed, without large bare areas) perennial vegetative cover with a density of 70% of the native background cover for the area has been established on all unpaved areas and areas not covered by permanent structures, or
 - B. Equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles) have been employed.

When background native vegetation covers less than 100% of the ground (e.g., arid areas, and beaches), establishing at least 70% of the natural cover of the native vegetation meets the vegetative cover criteria for final stabilization (e.g., if the native vegetation covers 50% of the ground, 70% of 50% would require 35% total cover for final stabilization. On a beach with no natural vegetation, no vegetation is required.
 - 12.2. For individual lots in residential construction, either of the following criteria is met:
 - A. The homebuilder has completed final stabilization as specified above; or
 - B. The homebuilder has established temporary stabilization including perimeter controls for an individual lot prior to occupation of the home by the homeowner and informing the homeowner of the need for, and benefits of, final stabilization. (Homeowners typically have

an incentive to put in the landscaping functionally equivalent to final stabilization as quickly as possible to keep mud out of their homes and off sidewalks and driveways.); or

- 12.3. For construction projects on land used for agricultural purposes (e.g., pipelines across crop or range land), final stabilization may be accomplished by returning the disturbed land to its pre-construction agricultural use. Areas disturbed that were not previously used for agricultural activities, such as buffer strips immediately adjacent to “waters of the United States,” and areas that are not being returned to their pre-construction agricultural use must meet the final stabilization criteria 12.1 or 12.2 above.

13. Municipal Separate Storm Sewer System or MS4 is defined at 40 CFR §122.26(b)(8) to mean a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains):

- 13.1. Owned and operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to state law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States;
- 13.2. Designed or used for collecting or conveying storm water;
- 13.3. Which is not a combined sewer; and
- 13.4. Which is not part of a Public Owned Treatment Works (POTW) as defined at 40 CFR §122.2.

Note: Phase II MS4 can also be owned or operated by Federal and State government, such as systems at military bases, large hospital or prison complexes, and highways and other thoroughfares. [see 40 CFR §122.26(b)(16)]

14. NOI means Notice of Intent, (DEQ Form 605-002A, see Part 2 of this permit.)

15. NOT means Notice of Termination (DEQ Form 605-003, see Part 8 of this permit).

16. Owner/Operator for the purpose of this permit and in the context of storm water associated with construction activity, means any party defined in 16.1 or 2, associated with a construction project that meets either of the following two criteria:

- 16.1. The party has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or
- 16.2. The party has day-to-day operational control of those activities at a project that are necessary to ensure compliance with a Storm Water Pollution Prevention Plan for the site or other permit conditions (e.g., they are authorized to direct workers at a site to carry out activities required by the SWP3 or comply with other permit conditions).

This definition is provided to inform permittees of DEQ's interpretation of how the regulatory definitions of “owner or operator” and “facility or activity” are applied to discharges of storm water associated with construction activity.

17. OPDES means the Oklahoma Pollutant Discharge Elimination System Act.

18. Outstanding Resource Waters means those waters of the State which are designated as such in Oklahoma's Water Quality Standards OAC 785:45, Appendix A..

- 19. Permit** means the General Permit OKR10 for Storm Water Discharges from Construction Activities Within the State of Oklahoma.
- 20. Permittee** means a person who has submitted an NOI and has received authorization to discharge storm water from construction or land disturbing activities under this permit.
- 21. Point Source** means any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, landfill leachate collection system, or vessel or other floating craft, from which pollutants or wastes are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.
- 22. Pollutant** means any material, substance, or property which may cause pollution (e.g., dredged spoil, solid waste, sewage, garbage, sewage sludge, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial or municipal waste).
- 23. Runoff coefficient** means the fraction of total rainfall that will appear at the conveyance as runoff.
- 24. Storm Water** means rainwater runoff, snowmelt runoff, and surface runoff and drainage.
- 25. Storm Water Associated with Industrial Activity** is defined at 40 CFR 122.26 (b) (14) & (15) and incorporated here by reference. Most relevant to this permit is 40 CFR 122.26 (b) (14) (x) and 40 CFR 122.26 (b) (15) (i), that relates to construction activity including clearing, grading, and excavation activities that result in the disturbance of one or more acres of total land area, or are part of a larger common plan of development or sale.
- 26. Storm Water Discharge-Related Activity** is defined as disturbance activities that cause, contribute to, or result in point source storm water pollutant discharges, including but not limited to excavation, site development, grading, and other land disturbing activities; and control measures to control storm water discharges including the siting, construction, and operation of best management practices (BMPs) to control, reduce, or prevent storm water pollution.
- 27. Takes or Taking** means any action that would “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect” any threatened or endangered species. Harm may include significant habitat modification that actually injures a species.
- 28. Total Maximum Daily Load or TMDL** means the sum of the individual wasteload allocations (WLAs) for point sources, safety, reserves, and loads from nonpoint sources and natural background.
- 29. Waters of the State** means all streams, lakes, ponds, marshes, watercourses, waterways, wells, springs, irrigation systems, drainage systems, storm sewers and all other bodies or accumulations of water, surface and underground, natural or artificial, public or private, which are contained within, flow through, or border upon this state or any portion thereof, and shall include under all circumstances the waters of the United States which are contained within the boundaries of, flow through, or border upon this state or any portion thereof. Provided waste treatment systems, including treatment ponds or lagoons designed to meet federal and state requirement other than cooling ponds as defined in the Clean Water Act or rules promulgated thereto, and prior converted cropland are not waters of the State. (27A O.S. §1-1-201).

Part 10. Historic Preservation

The Environmental Protection Agency has determined that the Oklahoma Department of Environmental Quality’s NPDES permitting activities are not Federal undertakings and, therefore,

are not subject to review under Section 106 of the National Historic Preservation Act. However, applicants and permittees must comply with the State Antiquities Act (Title 53, Chapter 20, Section 361) where applicable and the Burial Desecration Law (Title 21, Chapter 47, Section 1168.0-1168.6), as well as with any applicable local laws concerning the identification and protection of historic properties.

Applicants and permittees who may receive Federal funding or other Federal assistance in the completion of their projects must be aware that compliance with Section 106 of the Act may apply. For information about the Section 106 review process in Oklahoma, Oklahoma properties listed on or eligible for the National Register of Historic Places, and related topics, contact:

State Historic Preservation Office
Oklahoma Historical Society
2401 North Laird Avenue
Oklahoma City, OK 73105
(405)521-6249
www.okhistory.org/shpo/shpom.htm

Oklahoma Archeological Survey
111 East Chesapeake
Norman, OK 73019
405/325-7211
www.ou.edu/cas/archsur

Part 11 Endangered Species

Addendum A is a registry of Federal identified sensitive waters and watersheds and State identified sensitive waters and watersheds.

11.1 Background

The DEQ is seeking to ensure the activities regulated by the Permit are protective of endangered and threatened species and critical habitat. To ensure that those goals are met, owners/operators seeking Permit coverage are required under Part 1.3.2.E to assess the impacts of their storm water discharges and storm water discharge-related activities on identified endangered and threatened species and designated critical habitat. This may be accomplished by following Steps 1 and 2 listed below. It is not necessary to contact the appropriate wildlife agency if you can comply with the provisions listed in Step 2. The DEQ strongly recommends that applicants follow these steps at the earliest possible stage to ensure that measures to protect identified species are incorporated early in the planning process. At minimum, the procedures should be followed when developing the SWP3.

Permittees and contractors have an independent obligation to ensure that their activities do not result in any prohibited “take” of identified species. Many of the measures required in the Permit and in these instructions to protect identified species may also assist owners/operators in ensuring that their construction or land disturbing activities do not result in a prohibited take of a species. Owners/operators who plan construction or land disturbing activities within the corridor of a Federally identified sensitive water or a State identified sensitive water, Addendum A, may meet the requirements of Step 2.

This permit provides for the possibility of multiple owners/operators and contractors at a construction site. Applicants should be aware that in some cases they may meet the permit eligibility requirements by relying on another permittee’s certification of eligibility under Part 1.3.2.E.2.a., b., c., d. or e. This

is allowed under Part 1.3.2.E.2.e. of the permit, however, the other permittee's certification must apply to the contractor's project area and must address the effects from the Contractor's storm water discharges and storm water discharge-related activities on listed species and critical habitat. By certifying eligibility under Part 1.3.2.E.2.e. the applicant agrees to comply with any measures or controls upon which the other operator's certification under Part 1.3.2.E.2.a., b., c., d. or e. was based. This situation will typically occur where a developer or primary contractor, such as one for construction of a subdivision or industrial park, conducts a comprehensive assessment of effects on listed species for the entire construction project, certifies eligibility under Part 1.3.2.E.2.a., b., c., d. or e. and that certification is relied upon by other operators (i.e., contractors) at the site. However, applicants that consider relying on another operator's certification should carefully review that certification along with any supporting information. If an applicant does not believe that the operator's certification provides adequate coverage for the applicant's storm water discharges and storm water discharge-related activities or for the applicant's particular project area, the applicant should provide its own independent certification under Part 1.3.2.E.2.a., b., c., d. or e.

11.2 Procedures

To receive coverage under the Construction General Permit, applicants must assess the potential effects of their storm water discharges and storm water discharge-related activities on listed species. To make this assessment, applicants must follow the steps outlined below prior to completing and submitting a Notice of Intent (NOI) form, Addendum B.

Step 1: Determine Whether The Project Area Drains To Sensitive Waters Or Watersheds.

1. Refer to Addendum A, that lists all of the waters of Oklahoma which the U.S. Fish and Wildlife Service and the Oklahoma Department of Wildlife Conservation consider to be sensitive because they harbor populations of federal or state listed species or their designated critical habitat.
2. If the applicant's proposed construction site is not located within any of these areas, the proposed construction storm water discharge or storm water discharge related activities are not likely to significantly affect endangered and threatened species. The applicant may then skip Step 2 and further investigation is unnecessary.
3. If the applicant's proposed construction site is located within the corridor of any sensitive waters or watersheds, the applicant must continue on to step 2.

Step 2: Implementation of Storm Water Control Measures to Protect Endangered and Threatened Species in Sensitive Rivers:

1. Applicants whose proposed construction site is located within a sensitive water or watershed must incorporate the following measures into the SWP3 for this site. Other pollutants such as, but not limited to, oil, grease, solid waste (i.e. building material scrap, and trash), and human and hazardous waste, (e.g., paint and solvents), are not authorized for discharge under this permit. These potential pollutants must be properly managed and their contact with storm water minimized or eliminated to the greatest extent practicable.
 - a. Consistent with Part 4.5.6.A.1, sediment must be retained on site to the greatest extent practicable; all sediment, solid waste, and human waste control measures must be properly installed and maintained at all times; and off-site accumulations of any escaped sediment must be removed.
 - b. A vegetated buffer zone of at least 100 feet must be retained or successfully established/planted between the area disturbed during construction and all perennial or intermittent streams on or adjacent to the construction site. A vegetated buffer zone at least 50 feet wide must be retained or

successfully established/planted between the areas disturbed during construction and all ephemeral streams or drainages. Buffer zones shall be measured from the top of the first defined bank of the stream and shown on the site map in the SWP3.

- c. Consistent with Part 4.5.6.A.2, an implementation schedule must be included which describes the stabilization practices that will be used to control erosion during construction and when construction has permanently ceased. The preservation of mature vegetation on-site is preferred.
 - d. Consistent with Part 4.5.6.A.3, structural BMPs must be successfully implemented to divert uphill storm water flows from crossing disturbed areas, to store flows (e.g., retention ponds) or to otherwise control runoff from disturbed areas during construction. At a minimum this must include silt fencing and vegetated buffer strips on all down slope boundaries of the area disturbed during construction. The construction of temporary or permanent storm water detention or retention structures (e.g., ponds) is preferred, but these should not be constructed within intermittent or perennial stream channels or within floodplains.
 - e. Consistent with Part 4.5.6.B.2, velocity dissipation devices must be incorporated into the design of outfall channels and discharge locations. Outfalls must be screened to prevent the discharge of solid materials with storm water runoff.
 - f. Hazardous construction materials and waste must be stored in a manner that minimizes their contact with storm water. An emergency response plan must be included which addresses the handling of accidental spills.
2. The applicant must comply with any terms and conditions imposed under the eligibility requirements of Part 1.3.2.E.2 a, b, c, d, or e to ensure that its storm water discharges and storm water discharge-related activities are protective of listed species and/or critical habitat. Such terms and conditions must be incorporated in the project's SWP3. If the eligibility requirements of Part 1.3.2.E.2 a, b, c, d, or e cannot be met, the applicant may seek relief from the appropriate service in the form of an approved take. As an alternative, the applicant may seek coverage under a DEQ individual permit.

Addresses:

U. S. Fish and Wildlife Service
9014 East 21st Street
Tulsa, OK 74129
(918) 581-7458

Oklahoma Department of Wildlife Conservation
1801 North Lincoln Blvd.
Oklahoma City, OK 73105
(405) 521-3851

Oklahoma Natural Heritage Inventory
111 East Chesapeake
Norman, OK 73019
(405) 325-1985

The Oklahoma Natural Heritage Inventory has a very comprehensive database of endangered and threatened species locations. They can provide valuable information to help you in making determinations, but they have no authority to issue authorizations.

ADDENDUM A – Oklahoma Sensitive Waters and Watersheds Harboring Endangered and Threatened Species and Their Critical Habitat of Concern

A. Sensitive waters and watersheds for federal listed species, as identified by the U.S. Fish & Wildlife Service for the DEQ construction storm water general permit.

Grand (Neosho) River - A two-mile corridor (one mile from each bank) of the main stem of the Grand (Neosho) River above its confluence with Tar Creek. Includes portions of Ottawa and Craig Counties.

Arkansas River - A two-mile corridor (one mile from each bank) of the main stem of the Arkansas River between the Oklahoma/Arkansas state line and the Kaw Reservoir dam (excluding the flood pool of Keystone Reservoir). Includes portions of Sequoyah, Haskell, LeFlore, Wagner, Muskogee, Tulsa, Osage, Pawnee, and Noble and Kay Counties.

Cimarron River - A two-mile corridor (one mile from each bank) of the main stem of the Cimarron River from the flood pool of the Keystone Reservoir upstream to and including Beaver County. Includes portions of Creek, Payne, Logan, Kingfisher, Major, Woods, Woodward, Harper, and Beaver Counties.

South Canadian River - A two-mile corridor (one mile from each bank) of the main stem from the confluence with the Arkansas River (excluding the Eufaula Reservoir flood pool upstream to the Texas state line, and the river segment in Haskell, McIntosh, Pittsburg, Hughes, Pontotoc, Seminole, Pottawatomie, McClain, Cleveland, Canadian, Grady, Caddo, Blaine, Custer, Dewey, Ellis, and Roger Mills Counties.

Muddy Boggy River - A two-mile corridor (one mile from each bank) of the main stem of the Muddy Boggy River. Includes portions of Choctaw, Atoka, and Coal Counties.

Kiamichi River – The watershed of the Kiamichi River upstream from the Hugo Reservoir. Includes portions of Pushmataha, Atoka, Pittsburg, Latimer, and Leflore Counties.

Red River - A one-mile corridor (one mile from the north bank) along the main stem of the Red River except the Texhoma Reservoir. Includes portions of McCurtain, Choctaw, Bryan, Love, Jefferson, Cotton, Tillman, Jackson, and Harmon Counties.

Little River – The watershed of the Little River. Includes portions of LeFlore, Pushmataha and McCurtain Counties.

Glover River – The watershed of the Glover River. Includes portions of Pushmataha and McCurtain Counties.

Mountain Fork River – The watershed of the Mountain Fork River above Broken Bow Reservoir. Includes portions of Leflore and McCurtain Counties.

Northeast HUC-11 Watersheds – The **watersheds** are identified by the following 11-digit Hydrologic Unit Codes: 11070207190, 11070206060, 11070209030, 11070209050, 11070209060*, 11070209040 and 11070209070. The watersheds include portions of Ottawa, Craig, Delaware, and Mayes Counties.

* This HUC does not contain a known Ozark cavefish cave. It was included because it is entirely surrounded by 11 digit HUCs with known Ozark cavefish caves, therefore we assume that Ozark cavefishes likely occupy this portion of the aquifer.

Spring River – A two-mile corridor (one mile from each bank) of the Spring River. Includes portions of Ottawa County.

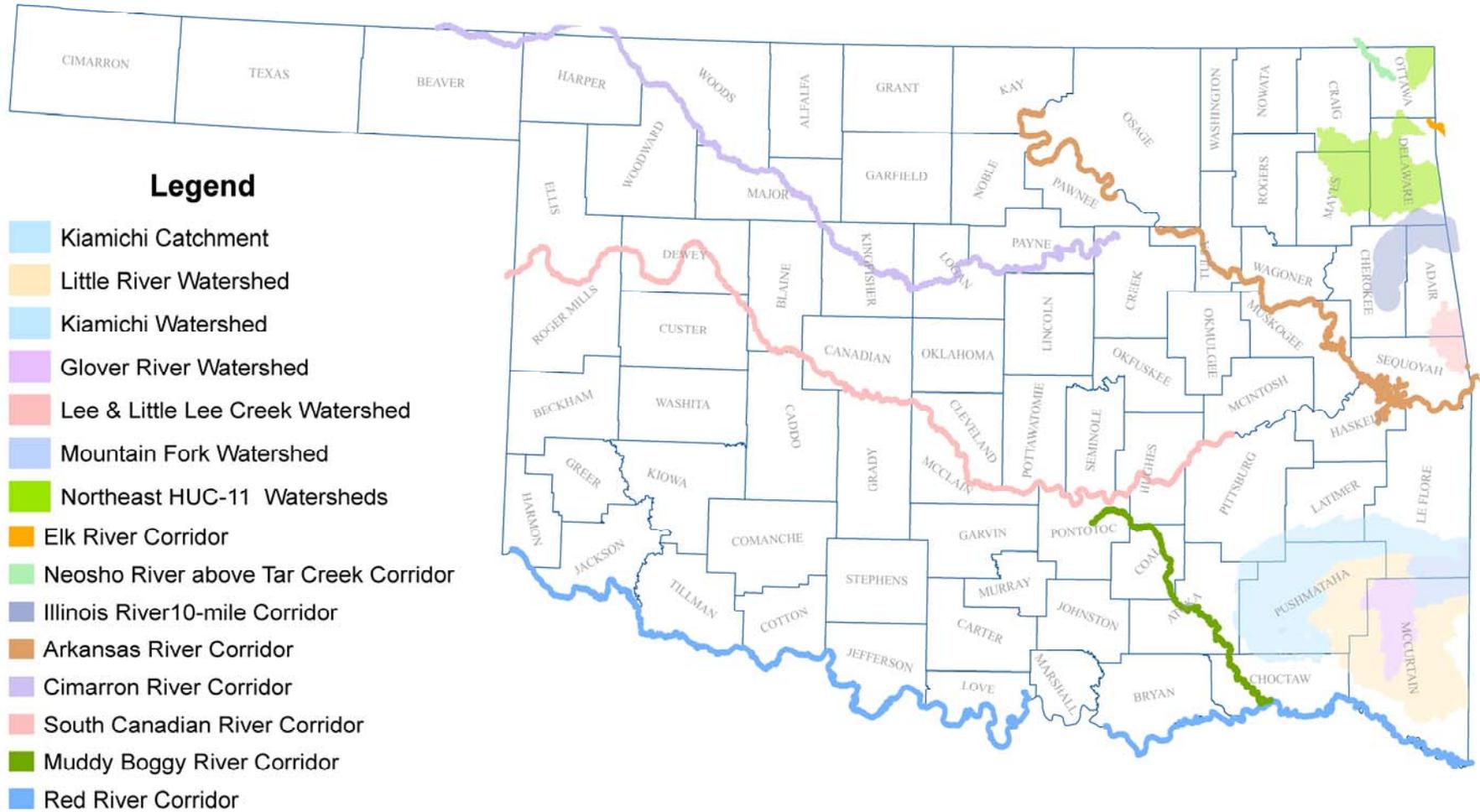
B. Sensitive waters and watersheds for State listed species, as identified by the Oklahoma Department of Wildlife Conservation for the DEQ construction storm water general permit.

Illinois River – A **ten-mile** corridor (five miles from each bank within the watershed) of the main stem of the Illinois River above the Tenkiller Reservoir. Includes portions of Cherokee, Delaware and Mayes Counties.

Lee and Little Lee Creeks – The **watershed** of Lee Creek and Little Lee Creek. Includes portions of Sequoyah and Adair Counties.

Note: No storm water discharge-sensitive endangered or threatened species occur in the following counties: Cimarron, Texas, Beckham, Greer, Washita, Kiowa, Alfalfa, Comanche, Grant, Garfield, Oklahoma, Garvin, Murray, Stephens, Carter, Lincoln, Johnston, Okfuskee, Okmulgee, Washington, Nowata, and Rogers.

Oklahoma Sensitive Waters and Watersheds for Federal & State listed Species as identified by the U.S. Fish & Wildlife Service and the Oklahoma Department of Wildlife Conservation



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ADDENDUM B -NOTICE OF INTENT

See Reverse Side for Instructions

DEQ FORM
605-002A
September 13, 2007



Oklahoma Department of Environmental Quality
Notice of Intent (NOI) for Storm Water Discharges Associated with
CONSTRUCTION ACTIVITY on Sites of One Acres or More Acres
Under the OPDES General Permit OKR10

SUBMISSION OF THIS NOTICE OF INTENT CONSTITUTES NOTICE THAT THE PARTY IDENTIFIED IN Part I OF THIS FORM INTENDS TO BE AUTHORIZED BY AN OPDES PERMIT ISSUED FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY IN THE STATE OF OKLAHOMA. BECOMING A PERMITTEE OBLIGATES SUCH DISCHARGER TO COMPLY WITH THE TERMS AND CONDITIONS OF THE PERMIT. IN ORDER TO OBTAIN AUTHORIZATION, ALL REQUESTED INFORMATION MUST BE PROVIDED ON THIS FORM. SEE INSTRUCTIONS ON BACK OF FORM.

IF YOUR FACILITY OR SITE IS ON INDIAN COUNTRY LAND, FILE YOUR NOI WITH THE EPA, USING EPA FORM 3510-9.

NEW APPLICATION **MODIFICATION OF CURRENT PERMIT** Enter Authorization Number: **OKR10** _____

I. Facility Owner/Operator Information

If you are a Co-permittee, check this box

Name: _____ Phone: (____) _____
Address: _____ Status of Owner/Operator: _____
City: _____ State: _____ Zip Code: _____ E-mail Address: _____

II. Site Information

Name of the project: _____ Address: _____
City: _____ County: _____ ZIP Code: _____
Telephone No. (____) _____ **Location:** Latitude: _____ Longitude: _____

Has a Storm Water Pollution Prevention Plan (SWP3) been developed? Yes No
Address of location of SWP3 for viewing: Address in I. Above. Address in II. Above. Other, please specify below.
Address: _____ Phone: (____) _____
City: _____ Zip Code: _____
Name of Receiving Water Body: _____
Is the Receiving Water Body on the DEQ 303(d) list? Yes No Is this facility/site on Indian Country land? Yes No (See Instructions)
Is there an approved TMDL or watershed plan applicable to this site? Yes No
Is this site a part of the common plan of development or sale? Yes No Estimated area to be disturbed (to nearest acre): _____

_____/_____/_____
Month Day Year
Construction Start Date

_____/_____/_____
Month Day Year
Estimated Completion Date

Is the Storm Water Pollution Prevention Plan in compliance with all Applicable local sediment and erosion plans? Yes No None

ENDANGERED SPECIES
Based on the instructions provided in Part 11 and Addendum A of the permit, is the proposed construction or land disturbing activity within the corridor of any of the listed sensitive waters or watersheds?
 Yes No
If the answer is yes, please refer to Part 11.2 Step 2.
All permit eligibility requirements with regard to protection of endangered species through the indicated Section of Part 1.3.2.E.2 of the permit have been complied with. (check one or more boxes):
a. b. c. d. e.

III. Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage this system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.
I understand that continued coverage under this permit is contingent upon maintaining eligibility as provided for in Part 1.3.

Name (Please Print): _____ Date: _____
Signature: _____ Title _____

For DEQ use only: Assigned Authorization Number: OKR10 _____



Instructions – DEQ Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity to be Covered Under the OPDES General Permit OKR10

Who Must File A Notice Of Intent Form

Under the provisions of the Clean Water Act, as amended, (33 U.S. 1251 et.seq....the Act), Oklahoma Environmental Code, Title 27A of the Oklahoma Statutes, Section 2-14-101 et. seq. and the rules OAC 252:004-15, discharge of storm water from construction activities is prohibited without an Oklahoma Pollutant Discharge Elimination System Permit. The operator of a construction site that has such a storm water discharge must submit an NOI to obtain coverage under an OPDES Storm Water General Permit (OKR10). If you have questions about whether you need a permit under the OPDES Storm Water program, or if you need information, write to the address listed below or telephone the Environmental Complaints and Local Services Division, Department of Environmental Quality (DEQ), at (405) 702-6100 and ask for the Storm Water Unit.

Where to File an NOI Form:

DEQ/Environmental Complaints and Local Services (ECLS)

Storm Water Unit

P.O. Box 1677

Oklahoma City, OK 73101-1677

FAX (405) 702-6223

Note: do not submit an SWP3 with the NOI, unless the project is located (1) within outstanding resource waters, or (2) within Federal and State sensitive waters and watersheds, or (3) within a larger site which is disturbing land of 40 or more acre.

Completing The Form

You must type or print, using upper-case letters, in the appropriate areas only. If you have any questions on this form, call DEQ-ECLS at (405) 702-6100 and ask for the Storm Water Unit.

Section I. Facility Owner/Operator Information

Provide the legal name, mailing address, and telephone number of the person, firm, public organization, or any other entity that either individually or together meet either of the following two criteria: (1) have operational control over the site specifications (including the ability to make modifications in specifications); and (2) have the day-to-day operational control of those activities at the site necessary to ensure compliance with plan requirements and permit conditions. If you are a Co-Permittee, check the appropriate box. Do not use a colloquial name.

Enter the appropriate letter to indicate the legal status of the operator of the facility: F = Federal; S = State; M = Public (other than Federal or State); P = Private.

Section II. Site Information

Enter the Project's official or legal name and complete street address, including city, county, state, ZIP code and phone number. If the site lacks a street address, indicate with a general statement the location of the site (e.g., Intersection of State Highways 61 and 34). The applicant must also provide the latitude and longitude of the facility in degrees, minutes, and seconds to the nearest 15 seconds ($45^{\circ} 7' 24'' = 45.1234$ decimal latitude) of the approximate center of the site.

The latitude and longitude of your facility can be located on USGS quadrangle maps. The quadrangle maps may be obtained at 1-800-USA MAPS. Longitude and latitude may also be obtained at the Census Bureau Internet site: <http://www.census.gov/cgi-bin/gazetteer>. Only one location description is needed: address; section, township, and range; or latitude and longitude.

Provide the address and phone number where the SWP3 may be viewed, if different from address previously given. Check appropriate box.

Enter the name of the receiving water body, the closest predominant receiving water body. The Oklahoma 303(d) list can be found online at http://www.deq.state.ok.us/WQDnew/305b_303d/index.html or the DEQ GIS Map and Data Viewer at http://maps.scigis.com/deq_wq/

If your facility or site is on Indian Country land, do not complete this form. File your NOI with the EPA using EPA Form 3510-9.

Indicate whether your discharge will be consistent with the conditions and requirements of EPA approved or established TMDLs. An approved TMDL report can be found online on the DEQ website at <http://www.deq.state.ok.us/WQDnew/tmdl/index.html>

Indicate whether your site is a part of the common plan of development or sale, which is a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under one plan.

Enter the estimated area to be disturbed including but not limited to: grubbing, excavation, grading, and utilities and infrastructure installation. Indicate to the nearest acre.

Enter the construction start and estimated completion date using four digits for the year.

Indicate if the proposed construction site or land disturbing activity is within the corridor of a listed sensitive water or watershed, Addendum A of the General Permit, and associated with the discharges and requirements to be covered by this permit as follows, Part 1.3.2.E.2:

- a The proposed construction site or land disturbing activity is not located within any of the corridors of the Federal or State identified sensitive waters or watersheds, and further investigation is not required.
- b The proposed construction site or land disturbing activity is located within a corridor of a Federally or State identified sensitive water or watershed (Addendum A). The SWP3 describes this area in relation to the listed water or watershed and specifies the measures to be employed to protect the endangered or threatened species or their critical habitat.
- c If applicant's storm water discharges and storm water discharge-related activities meet the criteria under Part 1.3.2.E.2.a, b, d, or e, there is no need to contact the U.S. Fish and Wildlife Service (USFWS) for Federal sensitive waters and watersheds or the Oklahoma Department of Wildlife Conservation (ODWC) for State sensitive waters (see Part 11). If one of those eligibility criteria cannot be met, applicants may contact those agencies for either a no jeopardy opinion or a finding that the storm water discharges are not likely to adversely affect listed species or critical habitat; or
- d The applicant's construction activities are authorized by the appropriate Federal or State agency and that authorization addresses the incidental taking of listed species by the applicant's storm water discharge or storm water discharge-related activities; or
- e The applicant's storm water discharges and storm water discharge-related activities were already addressed in another operator's certification of eligibility under Part 1.3.2.E.2 a, b, c, or d that included the applicant's project area. By certifying eligibility under Part 1.3.2.E.2 f, the applicant agrees to comply with applicable measures or controls upon which the other operator's certification under Part 1.3.2.E.2 a, b, c or d was based.

Indicate if the SWP3 is in compliance with all other applicable local sediment and erosion plans.

Section III. Certification

Federal Statutes provide for severe penalties for submitting false information on this application form. Federal regulations require this application to be signed as follows:

For a corporation: by a responsible corporate officer, which means: (i) president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or their designee, or any other person who performs similar policy or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manger is authorized to make management decisions which govern the operation of the regulated facility, including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign had been assigned or delegated to the manager in accordance with corporate procedures.

For a partnership or sole proprietorship: by a general partner of the proprietor, or; For a municipality, state, Federal, or other public agency: by either a principal executive or ranking elected official.

PLEASE MAKE SURE YOU ACQUIRE A COPY OF THIS PERMIT AND CAREFULLY READ ALL THE TERMS AND CONDITIONS

Wednesday, December 21, 2011

ADDENDUM C – NOTICE OF TERMINATION

DEQ FORM 605-003 September 13, 2007		OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY NOTICE OF TERMINATION (NOT) FOR STORM WATER DISCHARGES ASSOCIATED WITH INDUSTRIAL OR CONSTRUCTION ACTIVITY UNDER AN OPDES GENERAL PERMIT
Submission of this Notice of Termination constitutes notice that the party identified in Section I of this form is no longer authorized to discharge storm water associated with industrial or construction activities under the OPDES program. All Requested Information <u>Must</u> Be Provided On This Form. See Instructions On The Back Of Form.		
I. Permit Information: OPDES Storm Water General Permit Authorization Number: _____	Check here if you are no longer the operator of the facility/site: <input type="checkbox"/>	Check here if the storm water construction or industrial discharge is being terminated: <input type="checkbox"/>
II. Facility/Site Owner/Operator Information: Name: _____ Phone: _____ Address: _____ City: _____ County: _____ Zip Code: _____		
III. Facility/Site Location: Name: _____ Address: _____ City: _____ County: _____ Zip Code: _____ Latitude: _____ Longitude: _____		
IV. New Facility/Site Information: If you are no longer the operator of the facility/site, provide the following information pertaining to the new operator at the facility/site: Name: _____ Address: _____ City: _____ County: _____ Zip Code: _____		
V. Certification: I certify under penalty of law that all storm water discharges associated with industrial/construction activity from the identified facility/site that were authorized by a general permit have been eliminated or that I am no longer the owner or operator of the facility/site. I understand that by submitting this Notice of Termination, I am no longer authorized to discharge storm water associated with industrial or construction activity under this general permit, and that discharging pollutants in storm water associated with industrial or construction activity to waters of the State is unlawful under the Clean Water Act and OAC 252:606-1-3(b)(3)(L) where the discharge is not authorized by an OPDES permit. I also understand that the submittal of this Notice of Termination does not release me as an owner or operator from liability for any violations of this permit or the Clean Water Act. Print Name: _____ Date: _____ Signature: _____ Title: _____		



Instructions for Completing Notice of Termination (NOT) for Storm Water Discharges Associated with Construction Activity

When To File an NOT Form:

Permittees who are presently covered under an issued NPDES or OPDES general permit for storm water discharges associated with industrial/construction activity may submit a **Notice of Termination (NOT)** form when their facilities no longer have any storm water discharges associated with industrial/construction activity as defined in the storm water regulations at 40 CFR 122.26(b)(14), or when they are no longer the operator of the facilities. For a construction site, when the site has been finally stabilized (i.e., a uniform perennial vegetative cover with a density of at least 70% of the native background cover has been established for all unpaved areas and areas not covered by permanent structures or where equivalent permanent stabilization measures such as riprap or gabions have been used), and all storm water discharges from construction activities that are authorized by general permit (OKR10) are eliminated, or they are no longer the operator of the facility, an NOT must be submitted that is signed in accordance with Part 4.5 of the general permit. If you need assistance or have questions, contact the Storm Water Unit of the Environmental Complaints and Local Services at (405) 702-6100.

Section I: Permit Information:

Enter the existing OPDES General Storm Water Permit number assigned to the facility or site identified in Section I.

Section II: Facility Operator Information:

Give the legal name of the person, firm, public organization or any other entity that operates the facility or site described in this application. The name of the operator may or may not be the same name as the facility. The operator of the facility is the legal entity that controls the facility's operation, rather than the plant or site manager.

Section III: Facility/Site Location Information:

Enter the facility's or site's official or legal name and complete address, including city, state, and ZIP code. If the facility lacks a street address, indicate the latitude and longitude of the facility to the nearest 15 seconds.

Section IV: New Owner/Operator Information

If you are no longer the operator of the facility/site, provide the information pertaining to the new operator at the facility/site, including the name and address of the new owner/operator.

Section V: Certification

The NOT form must be signed by a responsible party as follows:

For a Corporation: by a responsible officer, which means: (i) president, secretary, treasurer, or vice president of the corporation in charge of a principal business function; or their designee, or any other person who performs similar policy or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

For a partnership or sole proprietorship: by a general partner or the proprietor.

For a municipality, state, Federal, or other public agency: by either a principal executive officer or ranking elected official.

Where to File an NOT form:

NOTs must be sent to the following address:

**DEQ
Environmental Complaints and Local Services
Storm Water Unit
P.O. Box 1677
Oklahoma City, OK 73101-1677**

ADDENDUM D - CONTRACTOR CERTIFICATION

(Optional; sample format)

(Name of Owner/Operator)

(Project Name)

Contractors, builders, regular suppliers or others (contractors) involved in construction activity who are not the owner/operator, developer, or general contractor, and have not been issued the Storm Water Construction General Permit (Permit) authorization, execute this Contractor Certification which places the responsibility of complying with and abiding by the intent and purpose of the permit with the contractor for any and all work performed under the authority and direction of the contractor. Furthermore, the contractor assumes responsibility to avoid or eliminate any actual or potential adverse effects upon the environment according to the Storm Water Pollution Prevention Plan (SWP3), during all phases of building, construction, or delivery activity on any and all construction sites under the control and responsibility of the contractor as described in the SWP3.

- 1. Contractor company name: _____
- 2. Contractor address: _____
- 3. Project locations: _____

(For additional addresses, attach list to this form)

4. Contractor must be thoroughly familiar with the original Notice of Intent (NOI) filed by _____
_____ with the Oklahoma Department of Environmental Quality.

(Owner/Operator Name)

Contractor must also be thoroughly familiar with, and adhere to, the Storm Water Pollution Prevention Plan (SWP3) and the Best Management Practices (BMP) on file at the following location; _____

The Contractor is certifying below that they assume all physical responsibility for any and all construction activities performed by the Contractor or under the direction and control of the Contractor, to avoid or eliminate any actual or potential adverse effects upon the environment pertaining to the properties listed in Item 3 above.

Certification

I certify that I understand the terms and conditions of the Oklahoma Pollutant Discharge Elimination System Act (OPDES) General Permit that authorizes storm water discharges associated with construction activity from the construction site identified as part of this certification. I have read and understand the Owner/Operators Notice of Intent and Part 1.3 eligibility requirements for coverage under the general permit for storm water discharges from construction activities, including those requirements published in the modified OPDES General Permit OKR10 of Month Date, 2007, and the SWP3 and BMP described pertaining to the project locations in Item 3 above. I agree that as a contractor, builder, regular supplier, or a support service company, I am responsible for installing and/or maintaining the appropriate pollution prevention measures that I am responsible for according to the agreement I have with the permittee.

I understand that continued coverage under this permit is contingent upon maintaining eligibility as provided for in Part 1.3 of the permit.

Signature: _____ Title: _____

Print Name: _____ Date: _____

ADDENDUM E – INSPECTION REQUEST

<p>DEQ FORM 605-008 September 13, 2007</p>		<p>OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY INSPECTION REQUEST FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY UNDER AN OPDES GENERAL PERMIT</p>
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All Requested Information Must Be Provided On This Form. See Instructions On The Back Of Form.

<p>I. Permit Information: OPDES Storm Water General Permit Authorization Number: _____</p>	<p>Check here if you are no longer the operator of the facility/site: <input type="checkbox"/></p>	<p>Check here if the storm water construction or industrial discharge is being terminated: <input type="checkbox"/></p>
---	--	---

II. Facility/Site Owner/Operator Information:

Name: _____ Phone: _____

Address: _____

City: _____ County: _____ Zip Code: _____

III. Facility/Site Location:

Name: _____

Address: _____

City: _____ County: _____ Zip Code: _____

Latitude: _____ Longitude: _____

IV. New Facility/Site Information:

If you are no longer the operator of the facility/site, provide the following information pertaining to the new operator at the facility/site:

Name: _____

Address: _____

City: _____ County: _____ Zip Code: _____

V. Owner/Operator's Signature:

Print Name: _____ Date: _____

Signature: _____ Title: _____



Instructions for Completing an Inspection Request for Storm Water Discharges Associated with Construction Activity

When To File an Inspection Request Form:

Permittees who are presently covered under an issued NPDES or OPDES general permit for storm water discharges associated with construction activity may submit a **Inspection Request (IR)** form when their facilities are getting ready to file a Notice of Termination (NOT). For a construction site, when the site has been finally stabilized (i.e., a uniform perennial vegetative cover with a density of at least 70% of the native background cover has been established for all unpaved areas and areas not covered by permanent structures or where equivalent permanent stabilization measures such as riprap or gabions have been used), and all storm water discharges from construction activities that are authorized by general permit (OKR10) are eliminated, or they are no longer the operator of the facility, an NOT must be submitted that is signed in accordance with Part 4.5 of the general permit. If you submit this IR form to the ODEQ prior to termination of your current permit, the DEQ will conduct an inspection and provide any assistance necessary within 30 days of receipt of this form. Upon completing the inspection, the DEQ will notify you of any needed changes to the site conditions or that the site has met the final stabilization requirements under the permit. This Inspection Request form should not be substituted for an NOT. You must continue to meet the conditions and terms of the permit until you have filed the NOT. If you have questions, contact the Storm Water Unit of the Environmental Complaints and Local Services (405) 702-6100.

Section I: Permit Information:

Enter the existing OPDES General Storm Water Permit number assigned to the facility or site identified in Section I.

Section II: Facility Operator Information:

Give the legal name of the person, firm, public organization or any other entity that operates the facility or site described in this application. The name of the operator may or may not be the same name as the facility. The operator of the facility is the legal entity that controls the facility's operation, rather than the plant or site manager.

Section III: Facility/Site Location Information:

Enter the facility's or site's official or legal name and complete address, including city, state, and ZIP code. If the facility lacks a street address, indicate the latitude and longitude of the facility to the nearest 15 seconds.

Section IV New Owner/Operator Information

If you are no longer the operator of the facility/site, provide the information pertaining to the new operator at the facility/site, including the name and address of the new owner/operator.

Section V: Certification

The Inspection Request form must be signed by a responsible party as follows:

For a Corporation: by a responsible officer, which means: (i) president, secretary, treasurer, or vice president of the corporation in charge of a principal business function; or their designee, or any other person who performs similar policy or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

For a partnership or sole proprietorship: by a general partner or the proprietor.

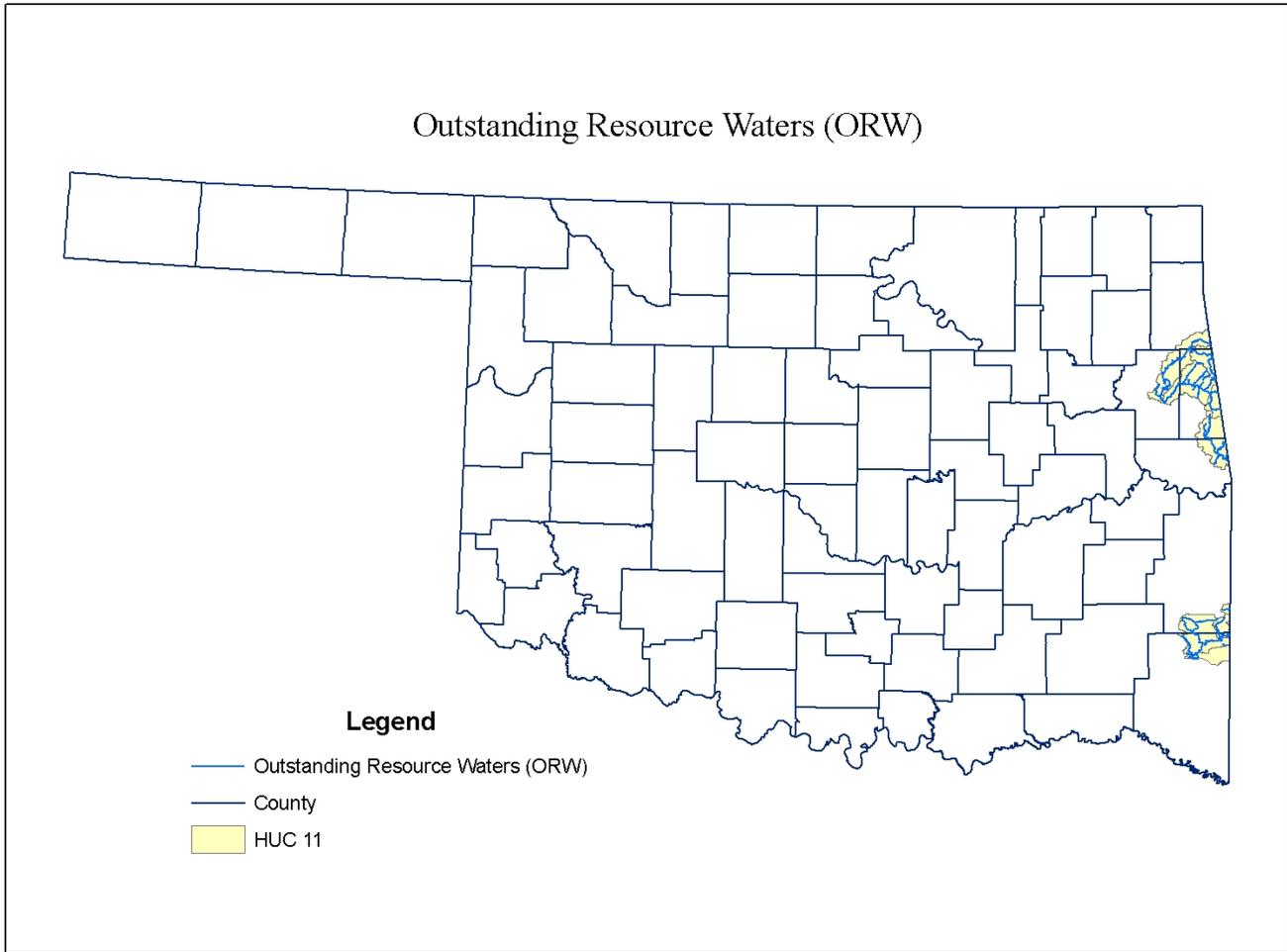
For a municipality, state, Federal, or other public agency: by either principal executive officer or ranking elected official.

Where to File an Inspection Request form:

Inspection Requests must be sent to the following address:

DEQ
Environmental Complaints and Local Services
Storm Water Unit
P.O. Box 1677
Oklahoma City, OK 73101-1677

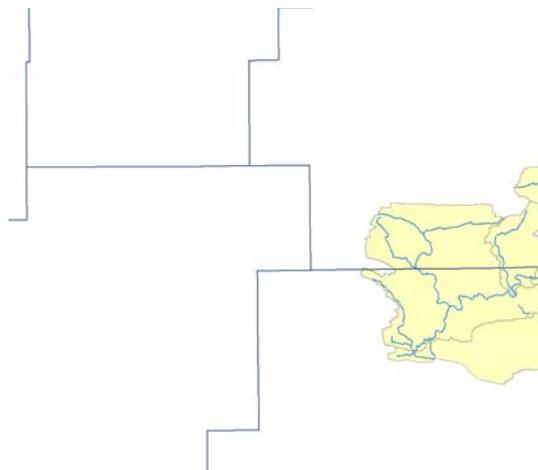
ADDENDUM F – OUTSTANDING RESOURCE WATERS (ORW)



Outstanding Resource Waters Details



Illinois River & Lee Creek Watersheds



Mountain Fork River Watershed

ATTACHMENT B - NOTICE OF INTENT

ADDENDUM B –NOTICE OF INTENT

See Reverse Side for Instructions

Oklahoma Department of Environmental Quality

DEQ FORM
605-002A
Sept. 3, 2009



Notice of Intent (NOI) for Storm Water Discharges Associated with CONSTRUCTION ACTIVITY on Sites of One Acre or More Acres Under the OPDES General Permit OKR10

SUBMISSION OF THIS NOTICE OF INTENT CONSTITUTES NOTICE THAT THE PARTY IDENTIFIED IN Part I OF THIS FORM INTENDS TO BE AUTHORIZED BY AN OPDES PERMIT ISSUED FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY IN THE STATE OF OKLAHOMA. BECOMING A PERMITTEE OBLIGATES SUCH DISCHARGER TO COMPLY WITH THE TERMS AND CONDITIONS OF THE PERMIT. IN ORDER TO OBTAIN AUTHORIZATION, ALL REQUESTED INFORMATION MUST BE PROVIDED ON THIS FORM. SEE INSTRUCTIONS ON BACK OF FORM.

IF YOUR FACILITY OR SITE IS ON INDIAN COUNTRY LAND, FILE YOUR NOI WITH THE EPA, USING EPA FORM 3510-9.

NEW APPLICATION **MODIFICATION OF CURRENT PERMIT** Enter Authorization Number: **OKR 10**

I. Facility Owner/Operator Information

If you are a Co-permittee, check this box

Name: _____ Phone: (____) _____
Address: _____ Status of Owner/Operator: _____
City: _____ State: _____ Zip Code: _____ E-mail Address: _____

II. Site Information

Name of the project: _____ Address: _____
City: _____ County: _____ ZIP Code: _____
Telephone No. (____) _____ **Location:** Latitude: _____ Longitude: _____
Has a Storm Water Pollution Prevention Plan (SWP3) been developed? Yes No
Address of location of SWP3 for viewing: Address in I. Above Address in II. Above Other, please specify below
Address: _____ Phone: (____) _____
City: _____ Zip Code: _____
Name of Receiving Water Body: _____
Is the Receiving Water Body on the DEQ 303(d) list? Yes No Is this facility/site on Indian Country land? Yes No (See Instructions)
Is there an approved TMDL applicable to this site? Yes No
Is this site a part of the common plan of development or sale? Yes No Estimated area to be disturbed (to nearest acre): _____

_____/_____/_____
Month Day Year
Construction Start Date

_____/_____/_____
Month Day Year
Estimated Completion Date

Is the Storm Water Pollution Prevention Plan in compliance with all Applicable local sediment and erosion plans? Yes No None

ENDANGERED SPECIES
Based on the instructions provided in Part 11 and Addendum A of the permit, is the proposed construction or land disturbing activity within the corridor of any of the listed sensitive waters or watersheds?
 Yes No
If the answer is yes, please refer to Part 11.2. Step 2.
All permit eligibility requirements with regard to protection of endangered species through the indicated Section of Part 1.3.2.E.2 of the permit have been complied with. (check one or more boxes):
a. b. c. d. e.

III. Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage this system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

I understand that continued coverage under this permit is contingent upon maintaining eligibility as provided for in Part 1.3.

Name (Please Print): _____ Date: _____
Signature: _____ Title: _____

For DEQ use only: Assigned Authorization Number: OKR10 _____



Instructions – DEQ Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity to be Covered Under the OPDES General Permit OKR10

Who Must File A Notice Of Intent Form

Under the provisions of the Clean Water Act, as amended, (33 U.S. 1251 et seq....the Act), Oklahoma Environmental Code, Title 27A of the Oklahoma Statutes, Section 2-14-101 et. seq. and the rules OAC 252:004-15, discharge of storm water from construction activities is prohibited without an Oklahoma Pollutant Discharge Elimination System Permit. The operator of a construction site that has such a storm water discharge must submit an NOI to obtain coverage under an OPDES Storm Water General Permit (OKR10). If you have questions about whether you need a permit under the OPDES Storm Water program, or if you need information, write to the address listed below or telephone the Environmental Complaints and Local Services Division, Department of Environmental Quality (DEQ), at (405) 702-6100 and ask for the Storm Water Unit.

Where to File an NOI Form:

DEQ/Environmental Complaints and Local Services (ECLS)

Storm Water Unit

P.O. Box 1677

Oklahoma City, OK 73101-1677

FAX (405) 702-6226

Note: do not submit an SWP3 with the NOI, unless the project is located (1) within outstanding resource waters, or (2) within Federal and State sensitive waters and watersheds, or (3) within a larger site which is disturbing land of 40 or more acre.

Completing The Form

You must type or print, using upper-case letters, in the appropriate areas only. If you have any questions on this form, call DEQ-ECLS at (405) 702-6100 and ask for the Storm Water Unit.

Section I. Facility Owner/Operator Information

Provide the legal name, mailing address, and telephone number of the person, firm, public organization, or any other entity that either individually or together meet either of the following two criteria: (1) have operational control over the site specifications (including the ability to make modifications in specifications); and (2) have the day-to-day operational control of those activities at the site necessary to ensure compliance with plan requirements and permit conditions. If you are a Co-Permittee, check the appropriate box. Do not use a colloquial name.

Enter the appropriate letter to indicate the legal status of the operator of the facility: F = Federal; S = State; M = Public (other than Federal or State); P = Private.

Section II. Site Information

Enter the Project's official or legal name and complete street address, including city, county, state, ZIP code and phone number. If the site lacks a street address, indicate with a general statement the location of the site (e.g., Intersection of State Highways 61 and 34). The applicant must also provide the latitude and longitude of the facility in degrees, minutes, and seconds to the nearest 15 seconds (45° 7' 24" = 45.1234 decimal latitude) of the approximate center of the site.

The latitude and longitude of your facility can be located on USGS quadrangle maps. The quadrangle maps may be obtained at 1-888-ASK-USGS. Longitude and latitude may also be obtained at the Census Bureau Internet site: <http://www.census.gov/cgi-bin/gazetteer>. Only one location description is needed: address; section, township, and range; or latitude and longitude.

Provide the address and phone number where the SWP3 may be viewed, if different from address previously given. Check appropriate box.

Enter the name of the receiving water body, the closest predominant receiving water body. The Oklahoma 303(d) list can be found online at http://www.deq.state.ok.us/WQDnew/305b_303d/index.html or the [DEQ GIS Map and Data Viwer](http://maps.scigis.com/deq%5Fwq/) at <http://maps.scigis.com/deq%5Fwq/>

If your facility or site is on Indian Country land, do not complete this form. File your NOI with the EPA using EPA Form 3510-9.

Indicate whether your discharge will be consistent with the conditions and requirements of EPA approved or established TMDLs. An approved TMDL report can be found online on the DEQ website at <http://www.deq.state.ok.us/WQDnew/tmdl/index.html>

Indicate whether your site is a part of the common plan of development or sale, which is a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under one plan.

Enter the estimated area to be disturbed including but not limited to: grubbing, excavation, grading, and utilities and infrastructure installation. Indicate to the nearest acre.

Enter the construction start and estimated completion date using four digits for the year.

Indicate if the proposed construction site or land disturbing activity is within the corridor of a listed sensitive water or watershed, Addendum A of the General Permit, and associated with the discharges and requirements to be covered by this permit as follows, Part 1.3.2.E.2:

- a The proposed construction site or land disturbing activity is not located within any of the corridors of the Federal or State identified sensitive waters or watersheds, and further investigation is not required.
- b The proposed construction site or land disturbing activity is located within a corridor of a Federally or State identified sensitive water or watershed (Addendum A). The SWP3 describes this area in relation to the listed water or watershed and specifies the measures to be employed to protect the endangered or threatened species or their critical habitat.
- c If applicant's storm water discharges and storm water discharge-related activities meet the criteria under Part 1.3.2.E.2.a, b, d, and e, there is no need to contact the U.S. Fish and Wildlife Service (USFWS) for Federal sensitive waters and watersheds or the Oklahoma Department of Wildlife Conservation (ODWC) for State sensitive waters (see Part 11). Otherwise, applicants may contact with those agencies for either a no jeopardy opinion or a finding that the storm water discharges are not likely to adversely affect listed species or critical habitat; or
- d The applicant's construction activities are authorized by the appropriate Federal or State agency and that authorization addresses the incidental taking of listed species by the applicant's storm water discharge or storm water discharge-related activities; or
- e The applicant's storm water discharges and storm water discharge-related activities were already addressed in another operator's certification of eligibility under Part 1.3.2.E.2 a, b, c, or d that included the applicant's project area. By certifying eligibility under Part 1.3.2.E.2 f, the applicant agrees to comply with applicable measures or controls upon which the other operator's certification under Part 1.3.2.E.2 a, b, c or d was based.

Indicate if the SWP3 is in compliance with all other applicable local sediment and erosion plans.

Section III. Certification

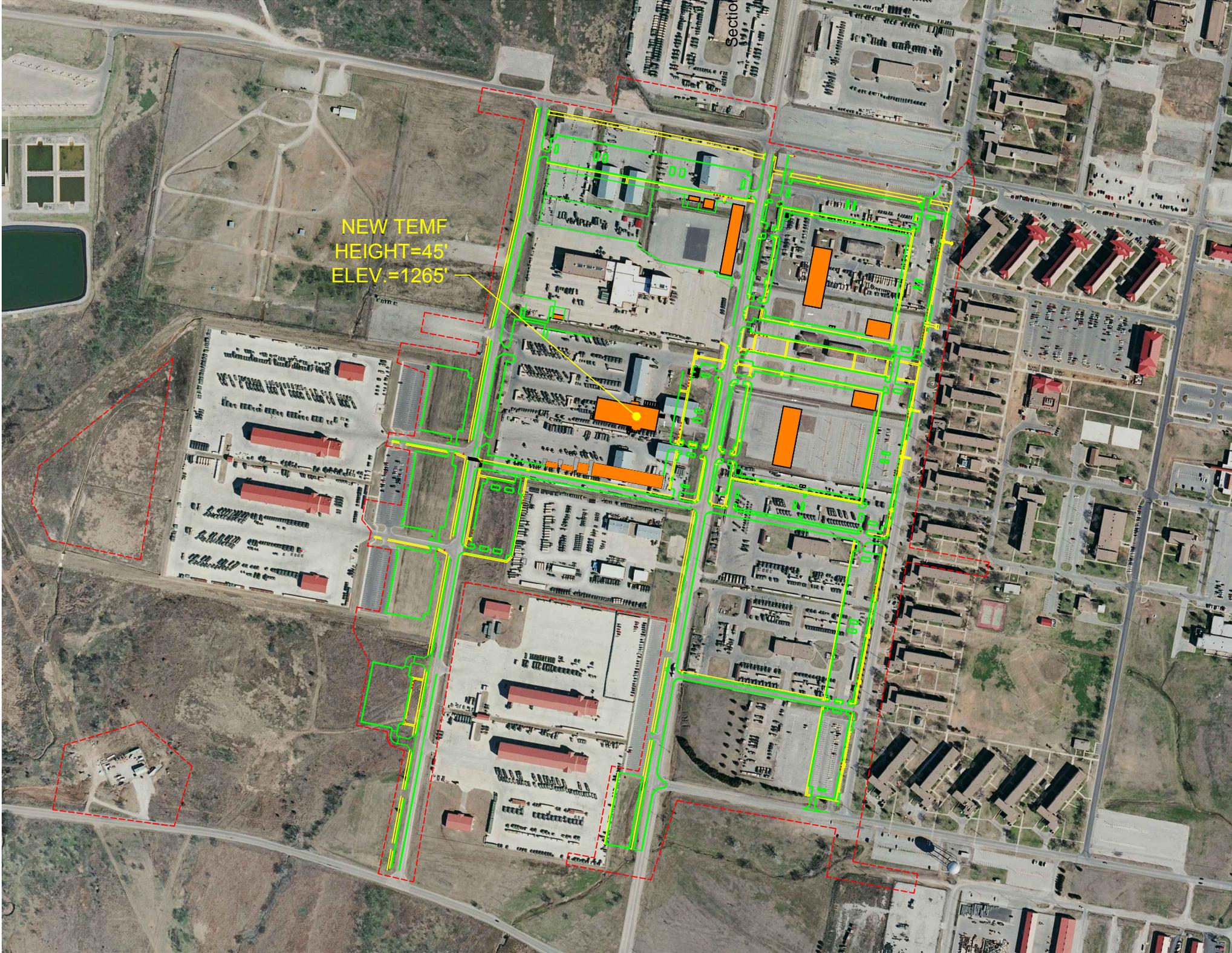
Federal Statutes provide for severe penalties for submitting false information on this application form. Federal regulations require this application to be signed as follows:

For a corporation: by a responsible corporate officer, which means: (i) president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or their designee, or any other person who performs similar policy or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manger is authorized to make management decisions which govern the operation of the regulated facility, including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign had been assigned or delegated to the manager in accordance with corporate procedures.

For a partnership or sole proprietorship: by a general partner of the proprietor, or; For a municipality, state, Federal, or other public agency: by either a principal executive or ranking elected official.

PLEASE MAKE SURE YOU ACQUIRE A COPY OF THIS PERMIT AND CAREFULLY READ ALL THE TERMS AND CONDITIONS

ATTACHMENT C - EROSION CONTROL PLANS

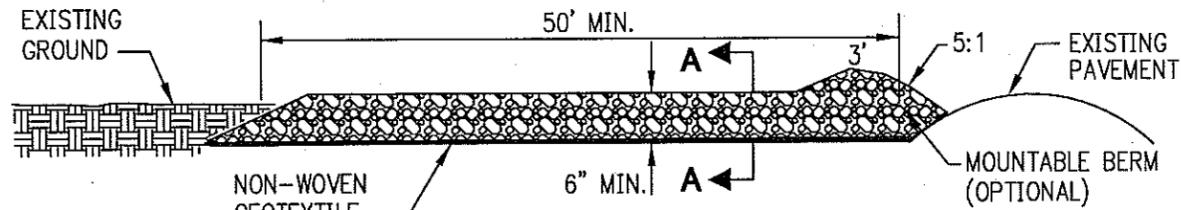


NEW TEMP
HEIGHT=45'
ELEV.=1265'

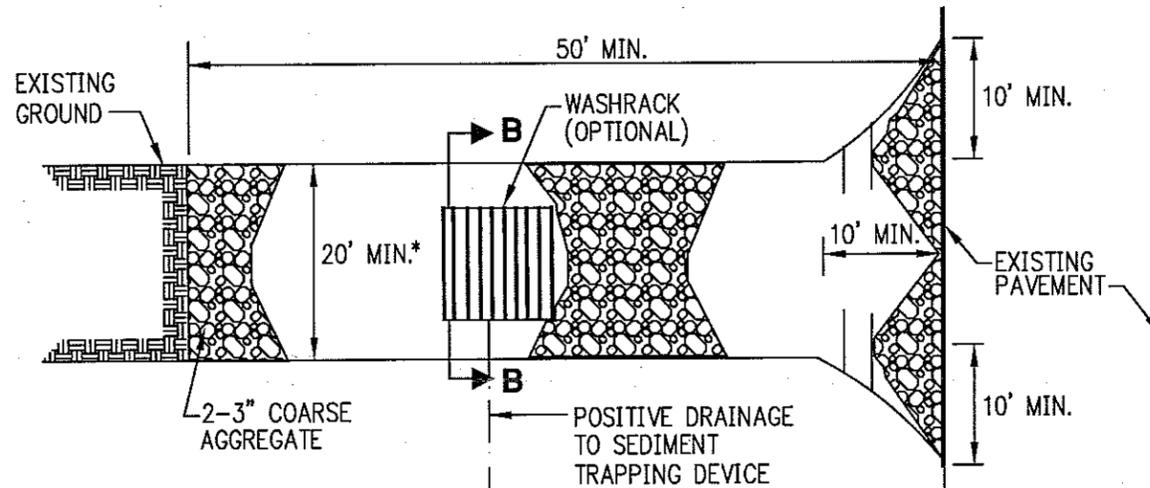
Section:

ATTACHMENT D - BMP DETAILS

TEMPORARY CONSTRUCTION ENTRANCE

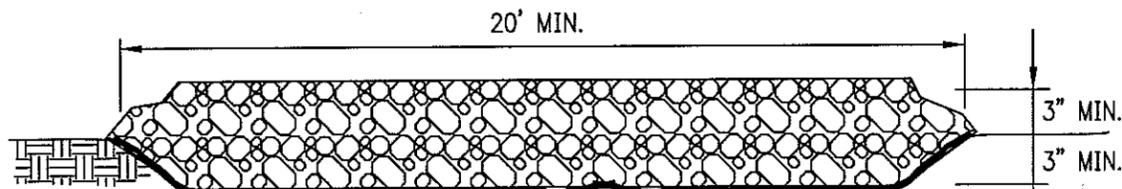


SIDE ELEVATION
NOT TO SCALE

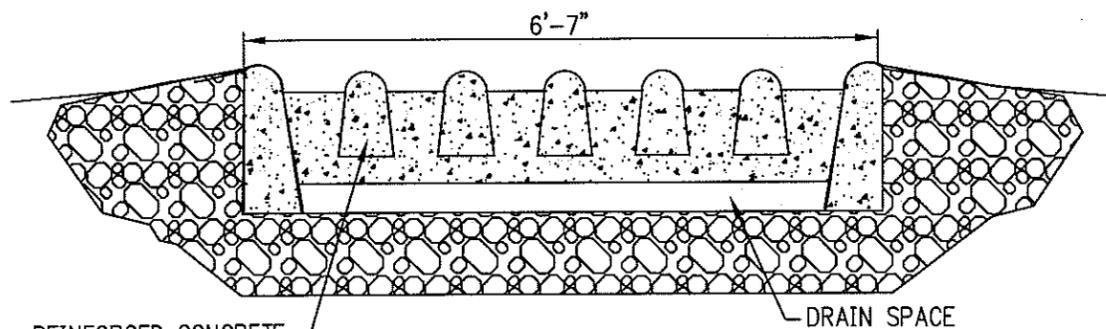


PLAN VIEW
NOT TO SCALE

* MUST EXTEND FULL WIDTH OF INGRESS AND EGRESS OPERATION



SECTION A-A
NOT TO SCALE



SECTION B-B
NOT TO SCALE

TEMPORARY CONSTRUCTION ENTRANCE PAD NOTES:

A) INSTALLATION:

1. AVOID LOCATING ON STEEP SLOPES OR AT CURVES ON PUBLIC ROADS. IF POSSIBLE, LOCATE WHERE PERMANENT ROADS WILL EVENTUALLY BE CONSTRUCTED.
2. REMOVE ALL VEGETATION AND OTHER UNSUITABLE MATERIAL FROM THE FOUNDATION AREA, GRADE, AND CROWN FOR POSITIVE DRAINAGE.
3. IF SLOPE TOWARDS THE PUBLIC ROAD EXCEEDS 2%, CONSTRUCT A 6-TO 8-INCH HIGH RIDGE WITH 3H:1V SIDE SLOPES ACROSS THE FOUNDATION APPROXIMATELY 15 FEET FROM THE EDGE OF THE PUBLIC ROAD TO DIVERT RUNOFF AWAY FROM IT.
4. INSTALL PIPE UNDER THE ENTRANCE IF NEEDED TO MAINTAIN DRAINAGE DITCHES ALONG PUBLIC ROADS.
5. PLACE STONE TO DIMENSIONS AND GRADE AS SHOWN ON PLANS. LEAVE SURFACE SMOOTH AND SLOPED FOR DRAINAGE.
6. DIVERT ALL SURFACE RUNOFF AND DRAINAGE FROM THE ENTRANCE TO A SEDIMENT CONTROL DEVICE.
7. IF WET CONDITIONS ARE ANTICIPATED, PLACE GEOTEXTILE FABRIC ON THE GRADED FOUNDATION TO IMPROVE STABILITY.

B) TROUBLESHOOTING:

1. CONSULT WITH A QUALIFIED DESIGN PROFESSIONAL IF ANY OF THE FOLLOWING OCCUR:
 - a. INADEQUATE RUNOFF CONTROL TO THE EXTENT THAT SEDIMENT WASHES ONTO PUBLIC ROAD – INSTALL DIVERSIONS OR OTHER RUNOFF CONTROL MEASURES.
 - b. SMALL STONE, THIN PAD, OR ABSENCE OF GEOTEXTILE FABRIC RESULTS IN RUTS AND MUDDY CONDITIONS AS STONE IS PRESSED INTO SOIL – INCREASE STONE SIZE OR PAD THICKNESS OR ADD GEOTEXTILE FABRIC.
 - c. PAD TOO SHORT FOR HEAVY CONSTRUCTION TRAFFIC – EXTEND PAD BEYOND THE MINIMUM 50-FOOT LENGTH AS NECESSARY.

C) INSPECTION AND MAINTENANCE:

1. INSPECT STONE PAD AND SEDIMENT DISPOSAL AREA WEEKLY AND AFTER 1/2-INCH OR GREATER STORM EVENTS.
2. RESHAPE PAD AS NEEDED FOR PROPER DRAINAGE AND RUNOFF CONTROL.
3. TOPDRESS WITH CLEAN 2-AND 3-INCH STONE AS NEEDED.
4. IMMEDIATELY REMOVE MUD OR SEDIMENT TRACKED OR WASHED ONTO PUBLIC ROAD. REPAIR ANY BROKEN ROAD PAVEMENT IMMEDIATELY.
5. REMOVE ALL TEMPORARY ROAD MATERIALS FROM AREAS WHERE PERMANENT VEGETATION WILL BE ESTABLISHED.

AMERICAN PUBLIC WORKS ASSOCIATION



KANSAS CITY
METROPOLITAN CHAPTER

TEMPORARY CONSTRUCTION
ENTRANCE

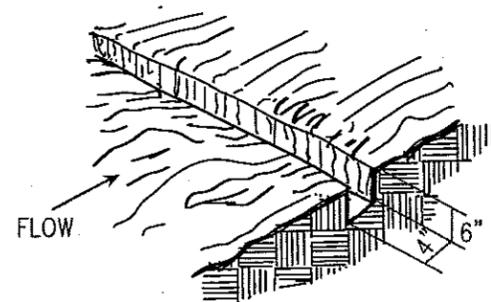
STANDARD DRAWING
NUMBER ESC-01
ADOPTED:

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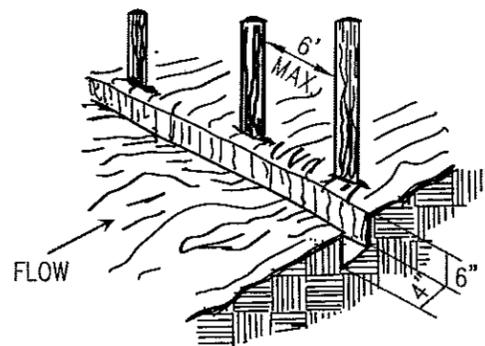
SOURCE: MODIFIED FROM VA. DCR, 1992

SEDIMENT FENCE

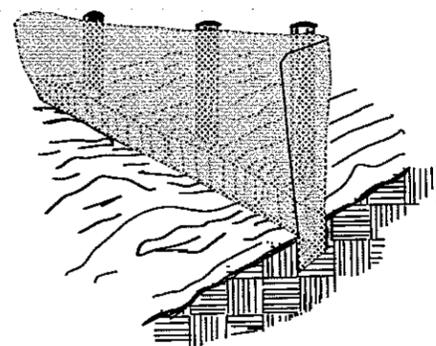
1. EXCAVATE A 6"x4" TRENCH.



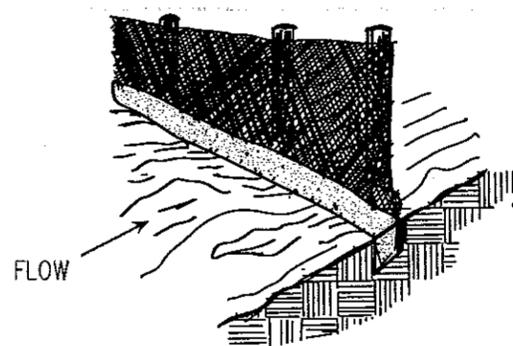
2. SET THE STAKES ALONG THE DOWN SLOPE SIDE OF THE TRENCH.



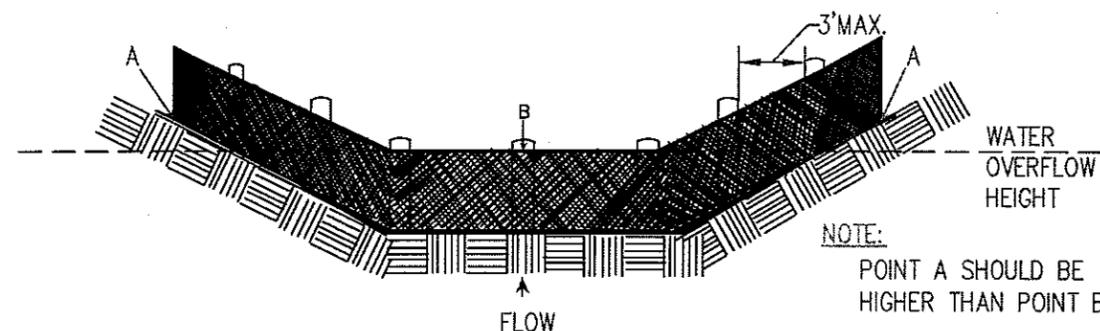
3. STAPLE GEOTEXTILE MATERIAL TO STAKES AND EXTEND IT INTO AND AROUND THE BOTTOM OF THE TRENCH.



4. BACKFILL AND COMPACT THE EXCAVATED SOIL OVER THE GEOTEXTILE IN THE TRENCH.



SHEET FLOW INSTALLATION
(PERSPECTIVE VIEW)
NOT TO SCALE



NOTE:
POINT A SHOULD BE HIGHER THAN POINT B.

DRAINAGEWAY INSTALLATION
(FRONT ELEVATION)
NOT TO SCALE

SEDIMENT FENCE NOTES:

A) INSTALLATION:

1. THE HEIGHT OF SEDIMENT FENCE SHALL BE A MINIMUM OF 16 INCHES ABOVE THE ORIGINAL GROUND SURFACE AND SHALL NOT EXCEED 34 INCHES ABOVE THE GROUND SURFACE.
2. THE FABRIC SHALL BE PURCHASED IN A CONTINUOUS ROLL CUT TO THE LENGTH OF THE BARRIER TO AVOID THE USE OF JOINTS. WHEN JOINTS ARE UNAVOIDABLE, FILTER CLOTH SHALL BE SECURELY SPLICED TOGETHER ONLY AT SUPPORT POSTS, WITH A MAX 6-INCH OVERLAP.
3. DIG A TRENCH AT LEAST 6 INCHES DEEP AND 4 INCHES WIDE ALONG THE FENCE ALIGNMENT.
4. DRIVE POSTS AT LEAST 24 INCHES INTO THE GROUND ON THE DOWNSLOPE SIDE OF THE TRENCH. SPACE POSTS A MAXIMUM OF 6 FEET APART.
5. EXTRA-STRENGTH SEDIMENT FENCE FABRIC SHALL BE USED. POSTS FOR THIS TYPE OF FABRIC SHALL BE PLACED A MAXIMUM OF 6 FEET APART. THE SEDIMENT FABRIC SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING A MINIMUM OF ONE INCH LONG, HEAVY-DUTY WIRE STAPLES OR TIE-WIRES, AND EIGHT INCHES OF THE FABRIC SHALL BE EXTENDED INTO THE TRENCH. THE FABRIC SHALL NOT BE STAPLED TO EXISTING TREES.
6. PLACE THE BOTTOM 1 FOOT OF FABRIC IN THE MINIMUM-OF-6-INCH DEEP TRENCH, LAPPING TOWARD THE UPSLOPE SIDE. BACKFILL WITH COMPACTED EARTH OR GRAVEL.
7. IF A SEDIMENT FENCE IS TO BE CONSTRUCTED ACROSS A DITCH LINE OR SWALE, IT MUST BE OF SUFFICIENT LENGTH TO ELIMINATE ENDFLOW, AND THE PLAN CONFIGURATION SHALL RESEMBLE AN ARC OR HORSESHOE, PLACED ON A CONTOUR, WITH THE ENDS ORIENTED UPSLOPE. EXTRA-STRENGTH SEDIMENT FABRIC SHALL BE USED WITH A MAXIMUM 3-FOOT SPACING OF POSTS.
8. TO REDUCE MAINTENANCE, EXCAVATE A SHALLOW SEDIMENT STORAGE AREA IN THE UPSLOPE SIDE OF THE FENCE. PROVIDE GOOD ACCESS IN AREAS OF HEAVY SEDIMENTATION FOR CLEAN OUT AND MAINTENANCE.
9. SEDIMENT FENCES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFUL PURPOSE, BUT NOT BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED.

B) TROUBLESHOOTING:

1. DETERMINE THE EXACT LOCATION OF UNDERGROUND UTILITIES, BEFORE FENCE INSTALLATION SO UTILITIES ARE NOT DISTURBED.
2. GRADE ALIGNMENT OF FENCE AS NEEDED TO PROVIDE A BROAD, NEARLY LEVEL AREA UPSTREAM OF FENCE TO ALLOW SEDIMENT COLLECTION AREA.

C) INSPECTION MAINTENANCE:

1. INSPECT SEDIMENT FENCES AT LEAST ONCE A WEEK AND AFTER EACH RAINFALL. MAKE ANY REQUIRED REPAIRS IMMEDIATELY.
2. SHOULD THE FABRIC OF A SEDIMENT FENCE COLLAPSE, TEAR, DECOMPOSE, OR BECOME INEFFECTIVE, REPLACE IT PROMPTLY.
3. REMOVE SEDIMENT DEPOSITS AS NECESSARY TO PROVIDE ADEQUATE STORAGE VOLUME FOR THE NEXT RAIN AND TO REDUCE PRESSURE ON THE FENCE. AVOID DAMAGING OR UNDERMINING THE FENCE DURING CLEANOUT. SEDIMENT ACCUMULATION SHOULD NOT EXCEED 1/2 THE HEIGHT OF THE FENCE.
4. REMOVE ALL FENCING MATERIALS AND UNSTABLE SEDIMENT DEPOSITS, AND BRING THE AREA TO GRADE AND STABILIZE IT AFTER THE CONTRIBUTING DRAINAGE AREA HAS BEEN PROPERLY AND COMPLETELY STABILIZED.

AMERICAN PUBLIC WORKS ASSOCIATION	
APWA	KANSAS CITY METROPOLITAN CHAPTER
SEDIMENT FENCE	STANDARD DRAWING NUMBER ESC-10 ADOPTED:

SOURCE: MODIFIED FROM VA. DCR, 1992

SITE MANAGEMENT MEASURES

Concrete Washout



Concrete washout areas are designated locations within a construction site that are either a prefabricated unit or a designed measure that is constructed to contain concrete washout. Concrete washout systems are typically used to contain washout water when chutes and hoppers are rinsed following delivery.

Purpose

Concrete washout systems are implemented to reduce the discharge of pollutants that are associated with concrete washout waste through consolidation of solids and retention of liquids. Uncured concrete and associated liquids are highly alkaline which may leach into the soil and contaminate ground water or discharge to a waterbody or wetland which can elevate the pH and be harmful to aquatic life. Performing concrete washout in designated areas and into specifically designed systems reduces the impact concrete washout will have on the environment.

Specifications

Site Management

- Complete construction/installation of the system and have washout locations operational prior to concrete delivery.
- Do not wash out concrete trucks or equipment into storm drains, wetlands, streams, rivers, creeks, ditches, or streets.
- Never wash out into a storm sewer drainage system. These systems are typically connected to a natural conveyance system.
- Where necessary, provide stable ingress and egress (see **Temporary Construction Ingress/Egress Pad** on page 17).
- It is recommended that washout systems be restricted to washing concrete from mixer and pump trucks and not used to dispose of excess concrete or

CONCRETE WASHOUT

residual loads due to potential to exceed the design capacity of the washout system. Small amounts of excess or residual concrete (not washout water) may be disposed of in areas that will not result in flow to an area that is to be protected.

- Install systems at strategic locations that are convenient and in close proximity to work areas and in sufficient number to accommodate the demand for disposal.
- Install signage identifying the location of concrete washout systems.

Location

- Locate concrete washout systems at least 50 feet from any creeks, wetlands, ditches, karst features, or storm drains/manmade conveyance systems.
- To the extent practical, locate concrete washout systems in relatively flat areas that have established vegetative cover and do not receive runoff from adjacent land areas.
- Locate in areas that provide easy access for concrete trucks and other construction equipment.
- Locate away from other construction traffic to reduce the potential for damage to the system.

General Design Considerations

- The structure or system shall be designed to contain the anticipated washout water associated with construction activities.
- The system shall be designed, to the extent practical, to eliminate runoff from entering the washout system.
- Runoff from a rainstorm or snowmelt should not carry wastes away from the washout location.
- Washout will not impact future land uses (i.e., open spaces, landscaped areas, home sites, parks).
- Washout systems/containment measures may also be utilized on smaller individual building sites. The design and size of the system can be adjusted to accommodate the expected capacity.

Prefabricated Washout Systems/Containers

- Self-contained sturdy containment systems that are delivered to a site and located at strategic locations for concrete disposal.

CONCRETE WASHOUT

- These systems are manufactured to resist damage from construction equipment and protect against leaks or spills.
- Manufacturer or supplier provides the containers. The project site manager maintains the system or the supplier provides complete service that includes maintenance and disposal.
- Units are often available with or without ramps. Units with ramps lend themselves to accommodate pump trucks.
- Maintain according to the manufacturer's recommendations.

Designed and Installed Units

These units are designed and installed on site. They tend to be less reliable than prefabricated systems and are often prone to failure. Concrete washout systems can be constructed above or below grade. It is not uncommon to have a system that is partly below grade with an additional containment structure above grade.

- Washout systems shall utilize a pit or bermed area designed and maintained at a capacity to contain all liquid and concrete waste generated by washout operations.
- The volume of the system must also be designed to contain runoff that drains to the system and rainfall that enters the system for a two-year frequency, 24-hour storm event.

■ Below Grade System

- ◆ A washout system installed below grade should be a minimum of ten feet wide by ten feet long, but sized to contain all liquid and waste that is expected to be generated between scheduled cleanout periods. The size of the pit may be limited by the size of polyethylene available. The polyethylene lining should be of adequate size to extend over the entire excavation.
- ◆ Include a minimum 12-inch freeboard to reasonably ensure that the structure will not overtop during a rain event.
- ◆ Line the pit with ten millimeter polyethylene lining to control seepage.
- ◆ The bottom of excavated pit should be above the seasonal high water table.

■ Above Grade System

- ◆ A system designed and built above grade should be a minimum of ten feet wide by ten feet long, but sized to contain all liquid and waste that is expected to be generated between scheduled cleanout periods. The size of the containment system may be limited by the size of

CONCRETE WASHOUT

polyethylene available. The polyethylene lining should be of adequate size to extend over the berm or containment system.

- ◆ The system design may utilize an earthen berm, straw bales, sandbags, or other acceptable barriers that will maintain its shape and integrity and support the polyethylene lining.
- ◆ Include a minimum four-inch freeboard as part of the design.

Washout Procedures

- Do not leave excess mud in the chutes or hopper after the pour. Every effort should be made to empty the chutes and hopper at the pour. The less material left in the chutes and hopper, the quicker and easier the cleanout. Small amounts of excess concrete (not washout water) may be disposed of in areas that will not result in flow to an area that is to be protected.
- At the washout location, scrape as much material from the chutes as possible before washing them. Use non-water cleaning methods to minimize the chance for waste to flow off site.
- Remove as much mud as possible when washing out.
- Stop washing out in an area if you observe water running off the designated area or if the containment system is leaking or overflowing and ineffective.
- Do not back flush equipment at the project site. Back flushing should be restricted to the plant as it generates large volumes of waste that more than likely will exceed the capacity of most washout systems. If an emergency arises, back flush should only be performed with the permission of an on-site manager for the project.
- Do not use additives with wash water. Do not use solvents or acids that may be used at the target plant.

Materials

- Minimum of ten millimeter polyethylene sheeting that is free of holes, tears, and other defects. The sheeting selected should be of an appropriate size to fit the washout system without seams or overlap of the lining (**designed and installed systems**).
- Signage.
- Orange safety fencing or equivalent.
- Straw bales, sandbags (bags should be ultraviolet-stabilized geotextile fabric), soil material, or other appropriate materials that can be used to construct a containment system (**above grade systems**).

CONCRETE WASHOUT

- Metal pins or staples at a minimum of six inches in length, sandbags, or alternative fastener to secure polyethylene lining to the containment system.
- Non-collapsing and non-water holding cover for use during rain events (optional).

Installation

Prefabricated Washout Systems/Containers

- Install and locate according to the manufacturer's recommendations.

Designed and Installed Systems

- Utilize and follow the design in the storm water pollution prevention plan to install the system.
- Dependent upon the type of system, either excavate the pit or install the containment system.
- A base shall be constructed and prepared that is free of rocks and other debris that may cause tears or punctures in the polyethylene lining.
- Install the polyethylene lining. For excavated systems, the lining should extend over the entire excavation. The lining for bermed systems should be installed over the pooling area with enough material to extend the lining over the berm or containment system. The lining should be secured with pins, staples, or other fasteners.
- Place flags, safety fencing, or equivalent to provide a barrier to construction equipment and other traffic.
- Place a non-collapsing, non-water holding cover over the washout facility prior to a predicted rainfall event to prevent accumulation of water and possible overflow of the system (optional).
- Install signage that identifies concrete washout areas.
- Post signs directing contractors and suppliers to designated locations.
- Where necessary, provide stable ingress and egress (see **Temporary Construction Ingress/Egress Pad** on page 17) or alternative approach pad for concrete washout systems.

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Maintenance

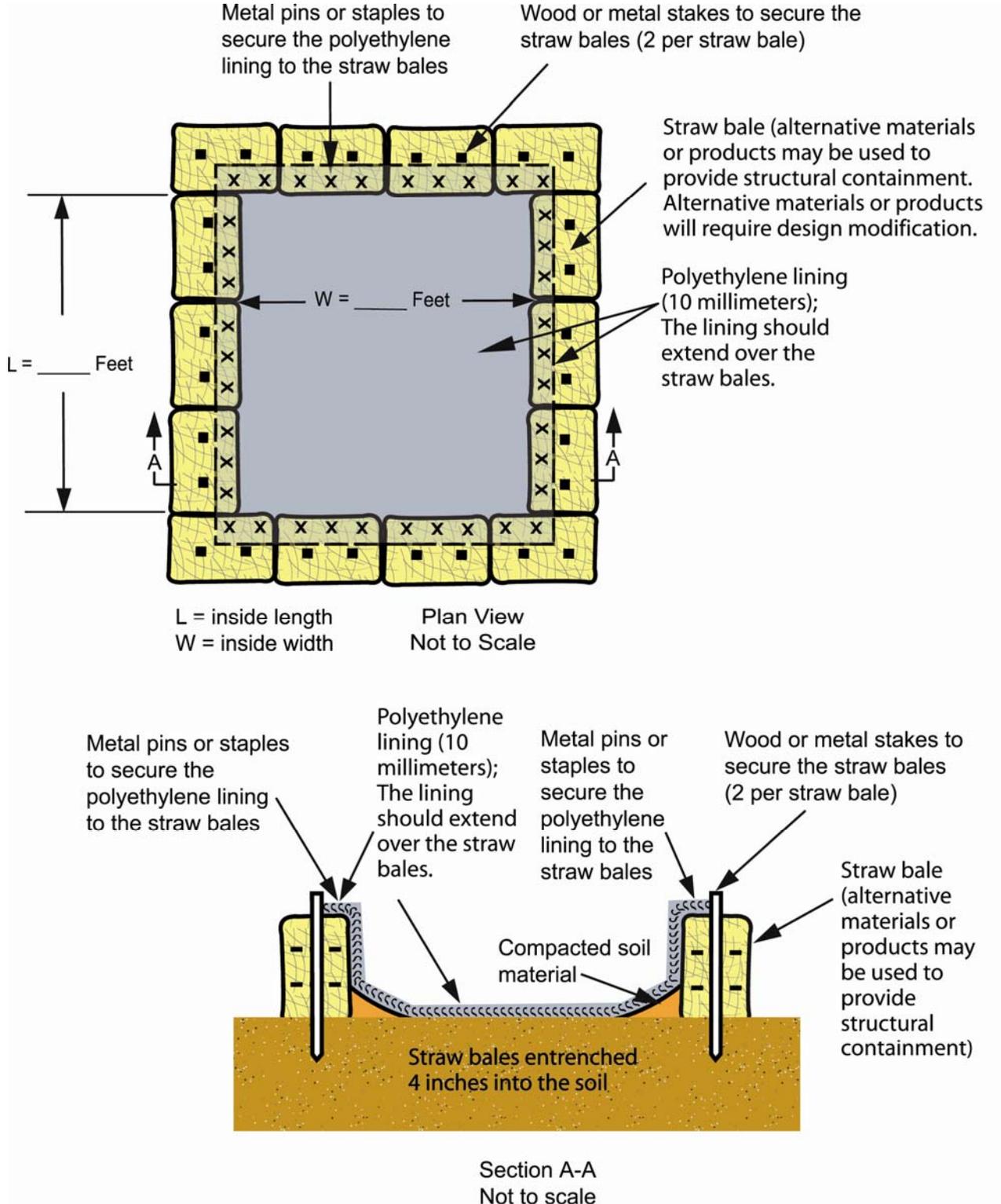
- Inspect daily and after each storm event.
- Inspect the integrity of the overall structure including, where applicable, the containment system.
- Inspect the system for leaks, spills, and tracking of soil by equipment.
- Inspect the polyethylene lining for failure, including tears and punctures.
- Once concrete wastes harden, remove and dispose of the material.
- Excess concrete should be removed when the washout system reaches 50 percent of the design capacity. Use of the system should be discontinued until appropriate measures can be initiated to clean the structure. Prefabricated systems should also utilize this criterion, unless the manufacturer has alternate specifications.
- Upon removal of the solids, inspect the structure. Repair the structure as needed or construct a new system.
- Dispose of all concrete in a legal manner. Reuse the material on site, recycle, or haul the material to an approved construction/demolition landfill site. Recycling of material is encouraged. The waste material can be used for multiple applications including but not limited to roadbeds and building. The availability for recycling should be checked locally.
- The plastic liner should be replaced after every cleaning; the removal of material will usually damage the lining.
- The concrete washout system should be repaired or enlarged as necessary to maintain capacity for concrete waste.
- Concrete washout systems are designed to promote evaporation. However, if the liquids do not evaporate and the system is near capacity it may be necessary to vacuum or remove the liquids and dispose of them in an acceptable method. Disposal may be allowed at the local sanitary sewer authority provided their National Pollutant Discharge Elimination System permits allow for acceptance of this material. Another option would be to utilize a secondary containment system or basin for further dewatering.
- Prefabricated units are often pumped and the company supplying the unit provides this service.
- Inspect construction activities on a regular basis to ensure suppliers, contractors, and others are utilizing designated washout areas. If concrete waste is being disposed of improperly, identify the violators and take appropriate action.

CONCRETE WASHOUT

- When concrete washout systems are no longer required, the concrete washout systems shall be closed. Dispose of all hardened concrete and other materials used to construct the system.
- Holes, depressions and other land disturbances associated with the system should be backfilled, graded, and stabilized.

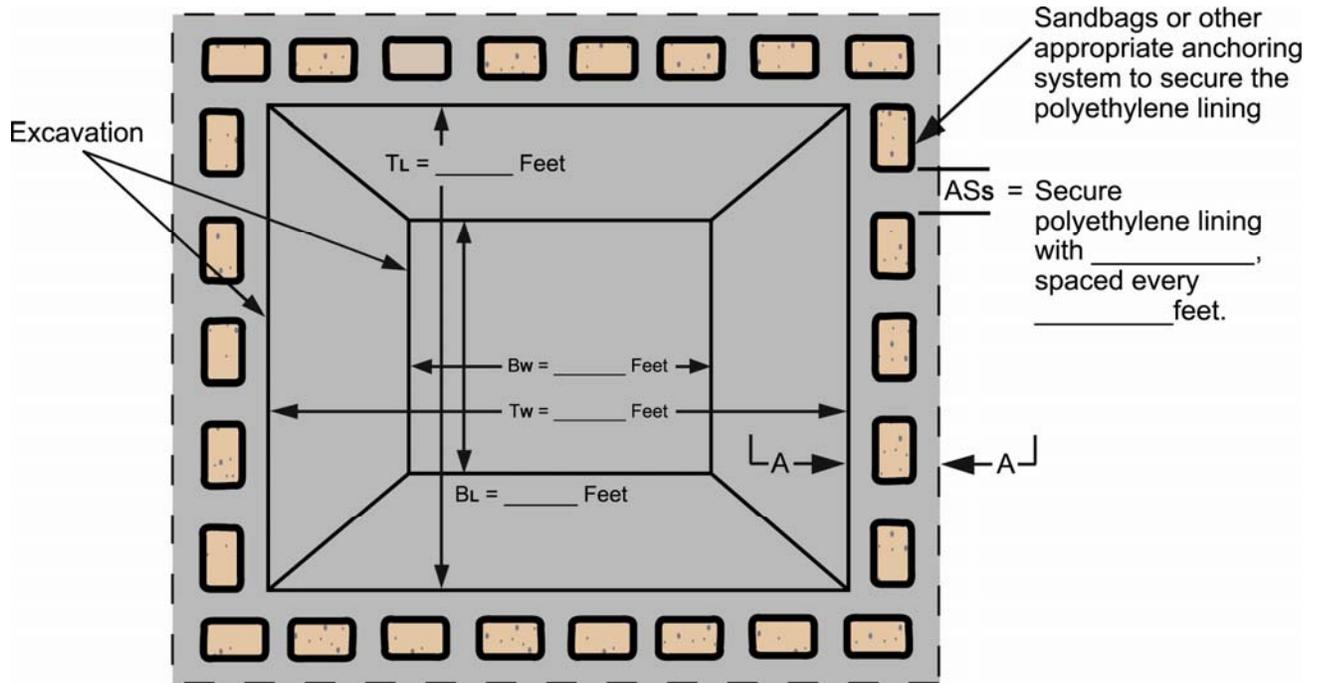
CONCRETE WASHOUT

Concrete Washout (Above Grade System) Worksheet

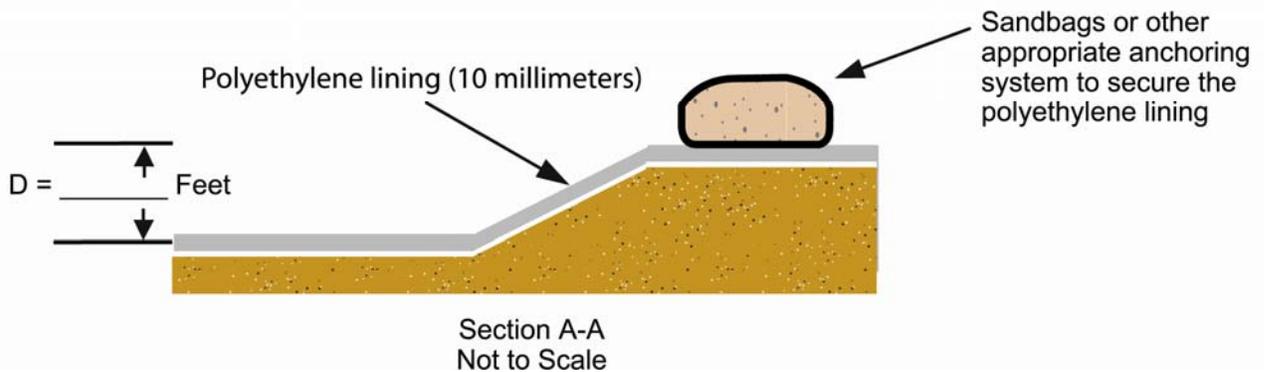


CONCRETE WASHOUT

Concrete Washout (Below Grade System) Worksheet



- TL = Top Length of Excavation
 - BL = Bottom Length of Excavation
 - Tw = Top Width of Excavation
 - Bw = Bottom Width of Excavation
 - ASs = Anchoring System type and spacing
- Plan View
Not to Scale



Dust Control

Construction Site Storm Water Runoff Control

Description

Dust control measures are practices that help reduce surface and air movement of dust from disturbed soil surfaces. Construction sites are good candidates for dust control measures because land disturbance from clearing and excavation generates a large amount of soil disturbance and open space for wind to pick up dust particles. To illustrate this point, limited research at construction sites has established an average dust emission rate of 1.2 tons/acre/month for active construction (WA Dept. of Ecology, 1992). These airborne particles pose a dual threat to the environment and human health. First, dust can be carried off-site, thereby increasing soil loss from the construction area and increasing the likelihood of sedimentation and water pollution. Second, blowing dust particles can contribute to respiratory health problems and create an inhospitable working environment.



Applicability

Dust control measures are applicable to any construction site where dust is created and there is the potential for air and water pollution from dust traveling across the landscape or through the air. Dust control measures are particularly important in arid or semiarid regions, where soil can become extremely dry and vulnerable to transport by high winds. Also, dust control measures should be implemented on all construction sites where there will be major soil disturbances or heavy construction activity, such as clearing, excavation, demolition, or excessive vehicle traffic. Earthmoving activities are the major source of dust from construction sites, but traffic and general disturbances can also be major contributors (WA Dept. of Ecology, 1992). The particular dust control measures that are implemented at a site will depend on the topography and land cover of a given site, as well as the soil characteristics and expected rainfall at the site.

Siting and Design Considerations

When designing a dust control plan for a site, the amount of soil exposed will dictate the quantity of dust generation and transport. Therefore, construction sequencing and disturbing only small areas at a time can greatly reduce problematic dust from a site. If land must be disturbed, additional temporary stabilization measures should be considered prior to disturbance. A number of methods can be used to control dust from a site. The following is a brief list of some control measures and their design criteria. Not all control measures will be applicable to a given site. The owner, operator, and contractors responsible for dust control at a site will have to determine which practices accommodate their needs based on specific site and weather conditions.

- *Sprinkling/Irrigation*. Sprinkling the ground surface with water until it is moist is an effective dust control method for haul roads and other traffic routes (Smolen et al., 1988). This practice can be applied to almost any site.
- *Vegetative Cover*. In areas not expected to handle vehicle traffic, vegetative stabilization of disturbed soil is often desirable. Vegetative cover provides coverage to surface soils and slows wind velocity at the ground surface, thus reducing the potential for dust to become airborne.
- *Mulch*. Mulching can be a quick and effective means of dust control for a recently disturbed area (Smolen et al., 1988).
- *Wind Breaks*. Wind breaks are barriers (either natural or constructed) that reduce wind velocity through a site and therefore reduce the possibility of suspended particles. Wind breaks can be trees or shrubs left in place during site clearing or constructed barriers such as a wind fence, snow fence, tarp curtain, hay bale, crate wall, or sediment wall (USEPA, 1992).
- *Tillage*. Deep tillage in large open areas brings soil clods to the surface where they rest on top of dust, preventing it from becoming airborne.
- *Stone*. Stone may be an effective dust deterrent for construction roads and entrances or as a mulch in areas where vegetation cannot be established.
- *Spray-on Chemical Soil Treatments (palliatives)*. Examples of chemical adhesives include anionic asphalt emulsion, latex emulsion, resin-water emulsions, and calcium chloride. Chemical palliatives should be used only on mineral soils. When considering chemical application to suppress dust, consideration should be taken as to whether the chemical is biodegradable or water-soluble and what effect its application could have on the surrounding environment, including waterbodies and wildlife.

Table 1 shows application rates for some common spray-on adhesives, as recommended by Smolen et al. (1988).

Table 1. Application rates for spray-on adhesives (Source: Smolen et al., 1988)

Spray-on Adhesive	Water Dilution	Type of Nozzle	Application (gal/ac)
Anionic Asphalt Emulsion	7:1	Coarse Spray	1,200
Latex Emulsion	12.5:1	Fine Spray	235
Resin in Water	4:1	Fine Spray	300

Limitations

In areas where evaporation rates are high, water application to exposed soils may require near constant attention. If water is applied in excess, irrigation may create unwanted excess runoff from the site and possibly create conditions where vehicles could track mud onto public roads. Chemical

applications should be used sparingly and only on mineral soils (not muck soils) because their misuse can create additional surface water pollution from runoff or contaminate ground water. Chemical applications might also present a health risk if excessive amounts are used.

Maintenance Considerations

Because dust controls are dependent on specific site and weather conditions, inspection and maintenance are unique for each site. Generally, however, dust control measures involving application of either water or chemicals require more monitoring than structural or vegetative controls to remain effective. If structural controls are used, they should be inspected for deterioration on a regular basis to ensure that they are still achieving their intended purpose.

Effectiveness

- *Sprinkling/Irrigation*. Not available.
- *Vegetative Cover*. Not available.
- *Mulch*. Can reduce wind erosion by up to 80 percent.
- *Wind Breaks/Barriers*. For each foot of vertical height, an 8-to 10-foot deposition zone develops on the leeward side of the barrier. The permeability of the barrier will change its effectiveness at capturing windborne sediment.
- *Tillage*. Roughening the soil can reduce soil losses by approximately 80 percent in some situations.
- *Stone*. The sizes of the stone can affect the amount of erosion to take place. In areas of high wind, small stones are not as effective as 20 cm stones.
- *Spray-on Chemical Soil Treatments (palliatives)*. Effectiveness of polymer stabilization methods range from 70 percent to 90 percent, according to limited research.

Cost Considerations

Chemical dust control measures can vary widely in cost, depending on specific needs of the site and level of dust control desired. One manufacturer of a chloride product estimated a cost of \$1,089 per acre for application to road surfaces, but cautioned that cost estimates without a specific site evaluation are rather inaccurate.

ATTACHMENT E - INSPECTION AND MAINTENANCE REPORT FORM

**Tactical Equipment Maintenance Facility Project
Storm Water Pollution Prevention Plan**

RECORD OF REVISIONS

Name of Permittee: <XXXXXX> Client

Construction Site Name: Tactical Equipment Maintenance Facility Project

Inspector: _____ Date: _____

Date	Sections Modified	Description of Modification	Approval Signatures

ATTACHMENT F - SPILL REPORT FORM

Procedures for Determining if a Hazardous Material Spill is a Reportable Quantity

- 1) First determine the type and quantity of material that has been spilled.
- 2) Obtain a material safety data sheet (MSDS) for the spilled material and determine whether any of the constituents are listed in Table 302.4 in 40 CFR 302.
- 3) If none of the constituents in the spilled material are listed in the table (excluding ethylene glycol), the spill is not reportable.
- 4) If the constituents in the spilled material are listed in the table, use the following equation to determine the pounds of material spilled:

$$\text{Pounds Spilled} = (V) (\text{Wt}\%) (\text{Sg}) (0.0834)$$

Where:

V = Volume of the material spilled, in gallons

Wt% = The weight percent of the constituents in the spilled material (see the MSDS)

Sg = Specific gravity of spilled material (see MSDS)

For Example:

V = 7 gallons

Wt% = 3.5

Sg = 1.04

Pounds Spilled = (7) (3.5) (1.04) (0.0834) = 2.13 pounds

- 5) If, based on the calculation, the pounds spilled are greater than the Final RQ (reportable quantity) value listed in Table 302.4 of 40 CFR 302 or the State's reportable quantity minimum amount, the spill must be reported to the appropriate federal, state, and local agencies.

**Tactical Equipment Maintenance Facility Project
Storm Water Pollution Prevention Plan
SPILL REPORT FORM**

Spill Reported By: _____
Name Phone Number

Date Reported: _____ Time: _____

Date of Spill: _____ Time: _____

Name of Facility: _____

Legal Description: _____ 1/4 _____ 1/4 _____ 1/4 SEC _____, TWP _____, Range _____,
County _____

Describe Spill Location and Events Leading to Spill: _____

Material Spilled: _____

Source of Spill: _____

Amount Spilled (Gallons or Pounds): _____

Amount Spilled to Waterway (Gallons or Pounds): _____

Nearest Municipality: _____

Containment or Clean-up Action: _____

List Environmental Damage (fish kill, etc.): _____

List Injuries or Personal Contamination: _____

Date and Time Clean-up Completed or Terminated: _____

If Clean-up Delayed, Nature and Duration of Delay: _____

Description of Materials Contaminated: _____

Approximate Depth of Soil Excavation: _____

Action To Be Taken to Prevent Future Spills: _____

Contact **XXXXX (XXX) XXX-XXXX**

<XXXXX> Client will contact agencies if necessary.

Agencies Notified:

Local: _____ Date: _____

State: _____ Date: _____

Federal: _____ Date: _____

Signed: _____

Contractor Superintendent or
Environmental Inspector

ATTACHMENT G - CONSTRUCTION SITE NOTICE

ATTACHMENT G
Tactical Equipment Maintenance Facility Project

CONSTRUCTION SITE NOTICE

For Storm Water Discharges Associated with Construction Activity
Authorized by Oklahoma Department Environmental Quality General Permit
Under the Oklahoma Pollutant Discharge Elimination System

Permittee:	<XXXXXX> Client
Project Name:	Tactical Equipment Maintenance Facility Project
Issued General Permit No.:	
Facility Contact Name:	XXXXXXX (XXX) XXX-XXXX
Project Description:	<p>The Project area at the Tactical Equipment Maintenance Facility (TEMF) Project covers XX acres, of which approximately XX acres will be disturbed for the Project. Before grading activities begin, all sediment and erosion control measures will be installed. Soil disturbing activities include the construction of the TEMF building, auxiliary buildings, a hardstand area, parking lot, and sidewalks. This SWP3 has been developed to cover construction activities related to the Project. Construction is scheduled to begin in October 2011 and be completed by October 2013.</p>

ATTACHMENT H - NOTICE OF TERMINATION

ADDENDUM C – NOTICE OF TERMINATION

<p>DEQ FORM 605-003 Feb 23, 2009</p>		<p>OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY NOTICE OF TERMINATION (NOT) FOR STORM WATER DISCHARGES ASSOCIATED WITH INDUSTRIAL OR CONSTRUCTION ACTIVITY UNDER AN OPDES GENERAL PERMIT</p>
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Submission of this Notice of Termination constitutes notice that the party identified in Section I of this form is no longer authorized to discharge storm water associated with industrial or construction activities under the OPDES program.

All Requested Information Must Be Provided On This Form. See Instructions On The Back Of Form.

<p>I. Permit Information: OPDES Storm Water General Permit Authorization Number: _____</p>	<p>Check here if you are no longer the operator of the facility/site: <input type="checkbox"/></p>	<p>Check here if the storm water construction or industrial discharge is being terminated: <input type="checkbox"/></p>
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II. Facility/Site Owner/Operator Information:

Name: _____ Phone: _____

Address: _____

City: _____ State: _____ Zip Code: _____

III. Facility/Site Location:

Name: _____

Address: _____

City: _____ County: _____ Zip Code: _____

Latitude: _____ Longitude: _____

IV. New Facility/Site Information:

If you are no longer the operator of the facility/site, provide the following information pertaining to the new operator at the facility/site:

Name: _____

Address: _____

City: _____ State: _____ Zip Code: _____

V. Certification

I certify under penalty of law that all storm water discharges associated with industrial/construction activity from the identified facility/site that were authorized by a general permit have been eliminated or that I am no longer the owner or operator of the facility/site. I understand that by submitting this Notice of Termination, I am no longer authorized to discharge storm water associated with industrial or construction activity under this general permit, and that discharging pollutants in storm water associated with industrial or construction activity to waters of the State is unlawful under the Clean Water Act and OAC 252:606-1-3(b)(3)(L) where the discharge is not authorized by an OPDES permit. I also understand that the submittal of this Notice of Termination does not release me as an owner or operator from liability for any violations of this permit or the Clean Water Act.

Print Name: _____ Date: _____

Signature: _____ Title: _____



Instructions for Completing Notice of Termination (NOT) for Storm Water Discharges Associated with Construction Activity

When To File an NOT Form:

Permittees who are presently covered under an issued NPDES or OPDES general permit for storm water discharges associated with industrial/construction activity may submit a **Notice of Termination (NOT)** form when their facilities no longer have any storm water discharges associated with industrial/construction activity as defined in the storm water regulations at 40 CFR 122.26(b)(14), or when they are no longer the operator of the facilities. For a construction site, when the site has been finally stabilized (i.e., a uniform perennial vegetative cover with a density of at least 70% of the native background cover has been established for all unpaved areas and areas not covered by permanent structures or where equivalent permanent stabilization measures such as riprap or gabions have been used), and all storm water discharges from construction activities that are authorized by general permit (OKR10) are eliminated, or they are no longer the operator of the facility, an NOT must be submitted that is signed in accordance with Part 4.5 of the general permit. If you need assistance or have questions, contact the Storm Water Unit of the Environmental Complaints and Local Services at (405) 702-6100.

Section I: Permit Information:

Enter the existing OPDES General Storm Water Permit number assigned to the facility or site identified in Section I.

Section II: Facility Operator Information:

Give the legal name of the person, firm, public organization or any other entity that operates the facility or site described in this application. The name of the operator may or may not be the same name as the facility. The operator of the facility is the legal entity that controls the facility's operation, rather than the plant or site manager.

Section III: Facility/Site Location Information:

Enter the facility's or site's official or legal name and complete address, including city, county, and ZIP code. If the facility lacks a street address, indicate the latitude and longitude of the facility to the nearest 15 seconds.

Section IV: New Owner/Operator Information:

If you are no longer the operator of the facility/site, provide the information pertaining to the new operator at the facility/site, including the name and address of the new owner/operator.

Section V: Certification:

The NOT form must be signed by a responsible party as follows:

For a Corporation: by a responsible officer, which means: (i) president, secretary, treasurer, or vice president of the corporation in charge of a principal business function; or their designee, or any other person who performs similar policy or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

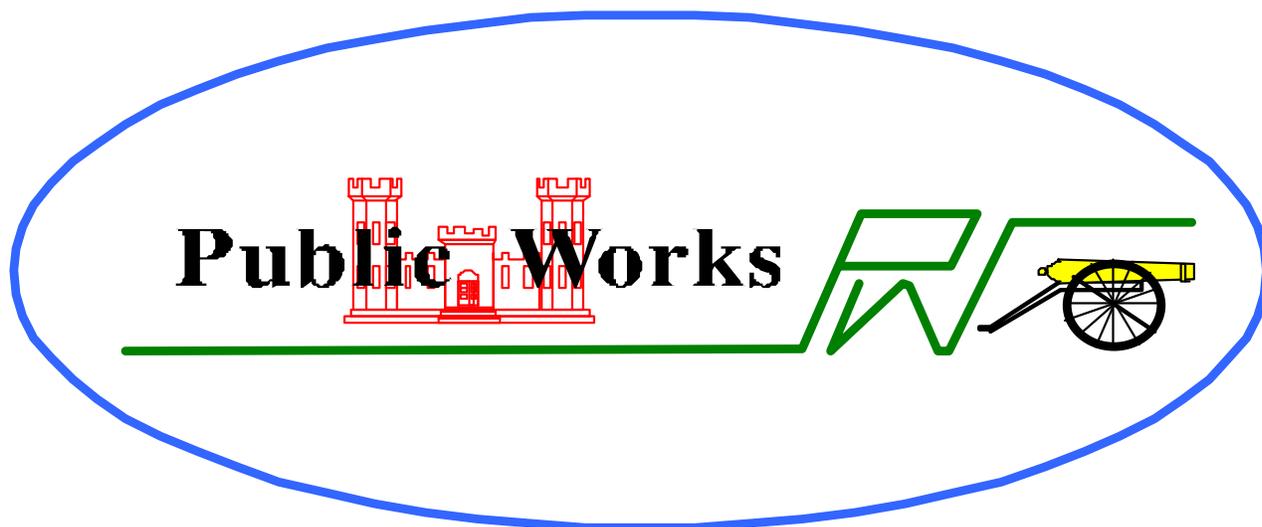
For a partnership or sole proprietorship: by a general partner or the proprietor.

For a municipality, state, Federal, or other public agency: by either a principal executive officer or ranking elected official.

Where to File an NOT form:

NOTs must be sent to the following address:

DEQ
Environmental Complaints and Local Services
Storm Water Unit
P.O. Box 1677
Oklahoma City, OK 73101-1677



DIRECRORATE OF PUBLIC WORKS
Fort Sill, Oklahoma
Project requirements
Updated: July 13, 2011

Point of Contact
Ahmad Santina, Electrical Engineer, P.E.
TEL: (580) 442-6026
E-mail: Ahmad.Santina@us.army.mil

ELECTRICAL GENERAL REQUIREMENT

1. SECTION: ELECTRICAL DISTRIBUTION SYSTEM, AERIAL

1.1 Existing Medium Voltage (MV) distribution system is 13,200/7,620 Volt, 3-phase, 4 wires, multi-grounded system installed on wood poles and/or underground. New work shall be required to be underground. Coordinate with DPW.

1.2 Transformers: Provide transformer with a spare capacity of 15% minimum. Provide Delta-Wye connection system, primary voltage:13200, Secondary voltage 480/277V, 208/120V, copper windings.

1.3 Pole-mounted sectionalizing switches: Provide sectionalizers as needed, coordinate with source.

1.4 Provide Fault Current Analysis, Protective Device Fully Coordination Study, see section 16375 below

1.5 Bare medium-voltage line conductors: Provide Aluminum-Conductor-Steel-Reinforced, ACSR.

1.6 Insulated Medium-Voltage line conductors: Provide 15kV, ethylene-propylene-rubber (EPR), 133 percent insulation level, copper.

1.7 Wood poles: Provide pressure treated, with creosote. Poles shall be branded with information such as height-class, year-month made, etc (ANSI standard info), metal tag is not acceptable. Poles with transformers, cutout or any equipment must be provided with metal tags showing feeder no.-pole number, fuse ratings, and other information, coordinate with DPW.

1.8 Guy assemblies: Provide where required zinc-coated steel, extra-high-strength, with 8 feet, ¾" diameter guy rods minimum. Provide yellow Guy marker, 2" diameter and/or width, 8' minimum height.

1.9 Provide Armless Construction, where single phase is used, prepare for 3-phase construction. Coordinate with DPW.

1.10 Guy assemblies: Provide zinc-coated steel, extra-high-strength, with 8 feet, $\frac{3}{4}$ " diameter guy rods. Provide Guy marker, 2" diameter minimum where required.

1.11 Cutouts: Provide 15KV, type K fuse link.

1.12 Surge arresters: Provide for protection of aerial-to underground transitions, transformers and other equipment as required.

1.13 Air-break switches: Provide Gang operated switches Normally open (NO) or Normally closed (NC) switches to connect to other feeders as required.

1.14 Ground rod: Provide copper-clad steel not less than $\frac{3}{4}$ inch in diameter by 10 feet in length. Ground rods must be driven into undisturbed earth, 2' minimum away from the pole edge, structure or concrete foundations. It is not acceptable to install rod in the hole with riser pole or driven into backfill

1.15 Provide Rigid Galvanized Steel Conduit in areas subject to vehicular traffics

1.16 Provide Metal poles with velocity 100mph minimum at the base of the pole, 1.3 wind gust factor, height and drag factor as recommended by AASHTO LTS-4. Effective projected area of luminaries and other equipment shall be considered in the pole design. Calculation shall be provided to support the pole design. Chipped, scratched, stained or dented poles shall not be acceptable.

1.17 Provide mower guard, 36" height minimum, above finished grade for all pole grounds protection.

2. SECTION: ELECTRICAL DISTRIBUTION SYSTEM, UNDERGROUND

2.1 Medium Voltage Cables, MV: Provide copper, 15 kV, concentric neutral underground distribution cable, with EPR 133% insulation level, with PVC jacket, copper.

2.2 Low Voltage Cables, service entrance, underground service entrance: Provide copper conductor with XLP or EPR insulation, copper

2.3 Cables in the same duct with MV cables shall have same type insulation

- 2.4 MV, Duct lines shall be PVC SCH 40, concrete-encased in trench, installed at 36 inches minimum below grade to the top of conduit. Under roads, use directional boring, provide conduit in casing, with spacers. Provide spare conduit of equal size. Provide spare conduit of equal size.
- 2.5 Low Voltage, Duct lines shall be direct-burial, thick-wall type SCH 40, SCH 80, Concrete encased if installed in vehicular traffic areas. Coordinate application with DPW.
Do not use PVC conduit in areas subject to physical damage, including but not limited to mechanical, electrical rooms, penetrating fire rated walls, floors or partitions.
- 2.6 Provide Rigid Galvanized Steel conduit, PVC coated or wrapped for transitions from below to above grade.
- 2.7 Transformer, pad mounted: Provide Loop feed type, dead front construction, copper windings with current limiting fuses, arresters, High-voltage warning signs, Dial-type thermometer, liquid-level gauge, and drain valve with built-in sampling device, Refer to TM 5-811-1/AF AFJMAN 32-1080 for other guidance. Transformer pad shall be a minimum of 6 inches larger than the transformer enclosure to include the cooling system.
- 2.8 Watt-hour meter: Provide electronic meter equal to SQD power-logic circuit monitor series 4000 or equal, include KYZ pulse initiation hardware for energy monitoring and control system (EMCS).
- 2.9 Padlock: Provide provision for padlock for major equipment. Coordinate with DPW
- 2.10 COORDINATED POWER SYSTEM PROTECTION:
- 2.10.1 The study shall be performed by a registered professional engineer with demonstrated experience in power system coordination in the last three years.
- 2.10.2 Scope Analysis: The fault current analysis, and protective device coordination study shall begin at the source bus and extend down to system bused where fault availability is 10,000 amperes (symmetrical) for

building/facility 600 volt level distribution buses.
Coordinate with DPW

2.10.3 Determination of facts: The time-current characteristics, features, and nameplate data for each existing protective device shall be determined and documented. The Contractor shall coordinate with the commercial power company for fault current availability at the site.

2.10.4 A single line diagram shall be prepared to show the electrical system buses, devices, transformation points, and all sources of fault current (including generator and motor contributions). A fault-impedance diagram or a computer analysis diagram may be provided. Each bus, device or transformation point shall have a unique identifier. If a fault-impedance diagram is provided, impedance data shall be shown. Locations of switches, breakers, and circuit interrupting devices shall be shown on the diagram together with available fault data, and the device interrupting rating.

2.10.5 Coordination Study: The study shall demonstrate that the maximum possible degree of selectivity has been obtained between devices specified, consistent with protection of equipment and conductors from damage from overloads and fault conditions. The study shall include a description of the coordination of the protective devices in this project. Provide a written narrative that describes: which devices may operate in the event of a fault at each bus; the logic used to arrive at device ratings and settings; situations where system coordination is not achievable due to device limitations (an analysis of any device curves which overlap); coordination between upstream and downstream devices; and any relay settings. Recommendations to improve or enhance system reliability, and detail where such changes would involve additions or modifications to the contract and cost changes (addition or reduction) shall be provided.

2.10.6 Study Report: The report shall include

- a- narrative describing the analyses performed; the bases and methods used; and the desired method of coordinated protection of the power system.
- b- Descriptive and technical data for the new protective devices proposed.

- c- Document utility company data including system voltages, fault MVA, system X/R ratio, time-current characteristics curves, current transformer ratios, and relay device numbers and settings; and existing power system data including time-current characteristic curves and protective device ratings and settings.
- d- Fully coordinated composite time-current characteristic curves for each bus in the system, as required to ensure coordinated power system protection between protective devices or equipment. The report shall include recommended ratings and settings of all protective devices in tabulated form.
- e- Provide the calculation performed for the analyses, including computer analysis programs utilized. A software package, of the same version used for the short circuit and coordination study shall be provided.

3. SECTION: MOTOR CONTROL CENTERS, SWITCHBOARDS/GEAR and PANELBOARDS

3.1 Switchgear and Panel Bus bars shall be copper. Size 200% Neutral for non-linear load. Switchgear bus bars shall be silver plated. Provide directories to show load served and source.

3.1.1 Ground bus: Provide full width at the bottom of the motor control center line-up. A full clamp-type solderless copper or copper alloy lug for No. 2/0 AWG stranded copper cable minimum shall be provided at each end of the bus for connection to the main grounding system.

3.1.2 Neutral Bus: A fully rated neutral bus shall be provided continuous through the control center. 200% rated neutral shall be provided for panels supplying electronics

3.2 Voltage Fault Protection: Provide protection against voltage faults, phase unbalance, phase loss, phase reversal, under-voltage and over-voltage

3.3 Distribution Transformers: Provide 200% neutral for dry type transformers supplying nonlinear loads. Use K-Factor rated, K4 for 50% and K13 for 100% connected nonlinear loads. Provide Copper windings type.

3.4 Switchboards: Provide dead-front construction. Mount switchgear on concrete slab.

3.5 Size panel to provide a minimum of 15% minimum future expansion.

4. ELECTRICAL WORK, INTERIOR

4.1 Use copper conductor only, Aluminum conductors shall not be used. Underground service entrance conductor shall be USE rated, with XLP or EPR insulation. Use THHN/THWN for interior wiring, minimum size for branch circuit conductor shall be No.12 minimum, no.8 AWG and larger shall be stranded, no.10 AWG and smaller shall be solid.

4.2 Equipment ground conductor: provide insulated green conductor in all conduits.

4.3 Provide Transient voltage surge suppressors (TVSS) at service entrance panels, and panels supporting electronic equipments, show on drawings schedules and/or line diagram.

4.4 CIRCUIT BREAKERS: Provide bolted type breakers, All ratings shall be clearly visible. Breakers used for switching shall be rated "SWD". Use of "Subfeed Breakers" is not acceptable unless specifically indicated otherwise. Main breaker shall be "separately" mounted "above" or "below" branch breakers. Where "space only" is indicated, make provisions for future installation of breakers.

4.5 Electrical, Zinc-Coated Steel Metallic Tubing (EMT),(IMC): Use EMT in the interior and dry location areas, conduit shall be concealed. Where physically protected, Use EMT in mechanical and electrical rooms, otherwise provide Galvanized Rigid steel conduit. Where conductors are to be installed concealed in wall, floor or ceiling, and conductors are subject to removal and replacement as a result of damaged insulation during construction or as a result of short circuit, conductors shall be installed in EMT, IMC or rigid steel conduit. MC or Romax Cables are not be acceptable.

4.6 Control wiring related to mechanical equipment such as HVAC, installed in the mechanical room, un-accessible areas and areas subject to traffic shall be installed in conduit. Cable shall be rated for the applications. All control related to electrical equipment, such as motors, lighting control, etc. shall be installed in conduit.

4.7 Each motor of 1/8 hp or larger shall be provided with thermal-overload protection and heavy duty disconnecting mean. Provide spare parts fuses.

4.8 Pull wires: Provide a pull wire in each empty raceway 50 feet in length and contains more than the equivalent of two 90-degree bends, or where the raceway is more than 150 feet in length.

4.9 Stub-Up & through slabs-on-grade conduits: Where conduits are to be stubbed up through concrete floors, a short elbow shall be installed below grade to transition from the horizontal run of conduit to a vertical run. A conduit coupling fitting, threaded on the inside shall be installed, to allow terminating the conduit flush with the finished floor. Conduit shall be Galvanized rigid steel.

4.10 Communications: Use Army Technical Guide for Installation Information infra structure architecture (I3A). Coordinate with DOIM.

4.11 Receptacles: Provide one receptacle per wall minimum, and every 12', coordinate with the user if more receptacles are needed. Use 20A heavy duty, grounding type receptacles, side wired. Receptacles with ground fault circuit interrupters shall be UL Class A type, with Set-reset buttons of contrast color.

4.11.1 Wet location Receptacles: Receptacles in wet locations shall be installed in an assembly rated for such use whether the plug is inserted or withdrawn.

4.12 Switches: Switches shall be rated for quit type AC only, 120/277volts with 20A current rating.

4.13 Splices: Use wire nut connectors for no.10 AWG and smaller. Do not use Quick Connect wire connectors type. Use solderless connectors for No.8 and larger and cover with insulation material same rating as conductor insulation.

4.14 Provide calculations for Panel Loads, Lighting, Feeders, Voltage drop, short circuit, load analysis, Coordination study, etc. See other sections.

4.15 Use fluorescent lighting fixtures with 100% electronic high frequency type, instant start ballasts, 95% minimum HPF, with no magnetic core and coil. Ballast shall be

connected in parallel, where if one or more lamps fails or are removed shall permit the operation of other lamps. Use 32W, T8 lamps, 10% THD maximum. Do not use ballast to serve multi fixtures. With emergency fixture, provide a back up power, red light indicator (LED) and test switch. Use other lighting as coordinated and approved for the applications.

4.16 Use LED type exit light with backup power, red light indicator (LED) and test switch.

4.17 Contractor shall provide temporary power as required to keep the facility in operation during the construction period. Coordinate in the field.

4.18 For Facilities with COM and TV, provide copper bus bar suitable for indoor application to conform to TIA J-STD-607-A grounding requirements, size ¼" X 2" X (length as required)

5. SECTION, FIRE DETECTION AND ALARM SYSTEM, ADDRESSABLE

(Refer to the fire department, (580) 442-5911)

5.1 Use factory painted RED color EMT conduit inside the building

5.2 Use MONACO transceiver; transmit at a frequency of 141.3625 MHZ, Coordinate with Monaco Enterprise and the fire department.

5.3 Provide 72 hours battery backup power, 15 minutes Alarm test.

5.4 Fire Alarm system shall be Class A, NAC devices style Z, IDC devices style D, SLC devices style 6. Size each SLC and NAC to provide 40 percent addressable expansion without hardware modifications to the panel.

5.5 Provide OVERVOLTAGE AND SURGE PROTECTION at the input power of panels, circuits that exit or enter a building.

5.6 provide a graphic Annunciator panel or remote control (LCD) panel as required by the fire department.

5.7 Use single action key operated pull station. Break glass, wrench operated pull station are not acceptable.

5.8 SECTION, Mass Notification System (MNS)

Coordinate with the fire department, (580)442-5911

Force Protection, David Fritz, (580)442-2532) & Karrie Lovins,
(580) 442-5973

6. SECTION: LIGHTNING PROTECTION SYSTEM

6.1 Provide lightning protection as required. System shall be certified.

- a. Provide Safety Tip air terminals
- b. Where Ground grid/counterpoise is used, install 30 inches below grade minimum, at a distance not less than 3 feet nor more than 8 feet from the structure.
- c. All Connections between the building steel columns and ground (counterpoise, Rods) shall be at the bottom of the columns. Use Cad-weld connections.
- d. Where poles are used for overhead system and ground rods are required, install the first ground rod a minimum of 6 feet from the pole base.

7. SECTION: CATHODIC PROTECTION SYSTEM (SACRIFICIAL ANODE)

7.1 Provide cathodic protection system, sacrificial to the sprinkler system riser entering the building from below grade. Coordinate with AWE for water piping and ONG for gas in other areas.

Notes:

1. The Unified Facilities Criteria (UFC) system, the installation design guide and the most indicated stringent requirement shall be used as guidance regarding the design and construction.
2. All section: provide details to show but not limited to transformers, pads, risers, trenching, pole details, controls, line diagrams etc.
3. As-built drawings: After completion of work, as built drawings shall be provided to reflect as-built conditions after all related work are completed and shall be on reproducible full-size Mylar film (one set) and CAD (Micro Station "DGN" format (latest edition used by DPW), on CDs.

Appendix KK
Geotech Earthwork Recommendations

Redox Test

The results of Redox tests are presented in the following table:

Redox Test Results				
Boring No.	Sample No.	Depth (feet)	Soil Descriptions	Redox Potential (mV)
BH-4,5,8,10,22, 24,28-33	Composite #1	0 - 5	Brown Sandy Clay	180
BH-12,14,15, 17-19,35,37-40	Composite #2	0 - 5	Brown Sandy Clay	188

Earthwork Recommendations

Building Pad Construction

A critical geotechnical consideration at Ft Sill TEMF site is the swelling soils. We recommend thickened ribbed mat foundation, spread footing foundation, underreamed drilled shaft, or drilled pier be used for the buildings at Ft. Sill TEMF site, either soil stabilization or construction of an inert fill / non-expansive fill building pad is advisable. The amount of ground surface movement that can be tolerated by the structure should be evaluated by the designer (a value of 0.50 inch or less may be used for Ft. Sill sites) and the corresponding amount of removal and replacement or over ground fill should be performed as indicated in the following options:

Option 1: Cut and Fill

- Remove the required amount of existing soil (see following table) and replace that soil with inert fill, meeting all requirements given herein, or native soil stabilized with lime to achieve a primary swell of no more than 1.0 percent when tested in accordance with ASTM D4546 (2008) Method B with a vertical stress equal to the anticipated in-situ vertical stress.

Cut and Fill Building Pad Requirements	
Depth of Removal and Replacement Soil (feet)*	Estimated Heave Potential (inches)
0.0	3.1
1.0	2.7
2.0	2.3
3.0	2.0
4.0	1.7
5.0	1.4
6.0	1.1
7.0	0.9
8.0	0.7
9.0	0.5

* - Below final site grade

or

Option 2: Fill Only

- Place the required amount or more of inert fill over existing soil (see following table), meeting all requirements given herein, over the native soils.

Over Ground Inert Fill Building Pad Requirements	
Depth of Over Ground Inert Fill Building Pad (feet)*	Estimated Heave Potential (inches)
0.0	3.1
1.0	2.7
2.0	2.3
3.0	2.0
4.0	1.7
5.0	1.4
6.0	1.1
7.0	0.8
8.0	0.5

* - Above existing site grade

Earthwork and Compaction Requirements - Entire Facility

Only nonplastic to low plasticity on-site soils (having a plasticity index of 4 to 12) or imported inert fill should be used for fill under structures and pavement. Inert fill should meet the following requirements:

Inert Fill Requirements

- Amount finer than 2 inch sieve = 100%
- Amount finer than No. 200 sieve = 12% minimum and, if $PI \leq 7$, 60% maximum
- Liquid Limit = 40 maximum
- Plasticity Index (PI) = 4 to 12

Subgrade Preparation

The existing subgrade for the building pads should be:

- stripped of all vegetation, topsoil, existing asphalt, existing aggregate base, and any other deleterious materials,
- overexcavated to a required depth and extended to at least 5 feet beyond building footprints,

APPENDIX LL
SUPPLEMENTAL REQUIREMENTS

SSA WAREHOUSES PROJECT SPECIFIC REQUIREMENTS

This appendix contains supplemental requirements to Section 01 10 00 STATEMENT OF WORK, Paragraphs 6, that must be included in the project design and construction.

The following paragraphs add new paragraphs, revise or supersede the paragraphs of the same number in Section 01 10 00:

6.3.3.1 Add the following sentence to the end of the paragraph:

Refer to Appendix HH for an example SWPPP.

6.15.4 Oil Water Separators (OWS). Not used.

FACILITY ELECTRICAL SYSTEM: Add the following:

6.10.7 **VSAT Requirements.** 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 SSA Warehouses. 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), as approved by the COR. 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 Stock Control Office .

The eight (8) Cat. 6 cables shall be provided with adequate length above the lay-in ceiling to reach any area in the Stock Control Office. 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 to protect the VSAT antenna. Bollards shall be 12-inch diameter by 5-foot high, concrete filled, schedule 80 galvanized steel pipe; space 5 foot O.C., 5 feet from edge of the antenna base, painted safety yellow. Bollard footings shall be designed to withstand organizational vehicular impact.

Appendix MM

Infrastructure Package

(Provided under separate cover – FOR INFORMATION ONLY)

Appendix NN
Water Quality Analysis

Section Appendix NN
 What does this report show? The results of our water quality analyses. Every regulated contaminant is listed here. The report contains the name of each substance, the highest level allowed by regulation (MCL), and the ideal goals for public health protection, the usual sources of such contaminants, footnotes explaining our finding, and a key to units of measurements.

Maximum Contaminant Level or MCL: The highest level of a contaminant allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

Maximum Contaminant Level Goal or 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.

Action Level: The concentration of a contaminant which, if exceeded, triggers a treatment or other requirement, a water system must follow.

Treatment Technique: A required process intended to reduce the level of a contaminant in drinking water.

Turbidity: Measurement of the cloudiness of the water. It is monitored because it is a good indicator of water quality. High turbidity can hinder the effectiveness of disinfectants.

Definitions:

Pci/L=Pico curies per liter (radioactivity measurement) MCL=Maximum Contaminant Level ppm=parts per million or milligrams per liter (mg/L)
 MCLG=Maximum Contaminant Level Goal TT=Treatment Technique ppb=parts per billion or micrograms per liter (ug/L)
 NTU=Nephelometric Turbidity units AL=Action Level BPQL=Below practical quantitative limits

**2005 WATER QUALITY DATA
 REGULATED AT THE TREATMENT PLANT**

CONTAMINANT	DATE TESTED	UNIT	MCL	MCLG	DETECTED LEVEL	RANGE	MAJOR SOURCE	VIOLATION
MERCURY (INORGANIC)	10/31/2005	ppb	2	2	BPQL	NONE	Erosion of natural deposit	NO
FLUORIDE	11/07/2005	ppm	4	4	1.36	.12-1.36	Erosion of natural deposit Treatment addition	NO
ARSENIC	10/31/2005	ppb	10	0	<2	NONE	Erosion of natural deposit	NO
SELENIUM	10/31/2005	ppb	50	50	<1	NONE	Erosion of natural deposit	NO
NITRATE-NITRITE	10/2005	ppm	10	10	<.10	NONE	Runoff from fertilizer use; leaching from septic tanks, sewage, erosion of natural deposit	NO
ALPHA EMITTERS	2002	pCi/L	15	0	.3025	.18-.51	Erosion of natural deposits	NO
BETA/PHOTON EMITTERS	2002	pCi/L	50	0	2.93	2.66-3.22	Decay of natural and man-made deposits	NO
TURBIDITY	8/12/2005	NTU	TT=.3NTU TT=% OF SAMPLES <.3 NTU	0	.65 100%	NONE	Soil runoff	NO
BARIUM	10/31/2005	ppm	2	2	.082	NONE	Discharge of drilling wastes; discharge from metal refineries; Erosion of natural deposit	NO
TOTAL ORGANIC CARBON* (results based on a yearly avg ratio)	12/2005	ppm	TT=Annual avg % removal based on raw water TOC levels and alkalinity. To be in compliance yearly avg ratio must be 1 or greater than 1.	N/A	SEE BELOW yearly avg ratio: 1.02		Naturally present in environment. Has no health effects. Provides a medium for the formation of disinfection by products, including Trihalomethanes and Haloacetic Acids.	YES

	1/05	02/05	03/05	04/05	05/05	06/05	07/05	08/05	09/05	10/05	11/05	12/05
SOURCE WATER TOC	4.53	4.93	4.73	4.61	5.55	4.43	4.53	4.41	4.31	4.52	4.79	4.52
ALKALINITY	123	129	134	131	131	137	118	108	107	112	118	125
FINISHED WATER TOC	3.42	3.37	3.22	3.46	4.46	3.36	3.18	2.99	2.87	2.96	3.31	3.50
Required % removal	25%	25%	25%	25%	25%	25%	35%	35%	35%	35%	35%	25%
Actual % removal	25%	32%	32%	25%	20%	24%	30%	32%	33%	35%	31%	23%

REGULATED IN THE DISTRIBUTION SYSTEM

CONTAMINANT	DATE TESTED	UNIT	MCL	MCLG	DETECTED LEVEL	RANGE OF DETECTION	MAJOR SOURCE	VIOLATION
TOTAL COLIFORMS	12/2005 (Monthly)	% Positive	No more than 5% positive	0	0	<1 % positive	Naturally present in the environment	NO
TOTAL TRIHALOMETHANES	12/2005 (quarterly)	ppb	80 Avg	0	63.18 (highest quarter)	31.78-63.18	by-product of chlorination	NO
HALOACTIC ACIDS (HAA5)	12/2005 (quarterly)	ppb	60 Avg	0	13.56 (highest quarter)	<10-19.00	by-product of chlorination	NO
BROMATE	12/2005 (monthly)	ppb	10	0	174 (highest month)	<5-174	by-product of ozone disinfection	YES

REGULATED AT THE CUSTOMERS TAP

CONTAMINANT	DATE TESTED	UNIT	MCL	MCLG	DETECTED LEVEL	RANGE	MAJOR SOURCE	VIOLATION
COPPER	8/2003	ppm	AL=1.3 ppm	1.3	1.1	0 sites>AL	Corrosion of household plumbing systems	NO
LEAD	8/2003	ppb	AL=15 ppb	0	3.1	0 sites>AL	Corrosion of household plumbing systems	NO

SPECIAL INFO AVAILABLE: Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone transplants, people with HIV/Aids or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the safe drinking water hotline 1-800-426-4791. Your water supply is safe in ALL water quality parameters. If you have any questions, please contact the Water Treatment Plant at 580-529-2703.

CITY OF LAWTON WATER TREATMENT PLANT 2005 WATER QUALITY REPORT

BILLING/CUSTOMER SERVICE INFORMATION: (580) 581-3308

**WEB SITES: www.cityof.lawton.ok.us or
www.epa.gov/safewater/**

WATER QUALITY

The City of Lawton is committed to providing residents with a safe and reliable supply of high-quality drinking water. This annual **A Consumer Confidence Report** required by the Safe Drinking Water Act (SDWA), tells you where your water comes from, how the treated water quality compares to the required quality standards and other things you should know about drinking water.

CRYPTOSPORIDIUM

Cryptosporidium is a microscopic organism that when ingested can result in diarrhea, fever and other gastrointestinal symptoms. This organism is found in most lakes and streams. Cryptosporidium comes from animals and humans whom are the carriers of the organism and have contact with the source water supplies. Cryptosporidium is eliminated by effective treatment combinations including filtration, sedimentation and disinfection.

TRIHALOMETHANES BY-PRODUCTS OF CHLORINATION

Million of people every year are affected by microbial contaminants (bacteria) in drinking water due to inadequate disinfection of the water supply. This is a real problem. Microbial risks are real. Chlorination of your water system is essential in order to protect public health. However, when chlorine is introduced into untreated water, chlorine and naturally occurring organics in the water form by products called TRIHALOMETHANES (THMS). Some people who drink water containing THMS in excess of the MCL over many years may experience problems with their liver, kidneys or central nervous system, and may have an increased risk of cancer.

TOC VIOLATIONS

During the first, second and third quarter of 2005 the Water Treatment Plant was out of compliance for the required TOC removal. TOC has no health effects; however, TOC can provide a medium for the formation of disinfectant by products. The Water Treatment Plant is now in full compliance with this requirement.

BROMATE MCL VIOLATION

Our water system recently violated a drinking water standard. Although this is not an emergency, as our customers, you have a right to know what happened, what you should do, and what we are doing to correct this situation. The average of the eight bromate samples submitted by the City of Lawton Water Treatment Plant for the twelve months of 2005 is .033 mg/L. This value exceeds the MCL of .010 mg/L for bromate; therefore, the WTP is in violation for exceeding the MCL for bromate.

The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that bromate is a health concern at certain high levels of exposure. Bromate is formed as a by-product of ozone disinfection of drinking water. Ozone reacts with naturally occurring bromide in water to form bromate. The EPA has set a drinking water standard to limit exposure to bromate.

WHAT SHOULD I DO? You do not need to use an alternative (e.g. bottled) water supply. However, if you have specific health concerns, consult your doctor.

WHAT DOES THIS MEAN? This is not an immediate risk. If it had been, you would have been notified immediately. However, some people who drink water containing bromate in excess of the MCL over many years may have an increased risk of getting cancer.

WHAT HAPPENED? WHAT IS BEING DONE?

The water treatment plant will try to control Bromate formation by lowering the pH of the water through the ozonation process and by lowering the ozone concentration used for disinfection.

SOURCE WATER PROTECTION

The City of Lawton is in the process of putting together a source water protection program. This is an ongoing effort to identify sources of possible pollution.

As these sources are identified, we will work to eliminate this pollution or to minimize its effect on the water supply. Your help is needed for this program to succeed. For more information, please visit www.epa.gov/owow/watershed.

Sources of pollution on the Lake Lawtonka or Lake Ellsworth reservoirs or their watershed should be reported to the Water Treatment plant by calling 580-529-2703

Please use care when using pesticides or herbicides as over application can runoff into the reservoir. Septic tanks should be serviced regularly to keep nutrients such as nitrogen and phosphorus out of the reservoir.

MONITORING REQUIREMENT NOT MET

Our water system violated a drinking water standard over the past year. Even though this was not an emergency, as our customers, you have a right to know what happened and what we did to correct this situation.

We are required to monitor your drinking water for specific contaminants on a regular basis. The results of regular monitoring are an indicator of whether or not our drinking water meets health standards. During September–December 2005 we did not monitor or did not complete all monitoring for Bromate and therefore cannot be sure of the quality of our drinking water during that time.

WHAT SHOULD I DO?

There is nothing you need to do at this time.

WHAT HAPPENED? WHAT IS BEING DONE?

In the month of September 2005 the laboratory doing the WTP compliance analysis for Bromate lost its certification for this analysis. The WTP was notified of this in March 2006 and has started sending the monthly compliance sample to the ODEQ laboratory. The monthly analysis for Bromate for 6 months was performed by a laboratory that was not certified for that analysis and as such those results cannot be relied on for accuracy.

For more information, please contact David Herring at 580-529-2703.

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

WATER INFORMATION

- TOTAL WATER TREATED:** 6,632,700,000
- DAILY AVG TREATED:** 18,171,781
- MAX DAILY FLOW:** 28,100,000
- WATER PUMPED FROM ELLSWORTH:** 2,850,728,000
- WATER PUMPED FROM WAURIKA:** 35,099,000
- TOTAL RAINFALL:** 20.84"
- AVG ATMOSPHERIC TEMPERATURE:** 62 **WATER:** 63
- PH RANGE:** 6.76-9.03
- HARDNESS** 157 PPM OR 9.16 GRAINS/GAL
- ALKALINITY:** 111 PPM
- FLUORIDE:** .99 PPM
- TURBIDITY:** .077 NTU

SOURCES OF WATER FOR THE CITY OF LAWTON

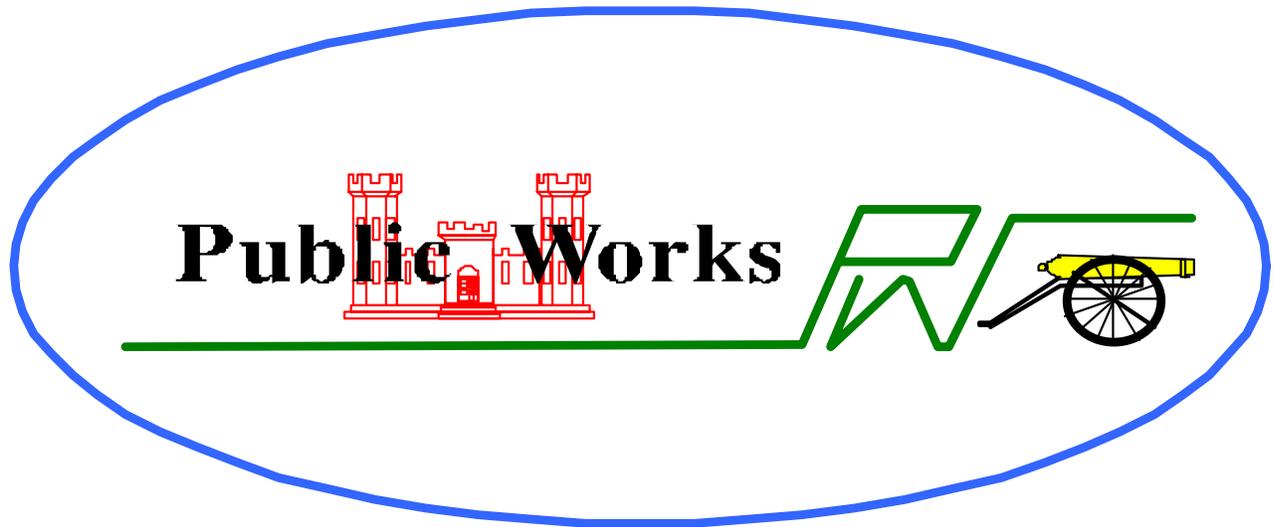
The water for the City of Lawton comes entirely from surface sources. The primary water supply is Lake Lawtonka. Lake Lawtonka has a watershed that covers approximately 92 square miles. Lake Ellsworth and Lake Waurika are the city's secondary water supplies. The watershed for Lake Ellsworth covers approximately 249 square miles, while the Lake Waurika watershed covers 562 square miles. As water travels over the land's surface or through the ground, it dissolves naturally occurring minerals and radioactive material, and can be polluted by animals or human activity. Contaminants that might be expected in untreated water include: biological contaminants, such as viruses and bacteria; inorganic contaminants, such as salts and metals; pesticides and herbicides; organic contaminants from industrial or petroleum use and radioactive materials. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. Presence of contaminants does not necessarily indicate that the water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the **U.S. Environmental Protection Agency's (EPA) Safe Drinking Water Hotline at 1-800-426-4791.**

PRSRRT STD
US POSTAGE
PAID
PERMIT NO. 46
LAWTON OK

**LAWTON WATER TREATMENT PLANT
PO BOX 27
MEDICINE PARK OK 73557**

Appendix OO

Fort Sill Public Works Engineering Design Guide



FORT SILL ENGINEERING DESIGN GUIDE
DIRECTORATE OF PUBLIC WORKS

Fort Sill, Oklahoma

General

1. Coordination of designs between all disciplines is of primary importance to producing a quality product, which in this case is the contract document(s) (drawings and specifications).
2. Design analyses texts shall follow the standard for format and content as required in the U.S. Army Corps of Engineers, Southwestern Division Architectural and Engineering Instruction Manual (SWD-AEIM), Chapter IX.
3. This document is intended to encompass design requirements which are common for all project designs and is broken out by design discipline.

Architectural Design

1. Architectural Compatibility. The designer shall provide a descriptive architectural design analysis. The analysis shall indicate to the project reviewers the logic and rationale for the selected architectural design. The analysis shall clearly indicate that the neighboring facilities were considered in the design and that the design as illustrated is compatible with surrounding facilities and/or the entire Base/Post and Base or Command Architectural compatibility documents. If the designer feels that worthy buildings do not exist, then so state and continue to support the designs selected and clarify why they are worthy, and are in the best interest of the future architectural improvement of the Base or Post. The analysis may incorporate words, sketches, illustrations, maps, photographs and color as desired to clarify the presented solution.

2. Roofing shall be standing seam metal type for structures. This type of roofing is currently being installed on most new buildings. Built-up roofing if required for mechanical systems shall have built-in walkway pads for equipment servicing and other heavy foot traffic areas. If it is necessary to install mechanical equipment on the roof OSHA requirements for safe access and handling of tools and parts must be followed. These requirements may include hoisting swing arm, guard rails, safety line anchor points, etc.

3. Entry Doors for Mechanical, Main Communications (USAF) and Electrical Rooms. Entry doors for mechanical, main communications and electrical rooms shall be exterior only. Entry of the electrical room from the mechanical room is acceptable provided an acceptable corridor space for access is provided. **ACCESS FROM THE OCCUPIED INTERIOR OF A FACILITY IS NOT ACCEPTABLE--THE BASE OR POST MAINTENANCE STAFF WILL NORMALLY BE THE ONLY PERSONS ALLOWED INTO THE MECHANICAL OR ELECTRICAL ROOMS FROM DEDICATED EXTERIOR DOORS.**

4. Building Surfaces Overall U-value Compliance. See the chapter on mechanical design for required calculations which will ensure each facility complies with the required maximum overall U-factor numbers as specified by current energy codes.

5. Building Exterior Surfaces Air Seal-up for HVAC Pressurization.

5.1 All buildings require complete detailed air leakage seal-up to eliminate uncontrolled outside air infiltration and ex-filtration to/from occupied areas. Seal-up allows mechanical air handling systems to pressurize occupied spaces, which eliminates or slows uncontrolled infiltration.

5.2 All traditional building penetrations will be sealed with an appropriate long-life (25-year minimum) material, such as elastomeric caulks, expanding foams, solid rubber stripping, spring metallic seals, etc. Traditional building penetrations will include items such as pipe penetrations, doors, windows, wall louvers, floor/wall intersections, skylights, dryer exhaust ducts, etc.

5.3 Seal-up of non-traditional building leakage locations is vitally important to enabling building pressurization by air handling systems.

5.3.1 For spaces served by "plenum" return-air handling systems, the entire heated or air-conditioned space (including the

above ceiling return-air plenum) will be sealed air tight. Seal-up will include all penetrations by mechanical, electrical, structural or architectural items. This will include items, areas or intersections of: roof surfaces, roof joist/wall connections, roof peaks, roof/wall intersections, floor/wall intersections, intersections between different wall types, intersections of walls with beams or columns, etc. Seal-up materials will include items impervious to airflow such as elastomeric caulks, expanding spray foams, etc. Batt or board insulations will not be considered adequate sealants on a stand alone basis, but will be allowed as part of a sealant system.

5.3.2 For spaces served by air-handling systems with fully ducted return-air systems, the space above the room ceilings is no longer a conditioned space. Since the space above the ceiling is a "cutoff" or un-vented attic, it is extremely prone to frost, condensation, mold, etc. if the ceiling or roof is not correctly insulated and air/vapor sealed. Seal-up locations and methods will be the same as discussed above for plenum-return systems. Suspended lay-in ceilings are not acceptable for vapor/air seals.

5.3.3 Review for compliance with building envelop seal-up requirements will be conducted at the 30% level, irregardless of whether the project is to have a 30% design review or not. Sketches, wall sections building sections, floor plans, notes etc. will be submitted at the 30% design point for seal-up compliance review. Obviously, building seal-up must be coordinated with building thermal insulation method, structural design, etc. **THE FACILITY DESIGN SHALL NOT PROCEED PAST THE 30% POINT UNTIL THE BUILDING SEAL-UP METHODS, DRAWINGS AND NOTES WHICH WILL BE INCORPORATED INTO THE CONTRACT DRAWINGS ARE APPROVED. FAILURE TO PROVIDE THE BUILDING SEAL-UP INFORMATION FOR REVIEW IS GROUNDS FOR DESIGN RESUBMITTAL.**

6. Mechanical & All Wall Louvers. Louvers shall be completely specified on the mechanical drawings (size, airflow, max. pressure drop, function/usage, min. net free area, descriptor/mark, how thick or deep, notes and requirements, such as bird screening); provide supplemental louver requirements (finishes, metal, construction, etc.) in only one place in the specifications. Architect and Mechanical engineer will coordinate to ensure requirements such as air tightness, thickness, color, etc. are fully described in the design or contract requirements. Additionally, specify louvers which shall not admit water into the building or any ductwork under any weather condition (wind or storm driven rain, etc.; this feature shall be fully coordinated with structural and mechanical engineers.

7. Location of Mechanical Plants and Main Mechanical Equipment Rooms. Mechanical plants and mechanical equipment rooms containing plant equipment (boilers, chillers, pumps, etc.) shall not be constructed in basements or on facility floors above the "ground" floor. Air Handling units or "fan rooms" may be planned and constructed on floors above grade to suit building design requirements and conditions. Do not use basements for fan rooms or for any mechanical or electrical equipment spaces.

8. Equipment Access Requirements. The architect will coordinate with the mechanical and structural engineers to provide access platforms, ladders and

catwalks for all equipment which is otherwise inaccessible because it is above user areas, ceilings, etc. Provide means of accessing equipment for removal (removable railings) and structural beams and trolley for user maintenance use in removing large and heavy items.

MECHANICAL DESIGN

1. All new building or major renovation or facility utility services shall be metered.

1.1 Water meters shall be equipped with an electrical pulse metering output transducer for connection to a future or existing Base/Post-wide Utility/Energy Monitoring and Control System (U/EMCS).

To be useful, the characteristics of the U/EMCS water meter pulse initiator must balance the limitations of the device receiving the pulses (U/EMCS) and the requirements of reasonable metering resolution. Pulse initiators shall provide a maximum of 500 pulses per minute, but not less than one pulse per 100 cubic feet of water (2.8 cubic meters). These requirements upon the pulse initiator should be reflected on the contract drawings. The limitation requirements given here are general and vary with the type of existing U/EMCS and a building's energy consumption; therefore, the pulse metering device must be tailored to the design where a Base or Post has an existing U/EMCS.

1.2 Gas meters shall be equipped with an electrical pulse (metering) output transducer for connection to a future or existing Base/Post-wide Energy Monitoring and Control System (EMCS).

To be useful, the characteristics of the EMCS natural gas meter pulse initiator must balance the limitations of the device receiving the pulses (EMCS) and the requirements of reasonable metering resolution. Pulse initiators shall provide a maximum of 500 pulses per minute, but not less than one pulse per 100 cubic feet (2.8 cubic meters) of natural gas. These requirements upon the pulse initiator should be reflected on the contract drawings. The limitation requirements given here are general and vary with the type of existing EMCS and a building's energy consumption; therefore, the pulse metering device must be tailored to the design where a Base or Post has an existing EMCS.

1.3 Electrical meters, instrument transformers, and all other utility systems shall be compatible/suitable for connection, via a pulsing or similar transducer, to the existing Base/Post-wide Utility/Energy Monitoring and Control System (U/EMCS) unless it is stated in the RFP or design scope of work that they will not need EMCS provisions.

To be useful, the characteristics of the U/EMCS electrical meter pulse initiator must balance the limitations of the device receiving the pulses (U/EMCS) and the requirements of reasonable metering resolution. Pulse initiators shall provide a maximum number of pulses per KWH up to 500 per minute, but not less than one pulse per KWH. These requirements upon the pulse initiator should be reflected on the contract drawings. The limitation requirements given here are general and vary with the type of existing U/EMCS and a building's energy consumption, therefore, the pulse metering device must be tailored to the design where a Base or Post has an existing EMCS.

2. Design conditions to be in accordance with TM 5-785 ENGINEERING WEATHER DATA for Fort Sill/Post AAF, OKLAHOMA (Location 34°39'N & 98°24'W, 361.8 meters (1187 feet) Elevation). Heating annual degree days 3367 and cooling is 2217

OUTDOOR

SUMMER 37.2°C DB (99°F DB), 24.4°C WB (76°F WB)

WINTER -8.9°C DB (16°F DB)

INDOOR as regulated by (USAFACFS 420.11)

Living quarters

SUMMER 25.6°C DB (78°F DB), 18.2°C WB (64.8°F WB), 50%RH

WINTER 20°C DB (68°F DB),

Administrative

SUMMER 25.6°C DB (78°F DB), 18.2°C WB (64.8°F WB), 50%RH

WINTER 20°C DB (68°F DB),

Work Bay

WINTER 12.8°C DB (55°F DB)

Warehouse

WINTER 10°C DB (50°F DB)

Mechanical Room (Boiler/Chiller Room)

WINTER 4.6°C DB (40°F DB)

1.1 Calculations:

1.1.1 Computer HVAC load programs may not include all loads. The designer will submit complete, detailed manual block load calculations which shall agree with computer block cooling and heating load outputs with a difference of 5% or less. Cooling block loads shall be submitted on AF form 108. Heating block loads shall be submitted on Southwestern Division (SWD) form 157-R.

1.1.2 Designer attention is directed to the equipment sizing and load calculation adjustments (additions) allowed and detailed in Chapter 13 of the OCE-AEI. The designer should use these adjustments whenever deemed necessary. For details, applications and questions, contact Fort Sill, DPW Mech. Design Section.

2.2 Preheating Coils or Other Freeze Protection:

2.2.1 Designer shall use the lowest recorded temperature for the design of critical freeze protection equipment in lieu of the standard 99% heating design dry bulb temperature. Critical equipment would include mech. space heating and freeze protection preheating coils. The applicability of this special design condition shall be discussed and verified with Fort Sill, DPW Mech. Design Section.

3. Mechanical ventilation to be in accordance with ASHRAE standard 62.1-2004. Lecture classroom (Educational Facility) space 3.8 L/sec/occupant (7.5 CFM/occupant), Computer classroom (Educational Facility) space 5 L/sec/occupant (10 CFM/occupant) and Office space (Administrative Facility) space 2.5 L/sec/occupant (5 CFM/occupant).
4. Locker room and toilets exhaust to be in accordance with ASHRAE 1999 Systems Ventilation of the Industrial Environment. Locker rooms 5 L/S sq.m (1 CFM/SQ.FT.), Toilet spaces 10 L/S sq.m (2 CFM/SQ.FT.); at least 10 L/S/toilet facility (25 CFM/toilet facility); 90 L/S minimum (200 CFM minimum). Shower spaces 10 L/S sq.m (2 CFM/SQ.FT.); at least 20

L/S/shower head (50 CFM/shower head); 90 L/S minimum (200 CFM minimum), Storage space 5 L/S sq.m. (1 CFM/SQ.FT.). Janitorial closets to treated the same as a toilet space 10 L/S sq.m (2 CFM/SQ.FT.). No return air from latrines back to air handling units, furnaces, etc.

5. Seismic zone maps and tables, design criteria, etc. shall be taken from the Seismic design technical manual, TM 5-809-10 Seismic Design for Buildings, TM 5-809-10-1 Seismic Design Guidelines for Essential Buildings and TM 5-809-10-2 Seismic Design Guidelines for Upgrade of Existing Buildings. Seismic Design for Fort Sill buildings to be per Zone 2 requirements.
 - 5.1 The designer will include the standard mechanical seismic guide specification. The specification and standard drawing compliment each other. The specification is Section 13080 - Seismic Protection for Mechanical, Electrical Equipment.
 - 5.2 Seismic zone maps and tables, design criteria, etc. shall be taken from the Seismic design technical manual, TM 5-809-10 Seismic Design for Buildings, TM 5-809-10-1 Seismic Design Guidelines for Essential Buildings and TM 5-809-10-2 Seismic Design Guidelines for Upgrade of Existing Buildings.
6. Energy Monitoring and Control System (EMCS/UMCS): Energy Monitoring and Control System (EMCS): All new Mechanical systems (pumps, chillers and boilers) shall be connected to the existing post wide EMCS system (t.a.c. Tour Andover Controls, 1650 West Crosby Road, Carrolllton, TX 75006-USA, (972) 323-5460)). The EMCS system shall monitor the utility consumption (electricity, gas and water). Temperature control system to be designed in-accordance with TM 5-815-3 and specifications UFC 13801 Heating, Ventilation and Air Conditioning (HVAC) Control Systems. Control system to be Direct Digital Controls for HVAC (DDC) as identified in specification section UFC 15951. Control system for buildings 10 tons and larger to be Digital Controls for HVAC (DDC) with EMCS and buildings with less than a total load of 10 tons to be microprocessor-based thermostat with password control code.
 - 6.1 EMCS/UMCS: Fort Sill uses a central utility monitoring and control system. It is an "open" protocol; LonWorks based system by TAC (Tour Andover Controls) Americas, located in Dallas, TX. These new facilities shall be connected to the UMCS. The connection method is via LAN; The D/B contractor will have to coordinate with Fort Sill DOIM to obtain a static IP address and to get their construction requirements (crossover mech/electrical) requirement.
 - 6.2 All mechanical building equipment and systems shall be connected to EMCS, including but not limited to air handlers, makeup air units, pumps, chillers, boilers, cooling equipment down to 5-tons, etc. Buildings with a total load (all spaces) larger than 10 tons shall be connected to the base wide EMCS system using the base Local Area Network (LAN) for communication to the existing head end. Buildings with total loads less than this may be stand alone building management EMCS panel or microprocessor type thermostat that required an access code to execute changes from heating to cooling, hours of operation and temperature setting.
 - 6.3 Monitoring and Control hardware and software requirements are: Standard Input/Output (I/O) points to be connected and integrated for monitoring and control (starter list which is not necessarily complete); Will need alarm limits, etc. as appropriate for all I/O:
 - Outside Temperature (F)

Outside Humidity (%)
 Boiler Safeties (All)
 Chiller Safeties (All)
 Air Handler Safeties (Freezestats, Firestats, etc.)
 Air Flow Monitor (normal/low)
 Start/Stop Monitor (normal/low)
 Air Handler Hot Deck (F)
 Air Handler Cold Deck (F)
 Return Air Temperature (F)
 Mixed Air Temperature (F)
 Supply Temperature for each Zone or Main Supply Temp (F),
 etc.
 Room Air Temperature for each Zone (F)
 Humidity for each Zone (%)
 Chilled Water Supply (F)
 Chilled Water Return (F)
 Chilled Water Flow (GPM)
 Chiller Start/Stop Control and Load Limiting Input/
 Tower Fan Status (on/off)
 Condenser Water Supply & Return Temps (F)
 Chilled Water Pump Status (on/off)
 Economizer Control
 Hot Water Pump Status (on/off)
 Hot Water Supply & Return Temperatures (F)
 Hot Water Flow (GPM)
 Filter Media Differential Pressure Alarms
 Motor Run Time (elapsed)
 Moisture Alarms in Raised Floor Areas
 Enable/Disable
 Start/Stop
 Run-longer user interface (usually 2 hours) to delay
 unoccupied modes

- 6.4 Standard Monitoring and Control Software that will be provided, both at the building or be integrated into or used at the existing EMCS are (again not a comprehensive list):

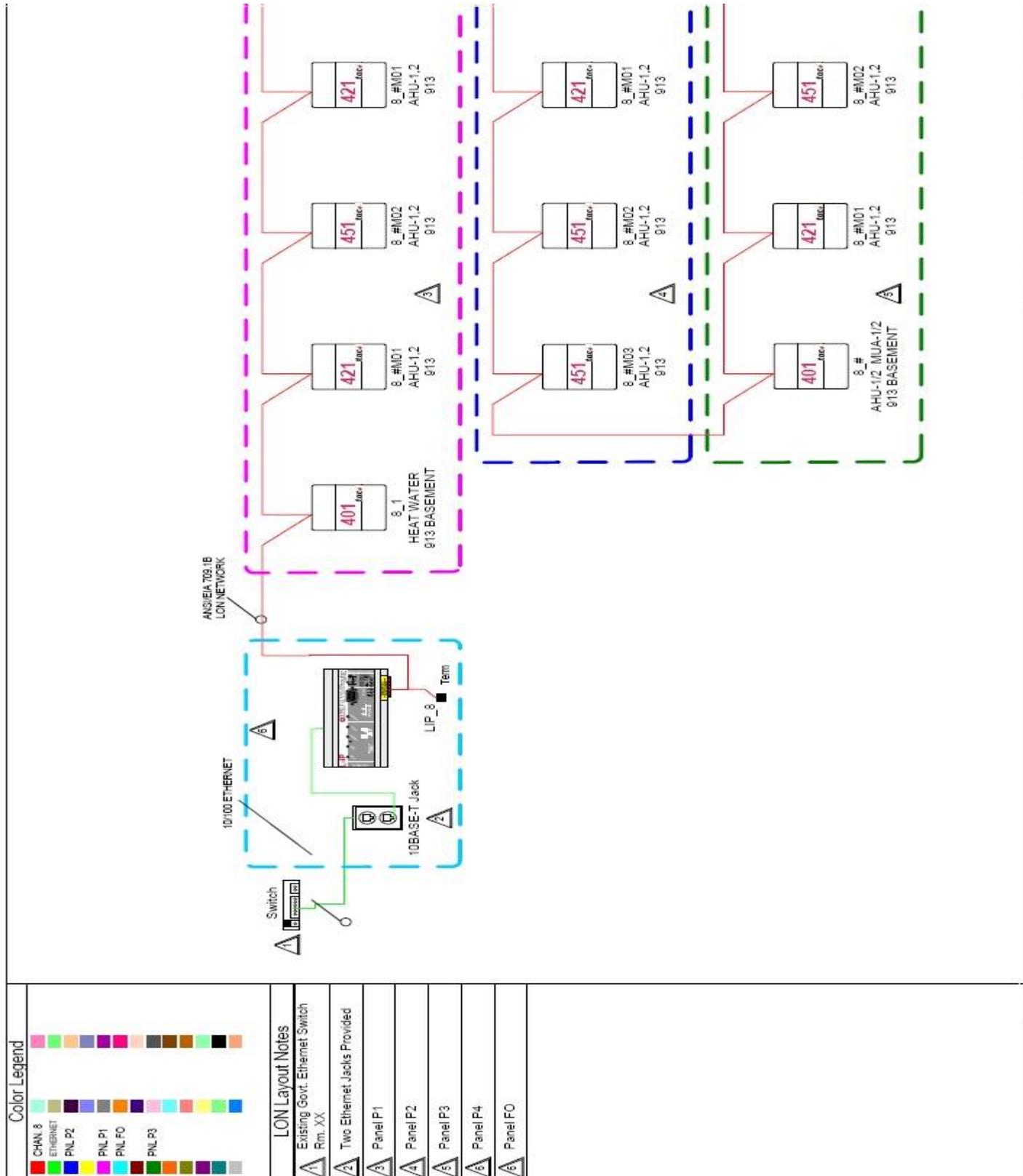
High and low temperature limit alarming
 High and low humidity limit alarming
 Equipment runtime and status (on/off, enabled, etc.)
 Scheduled and optimum start/stop
 Duty cycling
 Demand limiting (motor start/stop restrictions, motor size, etc.)
 Occupied/Unoccupied
 Time Scheduling
 Day/Night Setback
 Economizer
 Ventilation and Recirculation, Vent Delay, etc.
 Hot and Cold deck reset
 Reheat coil reset
 Boiler plant - boiler optimization
 Chiller plant - chiller optimization
 Heating water supply temperature reset
 Chilled water supply temperature reset
 Condenser water reset
 Postwide demand limiting

- 6.5 Integration of new facilities into the existing EMCS database and monitoring and controls software (such as the postwide demand limiting) will require generation of custom graphics matching the

style and complexity of the existing graphics. This will have to be done at the existing EMCS "front-end". Fort Sill does not want just anyone trying to do integration, but prefers that TAC or their designated local representative in Oklahoma City, OK (OKC) do the integration; TACs OKC rep. is , Energy Management & Controls Synergy (EMCS), POC is Mr. Jeff Houpt, 405-528-3627 or Welchweb Integration POC Mr. Charles Lee Welch, 817-857-1054. Other possible integrators (although not familiar with Ft Sill) are: Tang & Associates, POC is Mr. John Huston, 312-616-7498 or EMC engineers, POC is Mr. Carl Lundstrom, 678-254-1221.

- 6.6 Physical Interfacing Requirements: physical interfacing requirements are illustrated below with illustrations of a typical building interface and wiring layout and a LON to IP (L-IP) router connection diagram (as is typical on existing EMCS). If a building does not contain a government ethernet switch for LAN interface, it must be installed by DOIM at a cost to the project. Additionally, at this time DOIM is providing the "drop" from the switch to the location of the EMCS interface; the drop includes wiring and wiring from the switch to a two ethernet jack on a box. The drop also includes an IP address for the L-IP ethernet router. The project must also pay DOIM for providing the "drop". Note that these requirements and cost may change so during each project connectivity must be planned and costed with DOIM coordination.

Point Naming Convention: Fort Sill has requirements for naming of EMCS database points. Obtain and include this drawing and data as a requirement for each contract.



7. Geothermal ground or water source Heat Pumps shall be considered for all heating and cooling administrative and billeting areas. Gas fired furnaces with DX split system air conditioning shall be considered for buildings with cooling load of 10 tons or less. Package air cooled chiller with thermal storage (Calmac® propylene glycol type), hot water boiler and (multi-zone and/or single zone) air handler(s) for system larger shall be considered for buildings with cooling load of 10 tons or larger. The use of natural gas radiant heaters with hot surface ignition, in the apparatus bay and mechanical room shall be used in-lieu-of unit heaters where possible. In the mechanical room(s) gas fired radiant heater(s) with millivolt and standing pilot system shall be used for freeze protection. This type will not require electrical connections and will continue to operate in the event of a power outage.

8. Air conditioning and heating equipment should be industrial grade with a 14 + SEER on the air cooled chiller or air conditioning units and 80 + AFFUE rating with electronic pilot ignition on the boiler or furnace. The condenser coil(s) construction to be copper tube with copper or aluminum fins, all fins to be the flat plate type. Refrigerants shall be one of the fluorocarbon gases. Refrigerants shall have number designations and safety classifications in accordance with ASHRAE 34. Refrigerants shall meet the requirements of ARI 700 as a minimum. Refrigerants shall have an Ozone Depletion Potential (ODP) of less than or equal to 0.05. Equipment needs to be industrial grade classification.

9. Hot Water Boiler Systems:

9.1 Single building, hot water boiler systems shall be designed to include a hot water storage tank with a minimum size equivalent to one minute of hot water system flow. The designer shall coordinate the incorporation of the tank into the heating system with Design Section.

9.2 Boilers to be the condensing type 97 + AFFUE rating with the associated acoustical and vibration isolation kits. In design utilizing mutable boilers to achieve the heating load requirements primary and secondary pumping and EMCS programming to stage and optimize the boilers efficiency shall be used.

10. Mechanical Wall Louvers:

10.1 Louvers shall be completely specified on the drawings and in only one place in the specifications. Coordinate with the project architect to ensure requirements such as rain tightness, thickness, color, etc. are fully coordinated.

11. Design Coordination:

11.1 Coordination of Mechanical and Structural Designs: Coordination shall be both formal and informal. The mechanical calculations in the design analysis shall include a listing of mechanical equipment loads (weights), loading areas, etc. which have been given to the structural engineer(s). The loading list shall contain information for all devices on each project including fans, VAV or dual duct boxes, piping, air handling units, ductwork (as a standard weight/unit area) and any special mechanical device or equipment. The mechanical and structural designers shall jointly mark up floor plans to show the location of all supported equipment and platforms, mechanical penetrations of roof structures, grade beams, joists, beams, platforms, etc. with the

purpose of ensuring that loading, penetrations, etc. are all accounted for in the design and coordinated. The marked up plans shall not be included in the design analysis "book", but shall be submitted by the structural designer for review at the 90% design level. Of course, any addition or change to the design after 90% design shall require re-submittal of marked up coordination drawings. Note that minimum size of coordination markup drawings shall be 1/2-size or 1/2 of a full size drawing sheet.

- 11.2 Design of mechanical room(s) shall show equipment locations with their required service areas and paths of travel for removal of equipment. The path of travel shall not require the removal and reinstallation of other equipment.

12. Water Treatment.

- 12.1 On all systems where water is used for either primary or secondary heating or cooling, equipment and chemicals must be installed for chemical treatment. This applies to both closed and open type re-circulating systems. Unless specifically told otherwise, the designer shall design and install a bypass filter/feeder type water treatment system complete with isolation valves, drain, flow control (calibrate balancing valve with flow measurement taps, etc.)
- 12.2 The equipment installation will be based upon specific information obtained at the construction site and will be consistent with existing Base or Post treatment methods. Required design information includes data such as a current analysis of Base or Post water.
- 12.3 Industrial Wastes. All industrial buildings, maintenance shops, or other facilities generating waste water of other than sanitary wastes should be considered for connection of such wastes to an industrial waste sewer, if available. Wastes are to be identified both in characteristics and quantities in the project design analysis.

13. Chillers: Systems 100 tons or less use package chillier where practical, to keep refrigerants out of buildings. Large systems over 100 tons or group of buildings use central Chiller plant with Centrifugal or Absorption. Additionally, indoor refrigeration systems shall provide all design requirements to meet the safety requirements mandated by ASHRAE Standard 15.

- 13.1 Refrigerants shall be one of the fluorocarbon gases. Refrigerants shall have number designations and safety classifications in accordance with ASHRAE 34. Refrigerants shall meet the requirements of ARI 700 as a minimum. Refrigerants shall have an Ozone Depletion Potential (ODP) of less than or equal to 0.05.
- 13.2 Chiller tube fouling factors shall be a minimum be 0.001, for both evaporator and condenser bundles. Condenser bundle fouling factors may have to go higher (0.002 or greater) if continuous, extremely dirty open cooling tower sumps or other fouling problems are expected.
- 13.3 Air-cooled condensing unit and/or air-cooled condenser design. The base entering ambient air design temperature, for air entering the refrigerant condensing coil(s) will be the summer design 0.4%

Occurrence dry bulb from UFC 3-400-02; then 3 to 5 degrees F (1.67 to 2.78 degrees C) shall be added to the 1% dry bulb entering ambient to account for air re-circulation and ground heating affected caused by the building structure, walls, landscaping, roofs, etc. Additionally, with the implementation of force protection requirements, some designs are taking outside air in from above roof penthouses or ventilators, if this is the case, the designer will use the use the 1% Occurrence summer ambient, but add 1 deg F(0.56 deg C) to the air handler, etc. intake temperatures to account for heat pickup from the roof and intake device due to solar heating. This means that designers can't rely directly on HVAC load and analysis programs to size coil loads for them; Rooftop intake opening, from closest point on roof to lowest portion of the intake shall be not less than 18 inches.

- 13.4 Chilled water system volume requirements: For each chilled water system, the system must contain a minimum of 4.294 L (4 gallon) of water/ Propylene glycol per ton of chilling capacity, excluding the water volume of the chiller and all load heat exchange devices (coils) in the system. If the system volume as described above does not contain a minimum of 4.294 L/kW (4 gallon/ton), a chilled water storage tank shall be designed to bring the system volume up to a min. of 4.294 L/kW (4 gallon/ton). The chilled water storage tank shall be piped into the chilled water return line upstream of the chiller.
 - 13.5 Provisions will be made for removal of equipment from each chiller for maintenance. Tube bundles will have provisions for easy removal for maintenance, i.e. A-frames or monorails structurally adequate to support the loads and proper distance between system components and walls, etc. to ensure ability to clean, repair, and/or replace tube bundles.
 - 13.5 Package chiller tube bundle and piping shall be heat taped to eliminate freezing problems; Install Propylene Glycol in the system and chiller piping to prevent freezing to the temperature of -8.9°C DB (16°F DB) and programming in the EMCS to cycle the pumps for additional protection.
14. Cooling Towers and Condenser Water Systems:
- 13.1 To eliminate condenser water pump cavitation problems: First, as a minimum to ensure positive pump priming, the top(s) of the condenser water pumps shall be 3 feet lower than the cooling tower basin water surface. Second, the designer will evaluate the maximum Net Positive Suction Head Required (NPSHR) for the pumps selected (specific manufacturer). Then using elevated cooling tower cell(s) and/or putting the condenser water pumps in a pit, the maximum NPSHR with a safety factor of two shall be provided, that is, the NPSH (Available) shall exceed the maximum NPSHR by at least the safety factor.
 - 14.2 Condenser water pumps and piping shall be heat taped to eliminate freezing problems; Install condenser water pumps in the mechanical room or plant. Install condenser water piping below grade and provide positive drainage for the required above grade portions. Of course, other non-freeze designs are possible. The basic condenser water systems design, including freeze protection shall be discussed and finalized at the pre-design conference.

- 14.3 Provide one large mesh, duplex strainer on the condenser water main up stream of the pumps. The duplex strainer eliminates strainer cleaning downtime.
- 14.4 The designer shall detail and show the required condenser water pipe supports to ensure all condenser water piping is supported "independently" from the cooling tower and the cooling tower inlet/balancing valve(s).
- 14.5 The designer shall provide enough condenser water piping flanged connections to enable piping removal for all tower maintenance, including complete fill replacement and tower cell replacement.
- 14.6 Cooling towers shall be concrete or stainless steel casing. FRP, Zinc-Coated steel and/or PVC casings are not acceptable, due to short life and environmental concerns.
15. Duct system(s) to be constructed of galvanized sheet metal except for very small amounts of flexible diffuser runouts shall be sheet exterior insulated sheet metal only. Duct liner to be only used as required for acoustical control, use duct wrap or board insulation. Fiber glass duct board system(s) are not acceptable and shall NOT be used.
- 15.1 Ducting from and to an Air handling unit: Air handling units in mechanical spaces, fan rooms, etc. shall be fully ducted, that is ductwork shall extend from the supply fan outlet connection to the mechanical space wall and beyond to the entire SA duct system; Return Air ductwork shall extend, at least from the mechanical space wall continuously back to the air handler and exhaust and/or relief ductwork shall be ducted from the air handler to the building exterior; Outside air intake ductwork shall be ducted from the building exterior to the air handler.
- 15.2 Duct Runs:
- 15.2.1 FITTINGS: Do not use splitters, scoops or extractors. Show manual balancing dampers for all duct runouts and branches on the plans.
- 15.2.2 FLEXIBLE DUCT: Limit flex duct lengths to 1500 mm (5'-0") and straight runs. Provide hard elbows as required for all bends. Do not use more than one section of flex duct in a single duct run.
- 15.2.3 Duct liner: Duct liner shall only be used for exterior ductwork and for acoustical purposes; Its used shall be strictly limited due to problems with duct cleaning. Additionally, add to the specifications that duct liner will not "count" toward duct insulation values and requirements (except for exterior(outdoor) internally insulated ducts, ducts shall be insulated the same weather internally lined for acoustics or not.
- 15.2.4 Duct Seal Classes: Put this in the specifications; This information will both save energy and reduce or eliminate requirements for duct leakage testing: Constant Volume HVAC systems, all ductwork seal class A. Exhaust and ventilation systems, seal class A. VAV HVAC systems -

seal class A to the VAV terminals, then seal class C downstream of the terminals.

15.2. CALCULATIONS:

15.2.1 GENERAL:

- 15.2.1.1 Do not use static regain for calculating VAV system duct pressure losses.
- 15.2.1.2 Maximum Duct velocity shall not exceed 2000 feet per minute. This velocity may be too high for good acoustical performance in many cases and must be used with discretion.
- 15.2.1.3 HAND CALCULATIONS: Provide a hand calculation of the longest duct run for each Air handling unit. Each hand calculation must be accompanied with a sketch showing the duct system, lengths used in calculations, and air quantities entering or leaving the duct system. Calculations should be presented in a point-to-point tabular form and must include both pressure loss and velocity for each duct section in the longest duct run. The calculations must be traceable to the HVAC plans.
- 15.2.1.4 COMPUTER CALCULATIONS: Provide a sketch showing all nodes. Provide a point-to-point summary of the pressure losses for the governing duct run. The point-to-point summary may be hand written if the software used for the calculations is not capable of providing such a summary.

16. Do not place equipment on the roof. Roof top air handler(s), self contained heating/cooling units, condensing units, air cooled condensers, exhaust fans, supply fans, etc. are not acceptable.

17. Provide make up air quantity equal to exhaust air, which is to include air exhausted from battery rooms and vehicle exhaust systems.

18. Battery rooms, vehicle exhaust systems, and other industrial ventilation systems to meet the requirements of the latest edition of the "industrial ventilation" manual of the American conference of governmental industrial hygienists.

19. Use ASHRAE 15 SAFETY CODE FOR MECHANICAL REFRIGERATION requirements for separation of boilers and air conditioning equipment containing fluorocarbon refrigerant gases.

20. All new building or facility water services shall be metered. Water meters shall be equipped with an electrical pulse (metering) output transducer for connection to an existing base-wide Utility/Energy Monitoring and Control System (U/EMCS). New water lines under existing roads are to be bored. Cutting the road is not acceptable.

- 20.1 To be useful, the characteristics of the U/EMCS water meter pulse initiator must balance the limitations of the device receiving the pulses (U/EMCS) and the requirements of reasonable metering resolution. Pulse initiators shall provide a maximum of 500 pulses per minute, but not less than one pulse per 100 cubic feet of water. These requirements upon the pulse initiator should be reflected on the contract drawings. The limitation requirements given here are general and vary with the type of existing U/EMCS and a buildings energy consumption, therefore the pulse metering device must be tailored to the design where a base or post has an existing U/EMCS.
- 20.2 All new building or facility natural gas services will be metered. Gas meters shall be equipped with an electrical pulse (metering) output transducer for connection to a future or existing base-wide Energy Monitoring and Control System (EMCS). New gas lines under existing roads are to be bored. Cutting the road is not acceptable.
- 20.3 To be useful, the characteristics of the EMCS natural gas meter pulse initiator must balance the limitations of the device receiving the pulses (EMCS) and the requirements of reasonable metering resolution. Pulse initiators shall provide a maximum of 500 pulses per minute, but not less than one pulse per 100 cubic feet of natural gas. These requirements upon the pulse initiator should be reflected on the contract drawings. The limitation requirements given here are general and vary with the type of existing EMCS and a buildings energy consumption, therefore the pulse metering device must be tailored to the design where a base or post has an existing EMCS.

21. HVAC Pipes

21.1 GENERAL:

21.1.1 Pipe Sizing Criteria for hydronic systems:

General piping sizing criteria is a friction loss rate of between 1 and 4 feet per 100 feet of pipe (97.9 to 391.5 Pa/m of pipe) with a best nominal pipe sizing friction loss rate being used of 2.5 feet per 100 feet of pipe (245 Pascals per meter of pipe).

Additionally, to limit piping noise - maximum pipe velocity shall not exceed 4 feet per second (1.219 m/s) for piping 2 inches (50mm) and smaller and shall be sized with a pressure drop per unit length of no greater than 4 ft of water per 100 ft of pipe (392 Pa/m) for piping over 2" (50mm) in size.

- 21.1.2 Do not use reverse return systems unless the systems served are configured such that no additional piping is required than would be required for a direct return system. Design-Build contractors may use reverse return piping systems at their discretion.
- 21.1.3 Hand Calculations. Provide a hand calculation of the longest pipe run for each HVAC hydronic system. Each hand calculation must be accompanied with a sketch showing the pipe system, lengths used in calculations, and water quantities flowing into or out of the piping system. Calculations should be

presented in a point-to-point tabular form and must include both pressure loss and velocity for each pipe section in the longest run. The calculations must be traceable to the HVAC plans.

- 21.1.4 Computer Calculations. Provide a sketch showing all nodes. Provide a point-to-point summary of the pressure losses for the governing pipe run. The point-to-point summary may be hand written if the software used for the calculations is not capable of providing such a summary.

22. MISCELLANEOUS ITEMS RELATED TO EQUIPMENT SELECTIONS AND CALCULATIONS:

- 22.1 Provide psychometric charts for each air handling system.
- 22.2 Provide calculations for each fan and pump used. For fans allow for additional (safety factor) pressure losses due to construction tolerances. This is especially true for exhaust systems since exhaust ductwork generally follows the most torturous routing during construction. Also, a reasonable fan static pressure safety factor is also required to enable balancing according to the current testing and balancing specification, which is +10%, -0% for airflows.
- 22.3 Provide fan curves and pump curves for all fans and pumps. The curves shall show both the fan and system curves.
- 22.4 Documentation of Equipment Selections in Design Analysis: Provide catalog cuts for major pieces of mechanical equipment (chillers, boilers, air compressors, furnaces, air handlers, condensers, condensing units, pumps, VAV terminals, heat exchanges, water softeners, etc.) for both the 30% and 90% design submittals. If equipment types have radically changed or been added after 90% design, provide catalog cuts for the new or changed equipment. Provide catalog selections from at least 2 viable manufacturers for space planning purposes, with the largest equipment being used for that planning.
- 22.4.1 Fan Selection: To control fan sound energy generation in conjunction with the acoustical design, fans shall be selected as near to maximum efficiency as possible and adjacent ductwork shall be properly designed to limit turbulence, etc.
- 22.4.2 Pump Selection: Pumps shall be selected utilizing all required factors of the install/designed situation including flow, total dynamic head, liquid temperature, maximized efficiency, required motor voltage, etc. All of the above considerations are detailed in ASHRAE handbooks. Additionally, pumps shall normally be selected -15% and +5% of the 100% Best Operating Point (BEP) flow and shall be selected well to the right of any point of instability. Finally, pumps for use in variable speed pumping situations shall be selected optimally for energy savings with a pump that has exhibits a pump curve of relative "steepness" to avoid problems of flow control & instability.
- 22.4.3 Boiler Selections and Documentation in the Design Analysis: Each design shall include complete

documentation of boiler, or other heating source device selection. This will include a summary of all connected loads and flows and allowances added for piping heat losses and pickup allowance. This work shall be done by hand and shall also include manufacturers adjustments for elevation, delivery temperature, ambient temperatures, fuel type, flow rates, glycol solutions, etc.

22.4.4 Chiller Selections and Documentation in the Design

Analysis: Each design shall include complete documentation of chiller, or other cooling source device selection. This will include a summary of all connected loads, diversity and flows and allowances added for piping and pumping heat gains, etc. This work shall be done by hand and shall also include manufacturers adjustments for elevation, delivery temperature, ambient temperatures, flow rates, glycol solutions, etc.

23. Computer Energy System Analyses (CESA):

23.1 The CESA shall be a stand alone document which shall contain a summary report for the energy budget analysis and if required, the building mechanical systems and features life cycle cost analysis and selection.

23.2 All buildings and facilities require a computer energy systems analysis (CESA). See appendix SA1 for Energy Conservation Policy - US Army Corps of Engineers.

23.3 THE REQUIREMENT FOR LIFE CYCLE COST MECHANICAL SYSTEMS SELECTIONS IS CONGRESSIONAL AND IS NOT WAIVABLE! THE DECISION AS TO WHICH PROJECTS WILL REQUIRE LIFE CYCLE COST EQUIPMENT SELECTIONS WILL BE MADE BY THE TULSA DISTRICT, MILITARY DESIGN SECTION FOR EACH PROJECT. If a life cycle cost (LCC) study is required, before any work is done, the designer shall formally submit (in writing through the USACOE A/E contract manager) a letter stating which mechanical building systems which are proposed to be studied (min. of 3 competitive systems) for approval by the USACOE, Tulsa Dist., Mil. Design Section; the letter will also include the building systems, which are common to all study alternatives. Systems other than mechanical, such as glazing or wall insulation may also be studied by the designer, however those "other" study category items will not normally substitute for the mechanical systems study alternatives. The study alternatives will be discussed, changed and/or finalized with the designer. The designer, after finalization of the study alternatives with Tulsa Dist. will submit the final alternative choices (written letter format) to the USACOE A/E contract manager for the official file.

23.4 ENERGY BUDGET ANALYSES ARE REQUIRED FOR ALL NEW FACILITIES REGARDLESS OF SIZE AND FOR MOST ADD/ALTERED FACILITIES. THE ENERGY BUDGET REQUIREMENT IS BASIC ARMY/DOD CRITERIA AND IS NOT WAIVABLE! Energy budget studies will ordinarily require a minimum of two separate computer building energy simulations. The first simulation containing the mech. LCC study alternatives and using the "actual" building operation schedule and all process loads. The alternatives energy consumption's from the first simulation is utilized as LCC input data. After selecting one mech. system alternative, via LCC study, a second simulation is run using the chosen system, no process loads and a predetermined operation

schedule. The predetermined schedule and no-process loads allow comparison of the results of the second simulation with target energy budget figures. The target figures and predetermined occupancy schedules by occupancy/function are given in either AF ETL 94-4, Energy Budget Figures (EBFs) for Facilities in the Military Construction Program (U.S. Air Force projects) or the USACOE Architectural and Engineering Instructions (AEI), Chapter 11 (U.S. Army Projects).

- 23.5 Copies of a sample CESA summary report are available to the designer through the USACOE A/E contract manager.
- 23.6 Complete manual calculations shall be submitted to show compliance with the max. allowable overall U-factor requirements for walls, roofs and floors. The max. allowable overall U-factors shall be those shown in AF ETL 94-4, attachment 6 (Air Force Projects) or U.S. Army Corps of Engineers, Architectural and Engineering Instructions Design Criteria, Chapter 11, Table 11-4A Building Envelope Component Guidelines (Army Projects). Manual calculations shall follow the procedure of ASHRAE 1993 Fundamentals Handbook, Chapter 22, page 22.12, in the paragraph on U-overall Concept.
24. Acoustical analyses:
 - 24.1 A complete acoustical analysis will be required for mechanical ducted and unducted fan systems (room noise levels due to duct-borne noise) and for noise from mech. equipment transmitted through building surfaces to critical spaces/areas. Critical spaces are, occupied spaces next to mech. rooms or rooms next to outside equipment, rooms affected by jet noise, etc. Determination of which room(s) is(are) critical on a duct system is not always obvious and may require the designer to analyze multiple paths, to initially identify the critical room(s). For duct-borne noise, use procedures in the ASHRAE Fundamentals Handbook. For noise and vibration transmitted through building surfaces and structure, use Army Technical Manual TM 5-805-4, Noise and Vibration Control for Mechanical Equipment including submittal of all required calculation forms.
25. Acoustical analysis requirements are referenced in the SWD-AEIM. The SWD-AEIM references the Southwestern Division (SWD) criteria letter of 6 February 1997. A copy of the criteria letter may be obtained via the USACOE A/E manager.
26. The Mandatory Computerized Energy Systems Analysis (CESA) and Report Requirements: The CESA is comprised of studies, analyses, and reports for facilities energy conservation (Energy Usage, Conservation & Budget) and Life Cycle Cost Equipment Selection/Analysis (LCCA). The CESA incorporates all life cycle cost analyses (LCCA) and reports in an attempt to determine the best method to provide the most life cycle cost and energy effective building for our customers. In general, LCCA for a facility includes selection of building features as alternative HVAC systems (plant and/or building, building surfaces insulation levels or more efficient lighting systems. Selection of systems and features to study is guided and governed by the Corps District and will normally include 3 alternatives for each building feature studied. Energy Usage, Conservation and Budget entails reporting that the features, systems, etc. of the facilities meet mandatory limits imposed by ASHRAE standard 90.1 and EPACT 2005.

- 26.1 Energy and Study Criteria; if a date or version for criteria is not given, then the latest adopted or authorized version or edition is to be utilized. If the designer has a question, call the District Office for clarification:
- 26.2 The guiding document for energy conservation and life cycle cost selection is the Unified Facilities Criteria (UFC) 3-400-01 which references the following basic criteria. Note that the UFC has been coordinated, signed and released for use by all 4 military services:
- 26.3 Overall energy criteria: The energy criteria and goals can vary dependent upon the type of project, Model RFP/Modularity or stand project (milcon, POCA, O&M, etc.), see the following paragraphs:
- 26.3.1. Refer to Engineering and Construction Bulletin No. 2005-20 and EPACT 2005,
http://www.wbdg.org/ccb/ARMYCOE/COEECB/ecb_2005_20.pdf
- 26.3.2. Model RFPs for Army modularity projects require:

The Model RFP basically states the following, energy conservation strategies and HVAC and lighting systems selections shall achieve at least 30% energy savings over ANSI/ASHRAE/IESNA Standard 90.1-2004. Selection of solutions and technologies to achieve energy performance requirements shall be based on life cycle cost analysis. Some ways/best practices to achieve these requirements are listed in the Advanced Energy Design Guide: Small Office Buildings (ANSI/ASHRAE/IESNA).

UFC 3-410-01FA states "ENERGY COMPLIANCE ANALYSIS. In order to comply with the Energy Policy Act of 2005 (EPAct 2005), designs must achieve energy consumption levels that are a minimum of 30 percent below the level required by ASHRAE Standard 90.1. To demonstrate compliance with the EPAct 2005, the designer shall prepare an Energy Compliance Analysis (ECA) that includes a narrative of the path taken to demonstrate compliance (including reference to each paragraph in ASHRAE 90.1 that make up the proposed compliance "path"; identification of any software used to prepare calculations, input to and output from all calculations (with adequate explanation so that a reviewer can understand what all of the data means); a description of each energy conservation feature or change considered and the corresponding impact that it had on calculated energy consumption; and a description of the design proposed as a result of the ECA along with its calculated energy consumption".

All other projects shall meet the 30% energy reduction within project budget and if life cycle cost effective. Obviously, this will require computerized hourly energy analyses and life cycle cost analyses all of which will need to follow the standard procedures and criteria herein above for such studies and reports, etc. One large item to note, if budgets do not allow, the energy savings goals are not to be completely abandoned, instead save as

much as possible within budget and life cycle cost effectiveness.

UFC 3-400-02, Engineering Weather Data

ASHRAE Handbook of Fundamentals, American Society of Heating Refrigeration and Air Conditioning Engineers, Inc., Atlanta, Georgia

Title 10 Code of Federal Regulations, Part 436 - Federal Energy Management and Planning Programs, Subpart A - Methodology and Procedures for Life Cycle Cost Analysis

ASHRAE Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings, User's Manual, American Society of Heating Refrigeration and Air Conditioning Engineers, Inc., Atlanta, Georgia

ASHRAE Standard 62.1, Ventilation for Acceptable Indoor Air Quality

UFC 3-400-01 describes basic criteria and procedures for CESA for the USACOE Districts and their Contractors. The CESA shall be a stand alone document, provide all analysis input, output, assumptions, sketches, reduced floor plans, etc. to support the calculations, analyses and reports. The requirement for a CESA is mandatory for all projects to implement congressional requirements and as such is not waivable (see Appendix SA1 for Energy Conservation Policy), but required work varies by project or facility based upon size and complexity. The requirement for life cycle cost building systems and features selection is congressional and cannot be waived, even by a project or technical manager. Decisions as to which or any systems or features are worthy of study will be made by the District office, Military Design Section for each project. Design-Build projects will normally indicate which studies are required and which systems shall be studied; refer to the RFP. The Architect-Engineer A/E firm shall submit a written list with a minimum of 3 equivalent and competitive mechanical systems and perhaps some other building features for review and approval. No studies shall proceed without prior District approval of the intended building systems and features. The Designers should note that the UFC relies on ASHRAE standard 90.1 to ensure compliance with federal energy guidelines and reduction targets.

26.3.3. Mandatory and Suggested Software Tools and Forms: Energy Conservation, LCCA and HVAC/Energy Analysis Software Tools:

For building load and energy analyses, choose one from the following approved:

Building Loads and System Thermodynamics (BLAST), Trane TRACE, Carrier Hourly Analysis Program (HAP); Please take note; it is mandatory that all software used shall be the latest versions/subversions for MS® Windows.

For life cycle cost analyses, choose from the following mandatory software for data input, output and reports:

Life cycle costing shall be in accordance with Title 10 Code of Federal Regulations Part 436, Subpart A. The life cycle costing program to be utilized and in full compliance with the Federal Regulation and updated with the latest economic factors is the Building Life Cycle Costing (BLCC) program available from the National Institute of Standards and Technology. The Department of Energy's building energy tools web site has a link to BLCC (under Energy Economics) and it can also be found at <http://www.eren.doe.gov/femp/techassist/softwaretools/softwaretools.html> . For LCCA, the designer shall include LCCA alternative costs based upon actual equipment and materials involved, not just a "stock" cost per unit floor area time floor area.

To report Energy Usage, Conservation and Budget:

The A/E may be allowed to utilize manual means, as in forms from ASHRAE std 90.1 or software, as provided by DOE, RES check (for residential building energy code compliance) or COMcheck• EZ (for Commercial Building Code Compliance); COMcheck• EZ is the software that would normally be applied to COE projects. Currently, the software is available at web location, <http://www.energycodes.gov/> The designer must get permission to utilize the above in lieu of CESA (computerized energy runs, life cycle costing, etc.) so do not assume that you can use these programs without permission.

- 26.3.4. Required Manual Calculations with the CESA: Manual calculations and sketches shall be provided for building surfaces U-factors, R-Values and surfaces weights/unit area as part of the reported input to any energy analysis; the calculations shall follow the procedure of ASHRAE Fundamentals Handbook, for detailed calculation of overall corrected U-factors and shall include all thermal holes, thermal ties, etc. Additionally, exterior thermal air film resistance coefficient used for R value calculations for wall sections shall be a maximum of 0.17 sq ft-deg F-hr/BTU. Additionally, provide listings or spreadsheets showing building internal loads by space, user occupancy schedules, etc. All of these calculations will be part of the CESA report but shall also be used for normal HVAC load analyses.
- 26.3.5. CESA Report: Caution - The CESA is a stand-alone document and will NOT be bound with the design analysis or regular calculations; Additionally, it required to be complete at the first review submittal (normally 35% or 60% design) and will be updated and resubmitted if significant (as determined by the District) changes are made in the facility after the first design submittal . The A-E shall provide a summary report for the CESA listing all pertinent data on the project, the purpose of the study, study alternatives description, software packages used, any noteworthy input data (user occupancy schedules,

etc.) and results of energy analysis and/or LCCA. The summary report shall be submitted in both hard and software copies (MS Word). In addition to the summary report, the A-E may submit the entire CESA Adobe "PDF" or MS Word format; however hard copies shall always be required. The rest of the CESA report for shall include all input and output for energy and HVAC load analysis, LCCA analysis software inputs and output reports, Energy Usage, Conservation and Budget input and output reports, Manual Calculations and any other supporting data, drawings, sketches, etc. that may be deemed necessary.

27. Mechanical Equipment Vibration Isolation Design. All designs will incorporate vibration isolation drawing and/or specification provisions. It is preferable to put the vibration isolation requirements on the drawings for archival purposes. Designers shall incorporate a complete vibration isolation design in the form of drawing notes, details, and tables (isolation static deflection, isolation type required, etc.) for all mechanical equipment. The design shall be based upon the pre-designed (canned) recommendations, notes and text given by Army TM 5-805-4 (AFM 88-37), Noise and Vibration Control for Mechanical Systems. Design for items not covered by TM 5-805-4 will be accomplished by the design A/E or Design-Build contractor.
28. New sewer lines under existing roads are to be bored. Cutting the road is not acceptable.
29. Show all dimensions in English as well as SI.

Maintainability Design

1. General - Reuse of Existing Material. Caution must be exercised in the planned reuse of any existing materials (or materials that are to be Government-furnished equipment). In the time period between project inception/design and actual construction, either the condition of the material, or its availability may change. For major items of equipment, both show where they are located/stored. Additionally, specify by manufacturer's nameplate data exactly which items are to be used and their condition, which shall be verified by the contractor.
2. Corrosion Control.
 - 2.1 Cathodic Protection.
 - 2.1.1 Apply cathodic protection on all buried or submerged ferrous piping, tanks, structure and related facilities. Under no circumstances will coated facilities be installed without cathodic protection. This requirement includes ferrous materials such as cast iron.
 - 2.1.2 All cathodic protection designs must be based upon specific field tests made at the construction site. Tests shall include soil resistivity and water conductivity.
 - 2.2 Water Treatment.
 - 2.2.1 On all systems, where water is used for either primary or secondary heating or cooling, equipment and chemicals must be installed and maintained for proper chemical treatment. This applies to both closed and open type re-circulating systems. The RFP or drawings and/or specifications require the contractor to follow water treatment regimes required by the Base or Post during construction.
 - 2.2.2 The equipment installation will be based upon specific information obtained at the construction site and will be consistent with existing Base or Post water treatment methods. Required design information includes data such as a current analysis of Base/Post water, favored or mandatory treatment chemical systems, etc.
3. Air Conditioning Systems, Chillers, and Air Handling Units.
 - 3.1 Provisions will be made and dedicated space allocated for removal of equipment for maintenance. Tube bundles will have provisions for easy removal for maintenance (i.e., A-frames or monorails structurally adequate to support the loads and proper distance between system components and walls, etc.) to ensure ability to clean, repair, or replace tube bundles. Normally, a minimum of 30-inches space around all items of equipment shall be maintained. Dedicated maintenance space and height shall be shown on all plan and elevation drawings.
 - 3.2 For water cooled equipment such as chillers, install duplex plant cooling tower water strainers so that they may be cleaned without plant shutdown.

4. Electrical.

- 4.1 Use fully enclosed pad-mounted transformers in-lieu-of pole mounted types (where size is available and economics dictate). Insure sufficient clearance for access to drain plugs and front clearance for maintenance and switched isolation, etc.
- 4.2 Ensure adequate clear space around electrical equipment in accordance with the National Electrical Code.

5. Liquid Fuels and all Other Piping Systems (Above and Below Grade).

- 5.1 Pipelines and Hydrants. All designs and installations must ensure that maintenance personnel will be able to physically perform routine tasks with tools and equipment readily available on Base/Post. Items of consideration should include:
 - 5.1.1 Assuring that parallel or crossing pipelines are at least 1-foot apart to permit repair and/or equipment use in between the pipes. Large diameter pipes require even greater separation.
 - 5.1.2 Providing fueling hydrant outlet pits or equipment pits large enough for tool use in the pit while replacing or maintaining valves, flanges, pumps, nut and bolts, e.g., to perform gasket replacement, etc.
 - 5.1.3 Assuring that sufficient flanges, unions, etc. are installed to permit ease of pipe and equipment repair or replacement, e.g. pipe cutting or welding would not be permitted in a pump house, therefore, flanged piping is required.
 - 5.1.4 Providing sectionalizing valves in piping systems to shut down piping sections for repair, maintenance and pressure testing.
- 5.2 Fuel Storage Tank Area Considerations and Welding.
 - 5.2.1 Dikes or basins around storage tanks must be designed to allow tank cleaning, maintenance and repair equipment to be easily transported into the diked area. This includes providing clear access to the tank manholes without climbing over piping.
 - 5.2.2 Clearance must be provided between parallel buried tanks or other structures so that each tank can be easily excavated and removed, e.g., tanks may be too close together for mechanized equipment use.
 - 5.2.3 Welding. All welding will be performed by a welder certified in accordance with ANSI B31.1 Power Piping or API 1104 Welding of Pipelines and Related Facilities codes. Welds must be made and inspected in accordance with ANSI B31.8 Gas Transmission and Distribution Piping Systems requirements. No welding on any contract shall be allowed without the required Base or Post welding permit being issued to the contractor.

6. Sanitary Utilities and Systems.

6.1 Water.

- 6.1.1 Ensure all equipment (HVAC systems, fire sprinklers, etc.) connected to potable water supplies cannot cause cross-connection/back-flow hazard. Provide properly selected back-flow preventers, where required, as specified for the degree of hazard.
- 6.1.2 Irrigation/sprinkler systems served by potable water systems must include a suitable back-flow preventer to protect the potable water supply.
- 6.1.3 Backflow prevention devices shall be shown and installed between 1 and 3 feet above the finished ground floor to allow for maintenance and testing.

6.2 Industrial Wastes.

- 6.2.1 All industrial buildings, maintenance shops, or other facilities generating waste water of other than sanitary wastes should be considered for connection of such wastes to an industrial waste sewer, if available. Wastes are to be identified (both in characteristics and quantities) in project design analysis.
- 6.2.2 Materials for industrial waste drains, sewers, tanks, pumps and other features must be carefully selected for suitability with the worst-case expected waste characteristics. Once selected, these materials must be clearly and thoroughly specified in the project specifications. Also, substitutions shall be prohibited, both in the specifications and during the contractor submittal reviews.

7. Service and Maintenance Access Space, Doors, Etc.

- 7.1 Designers shall show dedicated service or airflow space (including a minimum height above floor or grade) and a note(s) shall be added to the drawings to preclude a contractor from installing anything (including larger types/manufacturer's versions) other than the equipment for which the access space is being shown. Encroachment upon dedicated access space shall constitute a variance from the contract requirements.
- 7.2 Service access panels or doors of ample size for complete maintenance shall be shown for all valves, water hammer arrestors, controls, etc. which are concealed behind walls, ceilings or floors. The access doors or panels shall be shown on the contract drawings by mechanical and electrical designers as well as by the project architect. Service access panels or doors shall be labeled as to the type of services contained behind the panel or door.

ENERGY AND SUSTAINABLE DESIGN

1. General. Energy conservative facilities designs are the rule. This will be accomplished through passive solar techniques, building insulation and many other means to meet military and commercial construction criteria and goals; some positive means of savings are by selection of mechanical and electrical equipment which is the lowest life-cycle cost, use of high-efficiency motor specifications, etc.
 - 1.1 Life-cycle cost analyses will be completed to determine the best capital asset investments to reduce the total ownership cost of facilities; improve energy efficiency and water conservation; provide safe, healthy and productive built environment; promote sustainable environmental stewardship; and reduce environmental impact/footprint of operations in accordance with AR 415-15. Life-cycle cost means the total cost related to energy conservation measures of owning, operating, and maintaining a building over its useful life as determined in accordance with 10 CFR part 436 (reference Federal Register). This policy applies worldwide to all construction activities on permanent Army Installations, Army Reserve Army Readiness Centers, and Armed Forces Reserve Centers, regardless of funds source.
 - 1.2 New Construction existing policy requiring all vertical construction projects will climate control to achieve a minimum of the Silver level of the Leadership in Energy and Environmental Design (LEED) for new construction per the U.S. Green Building Council (USGBC) rating system. Horizontal construction (e.g. ranges, roads, and airfields) will incorporate sustainable design features to the maximum extent possible.
 - 1.3 Existing Buildings all major renovation and repair projects exceeding \$7.5 million (requiring congressional notification) shall incorporate sustainable design features where life-cycle cost effective to achieve a minimum of the Certified level of the LEED Existing Building rating system. The installation Director of Public Works or Reserve Component equivalent, supporting Engineer District, designer of record, and/or the prime construction contractor will jointly verify the final LEED score and rating. USGBC certification is not required.
 - 1.4 The main energy criteria for most of our construction is ASHRAE standard 90.1. And other criteria that influence the design are as follow:
 - 1.4a Memorandum, DASA (I&H), 5 Jan 06, subject: Sustainable Design and Development Policy Update - SpiRiT to LEED Transition.
 - 1.4b AR 415-15, Army Military Construction and Non-Appropriated Funded Construction Program Development and Execution, 12 Jun 06.
 - 1.4c Energy Policy Act of 2005, 8 Aug 05.
 - 1.4d DoDI 4170.11, Installation Energy Management, 22 Nov 05.

- 1.4e Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings, Memorandum of Understanding, 6 Mar 06.
- 1.4f Federal Register, Vol. 71, No. 232, Rules and Regulations, 4 Dec 06.
- 1.4g Executive Order 13423, Strengthening Federal Environmental, Energy, and Transportation Management, 26 Jan 07.

See mechanical design section for implementation and reporting requirements for designers.

2. Solar Systems Design.

- 2.1 Active solar systems design criteria and requirements are listed in the most current copy of the Southwestern Division -Architectural and Engineering Instructions Manual (SWD-AEIM).
- 2.2 Currently, active solar heating systems are economically feasible and cooling systems economically feasibility is questionable. However, designers are required to "fill out" and submit the form on the following page within their 35% mechanical design analysis calculations package. Solar

3.0 Sustainable Design for the Army & LEED.

- 3.1 LEED: All design disciplines will normally have input to completion of holistic design and completion of a LEED analysis, using the LEED rating systems and guidelines to meet the current min. LEED certification level; current minimum goal for all projects varies, so refer to the design or design-build contract; reference for LEED is, <http://www.usgbc.org/> .
- 3.2 Sustainable Design and Development reference website, <http://www.cecer.army.mil/SustDesign/> . Sustainable design is important to the US Army, DOD, the nation and world for the following reasons, sustainable design is to be incorporated to the maximum extent possible within the given budget; additionally, requirements for sustainable design vary by installation and so should be researched at the start of design with facility representatives:
 - 3.2.1. Meets the needs of the present without compromising the quality of life of future generations.
 - 3.2.2. Maintains economic growth while producing an absolute minimum of pollution, repairing environmental damages of the past, producing less waste, and extending opportunities to life in a pleasant and healthy environment.
 - 3.2.3. Meets human needs by maintaining a balance between development, social equality, ecology, and economics.
 - 3.2.4. Demands systematic considerations of environmental impact, energy use, natural resources, economy, and quality of life.
 - 3.2.4. Has optimal benefit only when addressed at the inception of a project, and throughout the entire life cycle of a project

-- from concept to planning, to programming, design,
construction, and ownership.

APPENDIX

PRESCRIBED TEMPERATURE

AREA	HEATING TEMPERATURE RANGE	COOLING TEMPERATURE RANGE	DOMESTIC HOT WATER TEMPERATURE
Family Quarters	65-70	76-80	95
Troop Living	65-70	76-80	95
Administrative Areas	65-70	76-80	95
Classrooms	65-70	76-80	95
Dining Facility	65-70	76-80	General use 140 Pre-wash 160 Final rinse 180
Recreation	65-70	76-80	95
Motor Pools	50-65	Not applicable	95
Dental Clinics	70-75	70-75	140
Medical Clinics	70-75	70-75	140
Child Care	70-75	70-75	95
Operating Delivery	70-75	65-70	140
Intensive Care	75-80	70-75	140
Warehouse	55	Not applicable	95

1. Energy and Utilities

1.1 The Energy Policy Act (EPAct) of 2005 (Public Law 109-58), signed into law on August 8, 2005, establishes various energy management and conservation goals for all federal agencies. Executive Order (EO) 13423, signed and executed by President Bush on January 24, 2007 reinforces and strengthens those goals. Focus garrison efforts on complying with the following four key provisions of the EPAct of 2005 and EO 13423:

- 1.1.a Reduce total facility energy consumption by 3% per year thru FY 2015 with the goal of a 30% reduction relative to the garrison's FY 2003 baseline for energy intensity.
- 1.1.b Reduce the garrison's total water consumption by 2% per year beginning FY 2008 relative to the garrison's FY 2007 usage baseline with a goal of 16% reduction by FY 2015.
- 1.1.c Increase use of renewable energy to meet the goals of using not less than:
 - 3 percent of renewable energy in FY07 - FY09
 - 5 percent of renewable energy in FY10 - FY12
 - 7.5 percent of renewable energy in FY13 and thereafter
- 1.1.d Procure only energy efficient products (e.g. computers, peripherals, mechanical equipment, washers, etc.) as listed by Energy Star® or designated as such by the Federal Energy Management Program (FEMP).

1.2 More details on the Energy Policy Act of 2005, Executive Order 13423, and Energy Star Program can be found at:
http://www1.eere.energy.gov/femp/about/legislation_epact_05.html
http://army-energy.hqda.pentagon.mil/programs/energy_star.asp

ACTIVE SOLAR HVAC SYSTEMS ANALYSIS REPORTING FORM

1. Project Number and Fiscal Year:
2. Project Name:
3. Project Location:
4. Design Agency:
5. Designer:
6. Fuel Type(s):
7. Fuel Cost in \$/MBtu and \$/Mjoule¹:
8. Fuel Cost For 25 Year Payback (from Generic Solar Study) in \$/MBtu and \$/Mjoule*:
9. U.S. Bureau of Census Geographic Region:
10. Date of Generic Solar Study Referenced:

In accordance with SWD Criteria Letter V-1-191, an active solar analysis for this project indicates active solar is (not feasible) (requires further analysis as given herein).

¹The M symbol indicates Mega prefix for 1×10^6 .

PLUMBING DESIGN

1. Domestic Water:
 - 1.1 Ensure all equipment (HVAC systems, fire sprinklers, etc.) connected to potable water supplies cannot cause cross-connection/back flow hazard. Provide properly selected back flow preventers where required as specified for the degree of hazard.
 - 1.2 Reduced Pressure Back flow Preventers (RPBP) shall be installed between 12 inches and 36 inches above finished floor, while providing 30-inches clear access space (maintenance and testing) in front of the RPBP. Also, the designer shall include a drain pan, piped to a floor drain below the RPBP isolation chamber to catch water discharges.
 - 1.3 Plumbing shall be designed to meet the National Standard Plumbing Code-Illustrated by National Association of Plumbing-Heating-Cooling Contractors.
2. Domestic water piping, above the slab, to be type "L" or "K" copper tubing. The use of plastic pipe (Schedule 80, PVC or CPVC), plastic fittings and solvent welded plastic will be permitted provided that the Contractor takes measures to minimize the exposure of the pipe and fittings to ultra violet (UV) light. This protection should be, as a minimum, covering the pipe and fitting with shade material while in storage or transit. Domestic water piping, below the slab, to be type "L" or "K" insulated copper tubing with all joints above the slab.
3. Sanitary sewer piping to be cast iron below slab. The use of plastic pipe (Schedule 40, PVC), plastic fittings and solvent welded plastic will be permitted provided that the Contractor takes measures to minimize the exposure of the pipe and fittings to ultra violet (UV) light. This protection should be, as a minimum, covering the pipe and fitting with shade material while in storage or transit. Cast iron, copper, or stainless steel to be used above the slab. Plastic pipe (PVC or CPVC) can be used above the slab except where exposed to the exterior. PVC pipe used below the slab shall be bedded in non-expansive fill material a minimum of 6-inch to 8-inch in all directions.
 - 3.1 Floor drains shall be channeled to the appropriate sewer system (industrial or storm) based upon a water quality study determined by the designer with concurrence of the design agency (USACOE). Floor drains should be connected to an industrial waste line, if available and appropriate. Where no industrial waste system exists, other arrangements will be made, such as an oil/water separator, thence to sanitary sewer system, etc. Disposition of wastes from a facility should be discussed at the pre-design meeting.
 - 3.2 Depth of cover for sanitary sewers shall be at least 30 inches (760mm) to protect the pipe from superimposed live loads of ordinary traffic.
4. Use wall hung fixtures on carriers where possible. Floor drains shall be channeled to the appropriate sewer system (industrial or storm) based upon water quality study determined by the designer with concurrence of the design agency. Floor drains should be connected to an industrial waste line, if available. Where no industrial waste system exists, other

- arrangements will be made, such as oil/water separator thence to sanitary sewer system, etc. Disposition of wastes from a facility should be discussed at the pre-design meeting.
5. Domestic hot water to be produced by instantaneous type heaters where possible. Electric powered heaters may be used for location with very low usage.
 6. Industrial Wastes:
 - 6.1 All industrial buildings, maintenance shops, or other facilities generating wastewater of other than sanitary wastes should be considered for connection of such wastes to an industrial waste sewer, if available, if not then pre-treat the wastewater before disposal into the sanitary sewer. Wastes are to be identified both in characteristics and quantities in project design analysis.
 - 6.2 All industrial buildings, maintenance shops, or other facilities generating storm water runoff, should consider collection of such wastes water and the processing of it through an oil water separator before disposal into the sanitary sewer.
 - 6.3 Materials for industrial waste drains, sewers, tanks, pumps and other features must be carefully selected for suitability with the worst case expected waste characteristics. Once selected, these materials must be clearly and thoroughly prescribed in the project specifications. Also, substitutions should be prohibited—both in the specifications and during the contractor submittal reviews.
 7. Service/Maintenance Access Space, Doors, Etc.
 - 7.1 Designers shall show dedicated service or airflow space including a minimum height above floor or grade and note(s) shall be added to the drawings to preclude a contractor from installing anything, including larger types/manufacturers versions of the equipment for which the access space is being shown.
 - 7.2 Service access panels of ample size for complete maintenance shall be shown for all valves, water hammer arrestors, controls, etc. which are concealed behind hard walls, ceilings or floors. The access doors shall be shown by mechanical and electrical designers as well as by the project architect.
 8. Natural Gas Systems.
 - 8.1 Regulators. All distribution regulator sets must be installed with:
 - 8.1.1 Regulators that do not fail in the "valve open" position, that is, do not use pilot-loaded regulators, since they fail open.
 9. New utility lines (natural gas, water, sewer, etc.) under existing roads are to be bored. Cutting the road is not acceptable.
 10. Show all dimensions in English as well as SI.

FIRE PROTECTION DESIGN

1. Means of egress will comply with NFPA 101 Life Safety Code.
2. Fire separations will meet Uniform Building Code (UBC) and NFPA 101.
3. Fire protection designs will be governed by Fire Protection Engineering for Facilities (UFC 3-600-01), NFPA 13 (plus any other applicable NFPA codes), all applicable Air Force or Army design manuals/criteria and the authority having jurisdiction (base or post Fire Marshal).
4. Fire protection sprinkler systems containing "water only" should have double check valve back flow preventers. Systems containing antifreeze or other hazardous chemicals require a reduced pressure type back flow preventer.
5. Sprinkler system design will normally be by performance specification. One exception is aircraft hangar(s) which will be a complete design by the A/E.
6. Adequacy of water supply for fire suppression systems will be determined at or before the 30% design level. Requests for flow tests should be sent (in writing) to the project manager before the 10% design level.

CIVIL DESIGN

1. **Storm Drains:** Use concrete pipe, reinforced concrete pipe, ductile iron pipe, or high strength vitrified clay pipe for storm drains, culverts, etc. Smooth interior corrugated polyethylene pipe may be used for storm drains in areas with light weight vehicle traffic such as POV parking lots. Do not use PVC pipe because it becomes brittle. Soils at Ft. Sill are highly corrosive. Do not use steel or corrugated galvanized steel pipe.
2. **Domestic Water:** Water service is owned and operated by American Water Enterprises. All domestic water lines and components 5 feet outside building line must conform to American Water Enterprises' specifications.
3. **Sanitary Sewer:** Sanitary sewer service is owned and operated by American Water Enterprises. All sanitary sewer lines and components 5 feet outside building line must conform to American Water Enterprises' specifications.
4. **Natural Gas:** Natural gas service is owned and operated by Oklahoma Natural Gas Company. All natural gas lines and components 5 feet outside building line must conform to Oklahoma Natural Gas Company specifications.
5. **Foundations:** Soils at Ft. Sill are highly expansive clay soils, mostly CH soil classification. Floating slabs are prohibited. Use ribbed mat foundations or structural slabs with voids between the slab and the ground supported by piers and grade beams.
6. **Existing Roads:** Cutting existing pavement for utilities is not acceptable. Bore under all roads.
7. **Drainage:** Ensure positive drainage away from buildings.
8. **Dimensions:** Show all dimensions in English as well as SI.
9. Civil design shall be in accordance with the SWD-AEIM, the U.S. Army Corps of Engineers, Architectural and Engineering Instructions (AEI) and all applicable Air Force or Army design criteria (tech. manuals, engineering tech. letters, etc.)

Landscape Architectural Design

1. Irrigation/sprinkler systems served by potable water systems must include a suitable back-flow preventer to protect the potable water supply.

2. On projects requiring sprinkler system installation, the sprinkler system designer will coordinate the location of the irrigation controller (provide space on the wall in mechanical or electrical space) and will coordinate the location of the outside water stub out, if a contractor designed-performance-type specification for the sprinkler system is to be used. Finally, if an interior reduced pressure back-flow preventer (dedicated to the sprinkler system) is required, coordinate the location and installation with the mechanical designer.

3. Landscaping. Landscaping material considerations should be influenced by low maintenance, geographic suitability, disease and insect resistance, and Base or Post criteria. Other considerations would be year-round color or effect, mature size for the location planted, coordination with and balance of the building, and litter of fruit or seeds on sidewalks or parking areas and any possible interference of litter with mechanical equipment which is to be avoided.

Electrical Design

1. All project designs shall be in accordance with the latest edition of the National Fire Protection Association Standard No. 70, which is also known as the National Electrical Code.

2. All new building services shall be metered; types and details may be specified for each individual design (in the RAMP or RFP or at the pre-design meeting). Meters shall all be checked under load by a qualified meter technician.

3. Meters, instrument transformers, and all other utility systems shall be compatible/suitable and connection, via a pulsing or similar transducer, to the existing Base/Post-wide Utility/Energy Monitoring and Control System (U/EMCS) unless it is stated in the RFP or design scope of work that they will not need EMCS provisions.

To be useful, the characteristics of the U/EMCS electrical meter pulse initiator must balance the limitations of the device receiving the pulses (U/EMCS) and the requirements of reasonable metering resolution. Pulse initiators shall provide a maximum number of pulses per KWH up to 500 per minute, but not less than one pulse per KWH. These requirements upon the pulse initiator should be reflected on the contract drawings. The limitation requirements given here are general and vary with the type of existing U/EMCS and a building's energy consumption, therefore, the pulse metering device must be tailored to the design of the existing EMCS.

4. New fire alarm transmitters and annunciators shall be compatible with and connected to the existing Base or Post alarm system.

AS-BUILT DRAWINGS, OPERATION and MAINTENANCE MANUALS

1. Operation and Maintenance Data

Six manuals listing step-by-step procedures required for system startup, operation, shutdown, and routine maintenance, at least 14 days prior to field training. The manuals shall include the manufacturer's name, model number, parts list, list of parts and tools that should be kept in stock by the owner for routine maintenance including the name of a local supplier, simplified wiring and controls diagrams, troubleshooting guide, and recommended service organization (including address and telephone number) for each item of equipment.

2. As-Built Drawings

As-built drawings, at least 14 days, but not more than 90 days after completion. The Building and Mechanical System Drawings shall be updated to reflect as-built conditions after all related work is completed and shall be on reproducible full-size mylar film (one set) and CAD (one set in Micro Station "DGN" format on CD(s) or 3-1/2" Double Sided, High Density Diskettes).

Supplemental Appendices

SA1

Information on Life Cycle Cost and Energy
Studies and the Legal and Policy Basis for Them

Engineering Bulletin

No 94-01

Issuing: CEMP-ET

Issue Date: 28 Jan 94

SUBJECT: Life Cycle Cost Studies in Design

Applicability: INFORMATION

1. Reference Enclosure 1, HQUSACE, CEMP-ET, letter dated 11 December 1992, Subject: Energy Conservation Policy, and Enclosure 2, EIRS Bulletin No. 91-05, dated 31 May 1991, Subject: Planning and Engineering Studies.

2. The enclosures explain legal requirements for performing life cycle cost (LCC) analyses in design and provide information in order to facilitate ease of compliance. Although these directives help to minimize the burden for complying with LCC requirements some confusion remains over the extent and depth of analyses required.

3. Designers are responsible to determine the most LCC effective selection from among the viable alternatives available. Designers also are responsible to minimize the level of effort necessary in arriving at that determination. The following should be considered whenever a LCC analyses is anticipated:

a. Make maximum use of previous or generic LCC analyses. Revise only as necessary to apply to a new design or situation. Do not generate a new LCC analyses unless absolutely necessary for the application.

b. Don't perform a LCC analysis if the best viable alternative is obvious to the designer. Just document the project file.

c. Don't perform a LCC if the cost of the study exceeds the possible benefits derived. Just document the project file.

d. Only consider viable alternatives that will provide good performance, meet the functional requirements of the building, and meet the needs and expectations of the customer. For example, don't consider a heating and cooling system with complex controls if the installation does not have a reasonable capability for providing maintenance after it has been installed. If only one viable alternative exists, there is no further need to consider a LCC analyses.

SUBJECT: Life Cycle Cost Studies in Design

Applicability: INFORMATION

4. In applying the principles of life cycle cost analyses, common sense and the capabilities of designers should be combined to arrive at the most feasible and economic selection for the application at hand.

5. The point of contact for this subject is Mr. Dan Gentil, HQUSACE, CEMP-ET, 202-272-8622 (Autovon 285-8622).

2 Encls

RICHARD C. ARMSTRONG, P.E.
Chief, Engineering Division
Directorate of Military Programs

CEMP-ET (1110)

11 December 1992

ATTENTION OF:

REPLY TO:

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Energy Conservation Policy

1. The enclosed memorandum provides current information on energy conservation directives, the legal and policy basis for those directives, and information on compliance.
2. Recent directives, including Presidential Executive Order 12759 and P.L. 102-486, have placed renewed emphasis on the energy conservation program and have established new energy reduction goals. The issues concerning energy conservation are directly related to serious environmental problems and will continue to be of prominent concern in the years ahead. Continued support and participation in the energy conservation effort will best prepare us to meet these challenges.
3. The point of contact for this guidance is Mr. Dan Gentil, HQUSACE, CEMP-ET, 202-272-8622.

FOR THE DIRECTOR OF MILITARY PROGRAMS:

Encl

RICHARD C. ARMSTRONG, P.E.
Chief, Engineering Division
Directorate of Military Programs

ENERGY CONSERVATION POLICY

U.S. ARMY CORPS OF ENGINEERS

Summary

The following items represent important criteria and issues in the energy conservation program for the U.S. Army Corps of Engineers:

- a. A significant amount of rules and regulation governing energy conservation focus on existing facilities and the responsibilities of the installations. However, some of the rules and regulations also pertain to new designs.
- b. All the mandatory requirements of 10 CFR 435 have been incorporated into Corps of Engineers criteria and cannot be waived.
- c. The Design Energy Use and Energy Use Budget method of compliance indicates conformance with 10 CFR 435 and Executive Order 12759. This requirement cannot be waived but previous studies can be used to verify compliance, when applicable.
- d. Life cycle cost analysis is mandatory in conformance with 10 CFR 436 and cannot be waived. However, previous studies may be utilized to insure selection of the optimum alternative, when applicable.

Legal and Policy Basis

The legal and policy basis for energy conservation has evolved over many years as a result of several Executive Orders and Public Laws. From the period FY 76 to FY 85, the Army vigorously pursued an Energy Management Program designed to reduce energy consumption in compliance with the provisions of Executive Order 12003 (1977). This order established a systematic approach to the cost of owning, operating, and maintaining a building over its economic life (Life Cycle Cost) including its fuel and energy costs and evaluation of alternative building systems. As a result of this effort, the Army was able to reduce facility energy consumption 21.8 percent and administrative mobility energy consumption 25.9 percent. These achievements enabled the Army to exceed the Presidentially mandated goals, resulting in a cost avoidance in excess of 3.2 billion dollars and gave the Army the distinction of being the only Service to exceed both the facility and mobility goals.

In 1988, the Federal Energy Management Improvement Act was passed. Section 543(a) of this Act required each Federal agency to apply energy conservation measures and improve the design of its facilities so that the energy consumption per gross square foot of Federal buildings in use during FY 95 is at least 10 percent less than the energy consumption of Federal buildings in use during FY 85. Later in July 1989, the U.S. Department of Energy developed its energy conservation standards for new building (10 CFR 435) which required the adoption of any one of several methods to be employed in the design of energy efficient Federal buildings.

Recent government mandates include Executive Order 12759, April 17, 1991. This document requires Federal agencies to develop and implement energy strategy plans that insure compliance with certain overall energy reduction levels. In brief, the Executive Order 12759 requires:

- a. By the year 2000, a 20 percent overall reduction in energy use levels for all Federal buildings from 1985 energy use levels, to the extent that these measures minimize life cycle costs in accordance with 10 CFR 436.
- b. Each agency will prescribe policies under which its industrial facilities in the aggregate increase energy efficiency by at least 20 percent in Fiscal Year 2000, in comparison to Fiscal Year 1985.
- c. A 10 percent design efficiency improvement in new buildings.
- d. A conservation of 5 percent of our energy usage to renewable resources.

e. Implementation of procedures for innovative energy savings contracts such as Demand Side Management and Shared Energy Savings. These programs are designed to shift the first cost of energy saving retrofits away from the Government.

To insure compliance with all energy conservation mandates, the Corps of Engineers has adopted the Building Energy Compliance Alternative path as illustrated in 10 CFR 435. The requirements of this path have been incorporated into Chapter 11 of the Architectural and Engineering Instruction (AEI), Design Criteria, including revisions through September 1992. The thrust of this regulation required compliance with Energy Use Budgets that have been developed in accordance with 10 CFR 435.112 and follow the Building Energy Compliance Alternative. There are also minimum compliance requirements in lighting, electric power and others which are mandatory for all compliance paths. Compliance is obtained by conformance to the minimum requirements applicable to all paths and by verifying that the Design Energy Usage (DEU) for a facility is less than or equal to the calculated Energy Use Budget (EUB). All of these Federal requirements have been incorporated into the UFGS guide specifications, technical manuals, and other criteria. The present methodology that the Corps has adopted for the design and construction of Army facilities is the best method to insure cost effective compliance with all the applicable energy related Federal Regulations and Executive Orders.

The most recent Federal energy legislation is the Comprehensive National Energy Policy Act passed by Congress and signed into law (P.L. 102-486) on October 24, 1992 by President Bush. This bill establishes a comprehensive Federal buildings efficiency program, which requires installation of cost-effective efficiency measures in all Federal buildings, allows agencies to participate in utility incentive programs; and includes a Federal building demonstration program of energy-efficient products.

It requires, not later than January 1, 2005, each agency, to the maximum extent practicable, to install in Federal buildings owned by the United States, all energy and water conservation measures with payback periods of less than 10 years. Additionally, it allows agencies to participate in such programs as the Environmental Protection Agency's "Green Lights" program for purposes of receiving technical assistance.

Not later than December 31, 1993, a plan must be submitted describing how each agency intends to meet requirements, including how it will -

- a. Designate personnel primarily responsible for achieving such requirements;
- b. Identify high priority projects through calculation of payback periods;
- c. Take maximum advantage of contracts that provide financial incentives and other services available from utilities for efficiency investment, and other forms of financing to reduce the direct costs to the Government.

The Secretary of Energy will be required to establish a Federal Energy Efficiency Fund to enable agencies to meet the requirements of the Act. The current planned appropriations to carry out the requirements of this bill are not more than \$10,000,000 for Fiscal Year 1994, \$50,000,000 for Fiscal Year 1995, and such sums as may be necessary for Fiscal Years thereafter. All agencies will be eligible to submit proposals for grants from the Fund and Awards will be based on a competitive assessment of the technical and economic effectiveness of each agency's proposal.

The Secretary of Energy will also establish a Financial Incentive Program for Facility Energy Managers to reward outstanding facility energy managers in agencies. Not later than June 1, 1993, the Secretary of Energy will issue procedures for the bonus program, including the criteria to be used in selecting outstanding energy managers. There is authorized to be appropriated to carry out the Incentive Program not more than \$250,000 for each of the Fiscal Years 1993, 1994, and 1995.

The Energy Compliance Plan

The bottom line is that the Federal government is concerned about energy conservation and its relation to the environment. To fulfill these responsibilities the Corps has adopted the most cost effective and practicable means

by which all Federal energy laws and mandates can be met. Whether or not new requirements will be imposed as a result of the recent National Energy Act and future directives is uncertain.

Continued compliance with existing Corps regulations and guidance on energy conservation will best enable us to meet any new challenges which may be ahead. Although a difficult task in the face of shrinking budgets and re-organization, designers can meet requirements by utilizing existing tools and methods already available. An example of this would be to utilize a professionally acceptable computer program that accurately predicts the energy consumption of a proposed building. Utilization of such a program, that provides accurate results without inclusion of an unknown safety factor, can make it easier to verify that the DEU is within the EUB. Other computer programs are available which help to simplify the life cycle analysis process. The LCCID life cycle computer program, developed by the BLAST Support Office at CERL, is the only program maintained current to include up-to-date energy and discount factors published by the National Institute of Standards for the U.S. Department of Energy.

To sustain the already successful Corps energy conservation effort, while minimizing design expenditures, it is important to be innovative, creative and practicable wherever possible. For example it is not the intent of the Corps AEI criteria to require designers to perform a life cycle cost analysis on every material, installation, equipment, and system that must be considered during the course of design. The designer, however, does have the responsibility to evaluate all possible alternatives of the major facets, features and systems of a facility in order to insure a high quality design satisfying the functional requirements of the facility, providing comfort to the occupants, is consistent with energy conservation mandates, and has the lowest life cycle costs. Consistent with previous guidance, the following considerations should be analyzed before assuming that a new life cycle cost analysis is required:

- a. Use a previous study at the same installation if the conditions have not changed.
- b. Use existing studies from other installation with similar conditions.
- c. Apply the results of a previous study to justify an alternative is using new data will not materially affect the old data rather than starting a new study from scratch.
- d. Update an existing study by revising the conclusions of that study.
- e. A filing system could be set up to catalog life cycle cost studies and make them easily accessible to all designers.
- f. Consider the capability of an installation to operate and maintain a specific system before considering it as a viable alternative.
- g. Create a filing system which can be used to determine accurate and realistic operation and maintenance costs, and life expectancies, for different systems based on actual experiences, in cooperation with the installations.
- h. Avoid considering alternatives in life cycle analysis that are clearly impractical due to physical limitations, past design and construction experience or other predominant circumstances.

With the recent passage of P.L. 102-486, the Federal government has reaffirmed its resolve to sustain the energy conservation effort. The driving forces include serious environmental problems such as ozone destroying refrigerants (CFCs), poor indoor air quality, pollution caused by utility power generation, and the need to reduce dependence on foreign and nonrenewable resources. The Corps will be best poised to meet future anticipated directives by being innovative, creative, and by adhering to guidelines and utilizing resources which are already available.

Latest Criteria – EPACT 2005:

1. Refer to Engineering and Construction Bulletin No. 2005-20 and EPACT 2005, http://www.wbdg.org/ccb/ARMYCOE/COEECB/ecb_2005_20.pdf

2. Model RFPs for Army modularity projects require:

The Model RFP basically states the following, energy conservation strategies and HVAC and lighting systems selections shall achieve at least 30% energy savings over ANSI/ASHRAE/IESNA Standard 90.1-2004. Selection of solutions and technologies to achieve energy performance requirements shall be based on life cycle cost analysis. Some ways/best practices to achieve these requirements are listed in the Advanced Energy Design Guide: Small Office Buildings (ANSI/ASHRAE/IESNA).

UFC 3-410-01FA states "ENERGY COMPLIANCE ANALYSIS. In order to comply with the Energy Policy Act of 2005 (EPAct 2005), designs must achieve energy consumption levels that are a minimum of 30 percent below the level required by ASHRAE Standard 90.1. To demonstrate compliance with the EPAct 2005, the designer shall prepare an Energy Compliance Analysis (ECA) that includes a narrative of the path taken to demonstrate compliance (including reference to each paragraph in ASHRAE 90.1 that make up the proposed compliance "path"; identification of any software used to prepare calculations, input to and output from all calculations (with adequate explanation so that a reviewer can understand what all of the data means); a description of each energy conservation feature or change considered and the corresponding impact that it had on calculated energy consumption; and a description of the design proposed as a result of the ECA along with its calculated energy consumption".

All other projects shall meet the 30% energy reduction within project budget and if life cycle cost effective. Obviously, this will require computerized hourly energy analyses and life cycle cost analyses all of which will need to follow the standard procedures and criteria herein above for such studies and reports, etc. One large item to note, if budgets do not allow, the energy savings goals are not to be completely abandoned, instead save as much as possible within budget and life cycle cost effectiveness.

Appendix PP

Fort Sill Contractor's Installation Passes



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY

U.S. ARMY CORPS OF ENGINEERS
TULSA DISTRICT
P.O. BOX 33159
FORT SILL, OKLAHOMA 73503

CESWT-EC-FF

21 April 2011

MEMORANDUM FOR Record

SUBJECT: Contractor MOBILISA Cards

1. The Fort Sill Corp of Engineers Resident Office has verified **(Input Prime KTR)** and their subcontractors are authorized access to Fort Sill via Fort Sill's access control points to work on **(Input Project Name/Number/Location)**.
2. Normal work day is Monday thru Saturday, 0630-2000hrs. Any exceptions to this policy will be coordinated thru U.S. Army Corps of Engineers employees.
3. Scheduled contract completion date is **(Input Date)**. **See attachments for subcontractor pass information to include: subcontract duration, list of employees with last four of SSN.**
4. The POC for this memorandum is MAJ John A. Dills III at john.dills@usace.army.mil or by phone (580) 581-4128 office / (580) 262-1000.

//Original Signed//
JOHN A. DILLS III
MAJ, EN
U.S. Army Corps of Engineers

FORT SILL GATE PASS

Project Name/Number: _____

General Contractor: _____

Sub-contractor: _____

Employee (s) see attached list: _____

SSN Last 4 (or) see attached list: _____

Duration of Access: Start: _____ End: _____

Times Authorized: From: _____ To: _____

Days Authorized: S M T W T F S (Circle all that apply)

***Passes are issued/returned to BLDG 5030**

****Provide USACE QA/CM updated list of names with pass numbers monthly**

APPENDIX RR
CONTRACT DURATION

CONTRACT DURATION

(Refer to Section 00 73 10, SCR "COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK".)

UNIT/BRIGADE	PAD SITE AVAILABILITY FOR FINAL GEOTECH (CALENDAR DAYS AFTER NTP) ³		PAD SITE AVAILABILITY ¹		PERMANENT UTILITIES AVAILABILITY ²		PERMANENT UTILITIES FOR FIRE PROTECTION AVAILABILITY (CALENDAR DAYS AFTER NTP)		TEMF COMPLEX COMPLETION DATE FROM NOTICE TO PROCEED (CALENDAR DAYS)
	NTP	NTP							
SSA WAREHOUSES	NTP	NTP	120	120	330	330	330	330	495

¹ TEMF D/B Contractor shall provide the pad site for the SSA Warehouse D/B Contractor complete within the calendar days indicated after NTP.

² Contractor shall provide the permanent utilities for the SSA Warehouse (within the project limits shown) within the calendar days indicated after NTP.

³ Pads provided by TEMF Contractor to SSA Warehouse D/B Contractor for final geotechnical investigations within the calendar days indicated.