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1.0 PROJECT OBJECTIVES

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

Comparison of Military Facilities to Civilian Facilities

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

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

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

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

1.1. SECTION ORGANIZATION

This Section is organized under 6 major “paragraphs”.

(1) Paragraph 1 is intended to define the project objectives and to provide a comparison between the military facility(ies) and comparable “civilian” type buildings.

(2) Paragraph 2 describes the scope of the project.

(3) Paragraph 3 provides the functional, operational and facility specific design criteria for the specific facility type(s) included in this contract or task order.

(4) Paragraph 4 lists applicable industry and government design criteria, generally applicable to all facility types, unless otherwise indicated in the Section. It is not intended to be all-inclusive. Other industry and government standards may also be used, where necessary to produce professional designs, unless they conflict with those listed.

(5) Paragraph 5 contains Army Standard Design Criteria, generally applicable to all facility types, unless otherwise indicated in the Section.

(6) Paragraph 6 contains installation and project specific criteria supplementing the other 5 paragraphs.

2.0 SCOPE

2.1. TACTICAL EQUIPMENT MAINTENANCE FACILITY (TEMF)

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

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

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TEMF size: Small

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

Number of organizational vehicles to be accommodated: 126

Organizational vehicle hardstand: 15,282 square yards

Organizational storage building: 2,800 square feet

POL storage building: 0 square feet

Hazardous waste storage building: 0 square feet

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

UAV maintenance and storage, 1800SF, NOT required

POL vehicle parking IS required

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

2.2. SITE:

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

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

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

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

Approximate area available 8.80 acres

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

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

The following are also GFGI items: No Additional Requirements

2.4. FURNITURE REQUIREMENTS

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

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

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

2.5. NOT USED

3.0 TACTICAL EQUIPMENT MAINTENANCE FACILITY (TEMF)

3.1. GENERAL

(1) Functional Areas. The primary TEMF is composed of two main types of functional areas: Repair Bays (consisting of Repair areas and Maintenance areas), and the Core Area. Refer to the attached Floor Plans for recommended layout.

(2) Gross Building Area. Gross areas of facilities shall be computed according to subparagraphs below. Maximum gross area limits indicated in Paragraph 2.0, SCOPE, may not be exceeded. A smaller overall gross area is permissible if all established net area program requirements are met.

(a) Enclosed Spaces. The gross area includes the total area of all floors, including basements, mezzanines, penthouses, usable attic or sloping spaces used to accommodate mechanical equipment or for storage with an average height of 6'-11" measured from the underside of the structural system and with the perimeter walls measuring a minimum of 4'-11" in height, and other enclosed spaces as determined by the effective outside dimensions of the building.

(b) One-Half Spaces. One half of the area will be included in the gross area for balconies and porches; exterior covered loading platforms or facilities, either depressed, ground level, or raised; covered but not enclosed passageways or walks; covered and uncovered but open stairs; and covered ramps.

(c) Excluded Spaces. Crawl spaces; exterior uncovered loading platforms or facilities, either depressed, ground level, or raised; exterior insulation applied to existing buildings; open courtyards; open paved terraces; roof overhangs and soffits for weather protection; uncovered ramps; uncovered stoops; and utility tunnels and raceways will be excluded from the gross area.

(3) Net Area. Net area requirements for functional spaces are included in the drawings. If net area requirements are not indicated, the space shall be sized to accommodate the required function, comply with code requirements, comply with overall gross area limitations and other requirements of the RFP (for example, area requirements for corridors, stairs, and mechanical rooms will typically be left to the discretion of the Offeror).

(4) Deviations and Improvements. It is the intent of this document to allow deviations and improvements to the design shown.

(5) Handicapped Access. All TEMF buildings are to be handicapped accessible.

(6) Site Design and Functional Areas. Site features include vehicular hardstand, utilities and site improvements.

(7) Adapt-Build Model. An Adapt-Build Model for a TEMF, which contains a fully developed design, including a Building Information Model (BIM), 2-D CADD files, and specifications, can be downloaded from the following FTP site: ftp://ftp.usace.army.mil/pub/sas/TEMF/. This design is provided as a guide that exemplifies a technically suitable product and incorporates mandatory functional/operational requirements for a similar (although perhaps not an exact) facility to be constructed under this solicitation. It will be left to the offerors' discretion if, and how, they will use the sample design provided to satisfy the requirements of this Request for Proposal. This model is not intended to modify or over-ride specific requirements of this RFP and, under all circumstances, it will be incumbent upon the successful offeror to adhere to the site specific scope and functional/operational requirements specified within the RFP. Neither this statement of work, nor the adapt-build model, are intended to diminish the offeror's responsibilities under the clauses titled "Responsibility of the Contractor for Design," "Warranty of Design," and "Construction Role During Design." The successful offeror shall be the designer-of-record and shall be responsible for the final design and construction product, including but not limited to, adherence to the installation architectural theme, building code compliance and suitability of the engineering systems provided. The government assumes no liability for the model design provided and, to the extent it is used by an offeror, the offeror will be responsible for all aspects of the design as designer-of-record.

3.1.1. Repair Areas and Vehicle Corridor/Maintenance Areas

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

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

(1) Repair Areas

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

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

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

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

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

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

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

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

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

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

(2) Vehicle Corridor/Maintenance Areas

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

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

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

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

(2) POL Hose Reels. Provide two POL dispensing points mounted to the wall of the maintenance area. They should be spaced along the length of the pit. Hose and reel assembly shall be heavy duty, designed for the applicable fluid or oil. Provide shutoff valve at reel. Provide distribution for grease, engine oil, gear oil, transmission fluid, and antifreeze.

(3) Circulation Bays

(a) Provide an 8' wide x 96' long structural bay between each wing of repair bays and the core area to facilitate pedestrian egress from the building and shall conform to OSHA requirements.

(b) Equipment. Provide 4'-0" high x 8'-0" wide framed tack board (for 'safety board') mounted on wall along the circulation bay near the tool room. Provide one permanently installed emergency eyewash, hand held drench hose and shower station at each circulation bay that is adjacent to a core area and provide additional emergency eye wash, hand held drench hose and shower stations in other bays as required per OSHA standard 1910.151(c) and ANSI Z358.1. Provide one or more emergency eyewash, hand held drench hose and shower stations in Consolidated Bench Repair and in the Fluid Disribution Room when the equipment being serviced or solvents being used generate this requirement. Locate emergency wash stations in accordance with OSHA standard 1910.151(c) and ANSI Z358.1. Per OSHA 1910.151(c) emergency eyewash/shower units should be located such that a worker can reach one in 10 seconds. ANSI Z358.1 gives a guideline of 55 feet to meet this requirement.

3.1.2. Core Areas:

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

(1) Administration and Shop Control. Office space to accommodate foremen, production control, and clerical personnel. Provide one space per core; may be located on first or second floor but shall be accessible to the physically disabled. Provide counter and pass-through window between this room and the customer Waiting Area; size pass-through window to accommodate transfer of 30-inch by 30-inch items, and layout the area outside window so that two people can stand at the window and be out of the corridor traffic pattern. Provide viewing windows from administration and shop control space into the repair areas.

(2) Training Room. The training room space is intended to facilitate the training mission for maintenance personnel. This space is to be divided into two training areas with an operable folding partition (movable wall) having a sound isolation of STC 45, minimum. Provision shall be made to accommodate up to 30 students for computer based training, including power and data connections for each student.

(3) Consolidated Bench. Shop space for unit-level maintenance of electronics, optics, and other gear. Locate on first floor.

(a) Equipment. Provide an overhead coiling door 10'-0" wide x 10'-0" high.

(b) Furnishings/Fixtures. See Table 7 for furnishings. Provide capabilities shown in the features matrix for each work space.

(c) Provide operable exterior windows. Provide at least one window with clear view and unobstructed line of sight out of the building to a minimum of 800 feet for testing weapon sights.

(4) Tool Room. Designated space for the issue and secure storage of unit common tool kits, as well as supplemental tool kits and individual tools shared by shop personnel. Direct covered access from the tool room to the SATS containers (described below) on the exterior of the building is required. Provide lockable pair of personnel doors and pass-through opening with impact resistant counter and metal overhead lockable coiling shutter between Tool Room and Corridor.

(a) Standard Automotive Tool Set (SATS). The SATS is a unit-owned (i.e. GF/GI) containerized tool system with the dimensions of 8' x 20' x 8' high. An exterior hardstand storage area adjacent to the Tool Room shall be provided for three SATS containers. Connectivity to building and installation network is required. SATS are accessed from the end. Provide wall mounted awning with minimum 14-foot clear height above hardstand for weather protected entry into SATS containers. The technical manual for SATS is TM 9-4910-783-13&P.

(5) Tool Box Storage. Provide one Tool Box Storage Room for each wing of Repair Areas (if Repair Areas are located on both sides of a core, each side of core shall have a Tool Box Storage Room). Tool Box Storage is provided for personnel working inside the maintenance complex in the Repair Areas and the Consolidated Bench

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

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

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

(7) Latrine, Shower and Locker Rooms

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

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

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

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

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

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

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

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

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

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

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

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

(12) Non-Assignable Spaces and Gross Area. The items below account for additional gross area within the core that is not specifically listed in the spaces above. These items may also vary in size contingent on site, climate, type and use.

(a) Stairwells. Design in accordance with model and local building codes.

(b) Elevator. Provide one passenger elevator in each two-story building. Elevator machine room is also part of the gross area of the core.

(c) Common Circulation Corridors. All circulation corridors shall be a minimum of 6 feet wide.

(d) Waiting Area. Locate adjacent to Admin and Shop Control pass-through window off of corridor. Size Waiting Area for the seating of a minimum of four persons.

(e) Janitorial Spaces. Provide one janitorial space as shown on drawings with mop sink and heavy duty shelving. Expansion of the Janitorial Space to include a recycling function is optional.

(f) Mechanical Rooms. Utility space must be provided for heating and cooling equipment. Where feasible, vertically stack like utility spaces if located on two floors. Locate first floor mechanical rooms adjacent to exterior walls for external maintenance access and ventilation. See paragraph 3.1.7 Heating, Ventilation, and Air Conditioning (HVAC) Systems, for additional requirement. Walls and floor/ceiling assemblies enclosing mechanical room shall have a sound transmission class (STC) rating of not less than 50 (45 if field tested) for air-borne noise when tested in accordance with ASTM E 90, and an impact insulation class (IIC) rating of 50 (45 if field tested) when tested in accordance with ASTM E 492.

(g) Electrical Rooms. Locate first floor electrical rooms adjacent to exterior walls for external maintenance access and ventilation.

(h) Fluid Distribution Room. Provide a room to house the POL central distribution equipment and unused POL storage containers (typically 55-gallon drums) for five types of lubricants/fluids. Fluids shall be dispensed by automotive lubricant type air driven pump assemblies. Motor shall be heavy-duty compressed air driven reciprocating action. For antifreeze unit all parts shall be corrosion resistant. Locate near maintenance pit to minimize length of fluid distribution lines. Compliance with UFC 3-600-01, NFPA 30, and 29 CFR 1910.106 is mandatory. Provide secondary containment in compliance with applicable federal and state environmental regulations. Square footage for this space is part of the gross area for the core.

3.1.3. Site Functional Area

(1) Dock. Provide one docking location for maintenance and electronic testing of specialized, permanently vehicle mounted, communications equipment. Provide equipment power connections and grounding points for vehicle degauss and individual personnel static discharge protection of equipment.

(2) Organizational Vehicle Hardstand. This area consists of a rigid concrete paved area used for parking assigned vehicles (wheeled and heavy and tracked), commercial vehicles (Contractor support), trailers and generators. Organizational vehicle hardstand includes building aprons, parking spaces, and circulation lanes on site.

(a) Tactical/Military and Commercial Vehicle Parking. Maximize vehicle parking and traffic flow to best support the operation of the TEMF.

(b) POL Vehicle Parking Area. Parking for POL vehicles is considered separate from other organizational vehicle parking and shall be segregated from other vehicle parking areas.

(c) Dead Line Vehicle Parking. Parking for vehicles waiting for parts or for work to be performed. One dead line parking space for every pair of repair areas and shall be located in parking areas adjacent to repair bays that will service them.

(d) Building Aprons. Provide concrete pavement for aprons associated with each of the facilities located in the maintenance complex.

(3) Site Storage

(a) Hazardous Waste Storage Building. Provide a building with solid walls and roof. It is used to temporarily store used lubricants, flammable solvents, dry sweep, etc. A unit is authorized 60 square feet for each 25 vehicles, or part thereof, which it maintains. A minimum of 120 square feet of hazardous waste storage space will be provided. The specific requirement for this project is specified in Para. 2.1. Provide secondary containment in compliance with applicable federal and state environmental regulations. Compliance with UFC 3-600-01, NFPA

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

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

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

(d) Distribution Company Storage Facility. Not required

(e) Secure Open Storage. Not required

(f) UAV Maintenance and Storage Building. Not required

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

3.1.5. Architecture

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1. Hoist - 10 fpm
2. Trolley - 60 fpm
3. Bridge - 85 fpm

(c) Hoist motor control system shall provide one speed in each direction.

(d) Bridge and trolley main control systems shall provide one speed in each direction.

(e) Provide runway stops at limits of crane bridge travel.

3.1.6. Fire Protection

3.1.6.1. Standards and Codes

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

3.1.6.2. Fire Protection and Life Safety Analysis

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

3.1.6.3. Sprinkler System

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

3.1.6.4. Sprinkler Service Main and Riser

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

3.1.6.5. Exterior Hose Stream

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

3.1.6.6. Backflow Preventer

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

3.1.6.7. Fire Department Connection

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

3.1.6.8. 3.1.6.4 Elevators

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

3.1.6.9. System Components and Hardware

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

3.1.6.10. Protection of Piping Against Earthquake Damage

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

3.1.6.11. Fire Water Supply

Fire flow test data is provided in Appendix D.

3.1.6.12. Fire Pump

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

3.1.6.13. Fire Detection and Alarm

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

3.1.6.14. Building Construction

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

3.1.6.15. Fire Extinguishers Cabinets and Brackets

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

3.1.6.16. Interior Wall and Ceiling Finishes

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

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

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

(2) System Selection.

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

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

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

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

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

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

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

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

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

3.1.8. Plumbing

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

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

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

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

3.1.9. Electrical and Telecommunications Systems

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

(1) Exterior Electrical Distribution System

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

(2) Exterior Lighting

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

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

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

(3) Exterior Communication Services

(a) Parking Pad and Data Connections. None required

(4) Interior Electrical and Telecommunications

(a) Electrical

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

TABLE 5A - Minimum Size Telecommunications and SIPRNET Rooms for TEMF				
TEMF	Telecommunications Room		SIPRNET Room	
Floor	Width Feet (min)	Square Feet (min)	Width Feet (min)	Length Feet (min)
1st Small	8	150	6	6
1st Medium	8	150	6	6
2nd Medium	8	110	None	None
1st Large	8	150	6	6
2nd Large	8	110	None	None
1st EXLarge	8	150	6	6
2nd EXLarge	8	150	None	None

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

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

(h) Audio/Visual Systems

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

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

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

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

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

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

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

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

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

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

(n) Fire Detection and Alarm

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

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

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

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

3.1.10. Energy Conservation

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

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

Climate Zone 3A, Energy Conservation Features Table

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

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

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

Lighting Power Densities

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

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

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

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

3.1.10.3. Compliance Documentation

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

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

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

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

3.1.11. Equipment and Furniture:

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

TABLE 6 INSTALLED BUILDING EQUIPMENT

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

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

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

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

Table 7: Room Size and Furnishings Chart

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

3.2. FUNCTIONAL AND OPERATIONAL REQUIREMENTS

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

SMALL TEMF				

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

(b) Not Used

(c) Not Used

(d) Not Used

(e) Architectural TEMF Features Matrix

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

Notes for Architectural TEMF Features Matrix

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

6. Provide top of Concrete Cap at 12’-0”’. Provide an additional dropped ceiling to protect weapons and COMSEC equipment under repair. Top of caps shall be secure from unauthorized access.

7. All Finishes are considered minimum finishes only.

8. The Maintenance Corridor through the Core Area shall have a minimum 14’-0” clear Ceiling Height.

9. Roll-up doors or double doors may be provided for exterior access to the Fluid Distribution Room based on User preference.

(f) Mechanical TEMF Features Matrix

MECHANICAL TEMF FEATURES MATRIX	HVAC	HEAT	VENTILATE	AIR CONDITION	VEHICLE EMISSIONS EXHAUST SYSTEM	PLUMBING & FIRE PROTECTION	LAVATORY OR SINK	HOSE BIBB	WASH FOUNTAIN	WATER CLOSET	URINAL	SHOWERS	COMPRESSED AIR	EMERGENCY SHOWER & EYEWASH	SPRINKLER SYSTEM	TRENCH DRAIN AT DOORS	FLOOR DRAIN	MISCELLANEOUS	STEAM CLEANING FOR PARTS/ENGINES	WELDING AND/OR MACHINIST AREA	POL DISPENSING HOSE WITH REEL SYSTEM	ENVIRONMENTAL	OUT OF SPEC WASTE FUEL STORAGE	WASTE OIL STORAGE	WASTE ANTIFREEZE STORAGE/RECYCLE
FUNCTIONAL AREAS																									
ADMIN & SHOP CONTROL		•		•											•										
UNASSIGNED		•		•											•										
TOOL ROOM		•		•											•										
TOOL BOX STORAGE		•		•											•										
COMBAT SPARES		•		•											•										
LATRINES, SHOWERS, LOCKERS		•	•	•			•	•	8	•	•	•			•		•								
TRAINING ROOM		•		•											•										
BREAK, TRAINING & CONF		•		•			•								•										
CONSOLIDATED BENCH REPAIR		•		•									•	•	•		7								
WEAPONS STORAGE VAULT		•		•											•										
COMSEC VAULT		•		•											•										
NONSENSITIVE SECURE STORAGE		•	•												•										
COMMUNICATION VEHICLE DOCK																									
CORRIDOR		•		•											•										
MECHANICAL ROOM		4	•					•							•		•								
ELECTRICAL ROOM		4	•												•										
COMMUNICATIONS ROOM				•											•										
SIPRNet ROOM				•											•										
FLUID DISTRIBUTION		•	•					•					•		•										
REPAIR AREAS		•	•		•			•	8				•	•	•	•	7		5	1			3	3	3
MAINTENANCE AREAS		•	•		6			•					•	•	•	•	7				•		3	3	3
HARDSTAND																									
ORG STORAGE		4	•												•										
UAV MAINT. AND STORAGE BUILDING		•	•												•										
HAZ WASTE & POL STORAGE BUILDINGS			•																						
DISTRIBUTION COMPANY STORAGE FAC		•	•												•										

Notes for Mechanical TEMF Features Matrix

1. Welding exhaust system in one pair of repair areas. This area will also accommodate machinist function.
2. Not Used
3. Provide secondary containment in tanks outside of building.
4. Heat for freeze protection only.
5. Provide water and power connections for hook-up of user procured (GFGI) portable steam cleaner for cleaning of engines and engine components in a pair of repair areas.
6. Provide non-sparking explosion proof exhaust from pit.
7. Convey waste water through an oil/water separator prior to discharge to sanitary sewer.
8. Provide wash fountain in 8 FT circulation bay adjacent to the core area, or outside the latrines in the core area as shown on the drawings.

(g) Electrical TEMF Features Matrix

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

Notes for Electrical TEMF Features Matrix

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

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

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

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

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

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

11. ASLMS Containers

a) The ASLMS Container is provided with the following:

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

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

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

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

12. SATS Containers

a) The SATS Container is provided with the following:

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

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

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

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

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

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

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

3.3. References

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

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

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

(4) American Society of Mechanical Engineers (AMSE)

ASME HST-1, Performance Standard for Electric Chain Hoists
ASME HST-4, Performance Standard for Overhead Electric Wire Rope Hoists

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

(6) Not used.

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

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

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

(10) Crane Manufacturers Association of America (CMAA)

CMAA 70, Top Running and Bridge and Gantry Type Multiple Girder Electric Overhead Traveling Cranes, No. 70
CMAA 74, Top Running and Under Running Single Girder Electric Overhead Cranes
Utilizing Under Running Trolley Hoist, No. 74

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

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

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

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

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

<REV>

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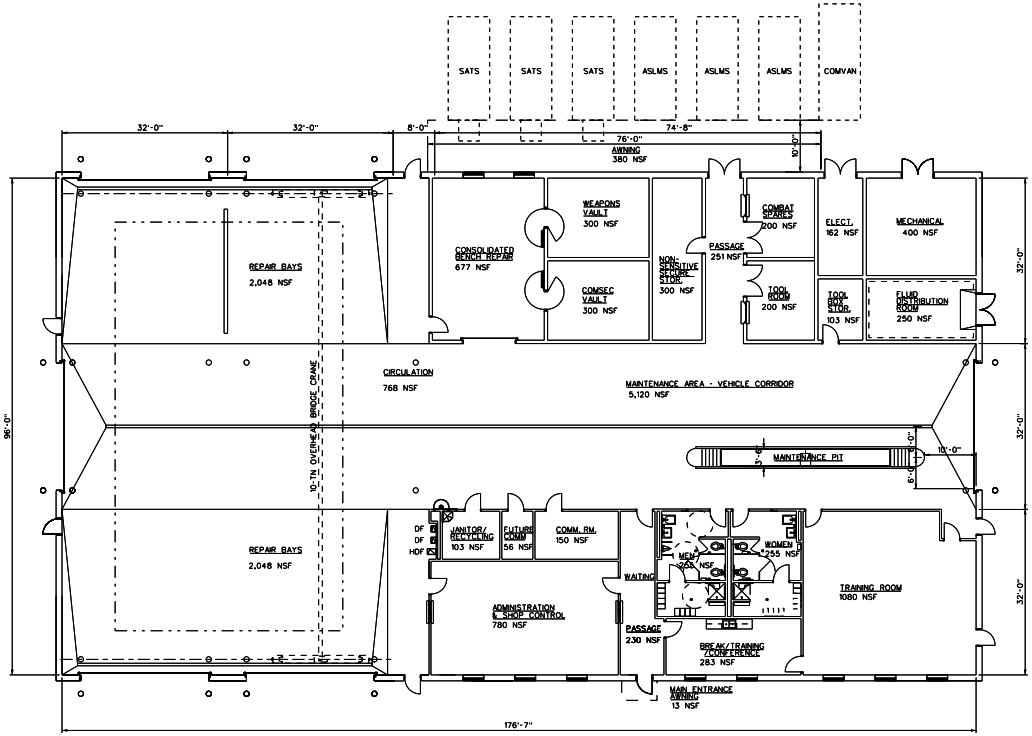

FLOOR PLAN 18,000 GSF

0' 25' 50' 75'

LEGEND

DF	DRINKING FOUNTAIN
HDF	HANDICAP DRINKING FOUNTAIN
TD	TRENCH DRAIN
WF	WASH FOUNTAIN

FLOOR PLAN INDICATES THE ARMY STANDARD SOLUTION IN SCHEMATIC FORM. DESIGNER OF RECORD IS ALLOWED TO MAKE ADJUSTMENTS FOR EXTERIOR FACADE/ARCHITECTURAL THEME, AND/OR TO ACCOMODATE SPECIFIC BUILDING ENGINEERING SYSTEMS (STRUCTURAL, MECHANICAL, ELECTRICAL, FIRE PROTECTION, AND SUSTAINABLE DESIGN). THESE ADJUSTMENTS WILL BE EVALUATED BY THE CENTER OF STANDARDIZATION (COS) DURING ITS COMPLIANCE REVIEW. INNOVATIVE, COST SAVING SOLUTIONS WILL BE GIVEN PROPER CONSIDERATION BY THE COS, AND WILL BE ADOPTED AS APPROPRIATE.

AREAS SHOWN ON THE FLOOR PLAN ARE TO BE CONSIDERED NET PROGRAM REQUIREMENTS. MAXIMUM ALLOWABLE GROSS BUILDING AREA IS THE MAXIMUM GROSS SPACE PERMISSIBLE FOR THE FACILITY.

A REDUCED OVERALL GROSS AREA IS ACCEPTABLE IF ALL NET PROGRAM REQUIREMENTS AND ADJACENCIES ARE MET.

US ARMY CORPS OF ENGINEERS SAVANNAH

SYMBOL	DESCRIPTION	DATE	BY

DESIGNED BY: DATE:
DWN BY: CKD BY: SOLICITATION NO.:
SUBMITTED BY: CONTRACT NO.:
FILE NAME: CATEGORY CODE:
SIZE: PLOT SCALE: PLOT DATE:

U. S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS SAVANNAH DISTRICT

FACILITIES STANDARDIZATION PROGRAM
TACTICAL EQUIPMENT MAINTENANCE FACILITIES

SMALL TEMF
FLOOR PLAN

PLATE REFERENCE NUMBER
A-101
SHEET

$$DGNSPEC$$
$$SYSTIME$$
$$USERNAME$$

</REV>

4.0 APPLICABLE CRITERIA

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

4.1. INDUSTRY CRITERIA

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

Table 1: Industry Criteria

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

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

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

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

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

IESNA RP-8	Roadway Lighting
IESNA Lighting Handbook	Reference and Application
Institute of Electrical and Electronics Engineers Inc. (IEEE)	
	Standard for Use of the International System of Units (SI): the Modern Metric System
Standard 1100	Recommended Practice for Powering and Grounding Sensitive Electronic Equipment
International Code Council (ICC)	
IBC	International Building Code Note: All references in the International Building Code to the International Electrical Code shall be considered to be references to NFPA 70. 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. All references in the International Building Code to the International Fire Code and Chapter 9 shall be considered to be references to Unified Facilities Criteria (UFC) 3-600-01.
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, Liquified Petroleum Gas Code.
International Organization for Standardization (ISO)	
ISO 6781:1983	Qualitative detection of thermal irregularities in building envelopes –

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

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

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

ANSI A250.8/SDI 100	Standard Steel Doors and Frames
Steel Deck Institute	
	SDI Diaphragm Design Manual
Steel Joist Institute	
	Catalog of Standard Specifications and Load Tables for Steel Joists and Joist Girders
Underwriters Laboratories (UL)	
UL 96A	Installation Requirements for Lightning Protection Systems
UL 300	Standard for Safety for Fire Testing of Fire Extinguishing Systems for Protection of Restaurant Cooking Areas
UNITED STATES ACCESS BOARD: U.S. ARCHITECTURAL AND TRANSPORTATION BARRIERS COMPLIANCE BOARD	
ADA and ABA Accessibility Guidelines for Buildings and Facilities	ABA Accessibility Standard for DoD Facilities Derived from the ADA and ABA Accessibility Guidelines: Specifically includes: ABA Chapters 1 and 2 and Chapters 3 through 10. Use this reference in lieu of IBC Chapter 11. Excluded are: (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). (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).
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES	
	FDA National Food Code
U.S. GREEN BUILDING COUNCIL (USGBC)	
LEED-NC	Green Building Rating System for New Construction & Major Renovations
	Application Guide for Multiple Buildings and On-Campus Building Projects

4.2. MILITARY CRITERIA

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

4.2.1. Energy Policy Act of 2005 (Public Law 109-58) (applies only to the extent specifically implemented in the contract, which may or may not directly cite or reference EPACT)

4.2.2. Executive Order 12770: Metric Usage In Federal Government

(a) Metric design and construction is required except when it increases construction cost. Offeror to determine most cost efficient system of measurement to be used for the project.

4.2.3. TB MED 530: Occupational and Environmental Health Food Sanitation

4.2.4. Unified Facilities Criteria (UFC) 3-410-01FA: Heating, Ventilating, and Air Conditioning - applicable only to the extent specified in paragraph 5, herein.

4.2.5. Deleted.

4.2.6. UFC 3-600-01 Design: Fire Protection Engineering for Facilities. Use the latest edition of the IBC in coordination with this UFC. Use Chapters 3, 6, 7, 33 and UFC 3-600-01. If any conflict occurs between these Chapters and UFC 3-600-01, the requirements of UFC 3-600-01 take precedence. Use UFC 3-600-01 in lieu of IBC Chapters 4, 8,9,10.

4.2.7. UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings

4.2.8. UFC 4-023-03 Design of Buildings to Resist Progressive Collapse (Use most recent version, regardless of references thereto in other publications)

(a) Note the option to use tie force method or alternate path design for Occupancy Category II.

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

4.2.10. Technical Criteria for Installation Information Infrastructure Architecture (I3A)

(a) Email: DetrickISECI3Aguide@conus.army.mil

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

5.0 GENERAL TECHNICAL REQUIREMENTS

This paragraph contains general technical requirements. See also Paragraph 3 for facility-specific 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 expectance 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.

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: Each building shall have exterior signage permanently attached on two faces of the 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. Coordination of the building colors and finishes is necessary for a cohesive design. Color selections shall be appropriate for the building type. The use of color, texture and pattern shall be used 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. Finishes should be selected with regards to aesthetics, maintenance, durability, life safety and image. Limit the number of similar colors for each material. Color of Ceramic and porcelain tile grout shall be medium range color to help hide soiling. Plastic laminate and solid surface materials shall have patterns that are mottled, flecked or speckled. Finish colors of fire extinguisher cabinets, receptacle bodies and plates, fire alarms / warning lights, emergency lighting, and other miscellaneous items shall be coordinated with the building interior. Color of equipment items on ceilings (speakers, smoke detectors, grills, etc.) shall match 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: Interior window treatments with adjustable control shall be provided in all exterior window locations for control of day light coming in windows or privacy at night. Uniformity of treatment color and material shall be maintained to the maximum extent possible within a building.

5.3.6. COMPREHENSIVE INTERIOR DESIGN

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

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 needs to be compatible with the intended functions and components that allows for future flexibility and reconfigurations of the interior space. 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”. In addition to gravity, seismic and lateral loads, design the 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.

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.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

5.6. PLUMBING

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

5.6.2. PRECAUTIONS FOR EXPANSIVE SOILS: Where expansive soils are present, the design for underslab piping systems and underground piping serving chillers, cooling towers, etc, shall include features 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, piping should be suspended 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: Not Used.

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

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

5.6.10. Where the seasonal design temperature of the cold water entering a building is below the seasonal design dew point of the indoor ambient air, and where condensate drip will cause damage or create a hazard, insulate

plumbing piping with a vapor barrier type of insulation to prevent condensation. Do not locate water or drainage piping over electrical wiring or equipment unless adequate protection against water (including condensation) damage is provided. Insulation alone is not adequate protection against condensation. Follow ASHRAE Fundamentals Chapter 23, Insulation for Mechanical Systems, IMC paragraph 1107 and International Energy Conservation Code for pipe insulation requirements.

5.7. ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

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

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

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

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

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

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

5.7.5.1. Interior Lighting:

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

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

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

(d) Metal Halide Lighting (where applicable): Metal Halide lamp fixtures in the range of 150-500 Watts shall be pulse start type and have a minimum efficiency rating of 88%.

(e) Lighting Controls: ANSI/ASHRAE/IESNA 90.1 has specific lighting controls requirements. Provide a high level of lighting system control by individual occupants or by specific groups in multi-occupant spaces (classrooms, conference rooms) to promote the productivity, comfort and well being of the building occupants. In office spaces, the preferred lighting should be a 30 FC ambient lighting level with occupancy sensor controlled task lighting in the work spaces to provide a composite lighting level of 50 FC on the working surfaces. Consider incorporating daylighting techniques for the benefit of reducing lighting energy requirements while improving the quality of the

indoor spaces. If daylight strategies are used, additional coordination is required with the architect and mechanical engineer. Additionally, incorporate electric lighting controls to take advantage of the potential energy savings.

(f) Exterior Lighting: See paragraph 6.9 for site specific information, if any, on exterior lighting systems. Minimize light pollution and light trespass by not over lighting and use cutoff type exterior luminaries.

5.7.6. TELECOMMUNICATION SYSTEM: All building telecommunications cabling systems (BCS) and OSP telecommunications cabling system shall conform to APPLICABLE CRITERIA to include 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. 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.

5.8.2.2. Design systems in geographical areas that meet the definition for high humidity in UFC 3-410-01FA in accordance with the special criteria for humid areas therein.

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

air through fan coil units. Avoid the use of direct expansion cooling coils in air handling units with constant running fans that handle outside air.

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

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

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

5.8.3. BUILDING AUTOMATION SYSTEM. Provide a Building Automation System consisting of a building control network as specified.

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

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

(a) Install hardware such that individual control equipment can be replaced by similar control equipment from other equipment manufacturers with no loss of system functionality.

(b) Necessary documentation (including rights to documentation and data), configuration information, configuration tools, programs, drivers, and other software shall be licensed to and otherwise remain with the Government such that the Government or its agents are able to perform repair, replacement, upgrades, and expansions of the system without subsequent or future dependence on the Contractor.

5.8.3.2. All DDC Hardware shall:

(a) Be connected to a TP/FT-10 ANSI/EIA 709.3 control network.

(b) Communicate over the control network via ANSI/EIA 709.1B exclusively.

(c) Communicate with other DDC hardware using only SNVTs

(d) Conform to the LonMark® Interoperability Guidelines.

(e) Be locally powered; link power (over the control network) is not acceptable.

(f) Be fully configurable via standard or user-defined configuration parameter types (SCPT or UCPT), standard network variable type (SNVT) network configuration inputs (*nci*), or hardware settings on the controller itself to support the application. All settings and parameters used by the application shall be configurable via standard or user-defined configuration parameter types (SCPT or UCPT), standard network variable type (SNVT) network configuration inputs (*nci*), or hardware settings on the controller itself

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

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

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

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

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

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

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

5.8.3.8. Not Used

5.8.3.9. Not Used

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.
- Control System Schematic diagram and Sequence of Operation for each HVAC system.
- Operation and Maintenance Instructions including procedures for system start-up, operation and shut-down, a routine maintenance checklist, and a qualified service organization list.
- LONWORKS® Network Services (LNS®) database for the completed system.
- Quality Control (QC) checklist (below) completed by the Contractor's Chief Quality Control (QC) Representative

Table 5-1: QC Checklist

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

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

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

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5.8.4. TESTING, ADJUSTING AND BALANCING. Test and balance air and hydronic systems, using a firm certified for testing and balancing by the Associated Air Balance Council (AABC), National Environmental Balancing Bureau (NEBB), or the Testing Adjusting, and Balancing Bureau (TABB). The prime contractor shall hire the TAB firm directly, not through a subcontractor. Perform TAB in accordance with the requirements of the standard under which the TAB Firm's qualifications are approved, i.e., AABC MN-1, NEBB TABES, or SMACNA HVACTAB unless

otherwise specified herein. All recommendations and suggested practices contained in the TAB Standard shall be considered mandatory. Use the provisions of the TAB Standard, including checklists, report forms, etc., as nearly as practicable to satisfy the Contract requirements. Use the TAB Standard for all aspects of TAB, including qualifications for the TAB Firm and Specialist and calibration of TAB instruments. Where the instrument manufacturer calibration recommendations are more stringent than those listed in the TAB Standard, adhere to the manufacturer's recommendations. All quality assurance provisions of the TAB Standard such as performance guarantees shall be part of this contract. For systems or system components not covered in the TAB Standard, the TAB Specialist shall develop TAB procedures. Where new procedures, requirements, etc., applicable to the Contract requirements have been published or adopted by the body responsible for the TAB Standard used (AABC, NEBB, or TABB), the requirements and recommendations contained in these procedures and requirements are mandatory.

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

5.9. ENERGY CONSERVATION

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

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

5.9.3. Purchase Energy Star products, except use FEMP designated products where FEMP is applicable to the type product. The term “Energy Star product” means a product that is rated for energy efficiency under an Energy Star program. The term “FEMP designated product” means a product that is designated under the Federal Energy Management Program of the Department of Energy as being among the highest 25 percent of equivalent products for energy efficiency. When selecting integral sized electric motors, choose NEMA PREMIUM type motors that conform to NEMA MG 1, minimum Class F insulation system. Motors with efficiencies lower than the NEMA PREMIUM standard may only be used in unique applications that require a high constant torque speed ratio (e.g., inverter duty or vector duty type motors that conform to NEMA MG 1, Part 30 or Part 31).

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

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

5.11. SUSTAINABLE DESIGN

5.11.1. STANDARDS AND CODES: Sustainable design shall conform to APPLICABLE CRITERIA. See paragraph 6, PROJECT-SPECIFIC REQUIREMENTS for which version of LEED applies to this project. The LEED-NC Application Guide for Multiple Buildings and On-Campus Building Projects (AGMBC) applies to all projects. Averaging may be used for LEED compliance as permitted by the AGMBC but is restricted to only those buildings included in this project. Each building must individually comply with the requirements of paragraphs ENERGY CONSERVATION and BUILDING WATER USE REDUCTION.

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

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

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

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

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

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

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

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

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

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

5.12. CONSTRUCTION AND DEMOLITION (C&D) WASTE MANAGEMENT: Achievement of 50% diversion, by weight, of all non-hazardous C&D waste debris is required. Reuse of excess soils, recycling of vegetation, alternative daily cover, and wood to energy are not considered diversion in this context, however the Contractor must tracked and report it. A waste management plan and waste diversion reports are required, as detailed in Section 01 57 20.00 10, ENVIRONMENTAL PROTECTION.

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

(a) Standoff distance from roads, parking and installation perimeter; and/or structural blast mitigation

(b) Blast resistant windows and skylights, including glazing, frames, anchors, and supports

(c) Progressive collapse resistance for all facilities 3 stories or higher

(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

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.

(1) 6.5.3 Programmable Electronic Key Card Access System: these facilities will not use Keyless Card Access System for entry. This section has been altered to include the requirements for keying and installation of final lock cores for all of the facilities doors. The information regarding what is to be provided to Ft Polk DPW is also provided in paragraph 6.5.3.3 of the section.

(AM#3)

(2) Section 01 10 00, part 3.2 FUNCTIONAL AND OPERATION REQUIREMENTS

(e) Architectural TEMF Feature Matrix – **'Delete'** Built-in Storage Bins requirement. The built-in bins are not required.

(3) Section 01 10, paragraph 3.1.7, subparagraph (4) Vehicle Exhaust Evacuation Systems. It is clarified that for the purpose of this paragraph, there are no tracked vehicles using this facility.

(4) Section 01 00 00, paragraph 5.9.2. The requirement to achieve energy consumption 40% below the stated baseline is revised to 30% below the stated baseline.

(5) Requirements set forth in this RFP for Life Cycle Cost Analysis for solar water heating is deleted. The Contractor may propose solar water heating at his discretion.

(/AM#3)

6.3. SITE PLANNING AND DESIGN

6.3.1. General:

a. See site work documents (Included as Appendix JJ) for the project location and the location of haul routes. Excess clean spoil shall be disposed of on the Installation at the southwest corner of the intersection of Chaffee Road and Exchange Road (refer to the site work documents for additional information). Concrete and asphalt debris can be disposed on a site east of the intersection of Chaffee Road and Magazine Road, as shown on the site work documents. All other disposals shall be off Government controlled property and at the contractor's expense. Construction limits shall be confined as shown on Sheet C-102 of the site work documents. Contractor shall neither stage, nor construct outside of "Approximate Limits of Work" as shown on said sheet. Connection points for utilities shown in the site development plans are merely the suggestion of the RFP writer. The Contractor is responsible for the final design of utility connections.

b. The site work documents provided by the Government are included in the Appendix. Any discrepancies which are found in the furnished plans shall be immediately brought to the attention of the Contracting Officer's Representative (COR). Borings, boring location map, subsurface condition data, and the geotechnical report as modified by the Government are furnished as part of the RFP and are included in the Appendices.

c. The contractor shall accept the site as is, be solely responsible for all work required to complete this project. The Contractor's pad preparation operations shall be confined to the work area.

d. The contractor will be allotted an on-site area for the placement of a construction trailer complex and storage for the contractor and respective Subcontractors. Permanent Trailers will not be permitted within Construction Limits without Government approval. The contractor is required to meter and pay for the electrical power and water utilized during construction.

e. All contractor vehicles shall be registered with the installation. Complete registration must be completed ten working days prior to bringing the vehicle onto the installation. All must have a valid vehicle registration, insurance and driver's license. The contractor shall coordinate through the COR.

f. The contractor shall be responsible for the site preparation, fencing, temporary construction access drives and maintenance of the compound at all times. Upon completion of the project and after removal of trailers, materials and equipment from within the fenced area, the fence shall be removed and will become the property of the contractor. Areas used by the contractor for the storage of equipment, material or other use, shall be restored to the original or better condition. Gravel used to traverse grassed areas shall be removed and the area restored to its original condition, including top soil and seeding as necessary.

g. The contractor will be responsible for providing temporary construction utilities; it may be necessary, initially, for the contractor to truck water to the site until utilities are constructed.

h. The contractor is responsible for connection of all utilities from the building to the service connection points shown on the site work documents. The contractor shall be responsible for coordination with Sitework documents and the utility providers/installation through the COR.

i. The Water and Sanitary Sewer Services on this installation are privatized by American Water Enterprise Military Services Group (American Water). The Contractor shall adhere to the AMERICAN WATER MILITARY SERVICE GROUP DESIGN GUIDE FOR WATER AND WASTEWATER FACILITIES included in Appendix MM. The Contractor is required to submit a Permit Application for Water and Sewer Taps and Line Installations to American Water for approval. All water and sanitary sewer construction shall be inspected by American Water. All submittals, correspondence, and inspections shall be submitted to American Water through the COR. The Contractor’s Water and Sanitary Sewer design will also have to be approved by the State of Louisiana, refer to American Water’s Design Guide for further information.

The Contractor shall adhere to Louisiana’s Title 51 Public Health - Sanitary Code Part XII. Water Supplies, Part XIII. Sewage Disposal, and Part XIV. Plumbing. State and Federal Law, and the Louisiana Sanitary Code, requires that – prior to the start of construction – approval by the Louisiana Department of Health and Hospitals (DHH) must be obtained for plans and specifications of all public water systems and wastewater systems. All extensions or modifications to the installations water or wastewater (W3) systems require submittal of plans and specifications to the DHH for approval. Construction may not start until the State review and approval process is completed. The Contractor shall submit a design summary package to the LDHH for review and approval:

DHH/OPH Central Region 6 Office

5604 B Coliseum Boulevard

Alexandria, Louisiana 71303

The design summary package shall consist of a cover letter briefly describing the project, the applicable filled out LDHH design summary forms, and the Contractor's design drawings and specs. Refer to the following for the LDHH design summary forms: HYPERLINK "https://ff.cecer.army.mil/FCKeditor/editor/%22%22%22%22%22http:/www.dhh.louisiana.gov/offices/publications.asp?ID=204&Detail=1092%22%22%22%22%22" http://www.dhh.louisiana.gov/offices/publications.asp?ID=204&Detail=1092

The Contractor shall be responsible for submittal of Government provided site design for approval by the State of Louisiana and American Water. Should Government-provided design data require revision, the Contractor will be responsible for design revisions.

6.3.1.1. Tactical Equipment Maintenance Facility (TEMF)

The TEMF site is bound by Illinois to the North, Texas to the East, a future COF to the south, and Existing Facilities to the West. The site is mostly clear with the exception of the area south of the hardstand / gravel area called out as "stormwater pond area" on sheet C-102 of the site development plans. This area is heavily wooded. Required facilites include the 18,000 S.F. TEMF, and a 2,800 S.F. Unit Storage Building. The Hazardous Waste and Oil Storage Building are not to be constructed, however they should have utilities provided for connection in the future. Utility connection points have been suggested on the site work documents. Site infrastructure points of connection to existing utilities have been identified within the site work documents, however the Contractor is not required to connect at given locations. Coordination, design and construction of all utilities, building pads, compaction, termite pretreatment (refer to the Appendix), sidewalks, final grading, plantings/landscaping, bollards and site furnishings are the responsibility of the contractor. The contractor's operations shall be limited to the site and excess soil may not be wasted off the Military Installation without written Governmental approval. The Contractor will not receive additional compensation for materials wasted off the Military Installation.

6.3.1.2 Grading Requirements:

a. Finished Floor Elevations: A building's finished floor elevation shall be a minimum of 12 inches above the highest point of the adjacent outside finished grade.

b. Turf Areas Adjacent to Buildings: For all turfed and unpaved areas adjacent to buildings the contractor shall slope away from the building at a minimum of 5% grade for the first 20 feet to 30 feet. These requirement shall be indicated on the grading plans with critical spot elevations.

c. Lawn Areas: Lawn areas beyond the turfed areas adjacent to buildings in Part 6.3.1.2. b. shall have a minimum of 2% slope and maximum desirable slope of 20%. If it becomes necessary to use slopes steeper than 20% slope

protection shall be provided. The type and amount of slope protection provided shall be based on the soil type, slope length, and aesthetic, environmental, and economic considerations.

d. Ditches and Swales: Drainage Channels, Ditches, and Swales: The contractor shall use a minimum longitudinal slope of 0.30% or steeper for all drainage channels, ditches or swales with a minimum velocity of 2 feet per second at full capacity. All drainage channels, ditches, or swales shall be designed with permanent Turf Reinforcement Mats(TRM) with vegetative grown in accordance with the most current Federal Highway Administration Hydraulic Engineering Circular No. 15 Design of Roadside Channels with Flexible Linings National Highway. The contractor shall provide calculations in the design analysis. The contractor shall ensure proper installation per the manufacturer's recommended methods and use of proper length and quantity of fasteners. The contractor shall ensure that within the permanent TRM the vegetative density of 95% and shall have vegetative stand a minimum of 4 inches tall. All seeding shall be native species on the Fort Polk Approved Plant List. All TRM products shall meet or exceed the current TxDOT Approved Product List for Item 169 "Soil Retention Blanket" rated by shear stress (HYPERLINK "http://www.txdot.gov/business/doing_business/product_evaluation/erosion_control.htm"http://www.txdot.gov/business/doing_business/product_evaluation/erosion_control.htm). No rock rip rap shall be used for erosion protection.

e. Roads, Streets, and Access Drives: Gradients for roads, streets and access drives shall be as outlined in AASHTO, A *Policy of Geometric Design of Highways and Streets.* Grade changes in excess of 1%shall be accomplished by means of vertical curves. The length of vertical curves will be determined in accordance with the aforementioned AASHTO criteria. Profiles are mandatory for vertical control of centerline gradients. Roads, streets and highways should be shown using of half-plan/half-profile type drawings.

f. Parking Areas: Pavement grades shall provide positive surface drainage with a 1 percent minimum slope in the direction of drainage. Provide a maximum slope within a 90-degree parking space of 1.5 percent from front to rear end and 5 percent from side to side. Provide a maximum slope within a 45-degree or 60-degree parking space of 5 percent from front to rear end and 1 percent from side to side. Grade perpendicular to direction of parking 5 percent maximum for bituminous or concrete surfaces and 3 percent for other surfaces.

g. Culverts: The recommended gradient of culverts shall be 0.5% with an absolute minimum of 0.3%. Concrete headwalls or end sections shall be provided for all culverts. Headwalls and end sections shall be designed to reduce velocities to levels that are non-erosive for the soil types encountered.

h. Sidewalks: Sidewalks parallel and adjacent to parking spaces shall be a minimum of 6 feet wide all other sidewalk shall be minimum of 4 feet wide. All sidewalk longitudinal and cross slopes shall conform to the ADA Accessibility Guidelines for Buildings and Facilities.

i. Dumpsters: Concrete loading aprons shall be provided for the first 15 feet in front of the dumpster pads to accommodate loading and to avoid rutting of the pavement in front of the dumpsters. The contractor shall locate dumpster walls in accordance to UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings.

6.3.1.3 Design Submittal: Complete design calculations shall be included in a design analysis in accordance to the format and content of the 2003 Southwestern Division Architectural and Engineering Instructional Manual. Horizontal and vertical control shall be provided for all new facilities. The contractor shall be provide Microstation Version 8.0 or later. All electronic drawings in accordance to the AEC 4.0 CADD standards.

6.3.2. Site Structures and Amenities

a.Building Setback and Force Protection: Sitework has been designed based on a unicof configuration. The Contractor shall provide building designs that conform to the provided site layout without revision thereby meeting AT/FP setbacks, etc. Construction standoff distances and access control are provided for in the site work documents and shall be maintained in accordance with the AT/FP requirements of UFC 4-010-01 for Primary Gathering within a Controlled Perimeter. The site layout shall be based on the facility threat security level to protect against exterior attack by providing standoff distance between an aggressor or bomb, barriers, and to facilitate visual monitoring of the site.

b. Building Spacing: Fire department access, clearances and separations are provided for in the site work documents and shall be maintained in accordance with UFC 3-600-01 and the International Building Code. For buildings shall also conform to the AT/FP requirements of UFC 4-010-01.

c. Parking Areas: Paving, perimeter concrete curbs and gutters are provided for in the site work documents.

d. Service/ Access Drives: Service/access drives/loops and equipment hardstand areas are provided for in the site work documents.

e. Walks: A sidewalk paralleling the parking places are provided for in the site work documents. Additional walks shall be designed and constructed to serve the facility and shall not be located under the eave's drip line.

6.3.3. Site Functional Requirements:

6.3.3.1. Stormwater Management (SWM) Systems.

A storm water pollution prevention plan (SWPPP) is required. The contractor will be the primary permittee for the construction site. Refer to the site work documents included in the Appendix for additional information. Permitting with the LDH&H will be coordinated through the COR. The Contractor shall comply with the requirements for general permit Number LAR 100000. The contractor shall incorporate and edit Appendix LL section 01 57 24.03 44 STORM WATER POLLUTION PREVENTION PLAN (LOUISIANA) into their specifications.

6.3.3.1.1. Storm Drain System: Existing Storm Drainage Systems are natural course channels. The Contractor shall tie into these systems as appropriate for his areas of design responsibility. Design and construction of the storm drainage system shall be in accordance with Federal Aviation Administration Advisory Circular FAA AC 150-5320-5C, *Surface Drainage Design*; Federal Highway Administration Publication No. FHWA-NHI-01-021, Hydraulic Engineering Circular No. 22, Second Edition, *URBAN DRAINAGE DESIGN MANUAL*; and U.S. Weather Bureau Technical Paper No. 40, dated May 1961, *Rainfall Frequency Atlas of the United States for Durations from 30 minutes to 24 hours, and return periods from 1 to 100 years*. Design of drainage structures shall be based on a 10-year storm frequency. Design of the storm drainage system shall incorporate the principles of Low Impact Development (LID), as detailed in UFC 3-210-10 DESIGN: *LOW IMPACT DEVELOPMENT MANUAL. The contractor's design shall maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the site with regard to the temperature, rate, volume, and duration of flow in accordance with the Energy Independence and Security Act of 2007 (Section 438, EISA 2007).* Manholes, surface inlets, and curb inlets shall be constructed of reinforced concrete or pre-cast reinforced concrete. Structures in pavement shall be designed to handle H-20 loading. Structures in turfed areas can be constructed for lighter weight loading. The Contractor is responsible for designing the storm drainage system to be as economical as possible, while taking into account the topography, drainage area, and outfall locations, as well as coordination with existing drainage

systems, and existing and future underground utilities. Profiles are required for underground storm drainage systems and sections are required for culverts.

a. Underground Systems: Whenever possible, pipe crowns shall be matched in elevations. Profiles of pipes shall show all existing and new underground utilities and pertinent surface features. The minimum pipe gradient shall be designed to provide a minimum velocity (full flow) of 3.0 fps. The new outfall and receiving channel must be designed to withstand the shear stress acting on the channel from the runoff to prevent erosion. New underground storm drainage pipes shall be sized by computation of backwater surface profiles. The minimum pipe size shall be 12 inches, unless the pipe is a part of the roof drain system, in which case the minimum size of laterals and collector pipes is 4 inches.

b. Street Drainage: Street drainage shall be accomplished by the use of curb and gutter and curb inlets. Curb gaps can be considered in areas where roadside ditches are used. The center one-third of the street shall not convey runoff during the passing of the design storm. Inverted crown sections for the streets shall not be used without prior approval. Curb inlets shall not be located in the radius of street intersections, at curb returns, or where pedestrian traffic is most likely to occur.

c. POV Parking and Hardstands: Do not concentrate the flow of storm runoff on asphalt pavement. Convey storm runoff within POV parking areas to perimeter curbs by sheetflow. However, if it is necessary to concentrate flow within a parking area, provide concrete paving at the swale flowline. Concentrated flow will not be permitted to flow from POV parking or hardstand areas onto adjacent gravel areas or turfed slopes. Sheetflow from parking areas and hardstands onto adjacent gravel or turfed areas must be examined for possible erosive effects.

d. The Contractor shall connect the roof drain system to an underground storm drain system.

6.3.3.2. Erosion and Sediment Control

A storm water pollution prevention plan (SWPPP) is required. The contractor will be the primary permittee on the EOD COF. The Contractor on the 09L Language Training Facility will be the Primary permittee on the 09L COF and the Contactor will be the secondary permittee. Refer to the site work documents included in the Appendix for additional information. Permitting with the LDH&H will be coordinated through the COR. The Contractor shall comply with the requirements for general permit Number LAR 100000. The contractor shall incorporate and edit Appendix LL section 01 57 24.03 44 STORM WATER POLLUTION PREVENTION PLAN (LOUISIANA) into their specifications.

The contractor shall be responsible for the Storm Water Pollution Prevention Plans (SWPPP) for the construction site in accordance with the paragraph above. The use of silt fences, mulch straw/hay bales around inlets and sediment traps to control erosion during construction shall be included. Refer to the site work documents included in the Appendices for additional information.

6.3.3.3. Vehicular Circulation.

Vehicular circulation is provided for in the site work documents.

6.4. SITE ENGINEERING

6.4.1. Existing Topographical Conditions

A three dimensional digital topographic and utility survey was completed for the site, and included in the site work documents.

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

(Am#2)

~~Site Geotechnical conditions and design requirements are set forth in Appendix A, which will be provided via amendment to this RFP.~~

6.4.2.1 Government Geotechnical Report

A Government Geotechnical Report (GGR) has been prepared, and is appended to these specifications. **The GGR provides the minimum standards and requirements for the foundation and pavement structures for this project.** The Government Geotechnical Report provides a general overview of the areal geologic conditions with detailed descriptions of the subsurface strata encountered during the Government geotechnical field investigation. Based on the results of the field investigation, laboratory testing program, and engineering analyses, the Government Geotechnical Report further provides parameters and minimum foundation design requirements which the Contractor shall utilize and comply with for designing the foundation. However, as stated in the Government Geotechnical Report, the Contractor (successful bidder) is responsible for drilling additional borings at the site, and performing additional laboratory testing (specified in the Government Geotechnical Report). conditions provided by the Government geotechnical field investigation, as presented in the Government Geotechnical Report. The Contractor's team shall include a licensed geotechnical engineer to interpret the Government Geotechnical Report. The Contractor's geotechnical firm shall have demonstrated successful performance in design of at least five (5) projects of similar type and scope in expansive soil environments in the states of Texas or Louisiana. The Contractor's licensed geotechnical engineer, in accordance with the requirements of the Government Geotechnical Report, shall develop and oversee the additional geotechnical field investigations and laboratory testing, and analyze and use this data to prepare a report that will verify the sufficiency of the minimum foundation and pavement design requirements provided in the Government Geotechnical Report. The GGR makes reference to the SWD AEIM which can be found at the following link: HYPERLINK "http://www.swd.usace.army.mil/capabilities/SWD_AEIM_Jan_2003.pdf"http://www.swd.usace.army.mil/capabilities/SWD_AEIM_Jan_2003.pdf

6.4.2.2 Contractor Geotechnical Report

A geotechnical evaluation report also shall be prepared by the Contractor's licensed geotechnical engineer and submitted along with the first foundation design submittal. This report shall summarize the subsurface conditions encountered during supplemental geotechnical borings and lab testing and provide recommendations for the design of appropriate foundations, floor slabs, retaining walls, embankments, and pavements **in full compliance** with the minimum foundation, floor slab system, earthwork, and pavement design requirements established in the Government Geotechnical Report. **The foundation systems selected for the facilities shall be limited to and in full compliance with those specified in the Government Geotechnical Report. No other foundation systems shall be allowed.** The following foundation systems are specifically prohibited: spot and/or continuous spread footings, straight-shaft and underreamed drilled piers, driven or cast-in-place piles, and auger cast piles.

The Contractor's geotechnical report shall discuss the types of foundation systems to be used, lateral load resistance capacities for foundation systems, and allowable bearing capacity and elevations for the foundation elements. An assessment of post-construction settlement potential including total and differential shall be provided. Recommendations regarding lateral earth pressures to be used in the design of retaining walls shall be provided and shall be in compliance with the parameters provided in the Government Geotechnical Report. The report shall 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. Calculations shall be included to support the recommendations for bearing capacity, settlement, heave, and pavement sections. Supporting documentation shall be included for all recommended design parameters such as site class, shear strength, earth pressure coefficients, friction factors, sub grade modulus, California Bearing Ratio (CBR), etc. in addition, the report shall provide earthwork recommendations and address variations between the recommendations provided by the government

and the contractor's geotechnical consultant; expected frost penetration; expected groundwater levels; recommendations for dewatering and groundwater control; and 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. All of these parameters shall meet or exceed the minimum requirements established in the Government Geotechnical Report.

6.4.2.3 The Design-Build contractor and the professional geotechnical engineer consultant shall certify in writing that the foundation, floor slab, earthwork, and pavement designs for the project have been developed **in full compliance** with the requirements established in the Government 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.

/Am#2)

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.

Results of flow test conducted in June of 2010 will be provided via an amendment to this RFP. Contractor shall conduct new flow test at an adjacent (new) fire hydrant to be constructed with the project facilities in accordance with NFPA 291. Data from this test shall be used to base hydraulic calculations and system design according to NFPA 13 and UFC-600-1 for the new automatic sprinkler fire protection system.

6.4.4. Pavement Engineering and Traffic Estimates:

6.4.4.1 **(Am#2)**

~~Vehicle rated pavement sections are to be designed by Contractor by use of the Geotechnical data presented in Appendix A~~

PAVEMENT: Pavement designs shall meet the minimum required pavement sections provided in the Government Geotechnical Report, and shall be designed in accordance with the design guidance referenced cited in the Government Geotechnical Report and using Pavement-Transportation Computer Assisted Structural Engineering (PCASE) pavement design software (which is available as a free download – refer to Section 6.b. of the Government Geotechnical Report). The Contractor's geotechnical report shall contain flexible and rigid pavement design(s) including design CBR and modulus of subgrade reaction and the required compaction effort for subgrades. Information shall be offered on the types of base course materials available in the area and design strengths. Pavement markings and traffic signage shall comply with the Installation requirements and with the Manual on Uniform Traffic Control Devices.

(/Am#2)

6.4.4.2. Emergency Vehicle Access: Access drives are to be provided for in the design to allow access for fire trucks and emergency vehicles in accordance with NFPA and UFC 3-600-1. Access to the emergency drive(s)is restricted with AT/FP access control.

6.4.4.3. Concrete Hardstands for Vehicle Parking and Storage Areas are provided for in the site work documents.

6.4.5. Traffic Signage and Pavement Markings

Pavement markings and striping shall be in accordance with state DOT standards and the Manual of Uniform Traffic Control Devices (MUTCD). Channelization and pavement markings shall be as required by the FHWAMUTCD and FHWA Standard Highway Signs.

6.4.6. Base Utility Information

For proposal purposes, the Contractor should assume he will be responsible for providing temporary utilities (water, sewer, and electricity, etc.) at the project site as needed to support construction activities. The Contractor shall coordinate connection point of temporary utilities with Fort Polk Directorate of Public Works (DPW) and American Water through the COR. The Contractor shall supplement the temporary water connection point with a PRV backflow preventer and the connection must be metered. Ft. Polk preferences for power and energy meters are attached in Appendix CC.

Refer to Paragraph 6.9.

The water distribution system tie in is shown on the site work documents. The Contractor shall coordinate points of connection through the COR with American Water. Design and construction of the potable water service between the main line and the TEMF shall be the responsibility of the Contractor. The design and construction of the water distribution system for domestic water shall be in accordance with American Water's Design Guide and Specifications. A meter will be provided by the Contractor, and the Contractor will be responsible for connection to the meter and all service piping beyond the meter outlet. Design and installation of the water system and meter shall be in accordance with American Water's Design Guide, and shall be the contractors responsibility to submit and get approval from LDHH, along with all associated fees. Coordination with American Water shall be through the COR. Valves will be installed on the water service lines near the connection point and on each service line to the building. For water mains, provide 2 valves at tees and 3 valves at crosses. Velocities in water lines shall be less than 7 feet per second (fps) to prevent possible water hammer effects.
a. Potable Water Disinfection - Verification of water line disinfection shall be performed per AWWA C651-05. The samples shall be analyzed by an analytical lab that holds a current state license and certification. Repeating disinfection protocols per AWWA C651-05 is required until satisfactory results are obtained (two consecutive sets of acceptable samples taken 24 hours apart). Water samples shall be collected in proper sterilized containers, and a bacterial examination shall be performed in accordance with state approved methods. As a minimum, one water sample from each 1000 linear feet segment of disinfected water line shall be collected. The water supply system disinfection is not approved for usage until each test result is negative for bacteriological examination. The water sample analytical results shall be provided to the DPW's Environmental Office for record keeping. The commercial laboratory shall be certified by the state's approving authority for examination of potable water.

Ft Polk preferences for back flow prevention can be found in Appendix EE and FF.

b. The Contractor shall provide one separate fire sprinkler service connection. The Contractor shall provide a double detector check valve assembly and all piping between the detector check and the building. The Contractor shall provide and locate fire hydrants in accordance with UFC 3-600-01 and American Water's Design Guide. The Contractor shall provide shutoff valves for each fire hydrant. The Contractor shall provide bollards around fire hydrants, Fire Department Connections (FDC), and Post Indicator Valves (PIV) that are subject to vehicular damage. The bollards shall be spaced to allow access by fire department personnel. The Contractor shall provide tamper switches with each PIV and shall connect the PIV to the building's fire alarm panel. Fire Department Connections shall be placed in front of the building and the PIV shall be placed a minimum of 40 feet away from all buildings. Any deviation from these locations must be approved in writing by the Fort Polk Fire Marshall and American Water.

The sanitary sewer system is shown on the SDP (Appendix JJ). The Contractor shall coordinate points of connection through the COR with American Water. Design and construction of the sanitary sewer system shall be in accordance American Water's Design Guide and Specifications. The design and construction shall also be in accordance with American Society of Civil Engineers (ASCE) and the Water Environment Federation (WEF), Gravity Sanitary Sewer Design and Construction, Second Edition (ASCE Manuals and Reports on Engineering Practice No. 60 / WEF Manual of Practice No. FD-5). The Contractor shall be responsible for the installation of two-way cleanouts and all structures required by criteria, as well as, all piping between the designated point of connection and the building. Manholes shall be provided at every change of direction and every 400 feet. Provide drop manholes if pipe elevations differ more than 18 inches. The minimum sewer main size shall be 8-inch. Provide 6-inch minimum sewer connections to buildings. Provide two-way cleanouts every 100 feet along a sewer branch connection from a building, and provide two-way cleanouts at the building connection. Manhole inlets shall be constructed of reinforced concrete or pre-cast reinforced concrete. Structures in pavement shall be designed to handle H-20 loading. Structures in turfed areas can be constructed for lighter weight loading. The Contractor shall refer to American Water's Design Guide and Specifications to determine type of pipe material. The Contractor shall

provide profiles for the underground sanitary sewer systems. Procedures for Submitting Plan and Specifications for Review and Approval of Water Sewage Facilities can be found at the following links:

http://www.swf.usace.army.mil/pubdata/EC/eca/REF/American%20Water%20Group%20Design%20Guide.pdf

http://www.swf.usace.army.mil/pubdata/EC/eca/REF/American%20Water%20Group%202010%20Technical%20Specs.pdf

Natural Gas distribution lines are shown on the SDP. The Contractor shall coordinate points of connection to the facility with the Fort Polk DPW through the COR. The Contractor shall install the site gas distribution piping. The Contractor shall provide and install the gas meter and connect the meter to the building stub out. Fort Polk uses a Sonix 880 meter or equivalent. The Contractor shall be required to stub the gas feed out of the building. Design and construction of the natural gas service lines shall be in accordance with ANSI B31.8, Gas Transmission Distribution and Piping Systems. Natural gas shall be provided to the building. A meter/regulator assembly shall be provided for the facility by the Contractor and shall have a valved bypass. Ft Polk Preferences for Gas Metering can be found in Appendix DD.

Refer to Paragraph 6.9.

6.4.7. Cut and Fill

Rough grading of the building sites, building pad and final grading as well as clearing / grubbing, compaction and final grading of all other areas shall be designed and provided for by the contractor.

6.4.8. Borrow Material

Borrow sources do not exist on this installation.

6.4.9. Haul Routes and Staging Areas

Permissible haul routes are shown in the site work documents.

6.4.10. Clearing and Grubbing:

Refer to Paragraph 5.1.2.5.

6.4.11. Landscaping:

Plant material shall include low maintenance, drought tolerant plantings for screening views from roads and other highly visible areas. Landscaping shall also comply with AT/FP and LEED Silver requirements. Minimal landscaping and final erosion control features shall be provided. No permanent landscape irrigation shall be included in the project. Refer to Appendix I for a list of acceptable plants. All landscaping within 33 feet of the facility shall adhere to force protection clear zone requirements as specified in UFC 4-010-01.

6.4.12. Turf:

Turfing shall be required on all graded, unpaved and disturbed areas resulting from the Contractor's operations. Sod shall be used in areas with steep slopes (≥ 3:1) or ditch linings to assist in establishing turf and to aid in erosion protection. Turf Reinforcement Matting (TRM) should be used in ditches that are subject to high velocity storm runoff. Erosion control matting shall also be utilized as necessary to control erosion on steeper slopes. No permanent irrigation shall be included in the project.

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 Polk**'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 Polk's identified preferences. Implement these preferences considering the following:

(a) Achievable within the Construction Contract Cost Limitation (CCL)

(b) Meets Milestones within Maximum Performance Duration.

(c) Achieves Full Scope indentified in this Solicitation

(d) Best Life-Cycle Cost Design

(e) Meets the Specified Sustainable Design and LEED requirements

(f) Complies with Energy Conservation Requirements Specified in this RFP.

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

(a) To be compatible with the existing facilities in the surrounding area.

(b) The Tactical Equipment Maintenance Facility must be architecturally compatible with the 115 Hospital Company Operations Facilities (COF) being constructed on the adjacent site.

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 Polk. 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) The functional floor plan layout is the CoS standard and exterior building appearance and aesthetics should use the drawings shown in Appendix J as reference for the final design of the building facade. Design quality is achieved through the integration of buildings with the site, sustainability, selection of building systems for low-cost maintenance and operation, and an overall balance of aesthetics and functionality. Innovative, creative, or cost-saving proposals, which meet or exceed these requirements, are encouraged. Provide the Owner with best value in the design and sellection of materials.

(c) Prevention of excessive wear and vandalism will be considered during the design of the Tactical Equipment Maintenance Facility. Attention should be given to: doors, door hardware and assemblies, gypsum wallboard, acoustic factors and interior building finishes. The facility is a vehicle maintenance facility and added durability is the primary requirement and providing best value to the owner.

(d) Corridors/passageways. Provide semi-recessed fire extinguisher cabinets to comply with applicable codes. Do not locate breaker panels in the corridors. With the exception of fire sprinkler heads, no piping, conduit or ductwork shall be exposed in corridors.

(e) Showers. If fiberglass, vinyl, resin or similar type shower pans are utilized, set in grout mortar bed.

(f) Janitor Closets. Provide a mop sink and a heavy duty shelf integral with the mop rack.

(g) Access to Mechanical, Electrical and Communications spaces shall be limited to authorized personnel through lockable doors. Size and locate rooms to allow equipment removal and maintenance. Locate exterior Mechanical, Electrical, Communications Equipment, Air intake and openings in exterior walls to comply with force protection standards.

6.5.2.7 Architectural Vernacular

The project requires the design and construction of the Tactical Equipment Maintenance Facility (TEMF) based on the Savannah Corp of Engineers Centers of Standardization (CoS) model for the TEMF. The Architectural style, color scheme and materials of the TEMF shall be selected to match and compliment the style of Fort Polk and the buildings in the area surrounding the new facility. The main building near the TEMF will be the 115 Hospital Unit COF to be constructed on the adjacent site. The primary criteria for material selection shall be durability do to the purpose of this facility.

6.5.2.7.1 Building Exterior

(a) The facilities will have a non-combustible roof covering that meets or exceeds Class 4 impact resistance rating when tested in accordance with UL 22 18.1. Permanently attached snow and ice guards shall be provided above entrances, pedestrian walkways and hardstand surfaces, where due to the roof layout; there is the potential for moisture runoff (snow, water or ice) at roof edges.

(b) For roof coverings with standing seam metal, provide the material with 22 gauge minimum steel panels that are textured, ribbed, or striated to minimize possibility of oil canning. Roof slopes shall be consistent with the roof slopes of the surrounding buildings unless indicated otherwise by the Contracting Officer.

(c) If operable windows are provided, they shall be installed complete with insect screens.

(d) Exterior guard and stair railings shall have a non painted durable weather resistant finish.

(e) Exterior Building Signage. Each building shall have exterior signage permanently attached on two faces of the building indicating the assigned building number or address. Building number signage details and locations shall conform to the Installation Standards as indicated in Appendix H.

(f) Exterior finishes shall comply with the Ft Polk Installation Design Guide (IDG) and be compatible with the materials to be utilized on the future 115 Medical COF to be constructed on the adjacent site. The following are materials that can be utilized in the exterior construction of the TEMF:

(1) Exterior should be durable material, split fast CMU is a preference, up to a min. 8’-0”. The wall system above the CMU shouldl be pre finished insulated metal panels, EIFS on gypsum sheathing and metal framing, or other durable surface that comply with the energy requirements for this region of the country and will extend from the top of the CMU to the underside of the roof soffit. The D-B Contractor will submit samples of materials that are in the color and texture range of the materials on the existing facilities in the surrounding area to Contractor Officer for review and final selection.

(2) Roof system should be sloped to match the roof system slope of the adjacent COF roof and be of compatable material, standing seam metal is prefered. The roof covering for Standing Seam Metal on a sloped roof shall meet or exceeds Class 4 impact resistance rating when tested in accordance with UL 2218.1, with a color consistent with the roofs on the nearby Barracks Complex. Roof shall be pre finished metal dark bronze color.

(3) Glass and Glazing shall be tinted consistent with glazing on adjacent buildings.

(4) All windows shall be pre finished, blast proof that comply with AT/FP requirements for windows and window installation. The color shall match the dark bronze roof color. Provide screens for all operable windows.

(5) All doors shall be hollow metal construction, door frames shall be grout filled. All doors and frames shall be painted to match the roof color.

(6) Provide 24’-0”w x 14’-0”h roll-up doors as indicated on the CoS standard TEMF floor plan at all vehicle entrance to the Maintenance area of the TEMF. All roll-up doors should be prefinished color to match the roof color.

(7) Provide 30” x 30” pre finished operable louvers above each roll up door to be used for natural ventilation of the Maintenance Area.

6.5.2.7.2 Building Interior

(a) As a minimum provide Moisture Resistant Gypsum Board (MR) on walls of all Toilet Rooms.

(b) Pre-decorated gypsum board panels and trim system or similar type products and assemblies are not permitted.

(c) Doors. All doors shall be hollow metal doors with hollow metal frames, gout filled for durability. The doors and frames shall be painted per the Installation Design Guide interior color schemes.

6.5.2.7.3 Unique Architectural Requirements:

(a) Weapons Vaults for the TEMFshall conform to AR 190-11 Appendix G. Arms vaults shall be provided with day gates with issue windows. Day gates may be either single leaf or split (Dutch) door type.

(b) Walls which are to be provided for the secure storage of equipment for the Tool Room, Tool Box Storage Room, Consolidated Bench Room and Communication Equipment Storage spaces. Shall either have walls that extend from floor to structure or shall be capped at a minimum height of 9'-0" with construction equal to or greater than the wall construction. Minimum Wall construction will be 3-5/8” metal studs with heavy duty 13 gage woven wire mesh screwed to the studs at 6” cc and a layer of 5/8” gypsum board on each side. Any wall construction with gaps between it and intersecting walls, ducts and other penetrations will be no greater then 4-inches. Chain link fencing shall not be used.

(c) Break/Training/Conference Room, Training Room and the Administration Shop. Provide noise deadening insulation in the walls surrounding this space with a min. 42 STC. Provide Vending machines in this space.

(d) Insulation shall not be exposed on interior wall surfaces accessible to building occupants or maintenance personnel. As a minimum, wall surfaces from finished floor to a height of 8’-0” or 4” above finished ceilings as applicable, shall be provided with gypsum board or similar products that are durable and easy to maintain. Note that this also applies to wall surfaces on mezzanine levels if applicable.

(e) Except as otherwise indicated, provide Impact Resistant Gypsum Board from T.O.S. to 8’ A.F.F. along walls of Corridors, Stairs, Training Rooms, Storage Rooms, Supply Rooms, Janitor/Recycle Rooms. All spaces that share common walls with the maintenance bays will have Impact Resistant Gypsum Board.

(f) Ceilings in the Maintenance, Mechanical, Electrical, Communication and Fluid Distribution Room may be exposed to structure. All other spaces shall be provided with either Acoustical Tile or Gypsum Board Ceilings. Appropriate consideration for moisture and other environmental factors associated with Ft Polk and a TEMF should be taken in the design and selection of ceiling and wall finishes throughout this facilities. The SIPRNet Room will be provided with a hard gypsum board ceiling. As a minimum Moisture resistant (MR) ACT shall be provide for ceilings of Entry Vestibules, Toilets, Latrine and Shower Rooms, however MR Gypsum Board ceilings are preferred for these spaces. **(AM#6)** where acoustical ceiling tiles are utilized, limit size to 24" x 24." **(/AM#6)**

(g) Provide a 10' x 10' roll up door from the Maintenance Area into the Conslidated Bench Repair Area.

6.5.2.7.4 Floor Plans

(a) See attached floor plans for additional TEMF building requirements. TEMF layouts shall conform to the requirements herein and the attached floor plans. Building layouts may be adjusted slightly to accommodate proposed construction materials and building systems. However, dimensions indicated herein and on the plans shall be considered as minimum requirements. Overall building footprints shall be sized to fit within the building site limits as indicated on the attached site plans.

6.5.2.7.5 LEED

The Tactical Equipment Maintenance Facility can incorporate natural day lighting (i.e. clearstory windows and/or skylights) into the design of the Maintenance Bay area to the maximum extent possible. To be discussed with user during the design process.

6.5.3. Programmable Electronic Key Card Access Systems:

6.5.3.1 Electronic Card Reader Access Entry Control System.

(a) No electronic key card access will be provided for this facility.

6.5.3.2 Keyed Access Entry Control System

(a) Janitor Closets shall be provided with a keyed lockset.

(b) Lever handles are to be used per ADA.

(c) Provide a Knox Box, series 3200, as manufactured by Knox Company Phoenix, Arizona, at the main entrance to each building. Only one Knox Box is required per building. Knox box needs to be approximately 4”x4” and recessed into the wall.

(d) Latrine, Shower and Locker Rooms shall be provided with a dead bolt lock on the main entry door(s) into the space, so that the entire space can be closed off for maintenance or other access control purposes.

6.5.3.3 Key and Final Core Control and Installation

(a) Where required, the construction contractor shall be responsible for installation of all locksets and exit devices for the project. This includes combination and installation of any required cores and key duplication. The core type and combination shall meet the requirements of the master key system on Fort Polk. To ensure this occurs, the post Operations and Maintenance (O&M) contractor locksmith shall have input on core combination and shall be contacted during the project planning phase.

(b) To meet the Ft Polk master key plan, all keyed lockset devices shall be compatible with BEST lock cores. The type of core required will be dependent on the security requirement for the building and/or room. The O&M contractor locksmith will assist in determining the core type with input from Physical Security. POC, phone

(c) The construction contractor shall be responsible for installation of all permanent lock cores. Any coordination required with BEST Lock Company for installation of the cores shall be planned for and is the responsibility of the construction contractor.

(d) All cores shall include four for interior doors and five keys for exterior doors. All keys shall be stamped with “U.S. GOVERNMENT DO NOT DUPLICATE” and cores shall be stamped with the core number. All master keys provided shall be turned over to the O&M contractor locksmith for security control through the government Project Engineer. All other keys shall be inventoried and turned over to Facilities Utilization for issue to the building occupants through the government Project Engineer.

6.5.4. INTERIOR DESIGN

6.5.4.1 Structural Interior Design

6.5.4.1.1. Provide a sign on the exterior side of the mechanical room door that states "In Case of Emergency Call DPW Work Desk ". Coordinate sign size, font, material, installation method, etc. with DPW Office. Verify accuracy

of telephone number with the COR prior to fabrication of sign. Sign construction to be intended for exterior installation.

6.5.4.1.2. In reference to 01 10 00 paragraph 5.3.5.6, also provide window treatment at interior windows where privacy is required, such as an office. In addition, window treatment to be horizontal blinds designed for use in commercial type buildings.

6.5.4.1.3. If provided, wood to be a medium range color.

6.5.4.1.4. If incorporated into the building color theme, including Furniture, Fixtures and Equipment (FF&E), limit blue to minor accents. Use of blue requires DPW and Corps of Engineers approval prior to submitting color boards for review.

6.5.4.1.5. Variation of color and/or floor patterns is desired to visually shorten long corridors and add interest. Flooring material shall be selected primarily for durability in all spaces.

6.5.4.1.6. Coordinate type of luster for VCT floor polish with the Officer Representative (COR).

6.5.4.1.7. In addition to color guidance provided in Section 01 10 00, paragraph 5.3.5.3, provide finish color and pattern selections that help hide soiling.

6.5.4.1.8. Consider building maintenance, functionality and future flexibility when designing the building interior. The primary intent for the building materials will be durability related to the function of the facility.

6.5.4.1.9 Carpet: This is a vehicle maintenance facility and carpet will not be provided.

6.5.4.1.10 All finishes on floors, walls wainscots, and ceilings shall be selected with durability as the primary concern with respect to the facility function, Surfaces shall be durable and easily cleanable for grease, oil, paint and other materials that will be used in this facility.

6.5.4.2. FF&E Design

6.5.4.2.1. Notwithstanding provisions in other sections of the RFP that state the furniture procurement is not included in 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.

6.5.4.2.1.1. The Contractor is responsible for fully developing all furniture requirements per their design. Coordinate with the Contracting Officer Representative (COR) during the Design After Award stage; refer to Section 01 33 16 Attachment B of the RFP.

6.5.4.2.1.2. Specify furniture from the GSA Schedules. Furniture available open market may be specified when an item is not available on the GSA Schedules. Provide justification stating that item was not available on the GSA Schedules. This requires research and documentation to prove the item is not available on the GSA schedules.

6.5.4.2.1.3. Provide a design for a functional facility that is intended for commercial use.

6.5.4.2.1.4. Coordinate layout with building design and connections to assure that locations of electrical outlets, switches, J-boxes, communication outlets and lighting are 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. If project has SIPRNET, furniture layout to be coordinated with SIPRNET locations; verify that access required by the NEC for SIPRNET box and conduit is provided.

6.5.4.2.1.5. Provide locations for government furnished/government installed faxes, printers, and copiers.

6.5.4.2.1.6. Provide trash and recycle receptacles, unless otherwise noted. Do not provide recycle bins in recycle rooms, these will be government furnished/government installed by DECAM.

6.5.4.2.1.7. Do not include artwork, artificial plants or clocks in FF&E.

6.5.4.2.2. General Furniture Requirements:

6.5.4.2.2.1. The word "provide" when used in this section applies to the furniture design.

6.5.4.2.2.2. Provide furniture that complies with ANSI/BIFMA.

6.5.4.2.2.3. Provide furniture from manufacturer’s standard product line as shown in the most recent published price list and or amendment and not custom product.

6.5.4.2.2.4. Provide furniture that is appropriate for adults not children, unless otherwise noted.

6.5.4.2.2.5. Provide user friendly features such as radius edges. Do not use sharp edges and exposed connections.

6.5.4.2.2.6. Provide concealed clips, screws, and other construction elements when possible.

6.5.4.2.2.7. Provide abutting work surfaces that mate closely and are of equal heights when used in side-by-side configurations in order to provide a continuous and level work surface.

6.5.4.2.2.8. Provide underside of desks, tables and work surfaces that are completely and smoothly finished.

6.5.4.2.2.9. Provide knee space at workstations and tables that is not obstructed by panels/legs that interfere with knee space of seated person.

6.5.4.2.2.10. Provide desks, storage and tables with leveling devices to compensate for uneven floors.

6.5.4.2.2.11. Provide workstations with stable keyboard trays that have height adjustability, tilting capability, including negative tilt, have a mouse pad at same height as keyboard tray that can accommodate both left and right handed users and retractable under work surface. Location of keyboard tray to be functional.

6.5.4.2.2.12. Provide task lighting and tack surfaces at workstations with overhead storage.

6.5.4.2.2.13. Provide workstation pedestal drawers that stay securely closed when in the closed position. Each drawer contains a safety catch to prevent accidental removal when fully open.

6.5.4.2.2.14. Locate furniture in front of windows only if the top of the item falls below the window.

6.5.4.2.2.15. Provide lockable desks and workstations, filing cabinets and storage.

6.5.4.2.2.16. Provide storage for office supplies.

6.5.4.2.2.17. Provide furniture as required in offices to locate and support faxes, printers, etc.

6.5.4.2.2.18. Provide all accessories required for completely finished furniture installation.

6.5.4.2.2.19. Unless otherwise noted, do not attach furniture including furniture systems to the building.

6.5.4.2.3. Standard Office Furniture:

6.5.4.2.3.1. Provide standard office furniture including casegoods, tables, storage, seating, etc. that is compatible in style, finish and color.

6.5.4.2.3.2. Provide casegoods and storage of steel construction.

6.5.4.2.3.3. Provide grommets and wire management requirements where appropriate.

6.5.4.2.3.4. Provide desk pedestal design that protects wires from damage during drawer operation.

6.5.4.2.3.5. Provide work surface tops constructed to prevent warpage. Provide finish intended for horizontal surfaces.

6.5.4.2.4. Standard Office Desk Chairs and Guest Chairs:

6.5.4.2.4.1. Provide ergonomic desk chairs with casters, non-upholstered adjustable arms, waterfall front, swivel, tilt, variable back lock, adjustable back height or adjustable lumbar support, pneumatic seat height adjustment, and padded, contoured upholstered seat and back, unless otherwise noted.

6.5.4.2.4.2. Provide desk chairs with adjustable seat height range of 4 1/2", range to include 16 1/2-20".

6.5.4.2.4.3. Recommend that desk chairs have a black frame and fabric.

6.5.4.2.4.4. Provide guest chairs that are compatible in style, finish and color with the desk chairs.

6.5.4.2.5. Conference Chairs:

6.5.4.2.5.1. At tables, provide 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. Provide arm height and/or design that allows seating to be moved up closely to the table top.

6.5.4.2.5.2. Provide perimeter conference chairs that are compatible in style, finish and color with conference seating at the tables.

6.5.4.2.6. Lounge and Reception Type Furniture:

6.5.4.2.7. General Seating:

6.5.4.2.7.1. Desk, guest and conference chair backs may be other than upholstered such as mesh fabric if it is ergonomically designed, forms to back and is comfortable.

6.5.4.2.7.2. Provide appropriate chair casters and glides for the floor finish where the seating is located. Universal casters that are appropriate for both hard surface flooring and carpet are preferred.

6.5.4.2.7.3. Provide seating that supports up to a minimum of 250 lbs.

6.5.4.2.7. Filing and Storage:

6.5.4.2.7.1. Provide counterweights for filing cabinets when required by the manufacturer for stability.

6.5.4.2.7.2. Provide file drawers that allow only one drawer to be opened at a time.

6.5.4.2.7.3. Provide storage and shelving units that meet customers functional load requirements for stored items. Provide heavy duty storage and shelving if information is not available.

6.5.4.2.8. Tables:

6.5.4.2.8.1. Provide plastic laminate table tops constructed to prevent warpage. Provide finish intended for horizontal surfaces. Don’t provide plastic laminate self edge.

6.5.4.2.9. Additional Facility FF & E Unique Furniture Requirements: Not Applicable

6.5.4.2.10. Furniture Warranties. Provide manufacturer's performance guarantees or warranties that include parts, labor and transportation as follows, unless otherwise noted:

Furniture System, unless otherwise noted – 10 year minimum

Furniture System Task Lights – 2 year minimum, excluding bulbs

Furniture System Fabric – 3 year minimum

Desks - 10 year minimum

Seating, unless otherwise noted - 10 year minimum

Seating Mechanisms and Pneumatic Cylinders - 10 years

Fabric - 3 years minimum

Filing and Storage - 10 year minimum

Tables, unless otherwise noted - 10 year minimum

Table Mechanisms – 5 year

Table Ganging Device - 1 year

Items not listed above - 1 year minimum

If manufacturer's standard performance guarantees or warranties exceed the minimum requirements listed above provide that guarantee or warranty.

6.5.4.2.11. Upholstery and Finishes:

6.5.4.2.11.1. Provide upholstery that meets Wyzenbeek Abrasion Test, 55,000 minimum rubs.

6.5.4.2.11.2. Provide easily cleanable upholstery and finishes in heavy use areas.

6.5.4.2.11.3. Utilize 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.

6.5.4.2.11.4. Provide finishes that can be cleaned with ordinary household cleaning solutions.

6.5.4.2.11.5. Provide upholstery and finish colors and patterns that help hide soiling.

6.5.4.2.11.6. Provide desk work surfaces and table tops that are neutral in color, not too light or too dark in color and have a pattern to help hide soiling. The exception is break areas; they are not limited to neutral colors.

6.5.4.2.12. Further coordination is required with the Contracting Officer Representative (COR) during Design After

Award stage for the following:

(a) Filing requirements such as hanging file or compressor divider type; letter or legal files

(b) Workstation filing and storage requirements; are mobile pedestals required; is an upholstered seat cushion necessary

on mobile pedestal

(c) General filing and storage requirements not located in workstations

(d) Desk chair requirements such as adjustable arms, adjustable back height, and seat pan forward and back adjustment to increase or decrease depth of seat pan

(e) Seating requirements such as adjustments, chair with glides or casters, other necessary features, etc.

(f) Lock and keying requirements; is storage in desks and workstations to be keyed alike or differently, etc.; at a minimum provide 2 keys per workstation when keyed alike and 2 keys for other lockable office storage items

(g) Table requirements such as four legs, pedestal, foldable, nesting, mobile on casters, etc.; are dollies required.

Interior building signage requirements:

Interior building signage requirements:

In reference to 01 10 00 paragraph 5.3.5.5, provide interior signage that conforms to UFC 3-120-01 Air Force Sign

Standards (applies to Army projects). Coordinate all signage requirements, including message content, room numbering, and placement with User and COR. Consider UNICOR System 2/90 signage as a good basis of design. Provide signage for all rooms, unless otherwise noted or directed by the Contracting Officer

6.6. STRUCTURAL DESIGN

6.6.1 General:

(a) Consider mission effectiveness, the most economical system in the locality, life-cycle economics, and space adaptability in choosing the structural systems. Provide an open layout out to allow future space adaptability including future reorganization or reallocation of space. Internal load bearing structures shall be limited.

(b) Analyze, design, and detail as a complete structural system. Design structural elements to preclude damage to finishes, partitions and other fragile, non-structural elements; to prevent impaired operability to moveable components: and to prevent cladding leakage and roof ponding. Limit deflections of structural members to the allowable limits of the IBC when no other more stringent restrictions exist, such as applicable material standards, manufacturer's product recommendations or detailing limitations.

(Am#2)

~~(c) Consider climate conditions, high humidity and other adverse conditions when selecting the type of cement and admixtures used in concrete, the concrete cover on reinforcing steel, the coating on structural members, expansion joints, the level corrosion protection, and the structural systems. All concrete shall have a minimum strength of 4000 PSI and shall be steel reinforced. The minimum concrete compressive strength of floors subjected to pneumatic tired traffic shall be 4000psi; for floors subjected to abrasive traffic such as steel wheels, the minimum concrete compressive strength shall be 5000 psi. Slab on grade shall be a minimum of 6" thick. Mechanical and electrical equipment shall be on a poured in place concrete pad. The concrete pad shall be a minimum of 4" thick.~~

(c) Consider Climate conditions, high humidity and other adverse conditions when selecting the type of cement and admixtures used in concrete, the concrete cover on reinforcing steel, the coating on structural members, expansion joints, the level of corrosion protection, and the structural systems. All concrete shall have a minimum compressive strength of 4000 psi and shall be steel reinforced. See the Geotechnical Appendix for flexural strength requirements.

(/Am#2)

(d) In addition to the basic loading criteria (gravity, wind, seismic and snow), building ancillary building items, e.g. doors, windows jambs and connections, overhead architectural features, equipment bracing shall be design following the requirements or UFC 4010-01, DOD Minimum Antiterrorism Standards for Buildings. Ensure and document that the design of glazed items includes, but not limited to, the following items under the loads prescribed in UFC 4-010-01:

(1)Supporting members of glazed elements, e.g. window jamb, sill, header

(2)Connections to glazed elements to supporting members, e.g. window to header

(3)Connections of supporting members to each other, e.g. header to jamb

(4)Connections to supporting members to structural system, e.g. jamb to foundation.

6.6.2 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.

(1)General Standards:

The following information from the Unified Facilities Criteria (UFC) shall be used as the building design criteria:

(a) UFC 3-301-01, Structural Engineering, latest edition

Table 2-1, Table 2-2, Table D-1Table E-1 and Table E-2

(b) Occupancy Category:

Per UFC 3-310-01Table 2-2 and ASCE 7the occupancy category shall be II.

6.6.3Material Properties:

(1)Concrete:

(a)Reinforcing steel: ASTM A615, Grade 60 and 40, deformed.

(b)Welded wire fabric: ASTM A185.

(2)Metals:

(a)Structural Steel Wide flange members shall be ASTM A992, Grade 50.

(b)Structural Steel Shapes (angles, channels, etc) and plates shall be minimum ASTM A36, Grade 36.

(c)Hollow structural steel sections shall be ASTM A500, Grade B. Round HSS shall be minimum 42 ksi, and rectangular HSS shall be minimum 46 ksi.

(d)Pipe shall be ASTM A53, Grade B, minimum 35 ksi.

(e)Steel Deck shall be ASTM A653, minimum 33 ksi

6.6.4 Arms Vault:

The arms vaults shall be designed per and comply with the requirements of AR 190-11, Appendix G.

6.6.5 Deflection/ Drift Criteria:

(1)Roof framing members supporting ceilings shall have deflections limited to 1/360 for live load and 1/240 for dead plus live load in rooms with brittle ceiling materials.

(2)Seismic- and wind-related deflections and drifts shall be designed for and held below prescribed maximums.

(3)Individual metal plumbness shall be per the applicable code's (e.g. AISC Manual of Steel Construction (13 Ed.) for structural steel) standard mill practices. Modules shall not arrive to the site out of plumb by more than a horizontal distance of L/180 where L is the vertical length of the posts/columns (in inches).

(Am#3)

~~6.6.5~~ **6.6.6** **(/AM#3)** Project Specific Design Loads:

(1)Load Combination:

Load combinations shall be per the International Building Code.

(2)Dead Loads:

Minimum dead loads are in accordance with International Building Code. Dead loads shall include the weight of all permanent materials and equipment supported in or on a structure, including the structure's own weight.

(3)Live Loads:

Minimum live loads shall be in accordance with International Building Code and UFC 3-310-01, Table D-1 but not lower than the following minimum loads or the load requirement of the user:

(a)First Floor/ Slab-on-Grade: Shall support a uniform load of 150 psf (unless noted otherwise). At a warehouse condition the slab-on-grade shall support the more stringent of a 300 psf uniform load or a forklift with a capacity of **(AM#3)**

6000 ~~psf~~ Lbs**. (**/**AM#3)**

(b)Storage (light)/ Supply: Shall support a minimum uniform load of 125 psf or actual equipment load, whichever is greater.

(c)Equipment / Mechanical Room: Shall support a minimum uniform load of 125 psf or actual equipment load, whichever is greater.

(d)Roof: Minimum **(/AM#3) live load of (/AM#3)** 20 psf or Snow Load, whichever is greater. In addition to uniform load primary roof members, exposed to work floor, shall a single point load of 2000 pounds. The load shall be supported at a single panel point on the lower chord of roof trusses or any point along the primary members supporting the roof.

(4)Wind Loads:

Wind Speed, V, is 95 MPH per UFC 3-310-01,Table E-1. Design wind loads shall be calculated per ASCE 7 for both the main wind-force resisting system and for components and cladding. Wind importance factor (I_W) shall be a minimum of 1.0.

(5)Seismic Loads:

Design seismic loads shall be calculated per ASCE 7 and the following criteria:

(a)The following seismic accelerations apply per UFC 3-310-01, Table E-2: Ss = 0.12, S1 = 0.05.

(b)Site class shall be verified upon completion of the Geotechnical Report.

(c)Seismic importance factor (IE) shall be a minimum of 1.0.

(6) Snow Loads:

Minimum ground snow load, pg, is 5 PSF per UFC 3-310-01, Table E-1. Drifting snow and unbalanced snow loading shall be per ASCE 7. Snow importance factor (Is) shall be a minimum of 1.0.

(Am#2)

~~6.6.5 Foundation:~~

~~The foundation is site specific and must be designed in compliance with the recommendations from a geotechnical report for this site. The foundations for the structure shall be designed to support all the loads and load combinations as a result of, and in accordance with this RPF. Controlling slab/foundation moisture is critical for the success of the building slab/foundation and shall be a design consideration. The foundation shall be designed and constructed to experience maximum settlements less than 1 inch and differential settlement not greater than ½ inch. Coordinate the need for a vapor barrier with the architectural floor finishes and requirements of the geotechnical report. The minimum thickness of the vapor barriers shall be 10 mil.~~

(AM#3) ~~6.6.5~~ 6.6.7 (/AM#3) Foundation:

The Government Geotechnical Report (GGR) provides the minimum standards and requirements for the foundation and pavement structures for this project. No other foundation systems shall be allowed. Additionally, the following foundation systems are specifically prohibited: Spot and/or Continuous Spread Footings, Straight-Shaft and Underreamed Drilled Piers, Driven or Cast-in-Place Piles, and Auger Cast Piles. **Alternative foundation systems beyond those specified in the GGR are not permitted.** All aspects of the foundation design and construction shall be in full compliance with (shall **meet or exceed**) the requirements presented in the GGR attached as part of the RFP document.

(/Am#2)

6.7. THERMAL PERFORMANCE

No additional requirements.

6.8. PLUMBING

Provide shut-off valves to all sinks, toilets, water heaters, and/or any water tie-ins connections (hot and cold).

6.9. SITE ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

The electrical service installation on Ft. Polk shall be coordinated through DPW. Existing Electrical Pole and three phase electrical line along the western limits of the project is recommended for use and can be seen in the site work documents. Underground conduits and a pad mounted transformer to be installed by the contractor. Contractor to be responsible for calculation of building loads as well as the design of the site electrical system.

Communications and telephone service on this installation shall be coordinated through the COR. Main communication service consisting of 1-50 pair copper OSP cable and 1-12 strand single mode fiber optic OSP Cable as shown in the site work documents.

The installation of CATV cable (if necessary) will be by others.

6.10. FACILITY ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

The contractor shall size the main service equipment based on the final design load.

Communications and telephone service on this installation shall be coordinated through DOIM (Contact is Bill Woods at (337) 531-1622).

6.11. HEATING, VENTILATING, AND AIR CONDITIONING

Particular attention must be provided in design to the high humidity, moisture, mildew and mold potential of this region.

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:

[Not Supplied - PS_EnergyConservation : RENEWABLE_ENERGY_FEATURES]

6.13. FIRE PROTECTION

The system shall tie to the Installation Fire Department via FM radio transmission.

6.13.1 Fire alarm panel shall be located in the mechanical room.

6.13.2 Activation of smoke detectors in apartment units shall not result in a trouble signal being sent to the fire department.

6. 13.3 Alarm signals transmitted shall be zoned per floor.

6.13.4 Antenna shall be omni-directional type.

6.13.5 Provide Class A fire alarm circuits. Common speakers shall be used for fire alarm (FA) and mass notification (MN) messages. Smoke detectors shall transmit supervisory, trouble, and alarm signals to the fire alarm control panel (FACP) per the Installation's DPW.

6. 13.6 All IDC, SLC, and NAC circuits shall be class A style D, class A style 6, and class A style Z.

6. 13.7 FA signals and MN messages shall be transmitted via a Monaco BT -FM transceiver (or approved equal) to the Monaco D-21 proprietary supervising station receiving equipment.

6.13.8 Provide an 80-character display annunciator, with message buffer, at both the FACP and the fire department building entry. Also, provide a graphic display annunciator at the building entry. The graphic display should be an architectural display of the building set. The graphic display shall have LED lights that flash, representing signals sent by the transmitter.

(AM#6)

6.13.9 Base currently utilizes FS-250 by Siemens or 7100 by FCI fire control panels for existing structures.

(/AM#6)

Mass Notification System shall be capable of accepting controls to announce app pre-recorded messages as well as live messages from a remote site by way of dry contacts and 600 ohm audio inputs.

6.14. SUSTAINABLE DESIGN

6.14.1. LEED Rating Tool Version. This project shall be executed using LEED-NC Version 2.2.

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: [Not Supplied - PS_SustainableDesignGeneral : SD_EXEMPT_FACILITIES].

6.14.3. Credit Validation: 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 Contractor. Administration/team management of the online project will be by the Contractor. 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 the 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.

SS Credit 1 Site Selection:

Project site IS NOT considered prime farmland.

Project site is five feet or more above 100-year flood elevation.

Project site contains no habitat for threatened or endangered species.

No portion of project site lies within 100 feet of any water, wetlands or areas of special concern.

Project site WAS NOT previously used as public parkland.

SS Credit 2 Development Density & Community Connectivity.

Project site DOES NOT meets the criteria for this credit.

SS Credit 3 Brownfield Redevelopment.

Project site DOES NOT meets the criteria for this credit.

SS Credit 4.1 Public Transportation Access.

Project site DOES NOT meets the criteria for this credit.

EA Credit 6 Green Power.

35% of the project's electricity WILL NOT will be provided through an Installation renewable energy contract. Do not purchase Renewable Energy Credits (REC's) to earn this credit.

MR Credit 2 Construction Waste Management.

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

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. Not Used

6.14.8. Additional Information

(AM4)

~~No additional requirements.~~

Appendix O Has been included with a preferred LEED Strategy. The Contractor may substitute credits, keeping in mind the project must be LEED Silver certifiable without additional Government support or post-occupancy activities except as may be required herein.

(/AM4)

6.15. ENVIRONMENTAL

The Contractor must have two Fort Polk certified Environmental Compliance Officer's onsite. The training is forty (40) hours and is offered twice a month at building 2522. Coordinate the dates of training with your COR.

6.16. PERMITS

A SWPPP is required as indicated in this RFP and approval is required by LDH&H; the contractor shall coordinate this requirement though the COR.

A Fort Polk Utility Location and Dig Permit is required and shall be coordinated through the COR; an example form can be found in Appendix BB.

6.17. DEMOLITION

(AM#4)

The project site is currently occupied by a relocatable structure which supports an Installation function. Under the base bid, access to the project site is phased as set forth in Section 00 73 10, Supplemental Contract Requirements to allow the Installation to remove the structure. **(/AM#4)** Concrete Slab, Pavement, utilities, and flat work to be removed **(AM#4)** by the Contractor **(/AM4)** according to Demolition Site Plan, Sheet C-101 of the site work documents.

(AM#4)

The Government requires a contract option for Contractor demolition of the relocatable structure on the project site. This Option is included in the CLIN SCHEDULE in Section 00 11 00. At award of the Option, Contractor immediately becomes the owner of the relocatable structure and is granted immediate access to the project site.

(/AM4)

6.18. ADDITIONAL FACILITIES

(AM#6)

~~A 2,880 square foot Unit Storage Building will be designed and built within this project.~~

As set forth in Chapter 2 of this section, an Organizational Storage Building will be designed and built as part of this project.

(/AM#6)

End of Section 01 10 00.W912HN-07-X-9717

SECTION 01 33 00.W912HN-07-X-9717
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 zero(0) copies of the submittal and return zero(0) 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 zero(0) copies of information only submittals.

End of Section 01 33 00.W912HN-07-X-9717

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 ACTIVIES & CONFERENCES

3.1.1. Design Quality Control Plan

3.1.2. Post Award Conference

3.1.3. Partnering & Project Progress Processes

3.1.4. Initial Design Conference

3.1.5. Pre-Construction Conference

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

3.2.1. Site/Utilities

3.2.2. Interim Design Submittals

3.2.3. Over-the-Shoulder Progress Reviews

3.2.4. Final Design Submissions

3.2.5. Design Complete Submittals

3.2.6. Holiday Periods for Government Review or Actions

3.2.7. Late Submittals and Reviews

3.3. DESIGN CONFIGURATION MANAGEMENT

3.3.1. Procedures

3.3.2. Tracking Design Review Comments

3.3.3. Design and Code Checklists

3.4. INTERIM DESIGN REVIEWS AND CONFERENCES

3.4.1. General

3.4.2. Procedures

3.4.3. Conference Documentation

3.5. INTERIM DESIGN REQUIREMENTS

3.5.1. Drawings

3.5.2. Design Analyses

3.5.3. Geotechnical Investigations and Reports

3.5.4. LEED Documentation

3.5.5. Energy Conservation

3.5.6. Specifications

3.5.7. Building Rendering

3.5.8. Interim Building Design Contents

3.6. FINAL DESIGN REVIEWS AND CONFERENCES

3.7. FINAL DESIGN REQUIREMENTS

3.7.1. Drawings

3.7.2. Design Analysis

3.7.3. Specifications

3.7.4. Submittal Register

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

3.7.6. Acceptance and Release for Construction

3.8. DESIGN COMPLETE CONSTRUCTION DOCUMENT REQUIREMENTS

3.9. SUBMITTAL DISTRIBUTION, MEDIA AND QUANTITIES

3.9.1. Submittal Distribution and Quantities

3.9.2. Web based Design Submittals

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

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

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

1.2. DESIGNER OF RECORD

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

2.0 PRODUCTS (Not Applicable)

3.0 EXECUTION

3.1. PRE-WORK ACTIVITIES & CONFERENCES

3.1.1. Design Quality Control Plan

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

3.1.2. Post Award Conference

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

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

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

3.1.3. Partnering & Project Progress Processes

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

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

3.1.4. Initial Design Conference

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

3.1.5. Pre-Construction Conference

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

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

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

3.2.1. Site/Utilities

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

3.2.2. Interim Design Submittals

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

3.2.3. Over-the-Shoulder Progress Reviews

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

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

3.2.4. Final Design Submissions

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

3.2.5. Design Complete Submittals

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

3.2.6. Holiday Periods for Government Review or Actions

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

3.2.7. Late Submittals and Reviews

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

3.3. DESIGN CONFIGURATION MANAGEMENT

3.3.1. Procedures

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

3.3.2. Tracking Design Review Comments

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

3.3.3. Design and Code Checklists

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

3.4. INTERIM DESIGN REVIEWS AND CONFERENCES

3.4.1. General

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

3.4.2. Procedures

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

3.4.3. Conference Documentation

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

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

3.5. INTERIM DESIGN REQUIREMENTS

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

3.5.1. Drawings

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

3.5.2. Design Analyses

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

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

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

(a) Identify all loads to be used for design.

(b) Describe the method of providing lateral stability for the structural system to meet seismic and wind load requirements. Include sufficient calculations to verify the adequacy of the method.

(c) Provide calculations for all principal roof, floor, and foundation members and bracing and secondary members.

(d) Provide complete seismic analyses for all building structural, mechanical, electrical, architectural, and building features as dictated by the seismic zone for which the facility is being constructed.

(e) Computer generated calculations must identify the program name, source, and version. Provide input data, including loads, loading diagrams, node diagrams, and adequate documentation to illustrate the design. The schematic models used for input must show, as a minimum, nodes/joints, element/members, materials/properties, and all loadings, induced settlements/deflections, etc., and a list of load combinations. Include an output listing for maximum/minimum stresses/forces and deflections for each element and the reactions for each loading case and combination.

(f) See also the Security (Anti-Terrorism) requirements below for members subject to Anti-Terrorist Force Protection (ATFP) and Progressive Collapse requirements.

(g) Fully coordinate and integrate the overall structural design between two different or interfacing construction types, such as modular and stick-built or multistory, stacked modular construction. Provide substantiation of structural, consolidation/settlement analysis, etc., as applicable, through the interfaces.

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

3.5.3. Geotechnical Investigations and Reports:

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

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

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

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

3.5.4. LEED Documentation:

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

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

3.5.5. Energy Conservation:

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

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

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

3.5.6. Specifications

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

3.5.7. Building Rendering

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

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

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

3.5.8. Interim Building Design Contents

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

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

3.5.8.1. Lawn and Landscaping Irrigation System

3.5.8.2. Landscape, Planting and Turfing

3.5.8.3. Architectural

(a) Design Narrative

(b) Architectural Floor Plans, Typical Wall and Roof Sections, Elevations

(c) Finish schedule

(d) All required equipment

(e) Special graphics requirements

(f) Door and Window Schedules

(g) Hardware sets using BHMA designations

(h) Composite floor plan showing all pre-wired workstations

(i) Structural Interior Design (SID) package: See ATTACHMENT A for specific requirements

(j) Furniture, Fixtures & Equipment (FF&E) design package: See ATTACHMENT B for specific requirements

3.5.8.4. Structural Systems. Include:

(a) Drawings showing principal members for roof and floor framing plans as applicable

(b) Foundation plan showing main foundation elements where applicable

(c) Typical sections for roof, floor, and foundation conditions

3.5.8.5. Plumbing Systems

(a) Show locations and general arrangement of plumbing fixtures and major equipment

(b) Plan and isometric riser diagrams of all areas including hot water, cold water, waste and vent piping. Include natural gas (and meter as required), (natural gas and meter as required), (LP gas), (fuel oil) and other specialty systems as applicable.

(c) Include equipment and fixture connection schedules with descriptions, capacities, locations, connection sizes and other information as required

3.5.8.6. HVAC Systems

(a) Mechanical Floor Plans: The floor plans shall show all principle architectural features of the building which will affect the mechanical design. The floor plans shall also show the following:

(1) Room designations.

(2) Mechanical legend and applicable notes.

(3) Location and size of all ductwork and piping.

(4) Location and capacity of all terminal units (i.e., registers, diffusers, grilles, hydronic baseboards).

(5) Pre-Fabricated Paint Spray Booth (where applicable to project scope)

(6) Paint Preparation Area (where applicable to project scope)

(7) Exhaust fans and specialized exhaust systems.

(8) Thermostat location.

(9) Location of heating/cooling plant (i.e., boiler, chiller, cooling tower, etc).

(10) Location of all air handling equipment.

(11) Air balancing information.

(12) Flue size and location.

(13) Piping diagram for forced hot water system (if used).

(b) Equipment Schedule: Provide complete equipment schedules. Include:

(1) Capacity

(2) Electrical characteristics

(3) Efficiency (if applicable)

(4) Manufacturer's name

(5) Optional features to be provided

(6) Physical size

(7) Minimum maintenance clearances

(a) Details: Provide construction details, sections, elevations, etc., only where required for clarification of methods and materials of design.

(b) HVAC Controls: Submit complete HVAC controls equipment schedules, sequences of operation, wiring and logic diagrams, Input/Output Tables, equipment schedules, and all associated information. See the Statement of Work for additional specific requirements.

3.5.8.7. Fire Protection and Life Safety.

(a) Provide plan for each floor of each building that presents a compendium of the total fire protection features being incorporated into the design. Include the following types of information:

(1) The location and rating of any fire-resistive construction such as occupancy separations, area separations, exterior walls, shaft enclosures, corridors, stair enclosures, exit passageways, etc.

(2) The location and coverage of any fire detection systems

(3) The location and coverage of any fire suppression systems (sprinkler risers, standpipes, etc.)

(4) The location of any other major fire protection equipment

(5) Indicate any hazardous areas and their classification

(6) Schedule describing the internal systems with the following information: fire hazard and occupancy classifications, building construction type, GPM/square foot sprinkler density, area of operation and other as required

(b) Working plans and all other materials submitted shall meet NFPA 13 requirements, with respect to required minimum level of detail.

3.5.8.8. Elevators. Provide:

(a) Description of the proposed control system

(b) Description, approximate capacity and location of any special mechanical equipment for elevators.

3.5.8.9. Electrical Systems.

(a) Electrical Floor Plan(s): Show all principle architectural features of the building which will affect the electrical design. Show the following:

(1) Room designations.

(2) Electrical legend and applicable notes.

(3) Lighting fixtures, properly identified.

(4) Switches for control of lighting.

(5) Receptacles.

(6) Location and designation of panelboards. Clearly indicate type of mounting required (flush or surface) and reflect accordingly in specifications.

(7) Service entrance (conduit and main disconnect).

(8) Location, designation and rating of motors and/or equipment which requires electrical service. Show method of termination and/or connection to motors and/or equipment. Show necessary junction boxes, disconnects, controllers (approximate only), conduit stubs, and receptacles required to serve the motor and/or equipment.

(b) Building Riser Diagram(s) (from pad-mounted transformer to unit load center panelboard): Indicate the types and sizes of electrical equipment and wiring. Include grounding and metering requirements.

(c) Load Center Panelboard Schedule(s): Indicate the following information:

(1) Panelboard Characteristics (Panel Designation, Voltage, Phase, Wires, Main Breaker Rating and Mounting.

(2) Branch Circuit Designations.

(3) Load Designations.

(4) Circuit Breaker Characteristics. (Number of Poles, Trip Rating, AIC Rating)

(5) Branch Circuit Connected Loads (AMPS).

(6) Special Features

(d) Lighting Fixture Schedule(s): Indicate the following information:

(1) Fixture Designation.

(2) General Fixture Description.

(3) Number and Type of Lamp(s).

(4) Type of Mounting.

(5) Special Features.

(e) Details: Provide construction details, sections, elevations, etc. only where required for clarification of methods and materials of design.

3.5.8.10. Electronic Systems including the following responsibilities:

(a) Fire Detection and Alarm System. Design shall include layout drawings for all devices and a riser diagram showing the control panel, annunciator panel, all zones, radio transmitter and interfaces to other systems (HVAC, sprinkler, etc.)

(b) Fire Suppression System Control. Specify all components of the Fire Suppression (FS) System in the FS section of the specifications. Clearly describe how the system will operate and interact with other systems such as the fire alarm system. Include a riser diagram on the drawings showing principal components and interconnections with other systems. Include FS system components on drawing legend. Designate all components shown on floor plans “FS system components” (as opposed to “Fire Alarm components”). Show location of FS control panels, HVAC control devices, sensors, and 120V power panel connections on floor plans. Indicate zoning of areas by numbers (1, 2, 3) and detectors sub-zoned for cross zoning by letter designations (A and B). Differentiate between ceiling mounted and under floor detectors with distinct symbols and indicate sub-zone of each.

(c) Public Address System

(d) Special Grounding Systems. Completely reflect all design requirements in the specifications and drawings. Specifications shall require field tests (in the construction phase), witnessed by the Government, to determine the effectiveness of the grounding system. Include drawings showing existing construction, if any.

(e) Cathodic Protection.

(f) Intrusion Detection, Card Access System

(g) Central Control and Monitoring System

(h) Mass Notification System

(i) Electrical Power Distribution Systems

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

(a) Telecommunications Cabling

(b) Supporting Infrastructure

(a) Outside Plant (OSP) Cabling - Campus or Site Plans - Exterior Pathways and Inter-Building Backbones

(a) Include a layout of the voice/data outlets (including voice only wall & pay phones) on telecommunication floor plan drawing, location of SIPRNET data outlets (where applicable), and a legend and symbol definition to indicate height above finished floor. Show size of conduit and cable type and size on Riser Diagram. Do not show conduit runs between backboard and outlets on the floor plans. Show underground distribution conduit and cable with sizing from point of presence to entrance facility of building.

(b) Layout of complete building per floor - Serving Zone Boundaries, Backbone Systems, and Horizontal Pathways including Serving Zones Drawings - Drop Locations and Cable ID's

(c) Communication Equipment Rooms - Plan Views - Tech and AMEP/Elevations - Racks and Walls. Elevations with a detailed look at all telecomm rooms. Indicate technology layout (racks, ladder-racks, etc.), mechanical/electrical layout, rack elevation and backboard elevation. They may also be an enlargement of a congested area of T1 or T2 series drawing.

3.6. FINAL DESIGN REVIEWS AND CONFERENCES

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

3.7. FINAL DESIGN REQUIREMENTS

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

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 CADD 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. Drawing files with external references or special fonts are not acceptable. All displayed graphic elements on all levels of the drawing files shall be part of the project drawing image. The drawing files shall not contain any graphic element that is not part of the drawing image.

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

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

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

3.7.2. Design Analyses

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

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

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

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

3.7.3. Specifications

Specifications shall be 100% complete and in final form.

3.7.4. Submittal Register

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

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

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

3.7.6. Acceptance and Release for Construction

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

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

3.8. DESIGN COMPLETE CONSTRUCTION DOCUMENT REQUIREMENTS

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

3.9. SUBMITTAL DISTRIBUTION, MEDIA AND QUANTITIES

3.9.1. Submittal Distribution and Quantities

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

Activity and Address	Drawing Size (Full Size) **Full** Full Sets/ *Partial Sets	Design Analyses & Specs Full Sets/ *Partial Sets	Drawing Size (Half Size) **Half** Full Sets/ *Partial Sets	Non-BIM Data CD-ROM or DVD as Necessary (PDF& **.dgn**)	Furniture Submittal (FFE)	Structural Interior Design Submittal	BIM Data DVD (Per Attach F)
Commander, U.S.Army Engineer District **US Army Engineer District, Fort Worth**	1/0	6/0	5/0	2	1	2	2
Commander, U.S.Army Engineer District, Center of Standardization **Savannah District**	1/0	3/0	2/0	0	0	0	1
Installation	1/0	6/0	5/0	1	2	2	0
U.S.Army Corps of Engineers Construction Area Office	1/0	3/0	3/0	2	1	2	0
Information Systems Engineering Command (ISEC)	0/0	0/1	0/0	1	1 (Electronic only)	N/A	1
Other Offices	0/0	0/0	0/0	0	0	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 five (5) 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 STRUCURAL 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 item on the color boards to the contract documents to provide a clear indication of how and where each item will be used. Arrange finish samples to the maximum extent possible by room type in order to illustrate room color coordination. Label all samples on the color boards with the manufacturer's name, patterns and colors name and number. Key or code samples to match key code system used on contract drawings.

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

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

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

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

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

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

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

2.1.3. Exterior Color Boards

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

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

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

2.2. STRUCTURAL INTERIOR DESIGN DOCUMENTS

2.2.1. General

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

2.2.2. Finish Color Schedule

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

2.2.3. Interior Finish Plans

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

2.2.4. Furniture Footprint Plans

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

2.2.5. Interior Signage

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

2.2.6. Interior Elevations, Sections and Details

Indicate material, color and finish placement.

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

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

1.1. FORMAT AND SCHEDULE

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

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

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

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

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

Design submittal requirements include, but are not limited to:

1.1.1. Narrative of Interior Design Objectives

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

1.1.2. Furniture Order Form

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

(a) Furniture item illustration and code

(b) Furniture item name

(c) Job name, location, and date

(d) General Services Administration (GSA) FSC Group, part, and section

(e) Manufacturer, Product name and Product model number or National Stock Number (NSN)

(f) Finish name and number (code to finish samples)

(g) Fabric name and number, minimum Wyzenbeek Abrasion Test double rubs (code to fabric samples)

(h) Dimensions

(i) Item location by room number and room name

(j) Quantity per room

(k) Total quantity

(l) Special instructions for procurement ordering and/or installation (if applicable)

(m) Written Product Description: include a non-proprietary paragraph listing the salient features of the item to include but not limited to:

(1) required features and characteristics

(2) ergonomic requirements

(3) functional requirements

(4) testing requirements

(5) furniture style

(6) construction materials

(7) minimum warranty

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

Chair Description:

(1) Mid-Back Ergonomic Task Chair

(2) Pneumatic Gaslift; Five Star Base

(3) Mesh Back; Upholstered Seat

(4) Height and Width Adjustable Task Arms:

a. Arm Height: 6”- 11” (+-1/2”)

b. Arm Width: 2”– 4” adjustment

(5) Height Adjustable Lumbar Support

(6) Adjustable Seat Height 16”-21” (+- 1”)

(7) Sliding Seat Depth Adjustment 15”-18” (+-1”)

(8) Standard Hard Casters (for carpeted areas)

(9) Overall Measurements:

a. Overall width: 25” - 27”

b. Overall depth: 25”– 28”

(10) Must have a minimum of the following adjustments (In addition to the above):

a. 360 Degree Swivel

b. Knee-Tilt with Tilt Tension

c. Back angle

d. Forward Tilt

e. Forward Tilt and Upright Tilt Lock

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

(1) Type furniture systems (panel, stacking panels, spine wall, desk based system, or a combination)

(2) Minimum noise reduction coefficient (NRC)

(3) Minimum sound transfer coefficient (STC)

(4) Minimum flame spread and smoke development

(5) UL testing for task lighting and electrical system

(6) Panel widths and heights and their locations (this may be done on the drawings)Worksurface types and sizes (this may be done on the drawings)

(7) Worksurface edge type

(8) Varying panel/cover finish materials and locations (locations may be shown on the drawings)

(9) Storage requirements

(10) Keyboard requirements

(11) Lock and keying requirements

(12) Accessory components (examples: tack boards, marker boards, paper management)

(13) Electrical and communication raceway requirement; type, capacity and location (base, 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. Alternate Manufacturer List

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

1.1.4. FF&E Procurement List

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

1.1.5. Points of Contact (POCs)

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

1.1.6. Color Boards

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

1.1.7. Itemized Furniture Cost Estimate

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

1.2. INTERIOR DESIGN DOCUMENTS

1.2.1. Overall Furniture and Area Plans

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

1.2.2. Workstation Plans

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

1.2.3. Panel Plans

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

1.2.4. Desk Plans

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

1.2.5. Reflected Ceiling Plans

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

1.2.6. Electrical and Telecommunication Plans

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

1.2.7. Artwork Placement Plans

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

1.2.8. Window Drapery Plans

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

1.3. FURNITURE SELECTION

1.3.1. Select furniture from the GSA Schedules. Specify furniture available open market when an item is not available on the GSA Schedules. Provide justification fort 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 provide desks, storage and tables with leveling devices to compensate for uneven floors.

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

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

1.4.4. Unless otherwise noted, specify lockable desks and workstations and storage of steel construction. Use tempered glass glazing when glazing is required.

1.5. FINISHES AND UPHOLSTERY

1.5.1. Specify neutral colors for casegoods, furniture systems, storage and tables. Specify desk worksurfaces and table tops that are not too light or too dark in color and have a pattern to help hide soiling. Accent colors are allowed in break and lounge areas. Keep placement of furniture systems panel fabric accent colors to a minimum. All finishes shall be cleanable with ordinary household cleaning solutions.

1.5.2. Use manufacturer's standard fabrics; including textile manufacturers fabrics that have been graded into the furniture manufactures fabric grades and are available through their GSA Schedule. Customers Own Material

(COM) can be used in headquarter buildings in command suites with executive furniture. Coordinate specific locations with Corps of Engineers Interior Designer.

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

1.6. ACCESSORIES

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

1.6.2. Not Used.

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

1.7. MISSION UNIQUE EQUIPMENT

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

1.8. SUSTAINABILITY

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

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

1.9. FURNITURE SYSTEMS

1.9.1. General.

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

1.9.2. Connector Systems.

Specify a connector system that allows removal of a single panel or spine wall within a typical workstation configuration without requiring disassembly of the workstation or removal of adjacent panels. Specify connector system with tight connections and continuous visual seals. When Acoustical panels are used, provide connector system with continuous acoustical seals. Specify concealed clips, screws, and other construction elements, where possible.

1.9.3. Panels and Spine Walls

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

1.9.4. Electrical And Information/Technology (IT)

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

1.9.5. Pedestals

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

1.10. EXECUTIVE FURNITURE

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

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

1.11. SEATING

1.11.1. General

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

1.11.2. Desk and Guest Seating

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

1.11.3. Conference Room Seating

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

1.11.4. Lounge, Waiting and Reception Area Seating

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

1.11.5. Break Room Seating

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

1.11.6. Lounge, Waiting and Reception Furniture.

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

1.12. FILING AND STORAGE.

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

1.13. TRAINING TABLES.

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

1.14. FURNITURE WARRANTIES.

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

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

ATTACHMENT C
TRACKING COMMENTS IN DRCHECKS

1.0 General

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

2.0 DrChecks Review Comments

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

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

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

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

3.0 DrChecks Initial Account Set-Up

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

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

4.0 DrChecks Reviewer Role

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

4.1. Log into DrChecks.

4.2. Click on the appropriate project.

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

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

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

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

5.0 DrChecks Comment Evaluation

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

5.1. Log into DrChecks.

5.2. Click on the appropriate project.

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

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

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

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

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

6.0 DrChecks Back-check

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

6.1. Log into DrChecks.

6.2. Click on the appropriate project.

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

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

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

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

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

ATTACHMENT D
SAMPLE FIRE PROTECTION AND LIFE SAFETY CODE REVIEW

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

1.0 SAMPLE FIRE PROTECTION AND LIFE SAFETY CODE REVIEW

1.1. Project Name (insert name and location)

1.2. Applicable Codes and Standards

1.2.1. Unified Facilities Criteria (UFC): 3-600-01, Design: Fire Protection Engineering For Facilities

1.2.2. International Building Code (IBC) for fire resistance requirements, allowable floor area, building height limitations and building separation distance requirements, except as modified by UFC 3-600-01.

1.2.3. National Fire Protection Association (NFPA) 101 Life Safety Code (latest edition), for building egress and life safety and applicable criteria in UFC 3-600-01.

1.2.4. ADA and ABA Accessiblity 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 Section712, 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 v2.2 Submittals (OCT09REV)**		Provide for Credit Audit Only		Date Submitted (to be filled in by Contractor)	Government Reviewer's Use (OCT09REV)
PAR		**FEATURE**	**DUE AT**		**REQUIRED DOCUMENTATION**	**DATE**	**REV**
GENERAL							
	GENERAL - All calculations shall be in accordance with LEED 2.2 Reference Guide.						
	GENERAL: Obtain excel version of this spreadsheet at http://en.sas.usace.army.mil/enWeb, "Engineering Criteria". OCT09REV						
	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. OCT09REV						
	OCT09REV 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
OCT09REV			**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
OCT09REV			**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
OCT09REV			**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
OCT09REV			**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
OCT09REV			**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 buiding, statement indicating distance from building entrance.		ARC
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
OCT09REV			**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

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			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
OCT09REV			**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
OCT09REV			**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
OCT09REV			**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
OCT09REV			**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
OCT09REV			**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
OCT09REV			**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
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

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			Final Design OCT09REV		Option 1: List of specified roof materials indicating, for each, product type, manufacturer, product name and identification if known, SRI value and roof slope. OCT09REV		ARC
			**Closeout OCT09REV		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 OCT09REV		Option 3: List of specified roof materials indicating, for each, product type, manufacturer, product name and identification if known, SRI value and roof slope. OCT09REV		
			**Closeout OCT09REV		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 interiorfixtures does not intersect non-opaque building envelope surfaces). - OR - List of drawings and specification references that show automatic lighting controls that turn off non-essential lighting during non-business hours.		ELEC
OCT09REV			**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 façade/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							
WE1.1		Water Efficient Landscaping: Reduce by 50%	Final Design		Statement indicating which option for compliance applies.		CIV
OCT09REV			**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

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			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 convyance 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
WE3.1		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
			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
WE3.2		Water Use Reduction: 30% Reduction	Same as WE3.1		Same as WE3.1		MEC
CATEGORY 3 – ENERGY AND ATMOSPHERE							
EAPR1		Fundamental Commissioning of the Building Energy Systems (PREREQUISITE)	**Final Design		**Owner's Project Requirements document		ALL
			**Final Design		**Basis of Design document for commissioned systems		MEC, ELEC
			**Final Design		**Commissioning Plan		MEC, ELEC

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			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
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 lising, 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 2.2 Reference Guide Example Calculations		MEC
			Final Design		Narrative describing any special circumstances or explanatory remarks OCT09REV		
			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		PE
			Closeout		**Scope of work for post-occupancy implementation of M&V 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 75% 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 95% of Existing Walls, Floors & Roof	Same as MR1.1		Same as MR1.1		ARC
MR1.3		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
					OCT09REV		
			**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. OCT09REV		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 OCT09REV		**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal. OCT09REV		PE
			Closeout	X	Manufacturer published product data or certification confirming regional material percentages in spreadsheet		PE

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MR5.2		Regional Materials:20% Extracted, Processed & Manufactured Regionally	Same as MR5.1		Same as MR5.1		PE
MR6		Rapidly Renewable Materials	Closeout		Statement indicating total materials value and whether default or actual.		PE
			Closeout		Spreadsheet calculations indicating, for each rapidly renewable material, material name/description, manufacturer, cost, rapidly renewable content percent, rapidly renewable product value. Total rapidly renewable product value, rapidly renewable materials percentage.		PE
			Final Design OCT09REV		**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal. OCT09REV		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. OCT09REV		PE
			Closeout	X	Vendor invoices, FSC chain of custody certificates and anufacturer published product data or certification confirming all certified wood materials percentages in spreadsheet.		PE
CATEGORY 5 – 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
			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

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	LEED-NC v2.2 Submittals (OCT09REV)		Provide for Credit Audit Only		Date Submitted (to be filled in by Contractor)	Government Reviewer's Use (OCT09REV)
PAR		**FEATURE**	**DUE AT**		**REQUIRED DOCUMENTATION**	**DATE**	**REV**
			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	X	Manufacturer published product data or certification confirming material VOCs in spreadsheet		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	X	Manufacturer published product data or certification confirming material VOCs in spreadsheet		PE
EQ4.3		Low Emitting Materials: Carpet Systems	Closeout		Spreadsheet indicating, for each indoor carpet 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	X	Manufacturer published product data or certification confirming material CRI label in spreadsheet		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	X	Manufacturer published product data or certification confirming material urea formaldehyde in spreadsheet		PE
EQ5		Indoor Chemical & Pollutant Source Control	Closeout OCT09REV		Spreadsheet indicating, for each permanent entryway system used, the manufacturer, product name/model number and description of system. Roll-up and carpet systems requiring weekly cleaning to earn this credit are not a permitted option for Army projects.		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
			Closeout OCT09REV		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

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	**LEED-NC v2.2 Submittals (OCT09REV)**		Provide for Credit Audit Only		Date Submitted (to be filled in by Contractor)	Government Reviewer's Use (OCT09REV)
PAR		**FEATURE**	**DUE AT**		**REQUIRED DOCUMENTATION**	**DATE**	**REV**
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
EQ8.1		Daylight & Views: Daylight 75% of Spaces	Final Design		Option 1: Table indicating all regularly occupied spaces with space area and space area with 2% daylighting factor. Sum of regularly occupied areas and regularly occupied areas with 2% daylighting factor. Percentage calculation of areas with 2% daylighting factor to total regularly occupied areas.		ARC
			Final Design		Option 1: Glazing factor calculation table		ARC
			Final Design		Option 2: Simulation model method, software and output data		ARC
			Final Design		Option 2: 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.		ARC
			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 and glazing performance properties.		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
CATEGORY 6 – FACILITY DELIVERY PROCESS							
IDc1.1		Innovation in Design	Final Design OCT09REV		Narrative decribing 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 OCT09REV				
IDc1.3		Innovation in Design	Final Design OCT09REV				
IDc1.4		Innovation in Design	Final Design OCT09REV				
IDc2		LEED Accredited Professional	Final Design		Narrative indicating name of LEED AP, company name of LEED AP, description of LEED AP's role and responsiblilities in the project.		ARC

ATTACHMENT F
Version 02-03-2010

BUILDING INFORMATION MODELING REQUIREMENTS

1.0 Section 1 - Submittal Format

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

2.0 Section 2 – Design Requirements

2.1. BIM Model and Facility Data. Contractor shall use BIM application(s) and software(s) to develop project designs. "Facility Data" is defined as associated intelligent attribute data. The "Model" is defined as 3D graphics that includes Facility Data and output as described in the paragraph 'Output' below. Contractors will use the Model to produce accurate Construction Documents. For each Center of Standardization (CoS) facility type included in this project, all BIM Models and associated Facility Data shall be submitted in Bentley Systems BIM V8i SELECTSeries with associated USACE Bentley BIM Workspace (which includes specific standard BIM libraries and definitions). This Workspace can be downloaded from the CAD/BIM Technology Center. [Where available, the workspace will be specific to this CoS Facility Standard Design. The Contractor will be provided a baseline multi-discipline BIM Project Model for the CoS Facility Standard Design type, where such a model exists (for the purposes of site adaptation).] The USACE Bentley BIM Workspace is dependent on specific versions of the Bentley BIM suite of products and only the versions of the software that are listed in the Contractor instructions included with the USACE BIM Workspace are permitted to be used.

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

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

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

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

2.2.3. BIM Project Execution Plan.

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

2.2.4. BIM Requirements..

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

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

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

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

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

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

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

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

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

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

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

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

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

3.0 Section 3 – Design Stage Submittal Requirements

3.1. General Submittal Requirements.

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

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

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

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

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

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

3.2. Initial Design Conference Submittal.

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

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

3.3. Interim Design Submittals.

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

3.4. Final Design Submissions and Design Complete Submittals.

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

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

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

4.0 Section 4 – BIM Model Minimum Requirements and Output

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

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

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

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

4.2.3. Doors, Windows and Louvers. Doors, windows and louvers shall be depicted to represent their actual size, type and location. Doors and windows shall be modeled with the necessary intelligence to produce accurate window and door schedules.

4.2.4. Roof. The Model shall include the roof configuration, drainage system, penetrations, specialties, and the necessary intelligence to produce accurate plans, building sections and generic wall sections where roof design elements are depicted.

4.2.5. Floors. The floor slab shall be developed in the structural Model and then referenced by the architectural Model for each floor of the Project building.

4.2.6. Ceilings. All heights and other dimensions of ceilings, including soffits, ceiling materials, or other special conditions shall be depicted in the Model with the necessary intelligence to produce accurate plans, building sections and generic wall sections where ceiling design elements are depicted.

4.2.7. Vertical Circulation. All continuous vertical components (i.e., non-structural shafts, architectural stairs, handrails and guardrails) shall be accurately depicted and shall include the necessary intelligence to produce accurate plans, elevations and sections in which such design elements are referenced.

4.2.8. Architectural Specialties and Woodwork. All architectural specialties (i.e., toilet room accessories, toilet partitions, grab bars, lockers, and display cases) and woodwork (i.e., cabinetry and counters) shall be accurately depicted with the necessary intelligence to produce accurate plans, elevations and sections in which such design elements are referenced.

4.2.9. Signage. The Model shall include all signage and the necessary intelligence to produce accurate plans and schedules.

4.2.10. Schedules. Provide door, window, hardware sets using BHMA designations, flooring, wall finish, and signage schedules from the Model, indicating the type, materials and finishes used in the design.

4.3. Furniture. The furniture systems Model may vary in level of detail for individual elements within a Model, but at a minimum must include all features that would be included on a quarter inch (1/4”=1’0”) scaled drawing, and have necessary intelligence to produce accurate plans. Representation of furniture elements is to be 2D. Contractor may provide a minimal number of 3D representations as examples. Examples of furniture include, but are not limited to, desks, furniture systems, seating, tables, and office storage.

4.3.1. Furniture Coordination. Furniture that makes use of electrical, data or other features shall include the necessary intelligence to produce coordinated documents and data.

4.4. Equipment. The Model may vary in level of detail for individual elements within a Model. Equipment shall be depicted to meet layout requirements with the necessary intelligence to produce accurate plans and minimum schedules depicting their configuration. Examples of equipment include but are not limited to copiers, printers, refrigerators, ice machines and microwaves.

4.4.1. Schedules. Provide furniture and equipment schedules from the model indicating the materials, finishes, mechanical, and electrical requirements.

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

4.5.1. Foundations. All necessary foundation and/or footing elements, with necessary intelligence to produce accurate plans and elevations

4.5.2. Floor Slabs. Structural floor slabs shall be depicted, including all necessary recesses, curbs, pads, closure pours, and major penetrations accurately depicted.

4.5.3. Structural Steel. All steel columns, primary and secondary framing members, and steel bracing for the roof and floor systems (including decks), including all necessary intelligence to produce accurate structural steel framing plans and related building/wall sections.

4.5.4. Cast-in-Place Concrete. All walls, columns, and beams, including necessary intelligence to produce accurate plans and building/wall sections depicting cast-in-place concrete elements.

4.5.5. Expansion/Contraction Joints. Joints shall be accurately depicted.

4.5.6. Stairs. The structural Model shall include all necessary openings and framing members for stair systems, including necessary intelligence to produce accurate plans and building/wall sections depicting stair design elements.

4.5.7. Shafts and Pits. The structural Model shall include all necessary shafts, pits, and openings, including necessary intelligence to produce accurate plans and building/wall sections depicting these design elements.

4.6. Mechanical. The mechanical systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4”=1’0”) scaled drawing. Small diameter (less than 1-1/2” NPS) field-routed piping is not required in the model. Additional minimum Model requirements include:

4.6.1. HVAC. All necessary heating, ventilating, air-conditioning and specialty equipment, including air distribution ducts for supply, return, and ventilation and exhaust ducts, including control system, registers, diffusers, grills and hydronic baseboards with necessary intelligence to produce accurate plans, elevations, building/wall sections and schedules.

4.6.1.1. Mechanical Piping. All necessary piping and fixture layouts, and related equipment, including necessary intelligence to produce accurate plans, elevations, building/wall sections, and schedules.

4.6.2. Plumbing. All necessary plumbing piping and fixture layouts, floor and area drains, and related equipment, including necessary intelligence to produce accurate plans, elevations, building/wall sections, riser diagrams, and schedules.

4.6.3. Equipment Clearances. All HVAC and Plumbing equipment clearances shall be modeled for use in interference management and maintenance access requirements.

4.6.4. Elevator Equipment. The Model shall include the necessary equipment and control system, including necessary intelligence to produce accurate plans, sections and elevations depicting these design elements.

4.7. Electrical/Telecommunications. The electrical systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4”=1’0”) scaled drawing. Small diameter (less than 1-1/2”Ø) field-routed conduit is not required in the model. Additional minimum Model requirements include:

4.7.1. Interior Electrical Power and Lighting. All necessary interior electrical components (i.e., lighting, receptacles, special and general purpose power receptacles, lighting fixtures, panelboards, cable trays and control systems), including necessary intelligence to produce accurate plans, details and schedules. Lighting and power built into furniture/equipment shall be modeled.

4.7.2. Special Electrical Systems. All necessary special electrical components (i.e., security, Mass Notification, Public Address, nurse call and other special occupancies, and control systems), including necessary intelligence to produce accurate plans, details and schedules.

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

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

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

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

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

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

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

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

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

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

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

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

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

5.0 Section 5 - Ownership and Rights in Data

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

6.0 Section 6 – Contractor Electives

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

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

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

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

6.3.1.1. Construction Submittals – Over-The-Shoulder Progress Reviews. Periodic quality control meetings or construction progress review meetings shall include quality control reviews on the implementation and use of the Model for project scheduling.

6.4. Cost Estimating. In the BIM Execution Plan and during the Preliminary BIM Execution Plan Review, provide an overview of the use of BIM in the development and support of cost estimating requirements, or other applications such as cost analysis and estimate validation.

6.4.1. Submittal Requirements. During the Submittal stages, the Contractor shall deliver cost estimating information derived from the Model.

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

6.4.2.1. Sub system level extracted quantities from the BIM for use within the estimate shall be provided according to how detailed line items or tasks should be installed/built so that accurate costs can be developed and/or reflected. Therefore, when developing a BIM, the designer shall be cognizant of what tasks need to be separated appropriately at the beginning stages of model development, such as tasks done on the first floor versus the same task on higher floors that will be more labor intensive and therefore need to have a separate quantity and be priced differently. Tasks and their extracted quantities from the BIM shall be broken done by their location (proximity in the structure) as well as the complexity of its installation.

6.4.2.2. At all design stages it shall be understood that BIM output as described in this document will not generate all quantities that are necessary in order to develop a complete and accurate cost estimate of the project based on the design. An example of this would be plumbing that is less than 1.5" diameter and therefore not expected to be modeled due to granularity; this information is commonly referred to as The Gap. Quantities from The Gap and their associated costs shall be included in the final project actual cost estimates as well.

6.5. Other Analyses and Reports. Structural, energy and efficiency, EPACT 2005 & EISA 2007, lighting design, daylighting, electrical power, psychrometric processing, shading, programming, LEED, fire protection, code compliance, Life Cycle Cost, acoustic, plumbing.

7.0 Section 7 – BIM Project Execution Plan Template

7.1. Contractors will utilize the latest version of the USACE BIM PROJECT EXECUTION PLAN (USACE PxP) Template to develop an acceptable Plan. The template can be downloaded from the CAD/BIM Technology Center website.

ATTACHMENT G
DESIGN SUBMITTAL DIRECTORY AND SUBDIRECTORY FILE ARRANGEMENT

Organize electronic design submittal files in a subdirectory/file structure in accordance with the following table. The Contractor may suggest a slightly different structure, subject to the discretion of the government.

Design Submittal Directory and Subdirectory File Arrangement.

Directory	Sub-Directory	Sub-Directory or Files	Files
Submittal/Package Name	Narratives	PDF file or files with updated design narrative for each applicable design discipline	
	Drawings	PDF (subdirectory)	Single PDF file with all applicable drawing sheets - bookmarked by sheet number and name
		BIM (subdirectory) See Attachment F.	BIM project folder (with files) per the USACE Workspace. Include an Excel drawing index file with each drawing sheet listed by sheet #, name and corresponding dgn file name (Final Design & Design Complete only)
	Design Analysis & Calculations	Individual PDF files containing design analysis and calculations for each discipline applicable to the submittal	
		PDF file with Fire Protection and Life Safety Code Review checklist	
	LEED	PDF file with updated Leed Check List	
		PDF file or files with LEED Templates for each point with applicable documentation included in each file.	
		LEED SUBMITTALS	
	Energy Analysis	PDF with baseline energy consumption analysis	
		PDF with actual building energy consumption analysis	
	Specifications	Single PDF file with table of contents and all applicable specifications sections.	
		Submittal Register (Final Design & Design Complete submittal only)	
	Design Quality Control	PDF file or files with DQC checklist(s) and/or statements	
	Building Rendering(s)	PDF file of rendering for each building type included in contract (Final Design & Design Complete).	

SECTION 01 45 04.00 10
CONTRACTOR QUALITY CONTROL

1.0 GENERAL

1.1. REFERENCES

1.2. PAYMENT

2.0 PRODUCTS (NOT APPLICABLE)

3.0 EXECUTION

3.1. GENERAL REQUIREMENTS

3.2. QUALITY CONTROL PLAN

3.3. COORDINATION MEETING

3.4. QUALITY CONTROL ORGANIZATION

3.5. SUBMITTALS AND DELIVERABLES

3.6. CONTROL

3.7. TESTS

3.8. COMPLETION INSPECTION

3.9. DOCUMENTATION

3.10. NOTIFICATION OF NONCOMPLIANCE

1.0 GENERAL

1.1. REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Refer to the latest edition, as of the date of the contract solicitation.

- ASTM INTERNATIONAL (ASTM)
- ASTM D 3740 Minimum Requirements for Agencies

  Engaged in the Testing and/or Inspection
  of Soil and Rock as Used in Engineering
  Design and Construction
- ASTM E 329 Agencies Engaged in the Testing

  and/or Inspection of Materials Used in
  Construction
- U.S. ARMY CORPS OF ENGINEERS (USACE)

  ER 1110-1-12 Quality Management

1.2. PAYMENT

There will be no separate payment for providing and maintaining an effective Quality Control program. Include all costs associated therewith in the applicable unit prices or lump-sum prices contained in the Contract Line Item Schedule.

2.0 PRODUCTS (Not Applicable)

3.0 EXECUTION

3.1. GENERAL REQUIREMENTS

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause titled "Inspection of Construction." The quality control system shall consist of plans, procedures, and organization necessary to produce an end product, which complies with the contract requirements. The system shall cover all design and construction operations, both onsite and offsite, and shall be keyed to the proposed design and construction sequence. The site project superintendent is responsible for the quality of work on the job and is subject to removal by the Contracting Officer for non-compliance with the quality requirements specified in the contract. The site project superintendent in this context shall be the highest level manager responsible for the overall construction activities at the site, including quality and production. The site project superintendent shall maintain a physical presence at the site at all times, except as otherwise acceptable to the Contracting Officer, and shall be responsible for all construction and construction related activities at the site.

3.2. QUALITY CONTROL PLAN

Furnish for Government review, not later than 30 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause titled "Inspection of Construction." The plan shall identify personnel, procedures, control, instructions, tests, records, and forms to be used. The Government will consider an interim plan for the first 30 days of operation. Design and construction may begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. The Government will not permit work outside of the features of work included in an accepted interim plan to begin until acceptance of a CQC Plan or another interim plan containing the additional features of work to be started. Where the applicable Code issued by the International Code Council calls for an inspection by the Building Official, the Contractor shall include the inspections in the Quality Control Plan and shall perform the inspections. The Designer of Record shall develop a program for any special inspections required by the applicable International Codes and the Contractor shall perform these inspections, using qualified inspectors. Include the special inspection plan in the QC Plan.

3.2.1. Content of the CQC Plan

The CQC Plan shall include, as a minimum, the following to cover all design and construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agents subcontractors, designers of record, consultants, architect/engineers (AE), fabricators, suppliers, and purchasing agents:

3.2.1.1. A description of the quality control organization. Include a chart showing lines of authority and an acknowledgment that the CQC staff shall implement the three phase control system for all aspects of the work specified. A CQC System Manager shall report to the project superintendent or someone higher in the contractor's organization.

3.2.1.2. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function. Also include those responsible for performing and documenting the inspections required by the International Codes and the special inspection program developed by the designer of record.

3.2.1.3. A copy of the letter to the CQC System Manager, signed by an authorized official of the firm, which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Furnish copies of these letters.

3.2.1.4. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents subcontractors, designers of record, consultants, architect engineers (AE), offsite fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

3.2.1.5. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. Use only Government approved Laboratory facilities.

3.2.1.6. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

3.2.1.7. Procedures for tracking design and construction deficiencies from identification through acceptable corrective action. These procedures shall establish verification that identified deficiencies have been corrected.

3.2.1.8. Reporting procedures, including proposed reporting formats.

3.2.1.9. A list of the definable features of work. A definable feature of work is a task, which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable feature under a particular section. This list will be agreed upon during the coordination meeting.

3.2.1.10. A list of all inspections required by the International Codes and the special inspection program required by the code and this contract.

3.2.2. Additional Requirements for Design Quality Control (DQC) Plan

The following additional requirements apply to the Design Quality Control (DQC) plan:

3.2.2.1. The Contractor's QCP Plan shall provide and maintain a Design Quality Control (DQC) Plan as an effective quality control program which will assure that all services required by this design-build contract are performed and provided in a manner that meets professional architectural and engineering quality standards. As a minimum, competent, independent reviewers identified in the DQC Plan shall review all documents. Use personnel who were not involved in the design effort to produce the design to perform the independent technical review (ITR). The ITR is intended as a quality control check of the design. Include, at least, but not necessarily limited to, a review of the contract requirements (the accepted contract or task order proposal and amended RFP), the basis of design, design calculations, the design configuration management documentation and check the design documents for

errors, omissions, and for coordination and design integration. The ITR team is not required to examine, compare or comment concerning alternate design solutions but should concentrate on ensuring that the design meets the contract requirements. Correct errors and deficiencies in the design documents prior to submitting them to the Government.

3.2.2.2. Include in the DQC Plan the discipline-specific checklists to be used during the design and quality control of each submittal. Submit these completed checklists at each design phase as part of the project documentation.

3.2.2.3. A Design Quality Control Manager, who has the responsibility of being cognizant of and assuring that all documents on the project have been coordinated, shall implement the DQC Plan This individual shall be a person who has verifiable engineering or architectural design experience and is a registered professional engineer or architect. Notify the Government, in writing, of the name of the individual, and the name of an alternate person assigned to the position.

3.2.3. Acceptance of Plan

Government acceptance of the Contractor's plan is required prior to the start of design and construction. Acceptance is conditional and will be predicated on satisfactory performance during the design and construction. The Government reserves the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.4. Notification of Changes

After acceptance of the CQC Plan, notify the Government in writing of any proposed change. Proposed changes are subject to Government acceptance.

3.3. COORDINATION MEETING

After the Postaward Conference, before start of design or construction, and prior to acceptance by the Government of the CQC Plan, the Contractor and the Government shall meet and discuss the Contractor's quality control system. Submit the CQC Plan for review a minimum of 7 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations, design activities, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. The Government will prepare minutes of the meeting for signature by both parties. . The minutes shall become a part of the contract file. There may be occasions when either party will call for subsequent conferences to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4. QUALITY CONTROL ORGANIZATION

3.4.1. Personnel Requirements

The requirements for the CQC organization are a CQC System Manager, a Design Quality Manager, and sufficient number of additional qualified personnel to ensure contract compliance. The CQC organization shall also include personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly. The Contractor's CQC staff shall maintain a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure contract compliance. The CQC staff shall be subject to acceptance by the Contracting Officer. Provide adequate office space, filing systems and other resources as necessary to maintain an effective and fully functional CQC organization. Promptly furnish complete records of all letters, material submittals, shop drawing submittals, schedules and all other project documentation to the CQC organization. The CQC organization shall be responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the Contracting Officer.

3.4.2. CQC System Manager

Identify as CQC System Manager an individual within the onsite work organization who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System

Manager shall be a graduate engineer, graduate architect, or a BA/BS graduate of an ACCE accredited construction management college program. The CQC system Manager may alternately be an engineering technician with at least 2 years of college and an ICC certification as a Commercial Building Inspector (Residential Building Inspector certification will be required for Military Family Housing projects). In addition, the CQC system manager shall have a minimum of 5 years construction experience on construction similar to this contract. The CQC System Manager shall be on the site at all times during construction and shall be employed by the prime Contractor. Assign the CQC System Manager no other duties (except may also serve as Safety and Health Officer, if qualified and if allowed by Section 00 73 00). Identify an alternate for the CQC System Manager in the plan to serve in the event of the System Manager's absence. The requirements for the alternate shall be the same as for the designated CQC System Manager but the alternate may have other duties in addition to serving in a temporary capacity as the acting QC manager.

3.4.3. CQC Personnel

3.4.3.1. In addition to CQC personnel specified elsewhere in the contract provide specialized CQC personnel to assist the CQC System Manager in accordance with paragraph titled Area Qualifications.

3.4.3.2. These individuals may be employees of the prime or subcontractor; be responsible to the CQC System Manager; **are not intended to be full time, but must be physically present at the construction site during work on their areas of responsibility**; have the necessary education and/or experience in accordance with the experience matrix listed herein. These individuals may perform other duties but must be allowed sufficient time to perform their assigned quality control duties as described in the Quality Control Plan. **One person may cover more than one area, provided that they are qualified to perform QC activities for the designated areas below and provided that they have adequate time to perform their duties:**

3.4.4. Experience Matrix

3.4.4.1. Area Qualifications

3.4.4.1.1. Civil - Graduate Civil Engineer or (BA/BS) graduate in construction management with 4 years experience in the type of work being performed on this project or engineering technician with 5 yrs related experience.

3.4.4.1.2. Mechanical - Graduate Mechanical Engineer or (BA/BS) graduate in construction management with 4 yrs related experience or engineering technician with an ICC certification as a Commercial Mechanical Inspector with 5 yrs related experience.

3.4.4.1.3. Electrical - Graduate Electrical Engineer or (BA/BS) graduate in construction management with 4 yrs related experience or engineering technician with an ICC certification as a Commercial Electrical Inspector with 5 yrs related experience.

3.4.4.1.4. Structural - Graduate Structural Engineer or (BA/BS) graduate in construction management with 4 yrs related experience or person with an ICC certification as a Reinforced Concrete Special Inspector and Structural Steel and Bolting Special Inspector (as applicable to the type of construction involved) with 5 yrs related experience.

3.4.4.1.5. Plumbing - Graduate Mechanical Engineer or (BA/BS) graduate in construction management with 4 yrs related experience, or person with an ICC certification as a Commercial Plumbing Inspector with 5 yrs related experience.

3.4.4.1.6. Concrete, Pavements and Soils Materials Technician (present while performing tests) with 2 yrs experience for the appropriate area

3.4.4.1.7. Testing, Adjusting and Balancing Specialist must be a member (TAB) Personnel of AABC or an experienced technician of the firm certified by the NEBB (present while testing, adjusting, balancing).

3.4.4.1.8. Design Quality Control Manager Registered Architect or Professional Engineer (not required on the construction site)

3.4.4.1.9. Registered Fire Protection Engineer with 4 years related experience or engineering technician with 5 yrs related experience (but see requirements for Fire Protection Engineer of Record to witness final testing in Section 01 10 00, paragraph 5.10, Fire Protection).

3.4.4.1.10. QC personnel assigned to the installation of the telecommunication system or any of its components shall be Building Industry Consulting Services International (BICSI) Registered Cabling Installers, Technician Level. Submit documentation of current BICSI certification. In lieu of BICSI certification, QC personnel shall have a minimum of 5 years experience in the installation of the specified copper and fiber optic cable and components. They shall have factory or factory approved certification from each equipment manufacturer indicating that they are qualified to install and test the provided products. QC personnel shall witness and certify the testing of telecommunications cabling and equipment.

3.4.5. Additional Requirement

In addition to the above experience and/or education requirements the CQC System Manager shall have completed the course entitled "Construction Quality Management for Contractors". This course is periodically offered at This training coordinated through Robert Johnston (robert.p.johnston@usace.army.mil). 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:

  Coordinate with Contracting Officer's Representative for specific requirements

  [Not Supplied - ConstructionReqQC : LAB_ATTN]

  [Not Supplied - ConstructionReqQC : LAB_MAIL]

  [Not Supplied - ConstructionReqQC : LAB_STATE]
- For other deliveries:

  Coordinate with Contracting Officer's Representative for specific requirements

[Not Supplied - ConstructionReqQC : LAB_ATTN_OTHER]

[Not Supplied - ConstructionReqQC : LAB_MAIL_OTHER]

[Not Supplied - ConstructionReqQC : LAB_STATE_OTHER]

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.W912HN-07-X-9717
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.W912HN-07-X-9717

SECTION 01 57 23

TEMPORARY STORM WATER POLLUTION CONTROL

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 within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 4439	(2004) Geosynthetics
ASTM D 4491	(1999a; R 2004e1) Water Permeability of Geotextiles by Permittivity
ASTM D 4533	(2004) Trapezoid Tearing Strength of Geotextiles
ASTM D 4632	(2008) Grab Breaking Load and Elongation of Geotextiles
ASTM D 4751	(2004) Determining Apparent Opening Size of a Geotextile
ASTM D 4873	(2002) Identification, Storage, and Handling of Geosynthetic Rolls and Samples

1.2 SYSTEM DESCRIPTION

The work consists of implementing the storm water pollution prevention measures to prevent sediment from entering streams or water bodies as specified in this Section in conformance with the requirements of SECTION 01 57 24 STORM WATER POLLUTION PREVENTION PLAN, and the requirements of the National Pollution Discharge Elimination System (NPDES) permit or applicable state Pollution Discharge Elimination System.

1.3 EROSION AND SEDIMENT CONTROLS

1.3.1 Stabilization Practices

The stabilization practices to be implemented include temporary seeding, mulching, geotextiles, sod stabilization, vegetative buffer strips, erosion control matts, protection of trees, preservation of mature vegetation, etc. On the daily CQC Report, record the dates when the major grading activities occur, (e.g., clearing and grubbing, excavation, embankment, and grading); when construction activities temporarily or permanently cease on a portion of the site; and when stabilization practices are initiated.

1.3.1.1 Unsuitable Conditions

Where the initiation of stabilization measures by the fourteenth day after construction activity temporarily or permanently ceases or is precluded by unsuitable conditions caused by the weather, initiate stabilization practices as soon as practicable after conditions become suitable.

1.3.1.2 Burnoff

Burnoff of the ground cover is not permitted.

1.3.1.3 Protection of Erodible Soils

Immediately finish the earthwork brought to a final grade, as indicated or specified, and protect the side slopes and back slopes upon completion of rough grading. Plan and conduct earthwork to minimize the duration of exposure of unprotected soils.

1.3.2 Erosion, Sediment and Stormwater Control

d. Storm Water Notice of Intent for Construction Activities

e. Submit a Storm Water Notice of Intent for NPDES coverage under the general permit for construction activities and a Storm Water Pollution Prevention Plan (SWPPP) for the project to the Contracting Officer prior to the commencement of work. The SWPPP shall meet the requirements of the EPA general permit for storm water discharges from construction sites. Submit the SWPPP along with any required Notice of Intents, Notice of Termination, and appropriate permit fees, via the Contracting Officer, to the appropriate Federal agency for approval, while meeting the required waiting periods for document submission and land disturbance commencement. Maintain an approved copy of the SWPPP at the construction on-site office, and continually update as regulations require, to reflect current site conditions. Include within the SWPPP:

(1) Identify potential sources of pollution which may be reasonably expected to affect the quality of storm water discharge from the site.

(2) Describe and ensure implementation of practices which will be used to reduce the pollutants in storm water discharge from the site.

(3) Ensure compliance with terms of the EPA general permit for storm water discharge.

(4) Select applicable best management practices from EPA 832-R-92-005.

(5) Include a completed copy of the Registration Statement, BMP Inspection Report Template and Notice of Termination except for the effective date.

(7) Storm Water Pollution Prevention Measures and Notice of Intent 40 CFR 122.26, EPA 832-R-92-005. Provide a "Storm Water Pollution Prevention Plan" (SWPPP) for the project. The SWPPP

will meet the requirements of the State of Virginia general permit for storm water discharges from construction activities. Submit the SWPPP to the Contracting Officer for review, approval and signature a minimum of 15 days prior to the start of any land disturbing activities. Maintain an approved copy of the SWPPP at the construction on-site office, and continually update as regulations require, to reflect current site conditions.

1.3.3 Structural Practices

Implement structural practices to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Implement structural practices in a timely manner, during the construction process, to minimize erosion and sediment runoff. Include the following devices; Location and details of installation and construction are shown on the drawings.

1.3.3.1 Silt Fences

Provide silt fences as a temporary structural practice to minimize erosion and sediment runoff. Properly install silt fences to effectively retain sediment immediately after completing each phase of work where erosion would occur in the form of sheet and rill erosion (e.g. clearing and grubbing, excavation, embankment, and grading). Install silt fences in the locations indicated on the drawings. Final removal of silt fence barriers shall be after establishment of final stabilization. Obtain approval from the Contracting Officer prior to final removal of silt fence barriers.

1.3.3.2 Diversion Dikes

Build diversion dikes with a maximum channel slope of 2 percent and adequately compacted to prevent failure. The minimum height measured from the top of the dike to the bottom of the channel shall be 18 inches. The minimum base width shall be 6 feet and the minimum top width shall be 2 feet. Ensure that the diversion dikes are not damaged by construction operations or traffic. Locate diversion dikes where shown on the drawings.

1.3.4 Vegetation and Mulch

a. Provide temporary protection on sides and back slopes as soon as rough grading is completed or sufficient soil is exposed to require erosion protection. Protect slopes by accelerated growth of permanent vegetation, temporary vegetation, mulching, or netting. Stabilize slopes by hydroseeding, anchoring mulch in place, covering with anchored netting, sodding, or such combination of these and other methods necessary for effective erosion control.

b. Seeding: Provide new seeding where ground is disturbed. Include topsoil or nutriment during the seeding operation necessary to establish a suitable stand of grass. The seeding operation will be as specified in Section 32 92 19 SEEDING.

1.4 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. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Storm Water Pollution Prevention Plan
Storm Water Notice of Intent

Pollution prevention plan and Notice of intent for NPDES coverage under the general permit for construction activities

SD-06 Test Reports

Storm Water Inspection Reports for General Permit
Erosion and Sediment Controls

SD-07 Certificates

Mill Certificate or Affidavit

Certificate attesting that the Contractor has met all specified requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

Identify, store and handle filter fabric in accordance with ASTM D 4873.

PART 2 PRODUCTS

2.1 COMPONENTS FOR SILT FENCES

2.1.1 Filter Fabric

Provide geotextile that complies with the requirements of ASTM D 4439, and consists of polymeric filaments which are formed into a stable network such that filaments retain their relative positions. The filament shall consist of a long-chain synthetic polymer composed of at least 85 percent by weight of ester, propylene, or amide, and contains stabilizers and/or inhibitors added to the base plastic to make the filaments resistent to deterioration due to ultraviolet and heat exposure. Provide synthetic filter fabric that contains ultraviolet ray inhibitors and stabilizers to assure a minimum of six months of expected usable construction life at a temperature range of 0 to 120 degrees F. The filter fabric shall meet the following requirements:

FILTER FABRIC FOR SILT SCREEN FENCE

PHYSICAL PROPERTY	TEST PROCEDURE	STRENGTH REQUIREMENT
Grab Tensile	ASTM D 4632	100 lbs. min.
Elongation (percent)		30 percent max.
Trapezoid Tear	ASTM D 4533	55 lbs. min.
Permittivity	ASTM D 4491	0.2 sec-1
AOS (U.S. Std Sieve)	ASTM D 4751	20-100

2.1.2 Silt Fence Stakes and Posts

Use either wooden stakes or steel posts for fence construction. Wooden stakes utilized for silt fence construction, shall have a minimum cross section of 2 by 2 inches when oak is used and 4 by 4 inches when pine is used, and have a minimum length of 5 feet. Steel posts (standard "U" or "T" section) utilized for silt fence construction, shall have a minimum weight of 1.33 pounds/linear foot and a minimum length of 5 feet.

2.1.3 Mill Certificate or Affidavit

Provide a mill certificate or affidavit attesting that the fabric and factory seams meet chemical, physical, and manufacturing requirements specified above. Specify in the mill certificate or affidavit the actual Minimum Average Roll Values and identify the fabric supplied by roll identification numbers. Submit a mill certificate or affidavit signed by a legally authorized official from the company manufacturing the filter fabric.

PART 3 EXECUTION

3.1 INSTALLATION OF SILT FENCES

Extend silt fences a minimum of 16 inches above the ground surface without exceeding 34 inches above the ground surface. Provide filter fabric from a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are unavoidable, splice together filter fabric at a support post, with a minimum 6 inch overlap, and securely sealed. Excavate trench approximately 4 inches wide and 4 inches deep on the upslope side of the location of the silt fence. The 4 by 4 inch trench shall be backfilled and the soil compacted over the filter fabric. Remove silt fences upon approval by the Contracting Officer.

3.2 FIELD QUALITY CONTROL

Maintain the temporary and permanent vegetation, erosion and sediment control measures, and other protective measures in good and effective operating condition by performing routine inspections to determine condition and effectiveness, by restoration of destroyed vegetative cover, and by repair of erosion and sediment control measures and other protective measures. Use the following procedures to maintain the protective measures.

3.2.1 Silt Fence Maintenance

Inspect the silt fences in accordance with paragraph, titled "Inspections," of this section. Any required repairs shall be made promptly. Pay close attention to the repair of damaged silt fence resulting from end runs and undercutting. Should the fabric on a silt fence decompose or become ineffective, and the barrier is still necessary, replace the fabric promptly. Remove sediment deposits when deposits reach one-third of the height of the barrier. Remove a silt fence when it is no longer required. The immediate area occupied by the fence and any sediment deposits shall be shaped to an acceptable grade. The areas disturbed by this shaping shall be seeded in accordance with UFGS Guide Specification 32 05 33 LANDSCAPE ESTABLISHMENT, except that the coverage requirements in paragraph, titled "Establishment" of this section do not apply.

3.2.2 Diversion Dike Maintenance

Inspect diversion dikes in accordance with paragraph, titled "Inspections," of this section. Pay close attention to the repair of damaged diversion dikes and accomplish necessary repairs promptly. When diversion dikes are no longer required, shape to an acceptable grade. Seed the areas disturbed by this shaping in accordance with UFGS Guide Specification 32 92 19 SEEDING.

3.3 INSPECTIONS

3.3.1 General

Inspect disturbed areas of the construction site, areas that have not been finally stabilized used for storage of materials exposed to precipitation, stabilization practices, structural practices, other controls, and area where vehicles exit the site.

3.3.2 Inspections Details

Inspect disturbed areas and areas used for material storage that are exposed to precipitation for evidence of, or the potential for, pollutants entering the drainage system. Observe erosion and sediment control measures to ensure that they are operating correctly. Inspect discharge locations or points to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Inspect locations where vehicles exit the site for evidence of offsite sediment tracking.

3.3.3 Inspection Reports

For each inspection conducted, prepare a report summarizing the scope of the inspection, name(s) and qualifications of personnel making the inspection, the date(s) of the inspection, and all other requirements specified in the applicable Construction Storm Water General Permit. Furnish the report to the Contracting Officer within 24 hours of the inspection as a part of the Contractor's daily CQC REPORT. A copy of the inspection report shall be maintained on the job site.

3.3.4 Storm Water Pollution Prevention Plan (SWPPP) Revisions

In compliance with SECTION 01 57 24 STORM WATER POLLUTION PREVENTION PLAN, the Contractor is responsible to revise Storm Water Pollution Prevention Plan including the erosion control drawings. The current locations of storm control structures and types shall be depicted on the drawing portion of the on-site SWPPP for regulatory inspection and SWPPP revision record.

-- End of Section --

APPENDIX A

Geotechnical Information

FORT POLK, LOUISIANA

UNIT OPERATIONS FACILITIES

TACTICAL EQUIPMENT MAINTENANCE FACILITY (TEMF) & COMPANY OPERATIONS FACILITY (COF)

GOVERNMENT GEOTECHNICAL REPORT

FOR DESIGN-BUILD PROJECT RFP

PREPARED BY

U.S. ARMY CORPS OF ENGINEERS

FORT WORTH DISTRICT

ENGINEERING AND CONSTRUCTION DIVISION
ENGINEERING BRANCH

GEOTECHNICAL SECTION

CESWF-EC-DG

JULY 2010

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES (TEMF & COF)

GOVERNMENT GEOTECHNICAL REPORT

1. General. The purpose of this report is to provide subsurface information, and foundation and pavement design considerations, guidance, and requirements for new Unit Operations Facilities at Fort Polk, Louisiana. Design and construction of the new facilities will be accomplished under a design-build contract. The Unit Operations Facilities include a Tactical Equipment Maintenance Facility (TEMF) and a Company Operations Facility (COF). Preliminary project planning information available at the time of this report indicates the new Tactical Equipment Maintenance Facility will include an approximately 18,000 GSF Vehicle Maintenance Facility (Tactical Equipment Maintenance Facility) building (standard design, small), an approximately 480 GSF Hazardous Waste Storage Building, and an approximately 480 GSF Oil Storage Building (all square footage figures are approximate). The Company Operations Facility is anticipated to be approximately 15,000 GSF in size. There will also be a 2,800 GSF Unit Storage Building.

The Company Operations Facility is anticipated to incorporate two building sections – a single-story Administration Module and a split-level (tall single-story with partial second level mezzanine) Readiness Module. It is anticipated that all remaining project buildings will be single-story buildings. Specific details of the structural framing and roofing systems, exterior and interior finishing systems, and other construction details were not known at the time of this report. However, it is anticipated that the new building construction will match existing building architectural styles of the surrounding area. It is anticipated that the Vehicle Maintenance Facility (TEMF) building will include large vehicle repair bays and maintenance areas, as well as tool, equipment, and arms storage vaults, administrative areas, training and break rooms, restrooms, and electrical mechanical, and communication utility rooms. Rigid pavement features required for the project include an approximately 15,000 square yard organizational parking area (hardstand), access drives, aprons at vehicle and storage bays, and aprons in front of trash dumpster pads. Flexible pavement features include an approximately 22-vehicle capacity privately-owned vehicle

(POV) parking area. The POV parking for the Company Operations Facility is anticipated to accommodate between 60 and 100 POVs. An aggregate-surfaced pavement section is provided for a gravel hardstand for Conex boxes. Support features for the project are anticipated to include utilities and landscaping.

The proposed Unit Operations Facility (TEMF and COF) project site is located on a semi-developed parcel in the southern part of the South Fort Polk cantonment area. Specifically, the project site is bounded to the north by Illinois Avenue and to the east by Texas Avenue. The southern boundary of the project site is located approximately 1,500 feet south of Illinois Avenue. The western boundary of the project site is located approximately at the mid-point between Georgia Avenue and Texas Avenue. Based on available topographic survey information, the Tactical Equipment Maintenance Facility site and the Company Operations Facility site have different existing site grading conditions. The Tactical Equipment Maintenance Facility site is significantly flatter than the Company Operations Facility site (located immediately to the south). The Tactical Equipment Maintenance Facility site slopes downgradient to the east and to the west from a high point (oriented northwest-southeast) situated in the middle to eastern quarter of the project site; gradients across the TEMF site range from approximately 1 to3 percent. The Company Operations Facility site slopes downgradient to the southwest, with gradients across the COF site typically ranging from approximately 2 to 5 percent, although localized gradients may exceed 10 percent in the northwestern part of the site. Existing grades across the Tactical Equipment Maintenance Facility site range from approximately elevations 282.0 to 289.0 feet National Geodetic Vertical Datum (NGVD). Existing grades within the anticipated Vehicle Maintenance Facility (TEMF) building footprint range from approximately elevations 287.0 to 288.5 feet (NGVD). Existing grades across the Company Operations Facility site range from approximately elevations 269.0 to 288.0 feet (NGVD). Existing grades within the anticipated Company Operations Facility building footprint range from approximately elevations 274.0 to

286.0 feet (NGVD). Demolition of existing site features prior to construction of the new project facilities is anticipated to include existing concrete pavement and an existing building slab in the area of the Tactical Equipment Maintenance Facility, and demolition of existing asphalt pavement in the area of the Company Operations Facility. It is anticipated that extensive fill placement (possibly exceeding 10 feet) will be required for construction of the Company Operations Facility. Finish floor elevations for the new facilities were not known at the time of this report.

2. Subsurface Investigation. Raba-Kistner Consultants, Inc., drilled twelve (12) test holes, 10A2S-TEMF-1 through 10A2S-TEMF-10 and 8A2S-TEMF-21 and 8A2S-TEMF-22, at the Tactical Equipment Maintenance Facility site, and ten (10) test holes, 10A2S-COF011 through 10A2S-COF-20, at the Company Operations Facility site in May 2010 under a contract geotechnical field investigation scope of work prepared by the U.S. Army Corps of Engineers, Fort Worth District. Raba-Kistner Consultants, Inc. accomplished the geotechnical field investigation with a Mobile B-59 truck-mounted drill rig using a nominal 3-inch diameter shelby tube sampler, a 4-inch diameter fish tail bit, and a nominal 2-inch diameter split-spoon sampler (which was also used to recover soil samples). The borings were advanced to total depths ranging from 11.5 feet to 61.5 feet below existing grade. Representative soil samples recovered from the borings were placed in containers and delivered to the laboratory of TEAM Consultants, Incorporated (Arlington, Texas) for testing. Results of the field investigation are presented on Sheet B101, Boring Locations, and on Sheets B201 through B204, Logs of Borings – TEMF Site and Sheets B205 through B207, Logs of Borings – COF Site (Appendix A).

a. Groundwater Conditions. Groundwater conditions were monitored during and upon completion of drilling operations, and after an observation period of up to 24 hours after completion of drilling operations. Based on the information reported on the logs of borings, groundwater was encountered in five of the twelve borings drilled at the Tactical Equipment Maintenance Facility site and in four of the ten borings drilled at the Company Operations Facility

site. It should be noted that, based on previous engineering studies conducted at Fort Polk by the Fort Worth District, static groundwater levels of varying depths can be anticipated, ranging from depths at or within a few feet of the surface to greater than 25 feet below existing grade. It also should be noted that groundwater conditions are relative to the time of drilling, annual precipitation, and drainage conditions at the site. The successful bidder is advised to drill test holes prior to construction to verify groundwater conditions at the site, provide required design, and incorporate appropriate construction methods to properly account for groundwater. Tabulated below are the static levels measured at the time of the field investigation, by site area.

Tactical Equipment Maintenance Facility Site

Boring	Static Level, feet
8A2S-TEMF-4	18.6
8A2S-TEMF-6	18.2
8A2S-TEMF-7	19.5
8A2S-TEMF-21	17.8
8A2S-TEMF-22	20.2

Company Operations Facility Site

Boring	Static Level, feet
8A2S-COF-13	13.0
8A2S-COF-14	23.1
8A2S-COF-17	12.7
8A2S-COF-18	15.0

b. Dynamic Cone Penetrometer Testing. Dynamic Cone Penetrometer (DCP) testing for pavement design considerations was performed at the Tactical Equipment Maintenance Facility site in borings 10A2S-TEMF-1, 10A2S-TEMF-2, 10A2S-TEMF-3, 10A2S-TEMF-5, 10A2S-TEMF-6, 10A2S-TEMF-9, and 10A2S-TEMF-20. Dynamic Cone Penetrometer testing for pavement design considerations was performed at the Company Operations Facility site in borings 10A2S-COF-11, 10A2S-COF-12, 10A2S-COF-15, 10A2S-COF-16, 10A2S-COF-19, and 10A2S-

COF-20. DCP test results are discussed later in this report, and will be presented as Appendix D of the final report.

c. Soil Resistivity Testing. One soil resistivity test was performed at the Tactical Equipment Maintenance Facility site at a location approximately 125 feet south of boring 8A2S-TEMF-6. A soil resistivity test also was performed at the Company Operations Facility site at a location approximately 20 feet east of boring 8A2S-COF-13. Soil resistivity test results are summarized below.

Tactical Equipment Maintenance Facility Site

Diode Spacing, feet	Resistivity, ohm-cm	
	North-South	East-West
2.5	6,687	5,873
5.0	7,872	7,084
7.5	8,579	8,346
10.0	9,163	9,405
15.0	10,861	11,007
20.0	12,570	11,946
30.0	14,541	12,266
40.0	14,255	13,236
50.0	13,214	13,606

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES (TEMF & COF)

Company Operations Facility Site

Diode Spacing, feet	Resistivity, ohm-cm	
	North-South	East-West
2.5	11,155	12,400
5.0	16,277	17,618
7.5	21,831	22,836
10.0	25,086	26,618
15.0	28,438	29,874
20.0	32,555	31,406
30.0	32,746	32,172
40.0	30,640	30,640
50.0	26,810	29,682

3. Subsurface Conditions.

a. General Geology. Fort Polk lies within the West Gulf Coastal Plain section of the Coastal Plain physiographic province. The coastal plain of Louisiana is characterized by a broad rolling landform extending from the foot of the Ouachita Mountains on the north to the Gulf of Mexico on the south. It has developed upon a sequence of sedimentary rock units which dip gently southward, resulting in successively younger formations cropping out towards the Gulf. Most of Fort Polk lies within the outcrop area of the Fleming Formation, a complex sequence of sands and clays of Miocene age. Fisk (1940) divided the Fleming Formation into six members, distinguished from each other as being predominantly clayey zones or sandy zones. Although not accepted for use by the U.S. Geological Survey, the members are corelatable throughout several parishes on electric logs and show up as sandy intervals separated by clayey intervals. From oldest to youngest the members are: Lena, Carnahan Bayou, Dough Hills, Williamson Creek, Castor Creek, and Blounts Creek. The predominantly sandy members contain the aquifers that supply groundwater to Fort Polk.

Deposits of Pleistocene age continuously overlie the Fleming Formation within the extreme southeastern portion of Fort Polk. Elsewhere on the military reservation, these deposits form terraces that parallel the major streams and occur as isolated remnants mantling interstream highs. These deposits are fluviatile in nature and are generally coarser grained than the underlying Miocene deposits.

Sediments of recent age are confined to alluvial deposits in the larger stream valleys and as a thin veneer of residual soils developed upon primary materials.

b. Site Conditions. Based on available topographic survey information, the Tactical Equipment Maintenance Facility site and the Company Operations Facility site have different existing site grading conditions. The Tactical Equipment Maintenance Facility site is significantly flatter than the Company Operations Facility site (located immediately to the south). The Tactical Equipment Maintenance Facility site slopes downgradient to the east and to the west from a high point (oriented northwest-southeast) situated in the middle to eastern quarter of the project site; gradients across the TEMF site range from approximately 1 to3 percent. The Company Operations Facility site slopes downgradient to the southwest, with gradients across the COF site typically ranging from approximately 2 to 5 percent, although localized gradients may exceed 10 percent in the northwestern part of the site. Existing grades across the Tactical Equipment Maintenance Facility site range from approximately elevations 282.0 to 289.0 feet National Geodetic Vertical Datum (NGVD). Existing grades within the anticipated Vehicle Maintenance Facility (TEMF) building footprint range from approximately elevations 287.0 to 288.5 feet (NGVD). Existing grades across the Company Operations Facility site range from approximately elevations 269.0 to 288.0 feet (NGVD). Existing grades within the anticipated Company Operations Facility building footprint range from approximately elevations 274.0 to 286.0 feet (NGVD). It is anticipated that extensive fill placement (possibly exceeding 10 feet) will be required for construction of the Company Operations Facility.

Stratigraphically, the site is characterized by interbedded deposits of low to high plasticity clay (CL to CH, respectively), clayey sand (SC), silty sand (SM), poorly graded sand (SP), and poorly graded sand with silt (SP-SM). The low to high plasticity clay soils are soft to firm, moist to wet, gray to yellow brown to brown to red brown, sandy, and silty, with occasional scattered fine gravel and iron oxide stains noted. The sandy soils are typically loose to medium dense, moist to wet, gray to brown to yellow brown to red brown, clayey, and silty. Atterberg limits test results for the clayey soils at the Tactical Equipment Maintenance Facility site indicate these materials have liquid limits ranging from 26 to 114 percent, plastic limits varying from 12 to 36 percent (with plasticity indices ranging from 10 to 78 percent), and in situ moisture contents varying from approximately 11 to 43 percent. Atterberg limits test results for the clayey soils at the Company Operations Facility site indicate these materials have liquid limits ranging from 27 to 64 percent, plastic limits varying from 17 to 20 percent (with plasticity indices ranging from 8 to 44 percent), and in situ moisture contents varying from approximately 13 to 19 percent. It should be noted that soil specimens classifying as silty sands (SM) and subjected to Atterberg limits testing were determined to be non-plastic. Based on information presented on the logs of borings, possible fill materials were identified at the boring locations to depths ranging from 0.5 feet to 10 feet below existing grade.

Subsurface conditions representative of the project site are shown on the boring logs, Sheets B201 through B204, Logs of Borings – TEMF Site and Sheets B205 through B207, Logs of Borings – COF Site (Appendix A). The legend on the individual boring logs shows overburden materials as classified in the laboratory using procedures presented in ASTM D 2488. It should be noted that the actual interface between material types may be far more gradual or abrupt than represented; therefore, actual subsurface conditions in areas not sampled may differ from those predicted. The nature and extent of variations across the site may not become evident until construction commences, and the actual construction process may alter subsurface conditions as

well. If variations become evident at the time of construction, CESWF-EC-DG should be contacted to determine if the recommendations presented in this report need to be reevaluated.

4. Testing.

a. Laboratory Testing. Representative soil samples recovered from the borings were subjected to laboratory testing for identification, moisture content, grain-size distribution, Atterberg limits, density, strength, and controlled expansion-consolidation. The accumulative test results are presented in Appendix C. .Results of identification testing are shown on the individual boring logs, Sheets B201 through B204, Logs of Borings – TEMF Site and Sheets B205 through B207, Logs of Borings – COF Site (Appendix A). The visual descriptions and Unified Soil Classifications presented on the logs are based on test methods presented in ASTM D 2488. Descriptions of overburden materials were changed to correspond with the laboratory classification.

The laboratory test results are also presented graphically, by respective project site, in Appendix B as follows: Plasticity characteristics are shown on Plate 1, Plasticity Chart. Moisture content values are shown with respect to depth on Plate 2. Atterberg limits test results are shown with respect to depth on Plate 3. Dry density values of representative undisturbed samples and their corresponding moisture contents are shown with respect to depth on Plate 4. Ultimate compressive strengths of the clayey soils are shown with respect to depth on Plate 5. Testing results for the Tactical Equipment Maintenance Facility site are denoted with an “a” suffix after the plate number (e.g., Plate 1a), while testing results for the Company Operations Facility site are denoted with a “b” suffix after the plate number (e.g., Plate 1b).

(1) Shear Strength Testing. Shear strength characteristics of the cohesive soils were analyzed in the laboratory using one-point unconsolidated-undrained triaxial compression testing, confining the specimens to overburden pressure and then loading to failure. The ultimate compressive strengths recorded are presented below and in Appendix C at the end of this report.

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UNIT OPERATIONS FACILITIES (TEMF & COF)

Tactical Equipment Maintenance Facility Site

Boring	Depth, ft	γ_d, pcf	Q_u, tsf	Material Type
8A2S-TEMF-4	3.5	99.5	1.380	SM Silty Sand Overburden
8A2S-TEMF-4	8.5	105.2	2.090	CL Clay Overburden
8A2S-TEMF-4	53.5	78.1	1.910	CH Clay Overburden
8A2S-TEMF-4	58.5	99.0	6.260	SM Silty Sand Overburden

Company Operations Facility Site

Boring	Depth, ft	γ_d, pcf	Q_u, tsf	Material Type
8A2S-COF-18	3.5	105.6	2.120	CH Clay Overburden

(2) Controlled Expansion-Consolidation Testing. Controlled expansion-consolidation (CEC) testing was performed on one specimen of low plasticity clay (CL) collected at the Tactical Equipment Maintenance Facility site and on one specimen of high plasticity clay (CH) collected at the Company Operations Facility site to determine the shrink-swell potential of these materials. The low plasticity clay (CL) specimen subjected to CEC testing was collected at a depth of 8.5 feet within boring 8A2S-TEMF-4. This specimen has a liquid limit of 34 percent, a plastic limit of 16 percent (PI = 18 percent), and a natural moisture content of approximately 14 percent. An expansion pressure (p_{exp}) of approximately 0.5 tsf was recorded during CEC testing on this clayey sand specimen. Based on CEC test results, the low plasticity clay specimen collected at a depth of 8.5 feet within boring 8A2S-TEMF-4 has a low to moderate expansion potential (C_s = 0.019; p_{exp}/p_0 = 1.0) and a moderate potential for consolidation (C_c = 0.159). Controlled expansion-consolidation testing also was performed on a specimen of high plasticity clay (CH) collected at a depth of 3.5 feet within boring 8A2S-COF-18. This high plasticity clay specimen has a liquid limit of 53 percent, a plastic limit of 20 percent (PI = 33 percent), and a natural moisture content of approximately 19 percent. An expansion pressure (p_{exp}) of approximately 0.5 tsf was recorded during CEC testing on this high plasticity clay specimen.

Based on CEC test results, the high plasticity clay specimen collected at a depth of 3.5 feet within boring 8A2S-COF-18 has a moderate to high expansion potential ($C_s = 0.017$; $p_{exp}/p_0 = 2.3$) and a moderate potential for consolidation ($C_c = 0.159$). CEC test results are summarized below and are included in Appendix C at the end of this report.

Boring	Depth, feet	LL	PI	P_{exp}, tsf	P_{exp}/P_o	C_s	C_c	Material Type
8A2S-TEMF-4	8.5	34	18	0.5	1.0	0.019	0.159	CL Clay Overburden
8A2S-COF-18	3.5	53	33	0.5	2.3	0.017	0.159	CH Clay Overburden

b. Field Testing.

(1) Standard Penetration Testing. Standard penetration testing (SPT) was performed in every boring at approximately 2.5-foot intervals for foundation design considerations. A standard penetration test consists of driving a standard 1.5-inch (I.D.) diameter split-spoon sampler 18 inches into the soil using a 140-pound free-falling hammer dropped a distance of 30 inches. The number of blows required for each 6 inches of penetration is recorded. Penetration resistance (N) is defined as the sum of blows required to drive the second and third increments, or the final 12 inches. It should be noted that "refusal" is taken as a blow count of 50 or more per 6-inch increment. SPT results are presented in the 'Remarks' column of the individual logs (Appendix A). Also, standard penetration test blow counts (N-values) are shown with respect to depth on Plate 6 in Appendix B.

Standard penetration testing is performed to evaluate the relative densities of the in situ soils for foundation design considerations. The results are used to calculate the shear strength of the in situ soils and settlements relative to given load conditions. Based on standard penetration testing performed across the entire Unit Operations Facilities project area, the relative density of the in situ sandy, silty, gravelly, and clayey soils is similar at both the Tactical Equipment Maintenance Facility and Company Operations Facility sites is very similar and consistent with

depth. The relative density of the soils generally ranges from loose to medium dense throughout the entire depth investigated (61.5 feet), although the soils range from very loose to dense at the Tactical Equipment Maintenance Facility site (with average N-values ranging from 2 to 32). At the Company Operations Facility site, the soils range from very loose to dense (with average N-values ranging from 3 to 30). It should be noted that at both sites the N-values are most commonly less than 15.

(2) Dynamic Cone Penetrometer Testing. Dynamic Cone Penetrometer (DCP) testing for pavement design considerations was performed at the Tactical Equipment Maintenance Facility site in borings 10A2S-TEMF-1, 10A2S-TEMF-2, 10A2S-TEMF-3, 10A2S-TEMF-5, 10A2S-TEMF-6, 10A2S-TEMF-9, and 10A2S-TEMF-20. Dynamic Cone Penetrometer testing for pavement design considerations was performed at the Company Operations Facility site in borings 10A2S-COF-11, 10A2S-COF-12, 10A2S-COF-15, 10A2S-COF-16, 10A2S-COF-19, and 10A2S-COF-20. A DCP consists of a steel rod with a steel cone attached to one end and a sliding single-mass hammer. For this project, the DCP test was performed by driving the steel cone into the soil using a 17.6-pound sliding hammer dropped from a height of 22.6 inches (574 millimeters). The number of blows required for each 0.4 inch (10-mm) or greater of penetration was recorded as the "penetration per blow set"; therefore, the more penetration achieved per blow indicates that a "weaker" soil layer was encountered. Typically, penetration measurements are taken to a depth of 39.4 inches (1000 millimeters) or when refusal is achieved. Refusal is defined as the point at which the cone cannot penetrate the soil more than 0.4 inches (10 millimeters). Presented below are the average in situ strength parameters derived from the DCP tests, by project site area.

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Tactical Equipment Maintenance Facility Site

Depth, in	CBR, %	k, pci
0 – 6	4 – 45	124 – 379
6 – 12	8 – 40	172 – 313
>12	3 – 36	104 – 331

Company Operations Facility Site

Depth, in	CBR, %	k, pci
0 – 6	3 – 18	93 – 251
6 – 12	5 – 20	137 – 269
>12	5 – 45	130 – 374

5. Discussions. The following discussions are provided in support of the foundation and pavement design recommendations and requirements made herein for the proposed Unit Operations Facilities – TEMF and COF projects and appurtenant pavement structures. It should be noted that the discussions presented herein are based on the results of the Government geotechnical field investigation and laboratory testing program conducted at the site, as described previously in this report, as well as engineering studies, and previous engineering experience with similar structures at Fort Polk. **The Design-Build Contractor's foundation and pavement designs are required to comply with and to meet or exceed the minimum foundation and pavement design requirements and recommendations presented herein.** The bidders for this design-build contract project may use the subsurface boring log and lab testing data presented herein as a basis to formulate his or her foundation and pavement designs for the purposes of developing a bid for the project Request for Proposal (RFP) solicitation. However, the successful Design-Build Contractor shall supplement the information provided herein by his or her own geotechnical field investigation and laboratory testing program for the purpose of supplementing and comparing with the data provided in this report, verification of the stratigraphic contacts within design building footprints, and to serve as a basis for the development of his or her final foundation and pavement

designs. **Supplemental geotechnical field investigations conducted by the Design-Build Contractor shall be ONLY for the purpose of supplementing the data regarding the subsurface conditions provided by the Government geotechnical field investigation**. These supplemental efforts shall include conducting testing on soil specimens as described in Section 4 (Testing). A minimum of **four (4)** additional test holes **each** shall be drilled within the design building footprints for the Vehicle Maintenance Facility (Tactical Equipment Maintenance Facility) and the Company Operations Facility. A minimum of **two (2)** additional test holes **each** shall be drilled within areas of new pavement structure construction at the TEMF site and the COF site. Additional test holes for foundation design shall each be drilled to a minimum depth of 30 feet below existing grade, and additional test holes drilled for pavement design shall be drilled to a minimum depth of 10 feet below existing grade. Laboratory testing performed by the Design-Build Contractor (and/or their associates) is required to meet the following standards (at a minimum): Tests on disturbed specimens of overburden soils shall include classification (ASTM D 2488), moisture content (ASTM D 2216), grain size analysis (ASTM D 422), and Atterberg limits (ASTM D 4318). Undisturbed (shelby tube) specimens of the overburden soils shall also be collected; tests on undisturbed specimens of the overburden soil shall include the tests listed for disturbed specimens, as well as controlled expansion-consolidation testing (ASTM D 2435 and ASTM D 4546 (Method C)), density (Corps of Engineers Engineer Manual (EM) 1110-2-1906, Appendix II, Par. 4, Displacement Method), and strength testing (ASTM D 2850).

Development of the final foundation and pavement designs is the responsibility of the Design-Build Contractor; however, the Design-Build Contractor's final foundation and pavement designs shall be in full compliance with the requirements prescribed herein (including foundation type, foundation design parameters, and minimum pavement sections and pavement design criteria and parameters). The Design-Build Contractor shall provide to the Government engineering studies and design calculations that support the foundation and pavement design

recommendations they or their associates propose. The Design-Build Contractor's foundation and pavement design recommendations shall be reviewed for technical adequacy and compliance with the requirements and criteria established herein and in the Request for Proposal (RFP). Specific requirements for the Design-Build Contractor's foundation and pavement design analysis are provided in section 6.c.

a. Soil Activity Considerations. The Tactical Equipment Maintenance Facility and Company Operations Facility sites are characterized by interbedded deposits of low to high plasticity clay (CL to CH, respectively), clayey sand (SC), silty sand (SM), poorly graded sand (SP), and poorly graded sand with silt (SP-SM). Atterberg limits test results for the clayey soils at the Tactical Equipment Maintenance Facility site indicate these materials have liquid limits ranging from 26 to 114 percent, plastic limits varying from 12 to 36 percent (with plasticity indices ranging from 10 to 78 percent), and in situ moisture contents varying from approximately 11 to 43 percent. Atterberg limits test results for the clayey soils at the Company Operations Facility site indicate these materials have liquid limits ranging from 27 to 64 percent, plastic limits varying from 17 to 20 percent (with plasticity indices ranging from 8 to 44 percent), and in situ moisture contents varying from approximately 13 to 19 percent.

Based on the results of Atterberg limits, in situ moisture content testing, controlled expansion and consolidation testing, and engineering judgment and experience at Fort Polk, an active zone of at least 15.0 feet shall be used for expansive soils analyses. A deeper active zone shall be validated by additional borings. The results of Atterberg limits testing and CEC testing indicate that the clayey, sandy soils are potentially susceptible to both heave and consolidation. Once built upon, these materials can experience significant volumetric changes when their in situ moisture environment is altered. These volumetric change capacities necessitate special requirements with regard to the foundation design and earthwork activities for the new project construction, as are provided herein, to ensure adequate foundation performance.

b. Foundation Design Considerations. A variety of foundation systems have been utilized with success at Fort Polk, depending on site-specific subsurface conditions. Shallow foundation systems include spot and continuous spread footings, and reinforced concrete ribbed and flat mat slabs. Deep foundation systems include pre-cast reinforced concrete driven piles and reinforced concrete drilled and underreamed piers. Considerations associated with deep and shallow foundation systems are discussed in the following paragraphs.

A deep foundation system will not be necessary to support the anticipated building loads. Furthermore, the in situ soils exhibit no significant increase in strength with depth; hence there is no bearing capacity advantage of a deep foundation system of either driven piles or underreamed piers. The potentially high groundwater levels and sandy soils, prone to sloughing, based on experience, would also increase the difficulty in constructing a drilled and underreamed pier foundation system. Also, heave forces acting upon pier or pile foundations from the very high plasticity clays present at the site, and potentially large settlements that could be induced within clayey zones and seams by deep foundations could create significant structural distress within the facility. Lastly, it is anticipated that a shallow foundation system could be constructed more economically than a deep foundation system. Therefore, **a deep foundation system shall not be used for the buildings to be constructed within the scope of this project.**

Based on the results of laboratory strength testing and controlled expansion-consolidation testing, and engineering experience and judgment, the in situ clayey and sandy overburden soils identified during the geotechnical field investigation can be expected to be susceptible to both total and differential settlements from shallow foundation loads. Thus a shallow foundation will need to act monolithically to ensure differential movements do not exceed tolerable limits. The best foundation performance for this facility can be achieved by a reinforced concrete ribbed mat slab or flat mat slab. A properly designed and constructed ribbed mat or flat mat slab will act monolithically, would be anticipated to be constructed above the groundwater level, and also

would be assigned an allowable bearing capacity that would minimize the potential for excessive total or differential settlements to occur. **Therefore, the Design-Build Contractor shall limit consideration for foundation systems to either a reinforced concrete ribbed mat slab or a reinforced concrete flat mat slab.** The structural designer shall select the foundation system between these two types based on suitability for the structure, and, secondarily, on which foundation system would be able to provide the best performance for the greatest construction economy. A shallow spot and/or continuous spread footing foundation system **shall not** be allowed for this facility. ***IT IS REQUIRED THAT ALL FOUNDATION, FLOOR SLAB, AND EARTHWORK DESIGNS AND CONSTRUCTION BY THE DESIGN-BUILD CONTRACTOR AND THEIR ASSOCIATES SHALL COMPLY WITH THE MINIMUM REQUIREMENTS PRESENTED HEREIN.***

c. Pavement Design Considerations. The pavement designs presented in this report are based on criteria contained in *UFC 3-250-01FA*, *UFC 3-250-18FA*, *UFC 3-320-06A*, and engineering judgment.

(1) Traffic Types and Conditions. Six (6) pavement structures were analyzed and for this project, with minimum designs presented herein. New rigid pavement includes an approximately 15,000 square yard organizational parking area (hardstand), access drives and service drives, aprons at vehicle and storage bays, and aprons in front of trash dumpster pads. New flexible pavement includes an approximately 22-vehicle capacity privately-owned vehicle (POV) parking area for the Tactical Equipment Maintenance Facility. The POV parking for the Company Operations Facility is anticipated to accommodate between 60 and 100 POVs. An aggregate-surfaced pavement section is provided for a gravel hardstand for Conex boxes. The initial user of these facilities is anticipated to be a medical unit. The principal vehicles to be serviced and maintained by the new facilities are anticipated to be HMMWV (High-Mobility Multipurpose Wheeled Vehicle) variants. Other vehicles anticipated to be operated at the site

include tractor trailer trucks (Category IVA Traffic) and fork lifts. It is anticipated that the hardstand and access drives may experience up to 250 passes per hour of Category IVA Traffic (for a Class E Street and a pavement Design Index of 5). It is anticipated that the aprons in front of vehicle and storage bays will experience up to 250 passes per hour of Category IVA Traffic (for a Class E Street and a Design Index of 5), and up to 10-kip axle-load forklift trucks making less than 250 passes per day (for a Design Index of 5, per *UFC 3-320-06A*). Aprons in front of trash dumpster pads are anticipated to experience infrequent passes of trash trucks (Category IVA Traffic, Class F Street, Design Index = 4). The types of vehicles to occupy the POV parking area are anticipated to be limited to passenger cars and trucks (Category II Traffic) making at least 25 but fewer than 250 passes per hour (for a Class E Street and a Design Index of 2). These traffic loading conditions reflect the anticipated requirements of the medical unit which shall initially utilize the facilities. However, it is standard design practice (and requirement) to ensure future mission adaptability of vehicle maintenance facilities. This necessitates designing vehicle maintenance facilities to accommodate the largest vehicles operated at the installation. Therefore, the pavement structures for all areas (with the exception of POV parking areas) are designed to accommodate 120-kip track-laying vehicles (M1 Abrams tanks) making up to 10 passes per day; this design (Design Index = 8) also accommodates equivalent loading of 90-kip track-laying vehicles making up to 100 passes per day. If final design traffic loading conditions exceed the conditions specified herein, notify CESWF-EC-DG which shall evaluate the traffic loading conditions and issue revised minimum pavement section(s), as warranted, to accommodate the design traffic loading conditions. Based on criteria contained in the aforementioned Technical Manuals, the following traffic conditions were assigned for the remaining pavement structures:

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	Pavement Structure	Traffic Category	Street Class	Design Index
Rigid	Hardstand	Cat. VII Vehicles making ≤10 passes/day		8
	Access Drives	Cat. VII Vehicles making ≤10 passes/day		8
	Aprons, Vehicle & Storage Bays	Cat. VII Vehicles making ≤10 passes/day		8
	Apron (Trash) and Service Drives	IVA	F	4
Flexible	POV Parking Areas	II	E	2

If vehicle traffic loads and frequency are determined to be greater than those assumed in this report, structural pavement sections shall be increased appropriately using PCASE design.

(2) Pavement Design Parameters. California Bearing Ratio (CBR) and plate bearing tests were not conducted for this project. Instead, dynamic cone penetrometer (DCP) testing was conducted to evaluate the raw subgrade for pavement design considerations. The penetration resistance obtained from the DCP test is a measure of the soil's relative density, which in turn is used to derive "in situ" CBR and modulus of subgrade reaction values.

The average in situ CBR values measured within the upper 12 inches of soils tested at the Tactical Equipment Maintenance Facility site range from approximately 4 to 45 percent, and below this depth, CBR values range from 3 to 36 percent. Modulus of subgrade reaction values measured within the upper 12 inches of soils tested at the Tactical Equipment Maintenance Facility site range from 124 to 379 pci, and below this depth, modulus of subgrade reaction values range from 104 to 331 pci. The average in situ CBR values measured within the upper 12 inches of soils tested at the Company Operations Facility site range from approximately 3 to 20 percent, and below this depth, CBR values range from 5 to 45 percent. Modulus of subgrade reaction values measured within the upper 12 inches of soils tested at the Company Operations Facility site range from 93 to 269 pci, and below this depth, modulus of subgrade reaction values range from 130 to 374 pci. Laboratory CBR tests previously have been performed on similar subgrade materials collected at Fort Polk. The results indicate that CBR values between 3 and 4 percent can be expected for the sandy and clayey subgrade when compacted to 90 percent of maximum laboratory density. Previously conducted plate-bearing tests indicate the modulus of subgrade reaction for

this material to range from 100 pci to 150 pci. Based on the results of DCP testing and experience and engineering judgment, and in anticipation that some pavement structures may be constructed on fill materials, design CBR and modulus of subgrade reaction values of 4 percent and 100 pci, respectively, were assigned to the raw subgrade when compacted to 90 percent of laboratory maximum density (ASTM D 1557). To ensure that these design CBR and modulus of subgrade reaction values are achieved, the upper 6 inches of raw subgrade materials directly underlying the base course layer(s), as specified herein, shall consist of satisfactory materials, *excluding* materials that classify as CH materials. If the upper 6 inches of raw subgrade directly underlying the base course layer(s) are CH materials, the upper 6 inches of these materials shall be removed and replaced with satisfactory materials (excluding CH materials), and compacted to the density specified for raw subgrade underlying pavements. The CBR value considered for the sand clay gravel base material is 50.

6. Recommendations and Requirements. The following foundation and pavement design recommendations and requirements are based on the results of the field investigation, laboratory testing, engineering studies, and the criteria cited herein.

a. Foundation Design Recommendations and Requirements.

(1) Foundation System. Only the following foundation systems shall be allowed for the buildings to be constructed for the facilities included in the Tactical Equipment Maintenance Facility and Company Operations Facility projects: 1) a reinforced concrete ribbed mat slab, or 2) a reinforced concrete flat mat slab, designed in accordance with the criteria and requirements specified herein. **NO OTHER FOUNDATION SYSTEMS SHALL BE ALLOWED.** ***THE FOLLOWING FOUNDATION SYSTEMS ARE SPECIFICALLY PROHIBITED: SPOT AND/OR CONTINUOUS SPREAD FOOTINGS, DRILLED PIERS (BOTH STRAIGHT-SHAFT AND UNDERREAMED), DRIVEN OR CAST-IN-PLACE PILES, AND AUGER CAST PILES.*** Criteria for Site Class D shall be utilized for foundation seismic

design purposes, as presented in ***UFC 3-310-04 – Seismic Design for Buildings***. The Design-Build Contractor is responsible for developing the final foundation designs and earthwork requirements. The Design-Build Contractor shall use the subsurface conditions and laboratory and in situ testing data provided in this report, as well as supplemental subsurface investigations and testing performed by them or their associates to develop the final foundation designs and earthwork requirements. The Design-Build Contractor also shall use the design criteria cited herein to develop the final foundation designs and earthwork requirements. However, **it is required that the Design-Build Contractor's final foundation designs and earthwork requirements meet (or exceed) the minimum foundation design and earthwork requirements specified herein.**

(a) Reinforced Concrete Ribbed Mat or Flat Mat Slab. The proposed buildings to be constructed for the Tactical Equipment Maintenance Facility and Company Operations Facility projects shall be supported on either a reinforced concrete ribbed mat slab or a flat mat slab foundation system. ***The mat slabs shall be conventionally reinforced – POST-TENSIONED SLABS ARE NOT ALLOWED.*** A ribbed mat slab consists of a grid of stiffening ribs cast monolithically with the floor slab. The monolithic nature of this system allows the foundation to span or cantilever areas where a loss of support may occur; thus potential differential settlements are spread over a large horizontal area by the ribs through soil-structure interaction. The mat slabs shall be analyzed and designed for a minimum of 1.0 inch of long-term differential movement. For this reason, interior ribs shall be spaced no further than 15 feet center-to-center, and diagonal stiffener ribs should be placed at each corner of the mat slab. Design of the ribbed mat slab shall meet the minimum requirements as presented in ***CESWD-ED-TS/G Criteria Letter, dated 29 January 1988 – Design Criteria for Ribbed Mat Foundations, SWDED-G Criteria Letter, dated 16 April 1987 – Criteria for Developing Geotechnical Design Parameters for SWD Ribbed Mat Design Methodology***, and the recommendations and requirements provided

herein.

Interior and exterior beams shall bottom a minimum of 24 inches below outside finished grade. An allowable bearing capacity of 2.0 ksf (net) shall be used to size the beams. For this phase of design, it should be noted that (1) the structural load is supported solely on the beam and the beam intersections, (2) load transfer occurs over the effective beam width, and (3) the beam and soil remain in contact. Beam intersections should be widened at column locations to accommodate the above allowable bearing value for the anticipated load condition. The load used to size the beams shall consist of full dead load plus that portion of the live load that acts more or less continuously, usually 50 percent.

The ribbed mat slab foundations shall incorporate adequate stiffness such that the deformations do not exceed the structural tolerance of any elements in the foundation or superstructure. At a minimum, analyses should consider a vertical separation of the foundation slab and beams from the subgrade of 1.0 inch at the outside of all perimeter beams, with loss of support beneath the foundation over a horizontal distance of not less than 4.5 feet. This loss of support condition corresponds to the **center lift mode**. Additionally, **edge lift analyses** should consider an edge moisture variation distance equal to 5.25 feet, and an edge lift heave of 1.0 inch should be used in the design of the ribbed mat slab. This edge lift heave corresponds to an applied structural pressure of 100 psf. For edge lift considerations, two additional combinations of pressure and swell are required. For an allowable bearing capacity of 2.0 ksf, an edge lift heave of 0.75-inch can be expected to occur. At an ultimate bearing capacity of 6.0 ksf, 0.5-inch of heave should be anticipated. It should be noted that these anticipated heave amounts are based on the upper 4.5 feet (minimum) of existing soils within the proposed building footprints being removed and replaced with compacted nonexpansive backfill, as required herein. Should greater deflections be determined by additional testing done by the contractor, additional stiffness shall be designed into the foundation above these minimums.

A modulus of subgrade reaction equal to 200 psi/inch should be used when analyzing the ribbed mat slabs to determine in-service deformations. This value, however, should be factored to account for width effects such that $k_{design}=k_1(B_{eff})$, where B_{eff} is the effective beam width in feet. Design of the ribbed mat slabs may use the *SWD-AEIM* sections as a minimum stiffness "first approximation".

A reinforced concrete flat mat foundation should have a uniform thickness of not less than 2.0 feet. The mat should be tapered as required to ensure the perimeter of the slab extends to a constant elevation and is at least 24 inches below outside finish grade. An allowable bearing pressure of 2.0 ksf (net) shall be used to design the flat mat slabs. The load used to size flat mat slabs should consist of the full dead load plus that portion of the live load that reacts continuously, usually 50 percent. Flat mat slabs also should incorporate adequate stiffness such that the deformations do not exceed the structural tolerances of any element of the foundations or superstructures. Flat mat slabs should be analyzed for stiffness using the same edge and center lift mode analysis parameters as provided in this report for ribbed mat slab foundations and likewise stiffened if additional tests and analyses indicate greater deflections are possible.

The mat slabs will, by design, be supported on-grade. A polyethylene vapor barrier (10-mil minimum thickness) and a minimum 6-inch capillary water barrier should be placed beneath the mat slab.

(b) Small Support-type Structures. Small support-type structures (<500 GSF), if used, can be supported on reinforced concrete slabs-on-grade with turned-down edge beams. The turned-down edge beam should extend a minimum of 12 inches below outside finished grade and can be sized for a safe bearing pressure of 2,000 psf (net). Subgrade preparation shall be in accordance with the requirements specified below for ribbed and flat mat slabs.

(2) Subgrade Preparation Requirements. For ribbed mat and flat mat slab foundations, the upper 4.5 feet (minimum) of existing soils within the proposed building footprints

shall be removed and replaced with compacted nonexpansive backfill, which should limit the magnitude of predicted movement to approximately 1 inch or less. Furthermore, **subgrade preparation for the mat slabs (both ribbed mat and flat mat) shall ensure that a minimum of 2.5 feet of existing soil below the base of these features shall be removed and replaced with compacted nonexpansive fill, regardless of the amount of cut or fill required for site grading**. Any additional fill required to reach the final subgrade elevation below the base of the mat ribs or mat slab should be nonexpansive material as well. These measures should limit the magnitude of predicted floor slab movement to approximately 1 inch or less. Should further tests and analysis by the contractor show greater soil replacement is needed, then those stricter depths shall be incorporated. Nonexpansive fill should be placed in controlled lifts not exceeding 8 inches in loose thickness and compacted to not less than 95 percent of maximum laboratory density as determined in accordance with ASTM D 1557. The upper 6 inches of existing subgrade exposed after excavation operations, or cleared prior to fill placement should be scarified, moistened, manipulated, and recompacted to the same density required for nonexpansive fill materials. Vibration compaction should not be allowed. Groundwater levels, if present during construction, should be controlled in cut sections of the site by appropriate ditch construction and pumping to achieve required compaction levels of in place soils and fills.

(3) Below-Grade Structures. The following information is provided for the design of all below-grade structures, if applicable. An at-rest lateral earth pressure coefficient (k_o) of 0.7, an angle of internal friction (ϕ) of 28°, and a cohesion value (c) of 100 psf shall be used. The backfill material should be assumed to have a moist unit weight of 125 pcf and all backfill should be nonexpansive or select material. An active earth pressure coefficient (k_a) and a passive earth pressure coefficient (k_p) of 0.36 and 2.77, respectively, can be used for excavations for below-grade structures.

(4) Drainage. Proper drainage is an important design consideration to ensure

satisfactory long-term foundation performance. Exterior grading adjacent to the completed buildings should be sloped away from the structures a minimum of 5 percent for the first 10 feet. Runoff from the roofs should be adequately discharged a sufficient distance away from foundation edges. In no case shall water be allowed to pond adjacent to or beneath the buildings, both during and after construction.

(5) Care of Water. Drainage of ground and surface water from the project site continually throughout the construction contract is essential. The contractor will be required to protect the excavation and all constructed work throughout the life of the contract by means of ditches, berms, sumps with pumps, and any other means required to continually and effectively remove water from the site at all times. Ponding of water in the excavation is unacceptable at any time. These requirements shall be reflected in the specifications and structural notes.

(6) Mechanical Connections. All exterior mechanical connections shall be of the flexible type. Flexible connections should be capable of resisting a minimum of 2 inches of both vertical and horizontal movement. All condensate lines should drain away from foundation edges.

(7) Backfill Adjacent to Exterior Grade Beam Excavation. Use select clay backfill adjacent to exterior grade beam excavation to minimize water penetration to expansive subsoils.

(8) Material Testing Requirements. Testing shall be the responsibility of the contractor to ensure that the subgrade, fill, and backfill materials are properly compacted. To this end, the following frequencies of testing shall be included in the contract as a minimum:

- In-place density of the subgrade, fills, and backfills shall be performed for every 2000 square feet per lift in accordance with ASTM D 1556 or ASTM D 2922.
- Optimum Moisture and Laboratory Maximum Density of nonexpansive fill and backfill shall be performed for every 500 cubic yards or when any change in material occurs.

(9) Foundation Material Definitions.

(a) Satisfactory Materials. Satisfactory materials include materials

classified in ASTM D 2487 as GW, GM, GC, GP, SW, SP, SM, SC, CL, and CH and shall be free of trash, debris, roots or other organic matter, or stones larger than 3 inches in any dimension.

(b) Unsatisfactory Materials. Unsatisfactory materials include materials classified in ASTM D 2487 as Pt, OH, OL, ML, MH and any other materials not defined as satisfactory.

(c) Nonexpansive Soils. Nonexpansive soils for nonexpansive fill shall meet the requirements of the Louisiana Department of Transportation and Development Standard Specifications for Roads and Bridges for "Sand Clay Gravel", Part X, Section 1003.03(a). Satisfactory soils with a plasticity index of not less than 4 nor greater than 12 percent may be used as Nonexpansive soils.

(d) Select Soils. Select soils shall include all Satisfactory soils except CH materials. Select soils shall have a maximum liquid limit of 35 percent and a plasticity index of not less than 12 nor greater than 20 percent.

(e) Select Clay Backfill. Select clay backfill shall be a satisfactory material having a liquid limit of 35 percent or less, and a plasticity index of not less than 8 nor greater than 20 when tested in accordance with ASTM D 4318, and classifying as a CL in accordance with ASTM D 2487.

(f) Capillary Water Barrier. Capillary Water Barrier shall consist of clean, crushed, nonporous rock, crushed gravel, or uncrushed gravel. The maximum particle size shall be 1.5 inches and no more than 2 percent by weight shall pass the No. 4 sieve.

(g) Cohesionless and Cohesive Materials. Cohesionless materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic.

(h) Degree of Compaction. Degree of compaction is a percentage of the

maximum density obtained by the test procedure presented in ASTM D 1557.

The above material definitions and subgrade preparation requirements should be presented in ***UFGS-31 00 00 EARTHWORK***.

b. Pavement Design Recommendations and Requirements. The minimum pavement sections presented below are based on criteria contained in *UFC 3-250-01FA, UFC 3-250-18FA*, *UFC 3-320-06A*, and engineering judgment. The Design-Build Contractor is responsible for developing the final pavement designs. The Design-Build Contractor shall use the subsurface conditions and laboratory and in situ testing data provided in this report, as well as any supplemental subsurface investigations and testing performed by them or their associates, and any supplemental information regarding traffic loading conditions and requirements (beyond that provided herein) to develop the final pavement designs. The Design-Build Contractor shall use the United Facilities Criteria (UFCs) cited herein as well as Pavement-Transportation Computer Assisted Structural Engineering (PCASE) software (available at ***https://transportation.wes.army.mil/triservice/pcase/*** as a free download) to develop the final pavement designs. However, **it is required that the Design-Build Contractor's final pavement sections meet (or exceed) the minimum pavement sections specified herein.**

(1) Rigid Pavement. The following minimum rigid pavement sections shall be used for the hardstand, access and service drives, aprons at vehicle bays and storage bays, and aprons for a minimum distance of 15 feet in front of trash dumpster pads. The rigid pavement designs consider a modulus of subgrade reaction of 100 pci for the raw subgrade when compacted to 90 percent of laboratory maximum density and a concrete flexural strength of 600 psi at 28 days.

(a) Hardstand and Access Drives. The design is based on Category VII Traffic making up to 10 passes per day (Design Index = 8). This minimum pavement section shall be used for all hardstand and access drive areas for the TEMF. For access and service drives around the COF, the minimum section provided in Paragraph 6.b.(1)(c) shall be used.

9" Portland Cement Concrete (nonreinforced)

6" Open Graded Asphalt Stabilized Drainage Layer

4" Separation Layer (CBR=50) compacted to at least 100 percent of maximum laboratory density (ASTM D 1557)

6" Base Course (CBR=50) compacted to at least 95 percent of maximum laboratory density (ASTM D 1557)

6" Raw Subgrade compacted to at least 90 percent of maximum laboratory density (ASTM D 1557)

(b) Aprons at Vehicle and Storage Bays. The design considers Category VII Traffic making up to 10 passes per day (Design Index = 8).

7.5" Portland Cement Concrete reinforced with No. 4 bars spaced 16" o.c.e.w.

6" Open Graded Asphalt Stabilized Drainage Layer

4" Separation Layer (CBR=50) compacted to at least 100 percent of maximum laboratory density (ASTM D 1557)

6" Base Course (CBR=50) compacted to at least 95 percent of maximum laboratory density (ASTM D 1557)

(c) Service Drives – Areas Limited to Category IVA Traffic. The design is based on Category IVA Traffic and a Class F Street (Design Index = 4). This pavement section shall not be used around the TEMF; this section only applies to service and access drives for the COF.

7.5" Portland Cement Concrete (nonreinforced)

6" Open Graded Asphalt Stabilized Drainage Layer

4" Separation Layer (CBR=50) compacted to at least 100 percent of maximum laboratory density (ASTM D 1557)

6" Base Course (CBR=50) compacted to at least 95 percent of maximum laboratory density (ASTM D 1557)

6" Raw Subgrade compacted to at least 90 percent of maximum laboratory density (ASTM D 1557)

(d) Aprons in Front of Trash Dumpster Pads. The design is based on Category IVA Traffic and a Class F Street (Design Index = 4).

6" Portland Cement Concrete reinforced with No. 4 bars spaced 16 inches o.c.e.w.

6" Base Course (CBR=50) compacted to at least 95 percent of maximum laboratory density (ASTM D 1557)

6" Raw Subgrade compacted to at least 90 percent of maximum laboratory density (ASTM D 1557)

(e) Floor Slab within Vehicle and Storage Bays.

Vehicle Bays. The design considers Category VII Traffic making up to 10 passes per day (Design Index = 8), an effective modulus of subgrade reaction equal to 200 pci (upgraded due to nonexpansive fill), and a concrete flexural strength of 600 psi at 28 days. The vehicular floor slab shall have a minimum thickness of 7.0 inches and shall be reinforced with No. 4 bars spaced 12 inches on-center and in each direction. Subgrade preparation below the vehicle bay floor slabs shall be in compliance with the requirements specified in this report for floor slabs placed on-grade.

Storage Bays. For storage bays that will not experience greater than Category IVA Traffic, the following minimum pavement section shall be used. The design considers Category IVA Traffic making less than 250 passes per hour (Class E Street, with upgraded Design Index = 6), and up to 10-kip axle-load forklift trucks making less than 250 passes per day (upgraded Design Index = 6, per *UFC 3-320-06A*), an effective modulus of subgrade reaction equal to 200 pci (upgraded due to nonexpansive fill), and a concrete flexural strength of

650 psi at 28 days. The storage bay floor slab shall have a minimum thickness of 6.5 inches and shall be reinforced with No. 4 bars spaced 12 inches on-center and in each direction. Subgrade preparation below the storage bay floor slabs shall be in compliance with the requirements specified in this report for floor slabs placed on-grade.

Reinforcement for odd-shaped slabs, joint design, joint spacing, and other details should be in accordance with *UFC 3-250-01FA*, where applicable. The reinforcement bars should be placed a minimum of 1.5 inches clear distance from the surface of the pavement.

(2) Flexible Pavement. The following minimum flexible pavement section shall be used for the privately-owned vehicle (POV) parking area(s). The flexible pavement designs consider a CBR value of 4 percent for the raw subgrade when compacted to 90 percent of laboratory maximum density.

(a) POV Parking Area(s). The design is based on Category II Traffic and a Class E Street (Design Index = 2).

1.5” Hot-Mix Surface Course

7” Base Course (CBR=50) compacted to at least 100 percent of maximum laboratory density (ASTM D 1557)

6” Base Course (CBR=50) compacted to at least 95 percent of maximum laboratory density (ASTM D 1557)

6” Raw Subgrade compacted to at least 90 percent of maximum laboratory density (ASTM D 1557)

(3) Aggregate-Surfaced Pavements. The following pavement section is required for gravel hardstands for Conex boxes. The aggregate-surfaced pavement designs consider a CBR value of 4 percent for the raw subgrade when compacted to 90 percent of laboratory maximum density.

(a) Gravel Hardstands for Conex Boxes

6" Aggregate-Surface Course compacted to at least 100 percent of maximum laboratory density (ASTM D 1557)

6" Base Course (CBR=50) compacted to at least 95 percent of maximum laboratory density (ASTM D 1557)

6" Raw Subgrade compacted to at least 90 percent of maximum laboratory density (ASTM D 1557)

The following note should be incorporated as part of the pavement details shown on the contract drawings.

1. "The moisture content shall be at least 1 percent above optimum during compaction of the raw subgrade."

2. "The upper 6 inches of raw subgrade materials directly underlying the base course layer(s) shall consist of satisfactory materials, excluding materials that classify as CH materials. If the upper 6 inches of raw subgrade directly underlying the base course layer(s) are CH materials, the upper 6 inches of these materials shall be removed and replaced with satisfactory materials (excluding CH materials), and compacted to the density specified for raw subgrade underlying pavements."

(4) Pavement Material Definitions.

(a) High Stability Hot-Mix Surface Course. Aggregates and asphaltic materials shall conform to the requirements of the Louisiana Department of Transportation and Development Standard Specifications for Roads and Bridges for "Asphaltic Concrete Mixtures", Part V. Asphaltic material for the paving mixture should be asphaltic cement, viscosity grade AC-30 or PG-64-22. Edit guide specification ***UFGS-32 12 16 HOT-MIX ASPHALT (HMA) FOR ROADS*** to the above requirements.

(b) Prime Coat and Tack Coat. Asphaltic material for the prime coat shall be cut-back asphalt, grade MC-30, conforming to the requirements of Louisiana Department of Transportation and Development Standard Specifications for Roads and Bridges for "Asphaltic Materials", Part X, Section 1002. Prime coat should be applied to the surface of the base course.

Asphaltic material for the tack coat shall be cut-back asphalt, grade RC-250, or emulsified asphalt, grade SS-1, conforming to the requirements of Louisiana Department of Transportation and Development Standard Specifications for Roads and Bridges for "Asphaltic Materials", Part X, Section 1002. Tack coat should be applied to all surfaces that contact new asphalt pavement. Edit guide specification ***UFGS-32 12 10 BITUMINOUS TACK AND PRIME COATS*** to the above requirements.

(c) Portland Cement Concrete. The material shall conform to the requirements of ***UFGS-32 13 14 CONCRETE PAVEMENTS FOR SMALL PROJECTS***. The maximum nominal size coarse aggregate shall be 1.5 inches, and the mixture shall be designed to attain a flexural strength of 600 psi at 28 days.

(d) Base Course. Aggregates shall conform to the requirements of ***UFGS-32 11 23 AGGREGATE BASE COURSE***, and shall have a CBR value of 50 percent. The gradation for the material should conform to the requirements of the Louisiana Department of Transportation and Development Standard Specifications for Roads and Bridges for “Sand Clay Gravel:, Part X, Section 1003.03(a).

(e) Raw Subgrade. The material shall conform to the requirements of satisfactory soils as defined herein, with the exception of CH soils. If the upper 6 inches of raw subgrade directly underlying the base course layer(s) are CH materials, the upper 6 inches of these materials shall be removed and replaced with satisfactory materials (excluding CH materials), and compacted to the density specified for raw subgrade underlying pavements.

(f) Rapid Drainage Material. The material shall conform to the requirements of ***UFGS-32 11 10 DRAINAGE LAYER***.

(g) Separation Layer. A separation layer is a layer provided directly beneath the drainage layer to prevent fines from infiltrating or pumping into the drainage layer and to provide a working platform for construction and compaction of the drainage layer. For a

separation layer composed of graded aggregate material, as indicated in the pavement sections, above, the material shall conform to the requirements of a 50 CBR subbase (Gradation 1) as prescribed by guide specification ***UFGS-32 11 16***.

(5) Vehicular Pavement Material Testing Requirements. Testing shall be the responsibility of the contractor to ensure that the subgrade, base course, hot-mix surface course, and Portland cement concrete are properly constructed. To this end, the following testing requirements shall be included in the contract specifications as a minimum:

- In-place density testing of the subgrade, aggregate surface course, and base course shall be performed, at a minimum, every 600 square yards per lift in accordance with ASTM D 1556 and ASTM D 2922. ASTM D 1556 shall be used as a check at least once per lift for each 3,000 square yards of completed subgrade, aggregate surface course, and base course.

- Before starting work, at least one sample of base course, aggregate surface course, and base course material shall be tested in accordance with ASTM C 136. After the initial test, a minimum of one sieve analysis (ASTM C 136 and ASTM D 422) shall be performed for each 1,000 tons of base course placed, with a minimum of one analysis performed for each day's run until the course is completed. One liquid limit and plasticity index shall be performed for each sieve analysis per ASTM D 4318

- Wear tests shall be performed in accordance with ASTM C 131. A minimum of one test per base course material source shall be run.

- Thickness of the aggregate surface course and base course shall be measured for each 600 square yards of material placed. Compacted thickness of the base course shall be as presented in this report and the completed section shall be within 3/8-inch of the thickness presented.

- Hot Bin gradations for the asphalt wearing course shall be tested in accordance with ASTM C 136 and ASTM C 117. A minimum of one test shall be conducted. Marshall specimens shall be taken in accordance with methods described in AI MS-2. At least two sets of specimens shall be taken. Asphalt extractions shall be performed in accordance with ASTM D 2172, Method A or B. At least one asphalt extraction shall be conducted. Field density tests shall be conducted in accordance with ASTM D 2950. One test shall be conducted for each 300 square yards of pavement placed. The mat density shall be 97.5 to 100.5 percent and the joint density shall be 95.5 to 100.5 percent of the density obtained from laboratory-compacted specimens. Thickness measurements shall be taken at a minimum of one measurement for each 1,000 square yards of pavement placed.

- The Job Mix Formula for the bituminous mixture shall be furnished to the Contraction Officer for approval. The formula will indicate the percentage of each stockpile and mineral filler, the percentage of each size aggregate, the percentage of bitumen, and the temperature of the completed mixture when discharged from the mixer. The Contractor shall file with the Contracting Officer certified delivery tickets for all aggregates and bituminous materials actually used in construction. The finished mixture shall be designed using procedures contained in AI MS-2 and the criteria shown below.

Test Property	50 Blows
Stability (minimum), lbs	500
Flow (maximum), 1/100-inch	8-18
Air Voids, percent	3% to 5%
Percent Voids in mineral aggregate	14
TSR, minimum percent	75

- The contractor shall be responsible for the development of the mixture proportion study for cementitious materials and chemical admixtures. The concrete mix design shall include a statement giving the maximum nominal coarse aggregate size and the proportions of all ingredients that will be used in the manufacture of concrete at least 60 days prior to commencing concrete operations. Trial design batches, mixture proportioning studies, and testing requirements shall be the responsibility of the Contractor. Strength requirements shall be based on flexural strength. Trial mixtures having proportions, slumps, and air content suitable for the work shall be based on methodology described in ACI 211.1, modified as necessary to accommodate flexural strength. The maximum water-cementitious material ratio is 0.45. Coarse and fine aggregates shall have a satisfactory service record of at least 5 years successful service in three paving projects, or if a new source is used, shall meet the requirements when tested for resistance to freezing and thawing. Coarse and fine aggregates not having a satisfactory demonstrable service record shall have a durability factor of 50 when subjected to freezing and thawing in concrete in accordance with COE CRD-C 114 (Test Method for Soundness of Aggregates by Freezing and Thawing of Concrete Specimens).

- Smoothness measurements shall be taken in successive positions parallel to the pavement (flexible and rigid) centerline with a 12-foot straightedge. Measurements shall be taken perpendicular to the pavement (flexible and rigid) centerline at 15-foot intervals. Surface smoothness shall not exceed 3/8-inch.

c. **Requirements for the Design-Build Contractor's Foundation and Pavement Design Analysis.** The successful proposer shall provide a Foundation and Pavement Design Analysis after contract award. ***The geotechnical firm responsible for the geotechnical design shall have demonstrated successful performance in design of at least five (5) projects of similar type and***

scope in expansive soil environments in Louisiana. The Foundation and Pavement Design Analysis (Report) shall include a description of the project, including a discussion of any unusual features of the project, a discussion for each structure that requires a foundation system, and a discussion of each pavement type. All calculations in support of bearing, settlement, heave, and structural deflections shall be included in or attached to the report.

(1) **Foundation System.** ***A shallow foundation system consisting of either a reinforced concrete ribbed mat slab or a reinforced concrete flat mat slab shall be utilized for the facilities included in the Tactical Equipment Maintenance Facility and Company Operations Facilities projects. The Design-Build Contractor shall design the shallow foundation system in accordance with the requirements, recommendations, and design parameters provided in this report.***

(2) **Subgrade Preparation and Fill Requirements.** ***The Design-Build Contractor shall comply with the subgrade preparation and fill (earthwork) requirements specified in this report. Compaction requirements for the raw subgrade, fill, and backfill materials, and foundation and pavement material definitions shall be as specified herein.***

(3) **Pavement Sections.** The Design-Build Contractor shall provide separate subparagraphs for each rigid and flexible pavement structure included in the project, ***using the pavement sections provided in this report as minimum sections***. The Design-Build Contractor shall use the UFCs cited herein and PCASE pavement design software to develop the final pavement designs, and shall present PCASE design output data tables in their report documentation for review by the Government. Each pavement design shall include as a minimum the following items: traffic types, road classifications and design indexes; subgrade strength values (CBR and modulus of subgrade reaction values for the specified compactive effort); pavement material thicknesses and compaction requirements; and concrete flexural strength for designated time frame.

(4) Exhibits to be Included in the Design-Build Contractor's Foundation and Pavement Design Analysis. The following exhibits shall be included in the Design-Build contractor's Foundation and Pavement Design Analysis. The Design-Build contractor may use the information provided in this report to partially satisfy these requirements, but shall supplement the information provided herein with additional subsurface drilling and testing, as described in the first paragraph of Section 5 of this report. Required exhibits to be included with the Design-Build contractor's Foundation and Pavement Design Analysis include:

- Site Plan with Boring Locations and Legend;
- Boring Logs;
- Plasticity Chart;
- Standard Penetration Tests versus Depth of Boring (if applicable);
- Moisture Content versus Depth (Chart);
- Moisture Content-Liquid Limit-Plastic Limit versus Depth (Chart);
- Strength Tests Results versus Depth (Chart);
- Tabulation of Laboratory Test Results (to include Boring Number, Sample Number, Depth, Laboratory Classification, Visual Descriptions, Grain Size Analysis (%Gravel, %Sand, %Fines), LL, PL, PI, MC, Unit Weight, and Strength Test Data;
- Consolidation-Expansion Tests/Swell Pressure Tests (if applicable).

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES (TEMF & COF)

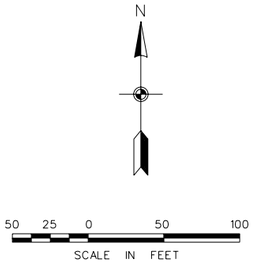
References:

- TEAM Consultants, Incorporated Report No. 102040
- UFC 3-220-03FA – Soils and Geology Procedures for Foundation Design of Buildings and Other Structures (Except Hydraulic Structures)
- UFC 3-220-07 – Foundations in Expansive Soils
- CESWD-ED-TS/G Criteria Letter, dated 29 January 1988 – Design Criteria for Ribbed Mat Foundations
- SWDED-G Criteria Letter, dated 16 April 1987 – Criteria for Developing Geotechnical Design Parameters for SWD Ribbed Mat Design Methodology
- UFC 3-250-01FA – Pavement Design for Roads, Streets, Walks, and Open Storage Areas
- UFC 3-250-18FA – General Provisions and Geometric Design For Roads, Streets, Walks, and Open Storage Areas
- UFC 3.320-06A – Concrete Floor Slabs on Grade Subjected to Heavy Loads
- Louisiana Department of Transportation and Development Standard Specifications for Roads and Bridges

FORT WORTH DISTRICT
JULY 2010

APPENDIX A

BORING LOCATIONS & LOGS OF BORINGS



NOTE: USE THIS SHEET FOR BORING LOCATIONS ONLY.

US Army Corps of Engineers
Fort Worth District

Symbol	Description	Tracking No.	Action	Date

Designed by: J. PICKERING
Date:
Rev.
Dwn by: J. PICKERING
Sol No.
Reviewed by: K. McCLESKEY
Contr No.
Submitted by: RAMANUJA KANNAN, P.E. CHIEF, GEOTECHNICAL SECTION
File name: $$cadd file name$$
Plot date: $$date$$
Plot scale:

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS

ENGINEERING/ CONSTRUCTION DIVISION DESIGN BRANCH

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PN: 069199

BORING LOCATIONS

Sheet reference number:
B-101

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$$REFERENCEFILE4$$

$$time$$

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$$user$$

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LOG OF BORING NO. 10A2S-TEMF-1

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	CLAY, Sandy, Firm, Reddish Brown, with ferric staining (possible fill)	
	SAND, Silty, Clayey, Loose, Pinkish Brown, Damp possible fill from 0 to 11.5 ft.	9
5	CLAY, Silty, Sandy, Pinkish Brown, Damp	8
	SAND, Silty, Clayey, Loose, Pinkish Brown, Damp	8
10		8
	Boring Terminated	
15		

SHEAR STRENGTH, TONS/FT2 (0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0); PLASTIC LIMIT, WATER CONTENT, LIQUID LIMIT (10 20 30 40 50 60 70 80); UNIT DRY WEIGHT, pcf; PLASTICITY INDEX; % -200

DEPTH DRILLED: 11.5 ft | DEPTH TO WATER: N/A | PROJ. No.: AAA10-025-00
DATE DRILLED: 5/21/2010 | DATE MEASURED: 5/21/2010 | FIGURE: 1

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 10A2S-TEMF-2

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	CLAY, Silty, Sandy, Soft, Dark Brown, Damp, with ferric staining (possible fill)	
		4
	- fill to a depth of 4 ft.	
5	CLAY, Silty, Sandy, Firm, Reddish Brown, Damp, with ferric staining possible fill to a depth of 11.5 ft.	5
		7
10		15
	Boring Terminated	
15		

SHEAR STRENGTH, TONS/FT2 (0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0); PLASTIC LIMIT, WATER CONTENT, LIQUID LIMIT (10 20 30 40 50 60 70 80); UNIT DRY WEIGHT, pcf; PLASTICITY INDEX; % -200

DEPTH DRILLED: 11.5 ft | DEPTH TO WATER: N/A | PROJ. No.: AAA10-025-00
DATE DRILLED: 5/19/2010 | DATE MEASURED: 5/19/2010 | FIGURE: 2

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 10A2S-TEMF-3

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	CLAY, Sandy, Firm, Reddish Brown, with ferric staining	
	SAND, Silty, Clayey, Firm, Loose to Medium Dense, Pinkish Brown, Damp - possible fill from 0 to 11.5 ft.	5
5		9
		11
10		10
	Boring Terminated	
15		

SHEAR STRENGTH, TONS/FT2 (0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0); PLASTIC LIMIT, WATER CONTENT, LIQUID LIMIT (10 20 30 40 50 60 70 80); UNIT DRY WEIGHT, pcf; PLASTICITY INDEX; % -200

DEPTH DRILLED: 11.5 ft | DEPTH TO WATER: N/A | PROJ. No.: AAA10-025-00
DATE DRILLED: 5/21/2010 | DATE MEASURED: 5/21/2010 | FIGURE: 3

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-4

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	CLAY, Silty, Sandy, Firm to Stiff, Reddish Brown to Pink, Damp, with ferric staining	
	SILT, Clayey, Sandy, Firm to Stiff, Reddish Brown to Pink, Damp, with ferric staining	
5	CLAY, Silty, Sandy, Firm to Stiff, Reddish Brown to Pink, Damp, with ferric staining	11
10	SAND, Silty, Clayey, Loose to Medium Dense, Reddish Brown to Pink, Damp to Wet, with ferric staining (medium to fine grain sand)	8
	- possible fill at 11.5 ft	6
15		7
		4
20		16

SHEAR STRENGTH, TONS/FT2 (0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0); PLASTIC LIMIT, WATER CONTENT, LIQUID LIMIT (10 20 30 40 50 60 70 80); UNIT DRY WEIGHT, pcf; PLASTICITY INDEX; % -200

DEPTH DRILLED: 61.5 ft | DEPTH TO WATER: 18.5 ft | PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 | DATE MEASURED: 5/20/2010 | FIGURE: 4a

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-4

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	SAND, Silty, Clayey, Loose to Medium Dense, Reddish Brown to Pink, Damp to Wet, with ferric staining (medium to fine grain sand) (continued)	5
		5
25		17
		10
30	SAND, Silty, Clayey, Loose to Medium Dense, Tan, Wet	12
		20
35		5
		16

SHEAR STRENGTH, TONS/FT2 (0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0); PLASTIC LIMIT, WATER CONTENT, LIQUID LIMIT (10 20 30 40 50 60 70 80); UNIT DRY WEIGHT, pcf; PLASTICITY INDEX; % -200

DEPTH DRILLED: 61.5 ft | DEPTH TO WATER: 18.5 ft | PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 | DATE MEASURED: 5/20/2010 | FIGURE: 4b

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-4

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	SAND, Silty, Clayey, Loose to Medium Dense, Tan, Wet (continued)	11
		20
45		27
		9
50	CLAY, Silty, Sandy, Soft, Reddish Brown, Wet, with ferric stains	3
	CLAY, Stiff, Gray, Wet, with reddish brown layers	
55		12
	SAND, Silty, Gray, Wet, with reddish brown layers	

SHEAR STRENGTH, TONS/FT2 (0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0); PLASTIC LIMIT, WATER CONTENT, LIQUID LIMIT (10 20 30 40 50 60 70 80); UNIT DRY WEIGHT, pcf; PLASTICITY INDEX; % -200

DEPTH DRILLED: 61.5 ft | DEPTH TO WATER: 18.5 ft | PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 | DATE MEASURED: 5/20/2010 | FIGURE: 4c

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-4

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	CLAY, Stiff, Gray, Wet, with reddish brown layers (continued)	8
	Boring Terminated	
65		
70		
75		

SHEAR STRENGTH, TONS/FT2 (0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0); PLASTIC LIMIT, WATER CONTENT, LIQUID LIMIT (10 20 30 40 50 60 70 80); UNIT DRY WEIGHT, pcf; PLASTICITY INDEX; % -200

DEPTH DRILLED: 61.5 ft | DEPTH TO WATER: 18.5 ft | PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 | DATE MEASURED: 5/20/2010 | FIGURE: 4d

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

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$$REFERENCEFILE5$$
$$REFERENCEFILE6$$
$$REFERENCEFILE7$$
$$REFERENCEFILE8$$
$$REFERENCEFILE9$$

NOTES:

1. USE THIS SHEET FOR BORING LOGS ONLY.
2. MOISTURE CONTENT, WHERE SHOWN, IS EXPRESSED AS PERCENT DRY WEIGHT AT TIME OF LABORATORY CLASSIFICATION.
3. LEGEND SHOWS OVERBURDEN MATERIALS CLASSIFIED ACCORDING TO ASTM D 2487 AND ASTM D 2488.
4. DESCRIPTION OF OVERBURDEN MATERIALS CHANGED TO CORRESPOND WITH LABORATORY CLASSIFICATION AS NECESSARY.
5. ORIGINAL DRILLING LOGS AVAILABLE AT CORPS OF ENGINEERS OFFICES.

US Army Corps of Engineers
Fort Worth District

Symbol	Description	Tracking No.	Action	Date

Rev.	Date:	Designed by: J. PICKERING
	Sol No.	Dwn by: J. PICKERING
	Contr No.	Reviewed by: K. MacLESKEY
		Submitted by: RAMANUJA KANNAN, P.E., CHIEF, GEOTECHNICAL SECTION

File name: $$cadd file name$$
Plot date: $$date$$
Plot scale:

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS

ENGINEERING/ CONSTRUCTION DIVISION DESIGN BRANCH

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PN: 069199

LOGS OF BORING 1 OF 7

Sheet reference number:
B-201

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$$date$$
$$user$$
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LOG OF BORING NO. 10A2S-TEMF-5

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	FILL material Clay, Silty, Sandy, Very Stiff, Reddish Brown, Damp with ferric staining	9
5	CLAY, Silty, Sandy, Firm, Reddish Brown, Damp with ferric staining - possible fill from 5 to 11.5 ft.	18
		20
10		19
	Boring Terminated	
15		

DEPTH DRILLED: 11.5 ft | DEPTH TO WATER: N/A | PROJ. No.: AAA10-025-00
DATE DRILLED: 5/19/2010 | DATE MEASURED: 5/19/2010 | FIGURE: 5

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-6

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	FILL, Clay, Silty, Loose to Medium Dense, Reddish Brown to Pink, Damp, with ferric staining	5
	FILL, Sand, Clayey, Silty, Loose to Medium Dense	9
10	CLAY, Sandy, Silty, Low Plasticity	9
	SAND, Clayey, Silty, Loose to Medium Dense, Reddish Brown to Pink, Damp to Wet, with ferric staining	14
15		

DEPTH DRILLED: 61.5 ft | DEPTH TO WATER: 18.2 ft | PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 | DATE MEASURED: 5/20/2010 | FIGURE: 6a

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-6

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	SAND, Clayey, Silty, Loose to Medium Dense, Reddish Brown to Pink, Damp to Wet, with ferric staining (continued)	6
		13
25		10
		4
30		11
		18
35		25
	SAND, Silty, Clayey, Loose to Medium Dense, Tan, Wet, with ferric staining	7

DEPTH DRILLED: 61.5 ft | DEPTH TO WATER: 18.2 ft | PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 | DATE MEASURED: 5/20/2010 | FIGURE: 6b

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-6

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	SAND, Silty, Clayey, Loose to Medium Dense, Tan, Wet, with ferric staining (continued)	5
		24
45		22
	CLAY, Stiff, Reddish Brown, Wet, with ferric staining, tan layers, and gray mottling	10
50	CLAY, Soft to Stiff, Gray, Wet, with ferric staining	3
55		14

DEPTH DRILLED: 61.5 ft | DEPTH TO WATER: 18.2 ft | PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 | DATE MEASURED: 5/20/2010 | FIGURE: 6c

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-6

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
65	CLAY, Soft to Stiff, Gray, Wet, with ferric staining (continued)	6
	Boring Terminated	
70		
75		

DEPTH DRILLED: 61.5 ft | DEPTH TO WATER: 18.2 ft | PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 | DATE MEASURED: 5/20/2010 | FIGURE: 6d

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-7

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	CLAY, Sandy, Silty, Firm to Stiff, Reddish Brown, Damp with ferric staining and traces of gravel (grades to pink with depth)	
	SAND, Clayey, Silty, Firm to Stiff, Reddish Brown, Damp with ferric staining and traces of gravel (grades to pink with depth)	
5	CLAY, Sandy, Silty, Firm to Stiff, Reddish Brown, Damp with ferric staining and traces of gravel (grades to pink with depth)	5
	SAND, Silty, Clayey, Loose to Medium Dense, Pinkish Brown, Damp to Wet, with ferric staining	
10	- possible fill to 10.2 ft.	9
	- clayey to 14.5 ft (purple and tan layers throughout)	9
15		14

DEPTH DRILLED: 61.5 ft | DEPTH TO WATER: 19.5 ft | PROJ. No.: AAA10-025-00
DATE DRILLED: 5/19/2010 | DATE MEASURED: 5/19/2010 | FIGURE: 7a

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-7

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	SAND, Silty, Clayey, Loose to Medium Dense, Pinkish Brown, Damp to Wet, with ferric staining (continued)	6
		13
25		10
		4
30		11
		18
35	SAND, Silty, Clayey, Loose to Medium Dense, Tan, with ferric staining	25
		7

DEPTH DRILLED: 61.5 ft | DEPTH TO WATER: 19.5 ft | PROJ. No.: AAA10-025-00
DATE DRILLED: 5/19/2010 | DATE MEASURED: 5/19/2010 | FIGURE: 7b

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-7

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	SAND, Silty, Clayey, Loose to Medium Dense, Tan, with ferric staining (continued)	5
		24
45	CLAY, Silty, Sandy, Stiff to Very Stiff, Reddish Brown, with ferric staining	22
		12
50	CLAY, Silty, Soft to Stiff, Grayish Brown, with ferric staining	3
55		14

DEPTH DRILLED: 61.5 ft | DEPTH TO WATER: 19.5 ft | PROJ. No.: AAA10-025-00
DATE DRILLED: 5/19/2010 | DATE MEASURED: 5/19/2010 | FIGURE: 7c

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

NOTES:

1. USE THIS SHEET FOR BORING LOGS ONLY.
2. MOISTURE CONTENT, WHERE SHOWN, IS EXPRESSED AS PERCENT DRY WEIGHT AT TIME OF LABORATORY CLASSIFICATION.
3. LEGEND SHOWS OVERBURDEN MATERIALS CLASSIFIED ACCORDING TO ASTM D 2487 AND ASTM D 2488.
4. DESCRIPTION OF OVERBURDEN MATERIALS CHANGED TO CORRESPOND WITH LABORATORY CLASSIFICATION AS NECESSARY.
5. ORIGINAL DRILLING LOGS AVAILABLE AT CORPS OF ENGINEERS OFFICES.

REFERENCE FILES:
$$REFERENCEFILE10$$
$$REFERENCEFILE11$$
$$REFERENCEFILE12$$
$$REFERENCEFILE13$$
$$REFERENCEFILE14$$
$$REFERENCEFILE15$$
$$REFERENCEFILE6$$
$$REFERENCEFILE7$$
$$REFERENCEFILE8$$
$$REFERENCEFILE9$$

US Army Corps of Engineers
Fort Worth District

Symbol	Description	Tracking No.	Action	Date

Rev.	Date:	Sol No.	Contr No.

Designed by: J. PICKERING
Dwn by: J. PICKERING
Reviewed by: K. McCLESKEY
Submitted by: RAMANUJA KANNAN, P.E., CHIEF, GEOTECHNICAL SECTION
File name: $$cadd file name$$
Plot date: $$date$$
Plot scale:

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS

ENGINEERING/ CONSTRUCTION DIVISION DESIGN BRANCH

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PN: 069199

LOGS OF BORING 2 OF 7

Sheet reference number:
B-202

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LOG OF BORING NO. 8A2S-TEMF-7

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DESCRIPTION OF MATERIAL	BLOWS PER FT
CLAY, Silty, Soft to Stiff, Grayish Brown, with ferric staining (continued)	6
Boring Terminated	

DEPTH DRILLED: 61.5 ft | DEPTH TO WATER: 19.5 ft | PROJ. No.: AAA10-025-00
DATE DRILLED: 5/19/2010 | DATE MEASURED: 5/19/2010 | FIGURE: 7d

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 10A2S-TEMF-8

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger
LOCATION: See Figure 1

DESCRIPTION OF MATERIAL	BLOWS PER FT
CLAY, Silty, Firm, Brown to Dark Brown, Damp, with organics and ferric staining	6
SAND, Clayey, Silty, Soft to Firm, Tan, Damp, with ferric staining	3
- possible fill to 8 ft	
CLAY, Silty, Soft to Firm, Tan, Damp, with ferric staining	8
CLAY, Silty, Stiff, Reddish Brown, Damp with ferric staining	12
Boring Terminated	

DEPTH DRILLED: 11.5 ft | DEPTH TO WATER: N/A | PROJ. No.: AAA10-025-00
DATE DRILLED: 5/21/2010 | DATE MEASURED: 5/21/2010 | FIGURE: 8

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 10A2S-TEMF-9

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger
LOCATION: See Figure 1

DESCRIPTION OF MATERIAL	BLOWS PER FT
CLAY, Sandy, Silty, Soft, Brown, Damp with ferric staining and traces of gravel	
CLAY, Silty, Reddish Brown, Damp with ferric staining and traces of gravel	3
- possible fill from 0 to 11.5 ft.	
CLAY, Sandy, Silty, Soft, Grayish Brown, Damp, with ferric staining	2 / 4 / 2
Boring Terminated	

DEPTH DRILLED: 11.5 ft | DEPTH TO WATER: N/A | PROJ. No.: AAA10-025-00
DATE DRILLED: 5/21/2010 | DATE MEASURED: 5/21/2010 | FIGURE: 9

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 10A2S-TEMF-10

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger
LOCATION: See Figure 1

DESCRIPTION OF MATERIAL	BLOWS PER FT
ASPHALT (0.5 inches)	
SAND, Silty, Clayey, Loose, Reddish Brown, Loose, with ferric staining and traces of gravel	
CLAY, Sandy, Stiff, Reddish Brown, Damp, with ferric staining	6
CLAY, Sandy, Silty, Stiff, Reddish Brown, Damp, with ferric staining	9 / 12 / 11
- possible fill to 11.5 ft	
Boring Terminated	

DEPTH DRILLED: 11.5 ft | DEPTH TO WATER: N/A | PROJ. No.: AAA10-025-00
DATE DRILLED: 5/21/2010 | DATE MEASURED: 5/21/2010 | FIGURE: 10

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-21

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DESCRIPTION OF MATERIAL	BLOWS PER FT
CLAY, Sandy, Silty, Stiff, Reddish Brown, Damp, with ferric staining	
SAND, Silty, Clayey, Loose to Medium Dense, Pinkish Brown, Damp to Wet with ferric staining	13
- possible fill from 0 to 9 ft	
	11
	13
	6
	12

DEPTH DRILLED: 61.5 ft | DEPTH TO WATER: 17.8 ft | PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 | DATE MEASURED: 5/20/2010 | FIGURE: 21a

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-21

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DESCRIPTION OF MATERIAL	BLOWS PER FT
SAND, Silty, Clayey, Loose to Medium Dense, Pinkish Brown, Damp to Wet with ferric staining (continued)	5 / 9 / 4 / 15 / 16 / 11
SAND, Silty, Clayey, Very Loose to Loose, Pink and Tan alternating, Wet, with ferric staining	2 / 5

DEPTH DRILLED: 61.5 ft | DEPTH TO WATER: 17.8 ft | PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 | DATE MEASURED: 5/20/2010 | FIGURE: 21b

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-21

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DESCRIPTION OF MATERIAL	BLOWS PER FT
SAND, Silty, Clayey, Very Loose to Loose, Pink and Tan alternating, Wet, with ferric staining (continued)	9
SAND, Silty, Clayey, Loose to Medium Dense, Tan, Wet, with ferric staining	13 / 26 / 32
CLAY, Silty, Stiff, Gray, Wet, with tan layers and ferric staining	10 / 12

DEPTH DRILLED: 61.5 ft | DEPTH TO WATER: 17.8 ft | PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 | DATE MEASURED: 5/20/2010 | FIGURE: 21c

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-21

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DESCRIPTION OF MATERIAL	BLOWS PER FT
CLAY, Silty, Stiff, Gray, Wet, with tan layers and ferric staining (continued)	11
Boring Terminated	

DEPTH DRILLED: 61.5 ft | DEPTH TO WATER: 17.8 ft | PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 | DATE MEASURED: 5/20/2010 | FIGURE: 21d

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

NOTES:

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4. DESCRIPTION OF OVERBURDEN MATERIALS CHANGED TO CORRESPOND WITH LABORATORY CLASSIFICATION AS NECESSARY.
5. ORIGINAL DRILLING LOGS AVAILABLE AT CORPS OF ENGINEERS OFFICES.

REFERENCE FILES:
$$REFERENCEFILE10$$
$$REFERENCEFILE11$$
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$$REFERENCEFILE14$$
$$REFERENCEFILE15$$
$$REFERENCEFILE6$$
$$REFERENCEFILE7$$
$$REFERENCEFILE8$$
$$REFERENCEFILE9$$
$$REFERENCEFILE4$$

US Army Corps of Engineers
Fort Worth District

Symbol	Description	Tracking No.	Action	Date

Rev.	Date:	Designed by: J. PICKERING	Sol No.	Contr No.
		Dwn by: J. PICKERING		
		Reviewed by: K. McCLESKEY		
		Submitted by: RAMANUJA KANNAN, P.E., CHIEF, GEOTECHNICAL SECTION		

File name: $$cadd file name$$
Plot date: $$date$$
Plot scale:

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS

ENGINEERING/ CONSTRUCTION DIVISION DESIGN BRANCH

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PN: 069199

LOGS OF BORING 3 OF 7

Sheet reference number:
B-203

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$$REFERENCEFILE3$$
$$REFERENCEFILE4$$

$$REFERENCEFILE5$$
$$REFERENCEFILE6$$
$$REFERENCEFILE7$$
$$REFERENCEFILE8$$
$$REFERENCEFILE9$$

REFERENCE FILES:
$$REFERENCEFILE0$$
$$REFERENCEFILE1$$
$$REFERENCEFILE2$$
$$REFERENCEFILE3$$
$$REFERENCEFILE4$$

LOG OF BORING NO. 8A2S-TEMF-22

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT2 (PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT)	PLASTICITY INDEX	% - 200
			CLAY, Sandy, Silty, Firm to Stiff, Reddish Brown, Damp, with ferric staining					
			SAND, Clayey, Silty, Stiff, Pinkish Brown, Damp, with ferric staining					
5			CLAY, Sandy, Silty, Stiff, Pinkish Brown, Damp, with ferric staining	11				
			· possible fill from 0 to 7 ft					
			SAND, Silty, Clayey, Loose to Medium Dense, Pinkish Brown, Damp to Wet, with ferric staining					
10				9				
			· no longer clayey below 12 ft					
15				8				
				9				
				9				

DEPTH DRILLED: 62.0 ft | DEPTH TO WATER: 20.2 ft | PROJ. No.: AAA10-025-00
DATE DRILLED: 5/19/2010 | DATE MEASURED: 5/19/2010 | FIGURE: 22a

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-22

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT2 (PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT)	PLASTICITY INDEX	% - 200
			SAND, Silty, Clayey, Loose to Medium Dense, Pinkish Brown, Damp to Wet, with ferric staining (continued)	2				
				4				
25				12				
				5				
30				9				
				12				
35				16				
				14				

DEPTH DRILLED: 62.0 ft | DEPTH TO WATER: 20.2 ft | PROJ. No.: AAA10-025-00
DATE DRILLED: 5/19/2010 | DATE MEASURED: 5/19/2010 | FIGURE: 22b

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-22

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT2 (PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT)	PLASTICITY INDEX	% - 200
			SAND, Silty, Clayey, Loose to Medium Dense, Pinkish Brown, Damp to Wet, with ferric staining (continued)	16				
				12				
45			SAND, Silty, Clayey, Loose to Medium Dense, Tan, Wet, with ferric staining	7				
				21				
50				5				
				19				
55			CLAY, Sandy, Silty, Firm, Gray, Wet, with tan layers and ferric staining	4				

DEPTH DRILLED: 62.0 ft | DEPTH TO WATER: 20.2 ft | PROJ. No.: AAA10-025-00
DATE DRILLED: 5/19/2010 | DATE MEASURED: 5/19/2010 | FIGURE: 22c

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-22

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT2 (PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT)	PLASTICITY INDEX	% - 200
			CLAY, Sandy, Silty, Firm, Gray, Wet, with tan layers and ferric staining (continued)					
			Boring Terminated					
65								
70								
75								

DEPTH DRILLED: 62.0 ft | DEPTH TO WATER: 20.2 ft | PROJ. No.: AAA10-025-00
DATE DRILLED: 5/19/2010 | DATE MEASURED: 5/19/2010 | FIGURE: 22d

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

NOTES:

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4. DESCRIPTION OF OVERBURDEN MATERIALS CHANGED TO CORRESPOND WITH LABORATORY CLASSIFICATION AS NECESSARY.
5. ORIGINAL DRILLING LOGS AVAILABLE AT CORPS OF ENGINEERS OFFICES.

US Army Corps of Engineers
Fort Worth District

Symbol	Description	Tracking No.	Action	Date

Designed by: J. PICKERING
Dwn by: J. PICKERING
Reviewed by: K. McCLESKEY
Submitted by: RAMANUJA KANNAN, P.E., CHIEF, GEOTECHNICAL SECTION
Date:
Sol No.
Contr No.
Rev.
File name: $$cadd file name$$
Plot date: $$date$$
Plot scale:

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS

ENGINEERING/ CONSTRUCTION DIVISION DESIGN BRANCH

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PN: 069199

LOGS OF BORING 4 OF 7

Sheet reference number:
B-204

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LOG OF BORING NO. 10A2S-COF-11

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	CLAY, Sandy, Silty, Stiff, Reddish Brown, Damp, with ferric staining	
		9
5	- possible fill to 6 ft	9
	SAND, Silty, Loose, Pinkish Brown, with ferric staining	
		9
10		6
	Boring Terminated	
15		

DEPTH DRILLED: 11.5 ft — DEPTH TO WATER: N/A — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/19/2010 — DATE MEASURED: 5/19/2010 — FIGURE: 11

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 10A2S-COF-12

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	CLAY, Sandy, Silty, Firm, Reddish Brown, Dry	
	CLAY, Sandy, Silty, Stiff, Reddish Brown, Damp, with ferric staining	
5		10
10	- possible fill from 0 to 11.5 ft	16
	Boring Terminated	
15		

DEPTH DRILLED: 11.5 ft — DEPTH TO WATER: N/A — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/18/2010 — DATE MEASURED: 5/18/2010 — FIGURE: 12

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-COF-13

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	SAND, Silty, Loose, Tan, Damp, with ferric staining	
	CLAY, Sandy, Reddish Brown, Damp with ferric staining	
5	SAND, Silty, Loose, Tan, Damp, with ferric staining	6
	- possible fill to 9 ft	
10	SAND, Silty, Loose to Medium Dense, Tan, Damp, with ferric staining	15
	- clayey to 12 ft	6
15	SAND, Silty, Loose to Medium Dense, Pinkish Brown to Reddish Brown, with ferric staining	14
		8

DEPTH DRILLED: 61.5 ft — DEPTH TO WATER: 13.0 ft — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 — DATE MEASURED: 5/20/2010 — FIGURE: 13a

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-COF-13

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	SAND, Silty, Loose to Medium Dense, Pinkish Brown to Reddish Brown, with ferric staining (continued)	6
5		5
25	- tan from 24.5 ft to 30 ft	7
		4
30	- reddish brown and clayey from 30 ft to 32 ft	3
	- tan from 32 ft to 47 ft - stiff from 32.3 ft to 37.5 ft	20
35	- reddish brown clay seam at 34 ft	19
		10

DEPTH DRILLED: 61.5 ft — DEPTH TO WATER: 13.0 ft — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 — DATE MEASURED: 5/20/2010 — FIGURE: 13b

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-COF-13

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	SAND, Silty, Loose to Medium Dense, Pinkish Brown to Reddish Brown, with ferric staining (continued)	7
	- very stiff from 42.5 ft to 47 ft	29
45		30
	CLAY, Silty, Firm to Very Stiff, Gray, Wet with ferric staining	3
50		6
55	- stiff from 55 ft to 61.5 ft	19

DEPTH DRILLED: 61.5 ft — DEPTH TO WATER: 13.0 ft — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 — DATE MEASURED: 5/20/2010 — FIGURE: 13c

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-COF-13

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	CLAY, Silty, Firm to Very Stiff, Gray, Wet with ferric staining (continued)	15
	Boring Terminated	
65		
70		
75		

DEPTH DRILLED: 61.5 ft — DEPTH TO WATER: 13.0 ft — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 — DATE MEASURED: 5/20/2010 — FIGURE: 13d

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-COF-14

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	CLAY, Sandy, Silty, Firm to Stiff, Reddish Brown, Damp, with ferric staining	
5		14
	- possible fill to 8 ft	
	CLAY, Silty, Stiff, Gray, Damp, with ferric staining	
10		10
	SAND, Silty, Loose, Pinkish Brown to Reddish Brown, Damp to Wet	
15		6
		6

DEPTH DRILLED: 62.0 ft — DEPTH TO WATER: 23.0 ft — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/18/2010 — DATE MEASURED: 5/18/2010 — FIGURE: 14a

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-COF-14

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	SAND, Silty, Loose, Pinkish Brown to Reddish Brown, Damp to Wet (continued)	6
25		5
		6
30	- tan from 30 ft to 34 ft	6
		5
35	- reddish brown and clayey from 34 ft to 45 ft	7
		8
		11

DEPTH DRILLED: 62.0 ft — DEPTH TO WATER: 23.0 ft — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/18/2010 — DATE MEASURED: 5/18/2010 — FIGURE: 14b

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

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4. DESCRIPTION OF OVERBURDEN MATERIALS CHANGED TO CORRESPOND WITH LABORATORY CLASSIFICATION AS NECESSARY.
5. ORIGINAL DRILLING LOGS AVAILABLE AT CORPS OF ENGINEERS OFFICES.

REFERENCE FILES:
$$REFERENCEFILE10$$
$$REFERENCEFILE11$$
$$REFERENCEFILE12$$
$$REFERENCEFILE13$$
$$REFERENCEFILE14$$

$$REFERENCEFILE5$$
$$REFERENCEFILE6$$
$$REFERENCEFILE7$$
$$REFERENCEFILE8$$
$$REFERENCEFILE9$$

US Army Corps of Engineers
Fort Worth District

Symbol	Description	Tracking No.	Action	Date

Rev.	Date:	Sol No.	Contr No.	Designed by: J. PICKERING	Dwn by: J. PICKERING	Reviewed by: K. McCLESKEY	Submitted by: RAMANUJA KANNAN, P.E., CHIEF, GEOTECHNICAL SECTION	File name: $$cadd file name$$ Plot date: $$date$$ Plot scale:

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS

ENGINEERING/ CONSTRUCTION DIVISION DESIGN BRANCH

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PN: 069199

LOGS OF BORING 5 OF 7

Sheet reference number:
B-205

Contr No.

$$time$$
$$date$$
$$user$$
$$cadd file name$$

LOG OF BORING NO. 8A2S-COF-14

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	SAND, Silty, Loose, Pinkish Brown to Reddish Brown, Damp to Wet (continued)	9
		13
45	CLAY, Sandy, Silty, Firm to Stiff, Reddish Brown, Wet, with ferric staining	6
		11
50	CLAY, Sandy, Silty, Firm to Stiff, Gray, with ferric staining	
		7
55		
		10

DEPTH DRILLED: 62.0 ft | DEPTH TO WATER: 23.0 ft | PROJ. No.: AAAA0-025-00
DATE DRILLED: 5/18/2010 | DATE MEASURED: 5/18/2010 | FIGURE: 14c

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-COF-14

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL
	CLAY, Sandy, Silty, Firm to Stiff, Gray, with ferric staining (continued)
65	Boring Terminated
70	
75	

DEPTH DRILLED: 62.0 ft | DEPTH TO WATER: 23.0 ft | PROJ. No.: AAAA0-025-00
DATE DRILLED: 5/18/2010 | DATE MEASURED: 5/18/2010 | FIGURE: 14d

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 10A2S-COF-15

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	CLAY, Sandy, Silty, Firm to Stiff, Reddish Brown, Damp, with ferric staining	
		7
5	- fill possibly to 11 ft	9
		13
10	SAND, Silty, Clayey, Loose, Tan, Damp	10
	Boring Terminated	
15		

DEPTH DRILLED: 11.5 ft | DEPTH TO WATER: N/A | PROJ. No.: AAAA0-025-00
DATE DRILLED: 5/21/2010 | DATE MEASURED: 5/21/2010 | FIGURE: 15

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 10A2S-COF-16

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	CLAY, Sandy, Silty, Firm to Stiff, Reddish Brown, Damp with ferric staining	
5	SAND, Clayey, Silty, Firm to Stiff, Reddish Brown, Damp with ferric staining - lightens to tan and pink layers at depth - possible fill from 0 to 11.5 ft.	10
10		7
	Boring Terminated	
15		

DEPTH DRILLED: 11.5 ft | DEPTH TO WATER: N/A | PROJ. No.: AAAA0-025-00
DATE DRILLED: 5/18/2010 | DATE MEASURED: 5/18/2010 | FIGURE: 16

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-COF-17

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	CLAY, Sandy, Silty, Firm, Brown to Reddish Brown, Damp, with ferric staining	
	- fill possibly from 0 to 12 ft	
5	CLAY, Sandy, Silty, Stiff, Reddish Brown, Damp, with ferric staining	11
10	SAND, Clayey, Loose to Medium Dense, Reddish Brown, Wet, with ferric staining	11
15		7
		7

DEPTH DRILLED: 61.5 ft | DEPTH TO WATER: 12.7 ft | PROJ. No.: AAAA0-025-00
DATE DRILLED: 5/18/2010 | DATE MEASURED: 5/18/2010 | FIGURE: 17a

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-COF-17

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	SAND, Clayey, Loose to Medium Dense, Reddish Brown, Wet, with ferric staining (continued)	6
		4
25		14
	SAND, Loose to Medium Dense, Tan to Reddish Brown, Wet, Medium to Fine Grained, with ferric staining	14
30		14
		4
35	- becomes medium dense from 36 ft to 42 ft	11
		13

DEPTH DRILLED: 61.5 ft | DEPTH TO WATER: 12.7 ft | PROJ. No.: AAAA0-025-00
DATE DRILLED: 5/18/2010 | DATE MEASURED: 5/18/2010 | FIGURE: 17b

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-COF-17

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	SAND, Loose to Medium Dense, Tan to Reddish Brown, Wet, Medium to Fine Grained, with ferric staining (continued)	8
		10
45		12
		20
50	CLAY, Sandy, Silty, Soft to Stiff, Gray to Tan, Wet, with ferric staining	3
55		14

DEPTH DRILLED: 61.5 ft | DEPTH TO WATER: 12.7 ft | PROJ. No.: AAAA0-025-00
DATE DRILLED: 5/18/2010 | DATE MEASURED: 5/18/2010 | FIGURE: 17c

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-COF-17

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	CLAY, Sandy, Silty, Soft to Stiff, Gray to Tan, Wet, with ferric staining (continued)	10
	Boring Terminated	
65		
70		
75		

DEPTH DRILLED: 61.5 ft | DEPTH TO WATER: 12.7 ft | PROJ. No.: AAAA0-025-00
DATE DRILLED: 5/18/2010 | DATE MEASURED: 5/18/2010 | FIGURE: 17d

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

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4. DESCRIPTION OF OVERBURDEN MATERIALS CHANGED TO CORRESPOND WITH LABORATORY CLASSIFICATION AS NECESSARY.
5. ORIGINAL DRILLING LOGS AVAILABLE AT CORPS OF ENGINEERS OFFICES.

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$$REFERENCEFILE13$$
$$REFERENCEFILE14$$
$$REFERENCEFILE15$$
$$REFERENCEFILE5$$
$$REFERENCEFILE6$$
$$REFERENCEFILE7$$
$$REFERENCEFILE8$$
$$REFERENCEFILE9$$
$$REFERENCEFILE4$$

US Army Corps of Engineers
Fort Worth District

Symbol	Description	Tracking No.	Action	Date

Rev.	Date:	Sol No.	Contr No.

Designed by: J. PICKERING
Dwn by: J. PICKERING
Reviewed by: K. McCLESKEY
Submitted by: RAMANUJA KANNAN, P.E., CHIEF, GEOTECHNICAL SECTION
File name: $$cadd file name$$
Plot date: $$date$$
Plot scale:

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS

ENGINEERING/ CONSTRUCTION DIVISION DESIGN BRANCH

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PN: 069199

LOGS OF BORING 6 OF 7

Sheet reference number:
B-206

Contr No.

$$time$$
$$date$$
$$user$$
$$cadd file name$$

LOG OF BORING NO. 8A2S-COF-18

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	CLAY, Sandy, Silty, Soft, Brown, Damp, with organics	
	CLAY, Sandy, Silty, Firm to Stiff, Reddish Brown, Damp, with ferric staining	10
5		
	SAND, Loose, Reddish Brown, Damp, Medium to Fine Grained	
	· possible fill to 10 ft	6
10		
		8
15		6
		6

DEPTH DRILLED: 62.0 ft — DATE DRILLED: 5/18/2010
DEPTH TO WATER: 15.0 ft — DATE MEASURED: 5/18/2010
PROJ. No.: AAA10-025-00 — FIGURE: 18a

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-COF-18

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	SAND, Loose, Reddish Brown, Damp, Medium to Fine Grained (continued)	6
		6
25		6
	· turns to Tan and Stiffens at 28 ft	14
30		4
		5
35	· Stiffens at 35 ft	21
		12

DEPTH DRILLED: 62.0 ft — DATE DRILLED: 5/18/2010
DEPTH TO WATER: 15.0 ft — DATE MEASURED: 5/18/2010
PROJ. No.: AAA10-025-00 — FIGURE: 18b

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-COF-18

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	SAND, Loose, Reddish Brown, Damp, Medium to Fine Grained (continued)	4
		8
45	CLAY, Sandy, Silty, Firm, Reddish Brown, Wet, with ferric staining and tan layers	6
	SAND, Silty, Clayey, Loose, Tan, Wet, with ferric staining	3
50		10
55	CLAY, Silty, Stiff, Gray, Wet, with ferric staining	9

DEPTH DRILLED: 62.0 ft — DATE DRILLED: 5/18/2010
DEPTH TO WATER: 15.0 ft — DATE MEASURED: 5/18/2010
PROJ. No.: AAA10-025-00 — FIGURE: 18c

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-COF-18

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL
	CLAY, Silty, Stiff, Gray, Wet, with ferric staining (continued)
	Boring Terminated
65	
70	
75	

DEPTH DRILLED: 62.0 ft — DATE DRILLED: 5/18/2010
DEPTH TO WATER: 15.0 ft — DATE MEASURED: 5/18/2010
PROJ. No.: AAA10-025-00 — FIGURE: 18d

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 10A2S-COF-19

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	CLAY, Sandy, Silty, Firm, Damp, with organics	
	CLAY, Sandy, Silty, Stiff to Very Stiff, Reddish Brown, Damp, with ferric staining	23
5		
	· possible fill from 0 to 8 ft	
	CLAY, Sandy, Silty, Stiff, Pinkish Brown, Damp, with ferric staining	
10		15
	Boring Terminated	
15		

DEPTH DRILLED: 11.5 ft — DATE DRILLED: 5/18/2010
DEPTH TO WATER: N/A — DATE MEASURED: 5/18/2010
PROJ. No.: AAA10-025-00 — FIGURE: 19

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 10A2S-COF-20

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger
LOCATION: See Figure 1

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT
	CLAY, Sandy, Silty, Firm, Brown, Damp, with organics	
	CLAY, Sandy, Silty, Firm to Stiff, Reddish Brown, Damp, with ferric staining possible fill from 0 to 11.2 ft.	5
5		
10		9
	Boring Terminated	
15		

DEPTH DRILLED: 11.5 ft — DATE DRILLED: 5/18/2010
DEPTH TO WATER: N/A — DATE MEASURED: 5/18/2010
PROJ. No.: AAA10-025-00 — FIGURE: 20

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

NOTES:

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US Army Corps of Engineers
Fort Worth District

Symbol	Description	Tracking No.	Action	Date

Date: Rev.
Sol No.
Contr No.
File name: $$cadd file name$$
Plot date: $$date$$
Plot scale:

Designed by: J. PICKERING
Dwn by: J. PICKERING
Reviewed by: K. MacCLESKEY
Submitted by: RAMANUJA KANNAN, P.E., CHIEF, GEOTECHNICAL SECTION

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS

ENGINEERING/ CONSTRUCTION DIVISION DESIGN BRANCH

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PN: 069199

LOGS OF BORING 7 OF 7

Sheet reference number: B-207

Contr No.

REFERENCE FILES:
$$REFERENCEFILE0$$
$$REFERENCEFILE1$$
$$REFERENCEFILE2$$
$$REFERENCEFILE3$$
$$REFERENCEFILE4$$
$$REFERENCEFILE5$$
$$REFERENCEFILE6$$
$$REFERENCEFILE7$$
$$REFERENCEFILE8$$
$$REFERENCEFILE9$$

APPENDIX B

LABORATORY TESTING & SPT DATA PLOTS

UNIT OPERATIONS FACILITIES - TEMF SITE
PLASTICITY CHART

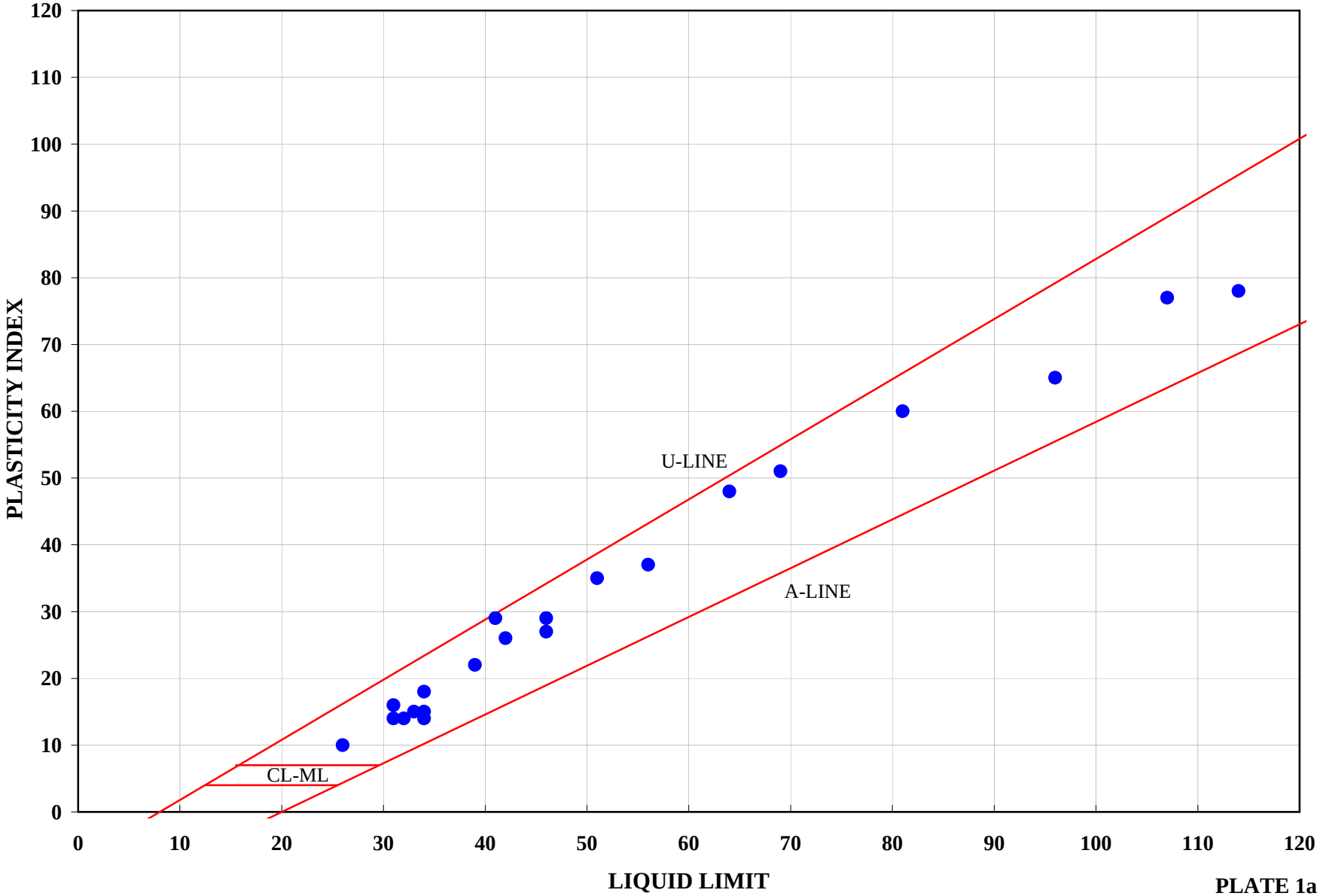


PLATE 1a

UNIT OPERATIONS FACILITIES - COF SITE
PLASTICITY CHART

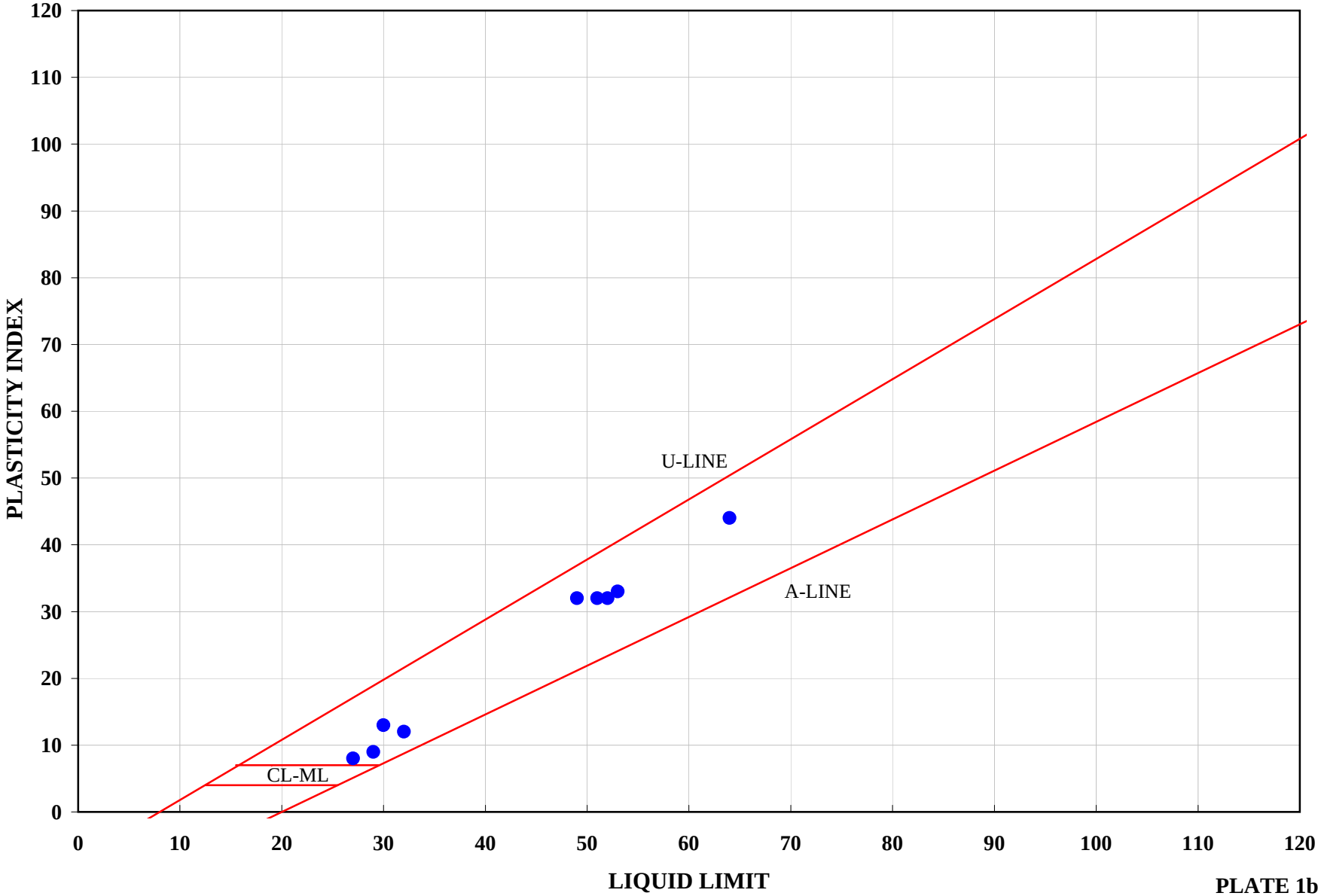


PLATE 1b

UNIT OPERATIONS FACILITIES - TEMF SITE
MOISTURE CONTENT VS DEPTH

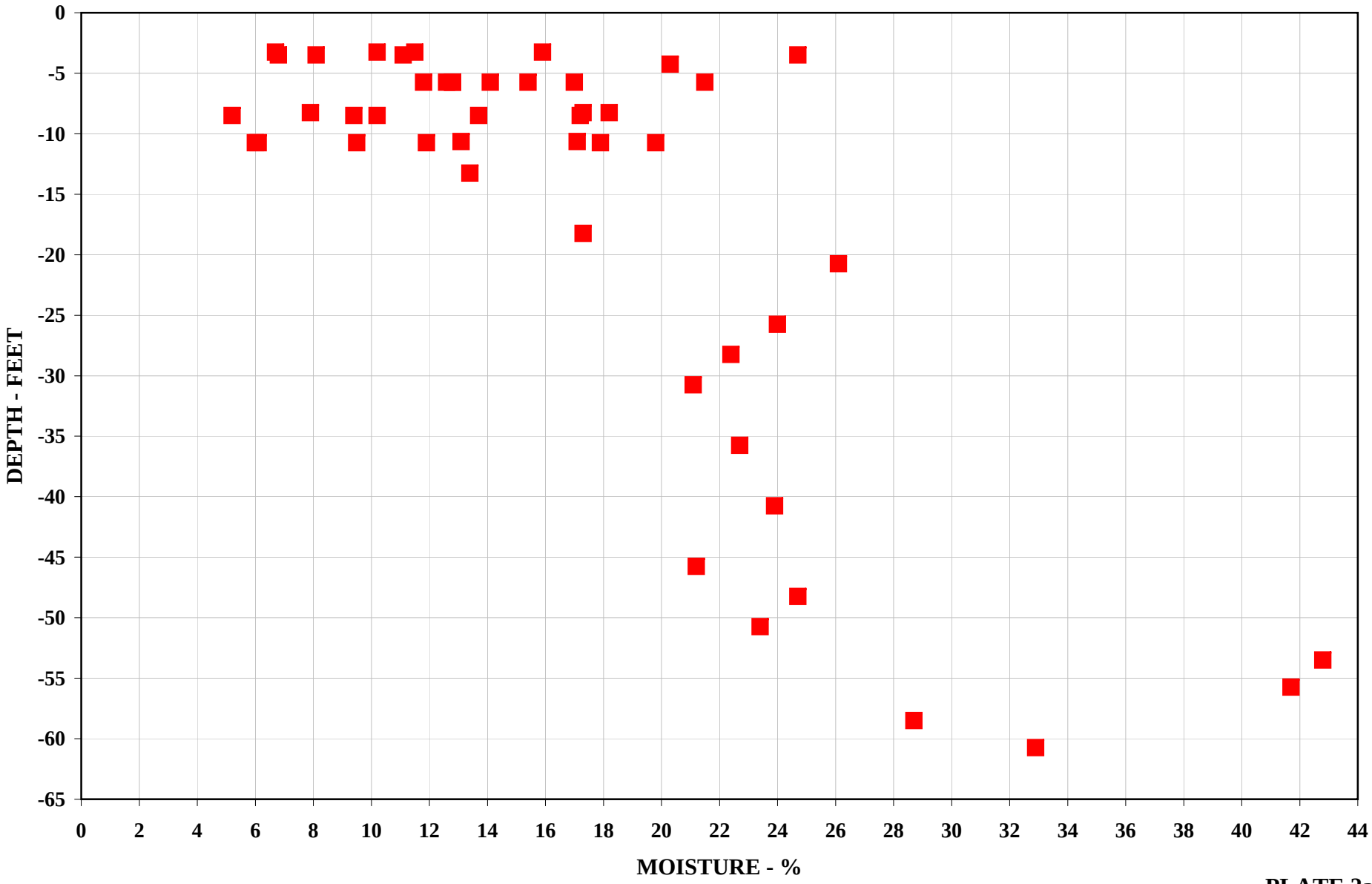


PLATE 2a

UNIT OPERATIONS FACILITIES - COF SITE
MOISTURE CONTENT VS DEPTH

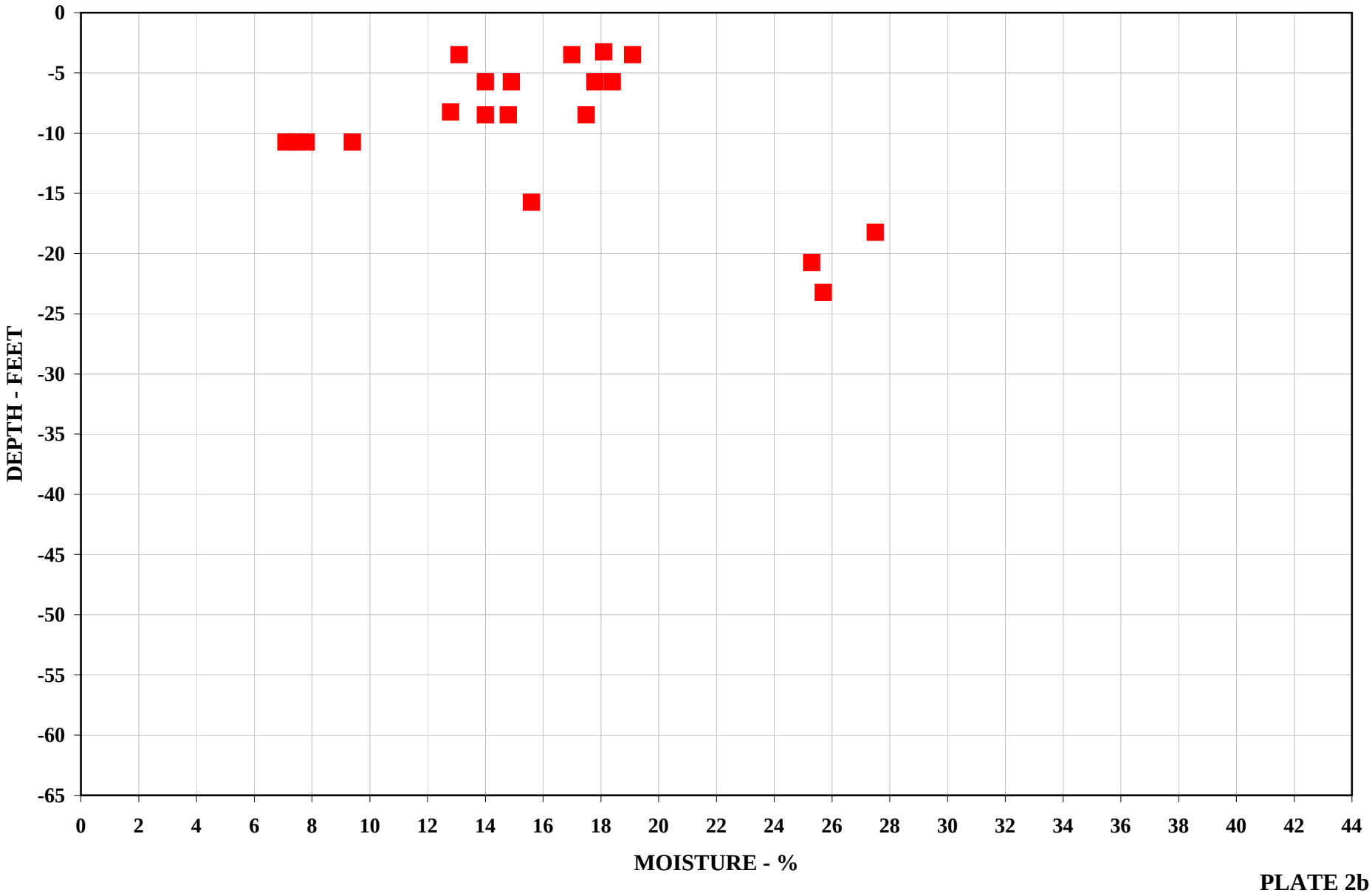


PLATE 2b

UNIT OPERATIONS FACILITIES - TEMF SITE
ATTERBERG LIMITS VS DEPTH

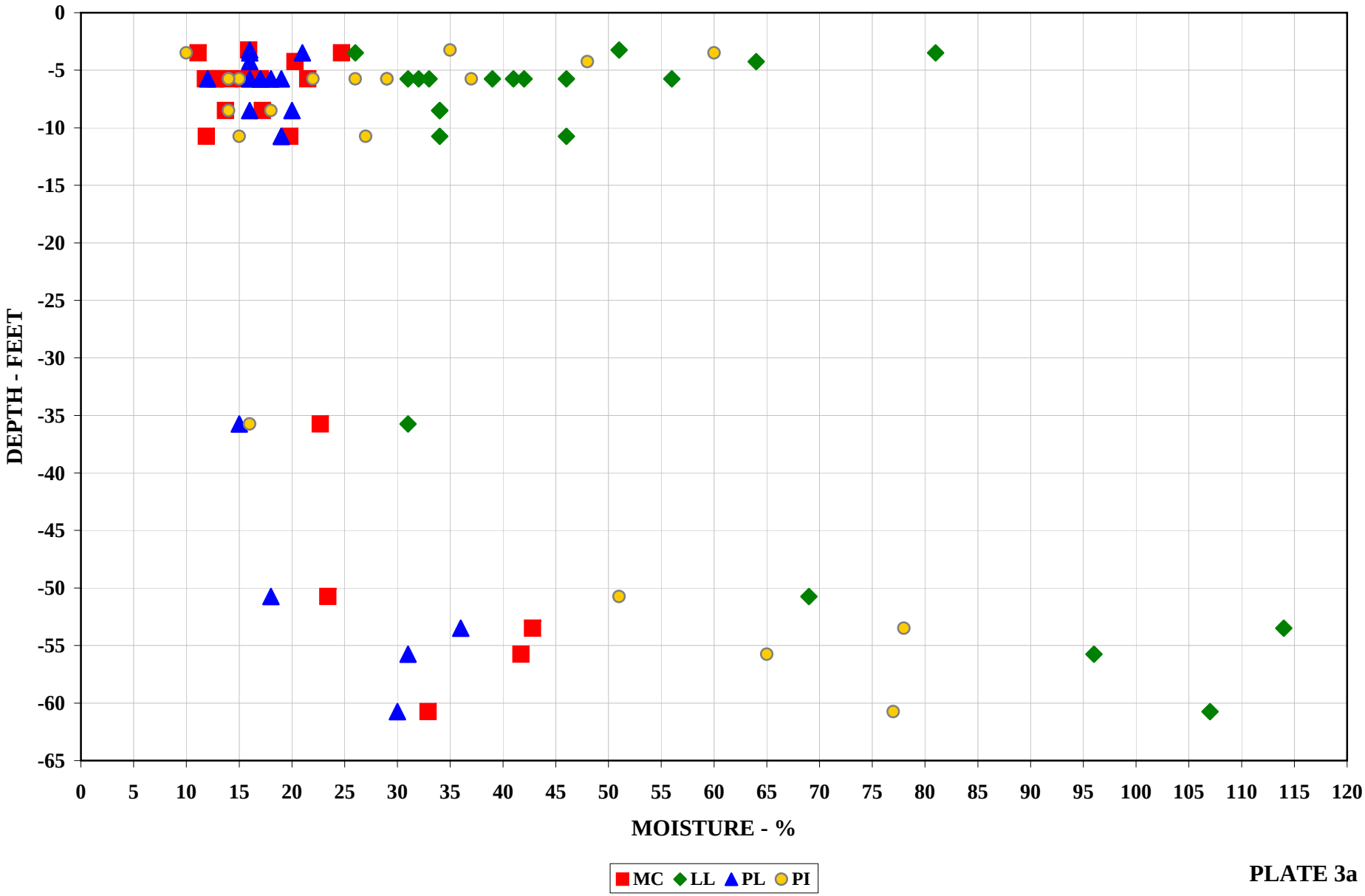


PLATE 3a

UNIT OPERATIONS FACILITIES - COF SITE
ATTERBERG LIMITS VS DEPTH

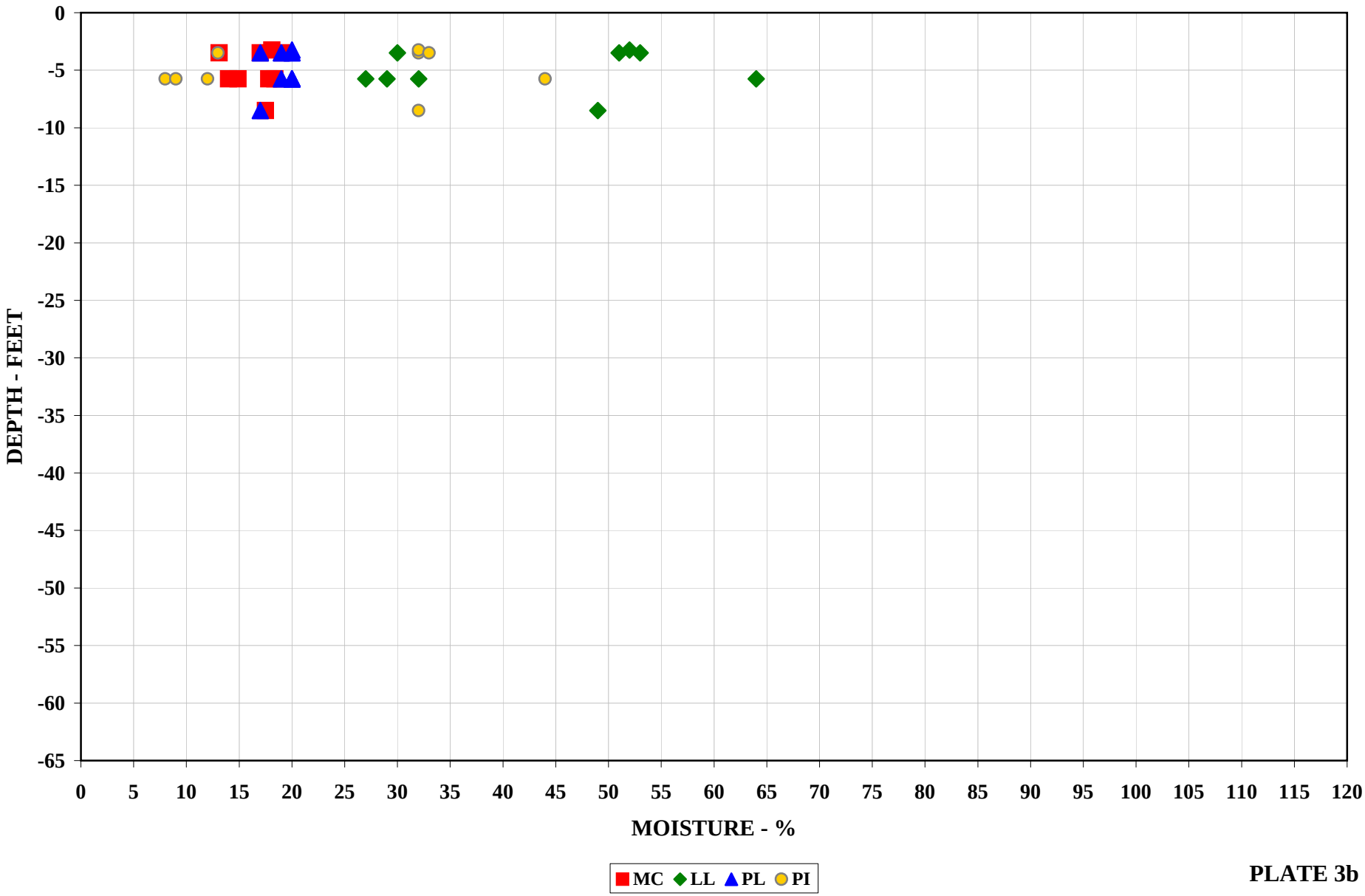


PLATE 3b

UNIT OPERATIONS FACILITIES - TEMF SITE
MOISTURE CONTENT - DRY DENSITY VS DEPTH

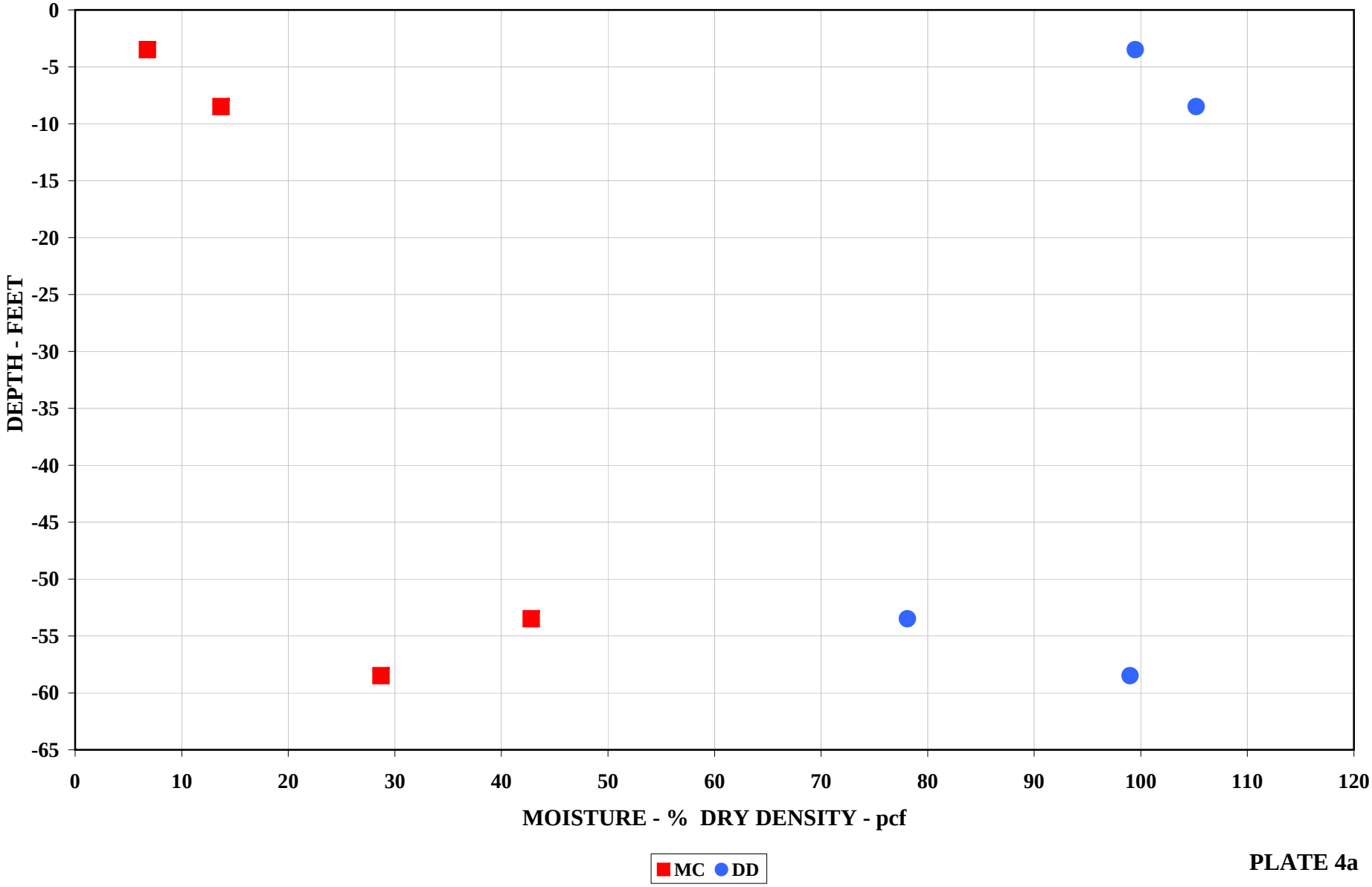


PLATE 4a

UNIT OPERATIONS FACILITIES - COF SITE
MOISTURE CONTENT - DRY DENSITY VS DEPTH

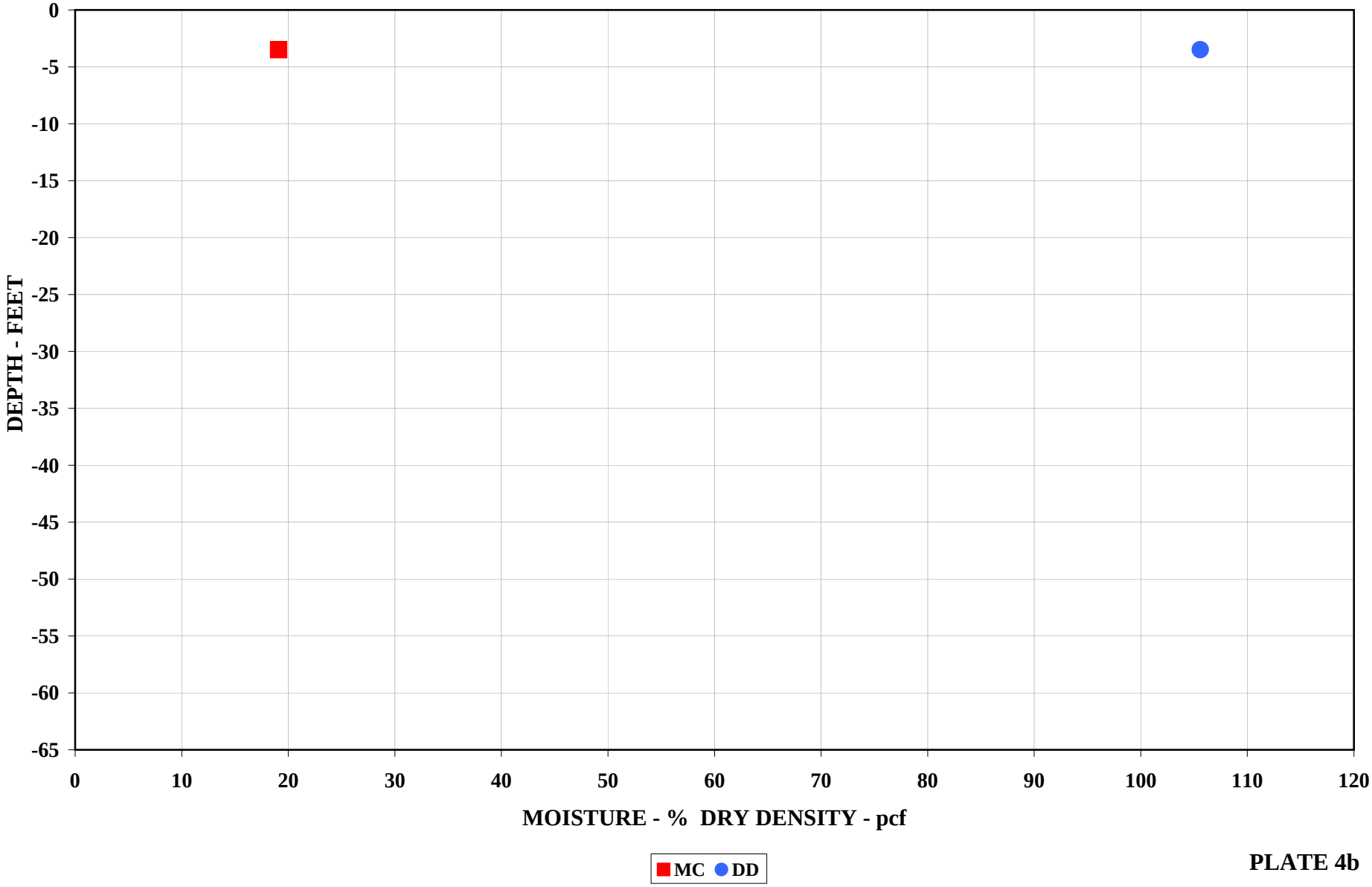


PLATE 4b

UNIT OPERATIONS FACILITIES - TEMF SITE
ULTIMATE COMPRESSIVE STRENGTH VS DEPTH

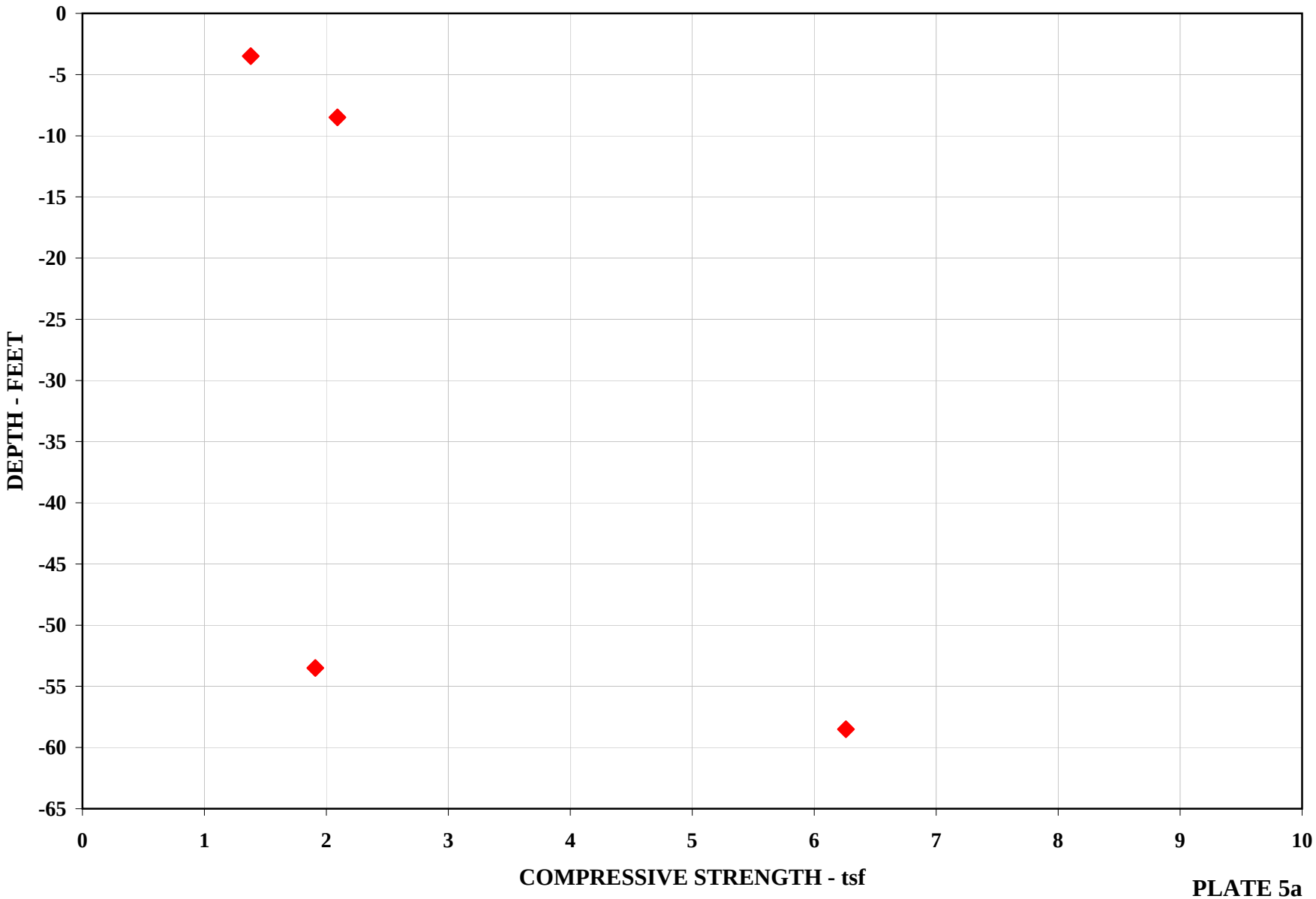


PLATE 5a

UNIT OPERATIONS FACILITIES - COF SITE
ULTIMATE COMPRESSIVE STRENGTH VS DEPTH

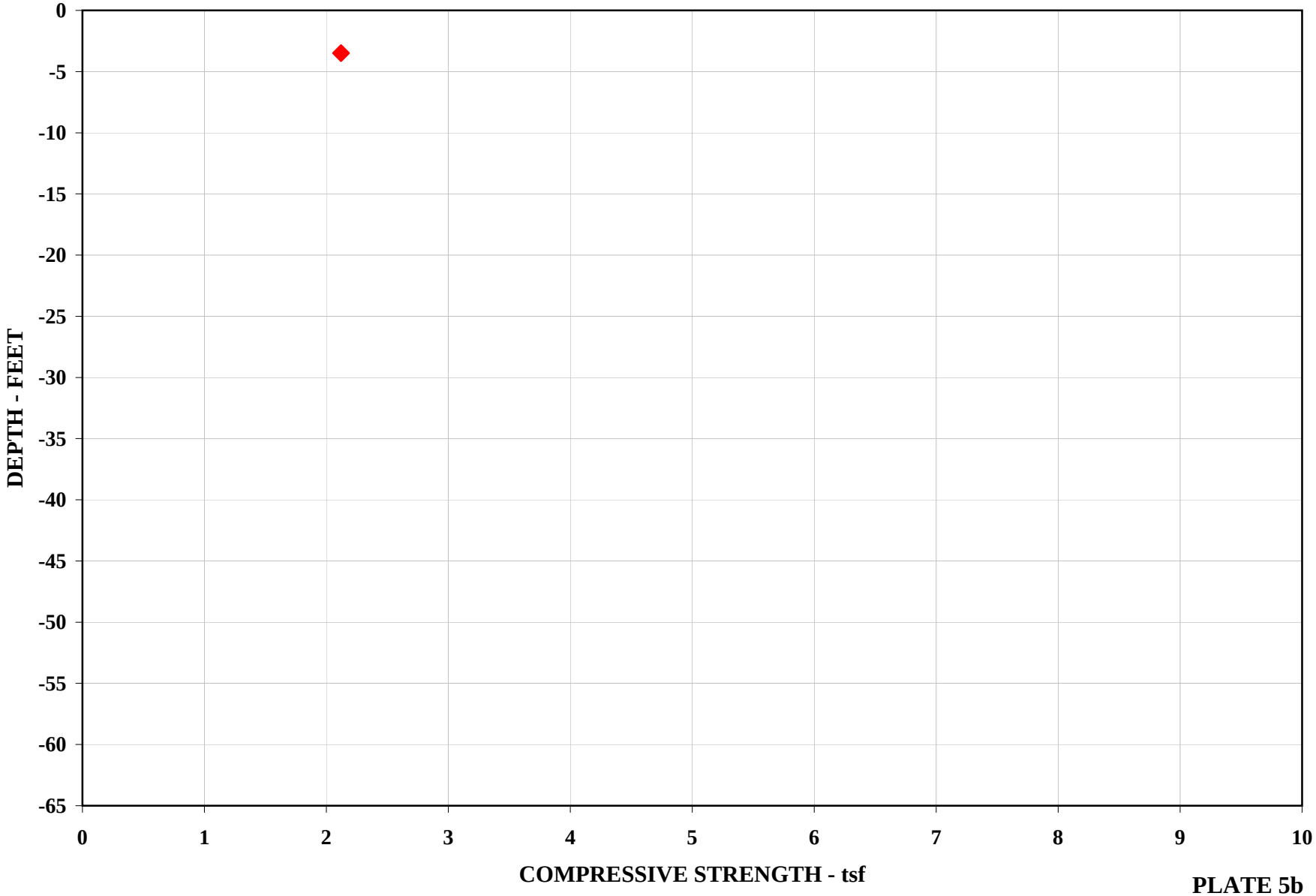


PLATE 5b

UNIT OPERATIONS FACILITIES - TEMF SITE
STANDARD PENETRATION TEST BLOW COUNTS VS DEPTH

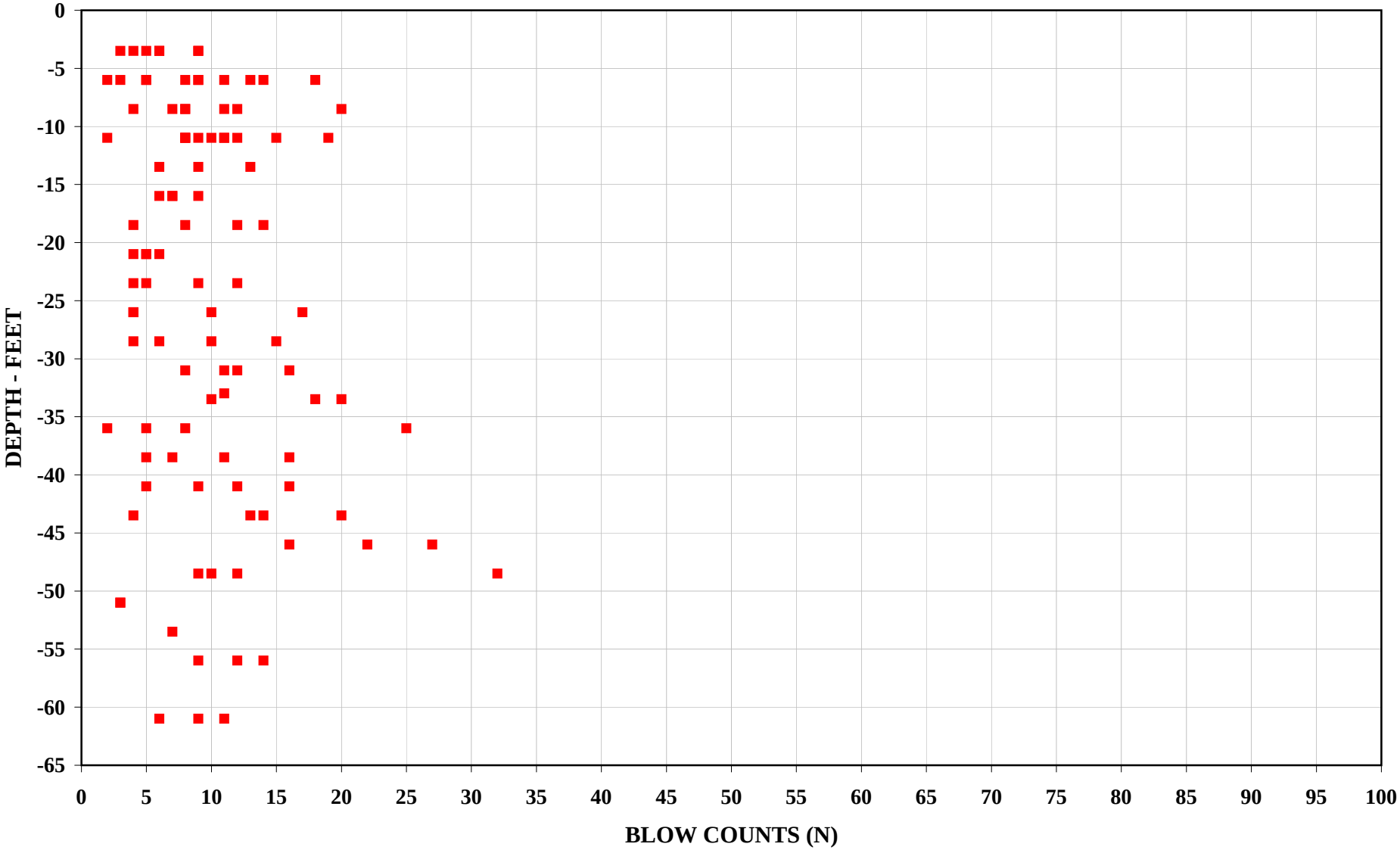


PLATE 6a

UNIT OPERATIONS FACILITIES - COF SITE
STANDARD PENETRATION TEST BLOW COUNTS VS DEPTH

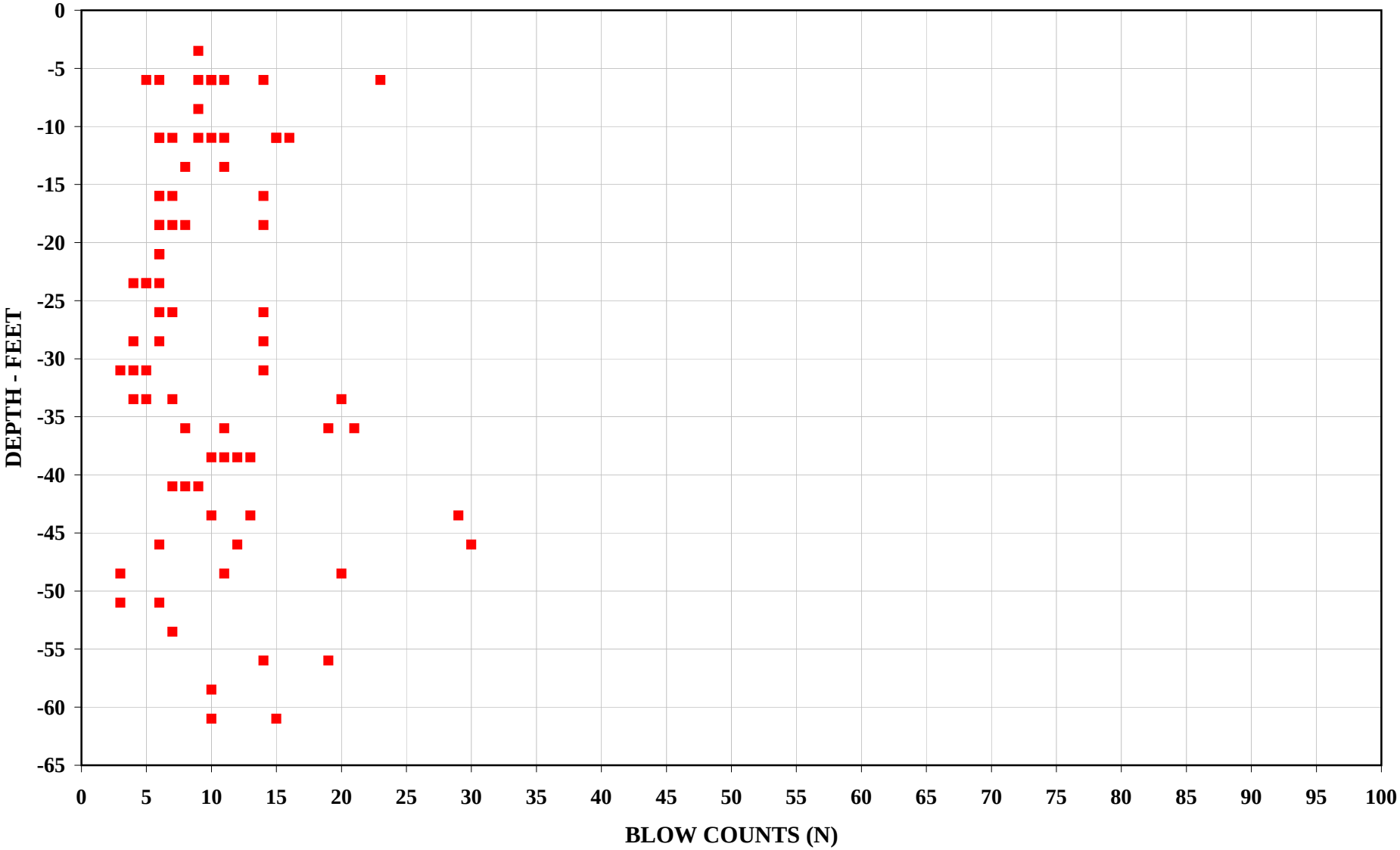


PLATE 6b

APPENDIX C

LABORATORY TESTING DATA

SUMMARY OF LABORATORY TEST RESULTS

LABORATORY TESTING SERVICES
UNIT OPERATIONS FACILITIES
FORT POLK, LOUISIANA

Boring No.	Sample No.	Sample Depth (ft.)	Visual Description & Unified Soil Classification (ASTM D-2487)		Percent Passing Sieve #4	#10	#20	#40	#60	#80	#100	#200
10A2S-TEMF-1	S-1	2.5-4	Tan silty sand	SM	99.6	99.2	98.8	98.1	93.9	72.5	54.5	22.0
	S-2	5-6.5	Tan sandy clay	CL	100.0	100.0	100.0	100.0	99.8	98.5	94.1	61.3
	S-3	7.5-9	Tan silty sand	SM	---	---	---	---	---	---	---	---
	S-4	10-11.3	Tan clayey sand	SC	---	---	---	---	---	---	---	---
8A2S-TEMF-4	S-1	2.5-4.5	Tan and brown silty sand	SM	100.0	100.0	99.9	99.8	94.5	68.7	52.6	19.3
	S-2	5-6.5	Tan and reddish brown sandy clay	CL	100.0	99.7	99.2	99.1	97.5	83.2	74.0	52.3
	S-3	7.5-9.5	Tan and brown sandy clay	CL	100.0	99.9	99.7	99.6	99.5	95.1	88.4	53.9
	S-4	10-11.5	Tan silty sand	SM	100.0	100.0	100.0	100.0	99.9	96.0	88.3	34.1
	S-5	12.5-14	Tan silty sand	SM	100.0	100.0	100.0	100.0	99.7	93.2	84.3	42.8
	S-7	17.5-19	Tan sand with silt	SP-SM	100.0	100.0	100.0	97.6	94.6	57.1	37.3	12.0
	S-8	20-21.5	Tan silty sand	SM	100.0	100.0	100.0	100.0	96.3	67.0	43.4	13.4
	S-10	25-26.5	Tan sand with silt	SP-SM	100.0	100.0	100.0	99.5	86.6	46.1	30.5	9.4
	S-11	27.5-29	Tan sand with silt	SP-SM	100.0	100.0	100.0	99.0	82.6	40.9	25.9	10.5
	S-12	30-31.5	Tan sand with silt	SP-SM	100.0	100.0	97.7	76.1	40.9	21.5	16.7	11.9
	S-14	35-36.5	Tan clayey sand	SC	100.0	100.0	99.1	59.8	35.2	26.3	24.1	20.3
	S-16	40-41.5	Tan silty sand	SM	100.0	99.9	99.4	91.4	44.4	20.5	17.6	12.9
	S-18	45-46.5	Tan sand	SP	100.0	100.0	100.0	93.0	31.4	12.6	10.0	4.9
	S-19	47.5-49	Tan sand with silt	SP-SM	100.0	100.0	99.8	90.8	17.1	7.8	6.9	5.4
	S-20	50-51.5	Tan and gray clay with sand	CH	97.6	96.2	95.4	94.4	90.9	87.1	84.7	77.0
	S-21	52.5-54.5	Light gray and tan clay	CH	100.0	99.8	99.3	99.2	99.1	98.6	98.2	96.6
	S-22	55-56.5	Light gray and tan clay	CH	100.0	100.0	100.0	99.9	99.3	98.9	98.7	97.6
	S-23	57.5-59.5	Tan and gray silty sand	SM	100.0	99.9	99.7	99.4	99.0	98.9	97.7	19.9
	S-24	60-61.5	Light gray and tan clay with sand	CH	100.0	99.8	99.1	98.5	98.0	97.1	95.7	85.0
8A2S-TEMF-6	S-1	2.5-4.5	Reddish brown and light gray clay	CH	100.0	99.9	99.8	99.7	99.4	98.7	98.3	96.2
	S-2	5-6.5	Reddish brown and tan clay with sand	CH	100.0	99.9	99.7	99.6	99.4	98.0	95.6	72.1
	S-3	7.5-9.5	Tan and gray clayey sand	SC	100.0	100.0	100.0	100.0	99.9	98.3	91.7	45.2
	S-4	10-11.5	Tan clay with sand	CL	100.0	100.0	100.0	100.0	99.9	99.2	98.1	82.3
8A2S-TEMF-7	S-1	2.5-4.5	Reddish brown and tan clayey sand	SC	97.3	96.0	95.2	92.4	82.0	59.1	50.2	33.6
	S-2	5-6.5	Reddish brown sandy clay	CL	100.0	100.0	100.0	99.8	97.1	90.9	84.2	50.6
	S-3	7.5-9.5	Tan and gray silty sand	SM	100.0	99.8	99.8	99.7	99.4	89.7	76.3	32.4
	S-4	10-11.5	Tan clayey sand	SC	100.0	100.0	100.0	99.8	99.4	96.6	92.0	45.4
10A2S-TEMF-8	S-1	2.5-4	Tan and dark brown silty sand	SM	99.8	99.7	99.5	98.9	91.9	74.6	66.5	44.1
	S-2	5-6.5	Tan and gray clayey sand	SC	99.5	99.2	98.9	98.6	91.6	74.3	66.8	47.0
	S-3	7.5-9	Reddish brown and gray sandy clay	CL	---	---	---	---	---	---	---	---
	S-4	10-11.3	Reddish brown and gray sandy clay	CL	---	---	---	---	---	---	---	---

SUMMARY OF LABORATORY TEST RESULTS

LABORATORY TESTING SERVICES
UNIT OPERATIONS FACILITIES
FORT POLK, LOUISIANA

Boring No.	Sample No.	Sample Depth (ft.)	Visual Description & Unified Soil Classification (ASTM D-2487)		Percent Passing Sieve #4	#10	#20	#40	#60	#80	#100	#200
8A2S-TEMF-10	S-1	2.5-4	Reddish brown sandy clay	CH	97.5	96.0	94.9	95.7	88.5	79.2	72.2	52.1
	S-2	5-6.5	Reddish brown and tan sandy clay	CL	98.8	98.0	97.7	97.2	95.0	87.2	80.7	55.3
	S-3	7.5-9	Reddish brown and gray sandy clay	CL	---	---	---	---	---	---	---	---
	S-4	10-11.5	Reddish brown and gray sandy clay	CL	---	---	---	---	---	---	---	---
8A2S-COF-13	S-1	2.5-4.5	Reddish brown sandy clay	CH	100.0	99.9	99.7	99.6	98.5	89.2	82.3	52.3
	S-2	5-6.5	Reddish brown clayey sand	SC	99.9	99.1	98.8	98.5	92.1	70.7	63.8	38.3
	S-3	7.5-9.5	Brown and tan silty sand	SM	100.0	99.6	99.3	99.1	90.7	62.6	54.9	24.4
	S-4	10-11.5	Tan sand with silt	SP-SM	100.0	100.0	100.0	99.9	73.9	35.1	24.4	11.4
10A2S-COF-16	S-1	2.5-4	Reddish brown sandy clay	CH	100.0	100.0	99.9	99.8	99.2	97.2	94.7	56.9
	S-2	5-6.5	Reddish brown clayey sand	SC	100.0	100.0	100.0	99.9	98.7	91.2	84.5	46.6
	S-3	7.5-9	Reddish brown clayey sand	SC	---	---	---	---	---	---	---	---
	S-4	10-11.5	Tan and gray silty sand	SM	---	---	---	---	---	---	---	---
8A2S-COF-17	S-1	2.5-4.5	Reddish brown and tan sandy clay	CL	99.2	98.7	98.5	98.2	95.6	87.6	81.1	55.2
	S-2	5-6.5	Reddish brown clay with sand	CH	100.0	998.0	99.7	99.5	98.6	94.8	90.5	71.1
	S-3	7.5-9.5	Reddish brown and tan sandy clay	CL	99.1	98.7	98.6	98.6	97.7	87.8	81.1	54.2
	S-4	10-11.5	Reddish brown silty sand	SM	100.0	100.0	100.0	100.0	99.1	80.7	60.3	22.0
8A2S-COF-18	S-1	2.5-4.5	Reddish brown and tan sandy clay	CH	100.0	100.0	100.0	99.9	99.4	95.3	88.4	54.6
	S-2	5-6.5	Reddish brown and tan clay with sand	CL	100.0	100.0	99.9	99.8	99.5	95.3	90.8	56.5
	S-3	7.5-9.5	Tan and brown silty sand	SM	100.0	100.0	100.0	99.9	98.6	86.2	70.5	19.7
	S-4	10-11.5	Tan silty sand	SM	100.0	100.0	100.0	99.8	90.2	63.0	40.8	12.1
	S-6	15-16.5	Tan and gray sand with silt	SP-SM	100.0	100.0	100.0	100.0	98.5	73.7	45.3	10.5
	S-7	17.5-19	Tan sand with silt	SP-SM	100.0	100.0	100.0	100.0	93.7	48.9	28.4	8.9
	S-8	20-21.5	Tan sand with silt	SP-SM	100.0	100.0	100.0	100.0	90.4	41.0	25.9	9.1
	S-9	22.5-24	Tan sand with silt	SP-SM	100.0	100.0	100.0	99.9	90.6	28.6	16.4	7.5
8A2S-COF-21	S-1	2.5-4.5	Tan and brown silty sand	SM	100.0	100.0	100.0	99.8	96.2	73.1	56.6	23.0
	S-2	5-6.5	Reddish brown and tan sandy clay	CL	99.9	99.8	99.4	99.1	97.5	91.4	86.5	61.4
	S-3	7.5-9.5	Tan and brown silty sand	SM	100.0	100.0	100.0	99.4	80.9	43.2	32.2	14.1
	S-4	10-11.5	Tan and brown silty sand	SM	100.0	100.0	100.0	99.6	91.5	58.6	44.9	17.8
8A2S-TEMF-22	S-1	2.5-4.0	Reddish brown and tan silty sand	SM	97.5	95.2	92.7	80.0	52.6	37.0	33.0	22.2
	S-1	4.0-4.5	Reddish brown and tan clay	CH	100.0	99.9	99.8	99.6	99.6	99.1	98.5	92.1
	S-2	5-6.5	Reddish brown and tan clay with sand	CL	100.0	100.0	100.0	100.0	99.8	98.7	96.9	79.4
	S-3	7.5-9.5	Tan and brown silty sand	SM	99.9	99.7	99.5	99.3	98.6	89.9	79.8	38.7
	S-4	10-11.5	Tan and brown silty sand	SM	100.0	100.0	100.0	100.0	99.5	85.9	68.2	21.4

SUMMARY OF LABORATORY TEST RESULTS

LABORATORY TESTING SERVICES
UNIT OPERATIONS FACILITIES
FORT POLK, LOUISIANA

Boring No.	Sample No.	Sample Depth (ft.)	Visual Description & Unified Soil Classification (ASTM D-2487)		Moisture Content (%)	Unit Dry Weight (pcf)	Atterberg Limits LL	PL	PI	Notes
10A2S-TEMF-1	S-1	2.5-4	Tan silty sand	SM	6.7	---	Non-Plastic			
	S-2	5-6.5	Tan sandy clay	CL	11.8	---	33	18	15	
	S-3	7.5-9	Tan silty sand	SM	7.9	---	---	---	---	
	S-4	10-11.3	Tan clayey sand	SC	13.1	---	---	---	---	
8A2S-TEMF-4	S-1	2.5-4.5	Tan and brown silty sand	SM	6.8	99.5	Non-Plastic			
	S-2	5-6.5	Tan and reddish brown sandy clay	CL	12.8	---	31	17	14	
	S-3	7.5-9.5	Tan and brown sandy clay	CL	13.7	105.2	34	16	18	*
	S-4	10-11.5	Tan silty sand	SM	9.5	---	Non-Plastic			
	S-5	12.5-14	Tan silty sand	SM	13.4	---	Non-Plastic			
	S-7	17.5-19	Tan sand with silt	SP-SM	17.3	---	Non-Plastic			
	S-8	20-21.5	Tan silty sand	SM	26.1	---	Non-Plastic			
	S-10	25-26.5	Tan sand with silt	SP-SM	24.0	---	Non-Plastic			
	S-11	27.5-29	Tan sand with silt	SP-SM	22.4	---	Non-Plastic			
	S-12	30-31.5	Tan sand with silt	SP-SM	21.1	---	Non-Plastic			
	S-14	35-36.5	Tan clayey sand	SC	22.7	---	31	15	16	
	S-16	40-41.5	Tan silty sand	SM	23.9	---	Non-Plastic			
	S-18	45-46.5	Tan sand	SP	21.2	---	Non-Plastic			
	S-19	47.5-49	Tan sand with silt	SP-SM	24.7	---	Non-Plastic			
	S-20	50-51.5	Tan and gray clay with sand	CH	23.4	---	69	18	51	
	S-21	52.5-54.5	Light gray and tan clay	CH	42.8	78.1	114	36	78	
	S-22	55-56.5	Light gray and tan clay	CH	41.7	---	96	31	65	
	S-23	57.5-59.5	Tan and gray silty sand	SM	28.7	99.0	Non-Plastic			
	S-24	60-61.5	Light gray and tan clay with sand	CH	32.9	---	107	30	77	
8A2S-TEMF-6	S-1	2.5-4.5	Reddish brown and light gray clay	CH	24.7	---	81	21	60	
	S-2	5-6.5	Reddish brown and tan clay with sand	CH	21.5	---	56	19	37	
	S-3	7.5-9.5	Tan and gray clayey sand	SC	17.2	---	34	20	14	
	S-4	10-11.5	Tan clay with sand	CL	19.8	---	46	19	27	
8A2S-TEMF-7	S-1	2.5-4.5	Reddish brown and tan clayey sand	SC	11.1	---	26	16	10	
	S-2	5-6.5	Reddish brown sandy clay	CL	12.8	---	41	12	29	
	S-3	7.5-9.5	Tan and gray silty sand	SM	9.4	---	Non-Plastic			
	S-4	10-11.5	Tan clayey sand	SC	11.9	---	34	19	15	
10A2S-TEMF-8	S-1	2.5-4	Tan and dark brown silty sand	SM	11.5	---	Non-Plastic			
	S-2	5-6.5	Tan and gray clayey sand	SC	14.1	---	32	18	14	
	S-3	7.5-9	Reddish brown and gray sandy clay	CL	18.2	---	---	---	---	
	S-4	10-11.3	Reddish brown and gray sandy clay	CL	17.1	---	---	---	---	

* See attached "Laboratory Test Data Sheets" for Consolidation Test Results

SUMMARY OF LABORATORY TEST RESULTS

LABORATORY TESTING SERVICES
UNIT OPERATIONS FACILITIES
FORT POLK, LOUISIANA

Boring No.	Sample No.	Sample Depth (ft.)	Visual Description & Unified Soil Classification (ASTM D-2487)		Moisture Content (%)	Unit Dry Weight (pcf)	Atterberg Limits LL	PL	PI	Notes
8A2S-TEMF-10	S-1	2.5-4	Reddish brown sandy clay	CH	15.9	---	51	16	35	
	S-2	5-6.5	Reddish brown and tan sandy clay	CL	15.4	---	42	16	26	
	S-3	7.5-9	Reddish brown and gray sandy clay	CL	17.3	---	---	---	---	
	S-4	10-11.5	Reddish brown and gray sandy clay	CL	17.9	---	---	---	---	
8A2S-COF-13	S-1	2.5-4.5	Reddish brown sandy clay	CH	17.0	---	51	19	32	
	S-2	5-6.5	Reddish brown clayey sand	SC	14.0	---	27	19	8	
	S-3	7.5-9.5	Brown and tan silty sand	SM	14.0	---	Non-Plastic			
	S-4	10-11.5	Tan sand with silt	SP-SM	7.8	---	Non-Plastic			
10A2S-COF-16	S-1	2.5-4	Reddish brown sandy clay	CH	18.1	---	52	20	32	
	S-2	5-6.5	Reddish brown clayey sand	SC	14.9	---	29	20	9	
	S-3	7.5-9	Reddish brown clayey sand	SC	12.8	---	---	---	---	
	S-4	10-11.5	Tan and gray silty sand	SM	9.4	---	---	---	---	
8A2S-COF-17	S-1	2.5-4.5	Reddish brown and tan sandy clay	CL	13.1	---	30	17	13	
	S-2	5-6.5	Reddish brown clay with sand	CH	17.8	---	64	20	44	
	S-3	7.5-9.5	Reddish brown and tan sandy clay	CL	17.5	---	49	17	32	
	S-4	10-11.5	Reddish brown silty sand	SM	7.4	---	Non-Plastic			
8A2S-COF-18	S-1	2.5-4.5	Reddish brown and tan sandy clay	CH	19.1	105.6	53	20	33	*
	S-2	5-6.5	Reddish brown and tan clay with sand	CL	18.4	---	32	20	12	
	S-3	7.5-9.5	Tan and brown silty sand	SM	14.8	---	Non-Plastic			
	S-4	10-11.5	Tan silty sand	SM	7.1	---	Non-Plastic			
	S-6	15-16.5	Tan and gray sand with silt	SP-SM	15.6	---	Non-Plastic			
	S-7	17.5-19	Tan sand with silt	SP-SM	27.5	---	Non-Plastic			
	S-8	20-21.5	Tan sand with silt	SP-SM	25.3	---	Non-Plastic			
	S-9	22.5-24	Tan sand with silt	SP-SM	25.7	---	Non-Plastic			
8A2S-COF-21	S-1	2.5-4.5	Tan and brown silty sand	SM	8.1	---	Non-Plastic			
	S-2	5-6.5	Reddish brown and tan sandy clay	CL	12.6	---	46	17	29	
	S-3	7.5-9.5	Tan and brown silty sand	SM	5.2	---	Non-Plastic			
	S-4	10-11.5	Tan and brown silty sand	SM	6.0	---	Non-Plastic			
8A2S-TEMF-22	S-1	2.5-4.0	Reddish brown and tan silty sand	SM	10.2	---	Non-Plastic			
	S-1	4.0-4.5	Reddish brown and tan clay	CH	20.3	---	64	16	48	
	S-2	5-6.5	Reddish brown and tan clay with sand	CL	17.0	---	39	17	22	
	S-3	7.5-9.5	Tan and brown silty sand	SM	10.2	---	Non-Plastic			
	S-4	10-11.5	Tan and brown silty sand	SM	6.1	---	Non-Plastic			

* See attached "Laboratory Test Data Sheets" for Consolidation Test Results

SUMMARY OF LABORATORY TEST RESULTS

LABORATORY TESTING SERVICES
UNIT OPERATIONS FACILITIES
FORT POLK, LOUISIANA

Boring No.	Sample No.	Sample Depth (ft.)	Visual Description & Unified Soil Classification (ASTM D-2487)		Moisture Content (%)	Unit Dry Weight (pcf)	Confining Pressure (tsf)	Q (tsf)	Strain @ Failure (%)	Type Failure
10A2S-TEMF-1	S-1	2.5-4	Tan silty sand	SM	6.7	---	---	---	---	
	S-2	5-6.5	Tan sandy clay	CL	11.8	---	---	---	---	
	S-3	7.5-9	Tan silty sand	SM	7.9	---	---	---	---	
	S-4	10-11.3	Tan clayey sand	SC	13.1	---	---	---	---	
8A2S-TEMF-4	S-1	2.5-4.5	Tan and brown silty sand	SM	6.8	99.5	0.219	1.380	2.7	Internal
	S-2	5-6.5	Tan and reddish brown sandy clay	CL	12.8	---	---	---	---	
	S-3	7.5-9.5	Tan and brown sandy clay	CL	13.7	105.2	0.531	2.090	6.4	Internal
	S-4	10-11.5	Tan silty sand	SM	9.5	---	---	---	---	
	S-5	12.5-14	Tan silty sand	SM	13.4	---	---	---	---	
	S-7	17.5-19	Tan sand with silt	SP-SM	17.3	---	---	---	---	
	S-8	20-21.5	Tan silty sand	SM	26.1	---	---	---	---	
	S-10	25-26.5	Tan sand with silt	SP-SM	24.0	---	---	---	---	
	S-11	27.5-29	Tan sand with silt	SP-SM	22.4	---	---	---	---	
	S-12	30-31.5	Tan sand with silt	SP-SM	21.1	---	---	---	---	
	S-14	35-36.5	Tan clayey sand	SC	22.7	---	---	---	---	
	S-16	40-41.5	Tan silty sand	SM	23.9	---	---	---	---	
	S-18	45-46.5	Tan sand	SP	21.2	---	---	---	---	
	S-19	47.5-49	Tan sand with silt	SP-SM	24.7	---	---	---	---	
	S-20	50-51.5	Tan and gray clay with sand	CH	23.4	---	---	---	---	
	S-21	52.5-54.5	Light gray and tan clay	CH	42.8	78.1	3.344	1.910	2.9	Angular (60^0)
	S-22	55-56.5	Light gray and tan clay	CH	41.7	---	---	---	---	
	S-23	57.5-59.5	Tan and gray silty sand	SM	28.7	99.0	3.656	6.260	13.9	Internal
	S-24	60-61.5	Light gray and tan clay with sand	CH	32.9	---	---	---	---	
8A2S-TEMF-6	S-1	2.5-4.5	Reddish brown and light gray clay	CH	24.7	---	---	---	---	
	S-2	5-6.5	Reddish brown and tan clay with sand	CH	21.5	---	---	---	---	
	S-3	7.5-9.5	Tan and gray clayey sand	SC	17.2	---	---	---	---	
	S-4	10-11.5	Tan clay with sand	CL	19.8	---	---	---	---	
8A2S-TEMF-7	S-1	2.5-4.5	Reddish brown and tan clayey sand	SC	11.1	---	---	---	---	
	S-2	5-6.5	Reddish brown sandy clay	CL	12.8	---	---	---	---	
	S-3	7.5-9.5	Tan and gray silty sand	SM	9.4	---	---	---	---	
	S-4	10-11.5	Tan clayey sand	SC	11.9	---	---	---	---	
10A2S-TEMF-8	S-1	2.5-4	Tan and dark brown silty sand	SM	11.5	---	---	---	---	
	S-2	5-6.5	Tan and gray clayey sand	SC	14.1	---	---	---	---	
	S-3	7.5-9	Reddish brown and gray sandy clay	CL	18.2	---	---	---	---	
	S-4	10-11.3	Reddish brown and gray sandy clay	CL	17.1	---	---	---	---	

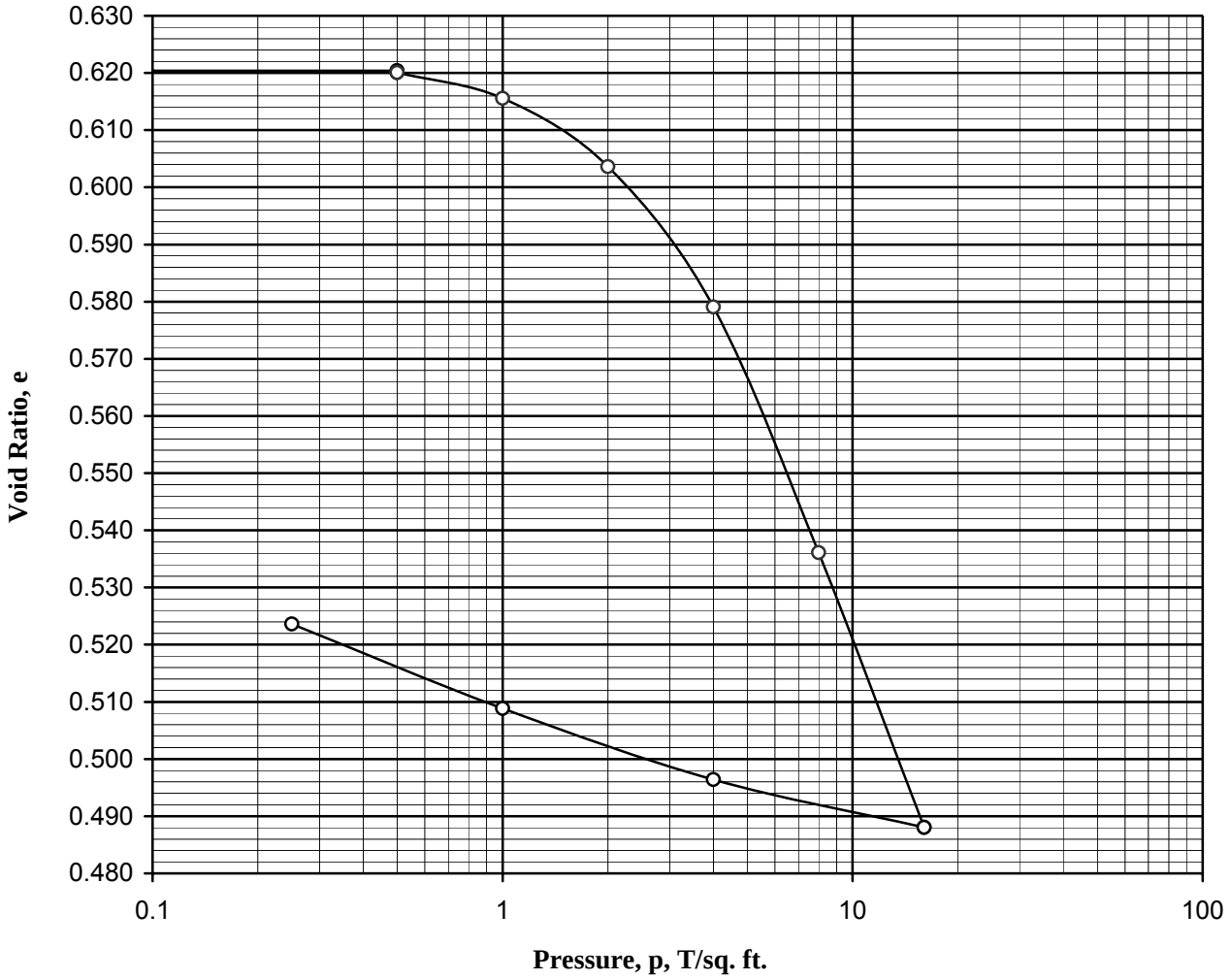
SUMMARY OF LABORATORY TEST RESULTS

LABORATORY TESTING SERVICES
UNIT OPERATIONS FACILITIES
FORT POLK, LOUISIANA

Boring No.	Sample No.	Sample Depth (ft.)	Visual Description & Unified Soil Classification (ASTM D-2487)		Moisture Content (%)	Unit Dry Weight (pcf)	Confining Pressure (tsf)	Q (tsf)	Strain @ Failure (%)	Type Failure
8A2S-TEMF-10	S-1	2.5-4	Reddish brown sandy clay	CH	15.9	---	---	---	---	
	S-2	5-6.5	Reddish brown and tan sandy clay	CL	15.4	---	---	---	---	
	S-3	7.5-9	Reddish brown and gray sandy clay	CL	17.3	---	---	---	---	
	S-4	10-11.5	Reddish brown and gray sandy clay	CL	17.9	---	---	---	---	
8A2S-COF-13	S-1	2.5-4.5	Reddish brown sandy clay	CH	17.0	---	---	---	---	
	S-2	5-6.5	Reddish brown clayey sand	SC	14.0	---	---	---	---	
	S-3	7.5-9.5	Brown and tan silty sand	SM	14.0	---	---	---	---	
	S-4	10-11.5	Tan sand with silt	SP-SM	7.8	---	---	---	---	
10A2S-COF-16	S-1	2.5-4	Reddish brown sandy clay	CH	18.1	---	---	---	---	
	S-2	5-6.5	Reddish brown clayey sand	SC	14.9	---	---	---	---	
	S-3	7.5-9	Reddish brown clayey sand	SC	12.8	---	---	---	---	
	S-4	10-11.5	Tan and gray silty sand	SM	9.4	---	---	---	---	
8A2S-COF-17	S-1	2.5-4.5	Reddish brown and tan sandy clay	CL	13.1	---	---	---	---	
	S-2	5-6.5	Reddish brown clay with sand	CH	17.8	---	---	---	---	
	S-3	7.5-9.5	Reddish brown and tan sandy clay	CL	17.5	---	---	---	---	
	S-4	10-11.5	Reddish brown silty sand	SM	7.4	---	---	---	---	
8A2S-COF-18	S-1	2.5-4.5	Reddish brown and tan sandy clay	CH	19.1	105.6	0.219	2.120	15.0	Angular (75^0Slickensided)
	S-2	5-6.5	Reddish brown and tan clay with sand	CL	18.4	---	---	---	---	
	S-3	7.5-9.5	Tan and brown silty sand	SM	14.8	---	---	---	---	
	S-4	10-11.5	Tan silty sand	SM	7.1	---	---	---	---	
	S-6	15-16.5	Tan and gray sand with silt	SP-SM	15.6	---	---	---	---	
	S-7	17.5-19	Tan sand with silt	SP-SM	27.5	---	---	---	---	
	S-8	20-21.5	Tan sand with silt	SP-SM	25.3	---	---	---	---	
	S-9	22.5-24	Tan sand with silt	SP-SM	25.7	---	---	---	---	
8A2S-COF-21	S-1	2.5-4.5	Tan and brown silty sand	SM	8.1	---	---	---	---	
	S-2	5-6.5	Reddish brown and tan sandy clay	CL	12.6	---	---	---	---	
	S-3	7.5-9.5	Tan and brown silty sand	SM	5.2	---	---	---	---	
	S-4	10-11.5	Tan and brown silty sand	SM	6.0	---	---	---	---	
8A2S-TEMF-22	S-1	2.5-4.0	Reddish brown and tan silty sand	SM	10.2	---	---	---	---	
	S-1	4.0-4.5	Reddish brown and tan clay	CH	20.3	---	---	---	---	
	S-2	5-6.5	Reddish brown and tan clay with sand	CL	17.0	---	---	---	---	
	S-3	7.5-9.5	Tan and brown silty sand	SM	10.2	---	---	---	---	
	S-4	10-11.5	Tan and brown silty sand	SM	6.1	---	---	---	---	

TEAM Consultants, Inc.

Geotechnical, Environmental, Construction Materials Testing

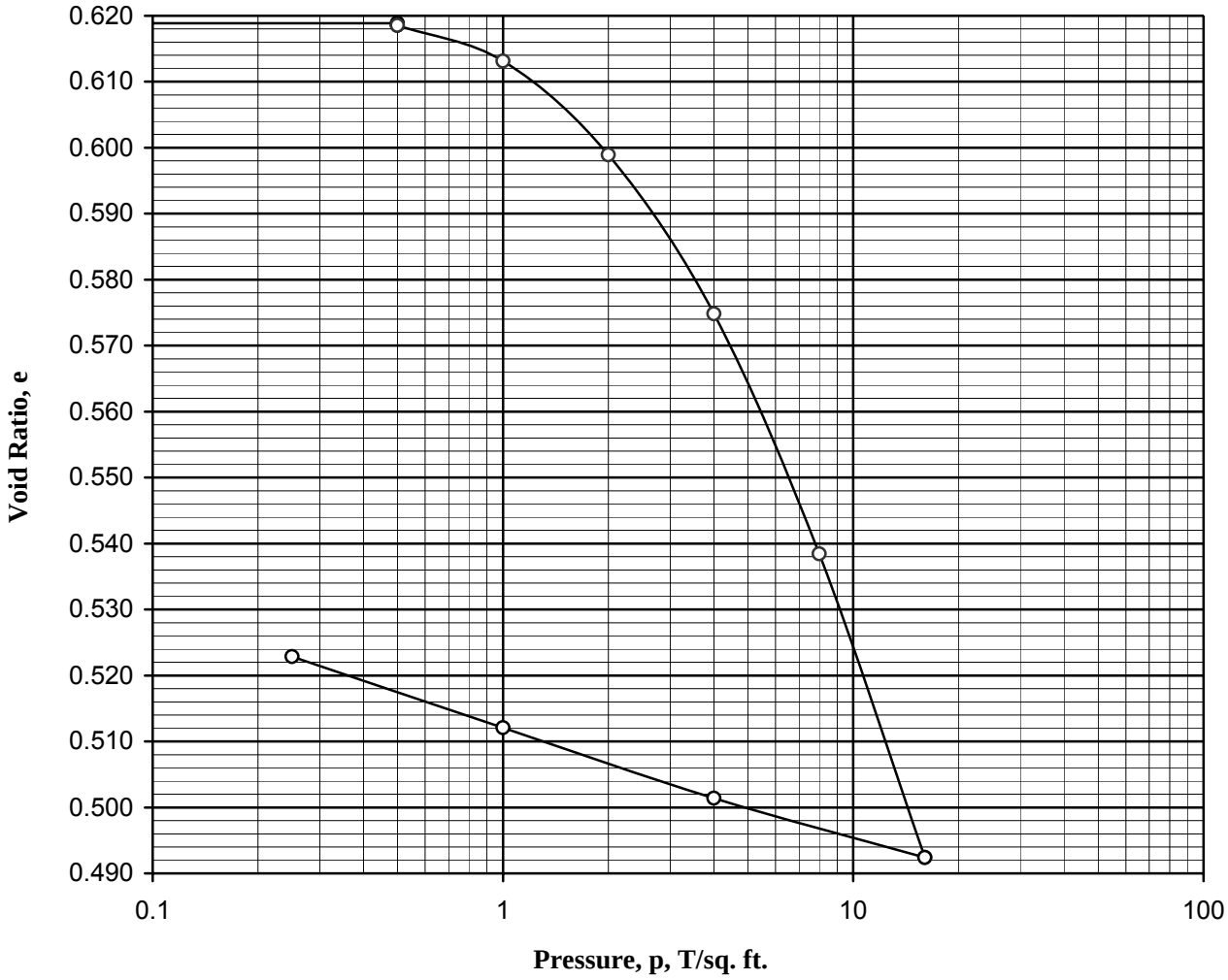


Type of specimen: Undisturbed		Before Test		After Test	
Diam. 2.50 in.	Ht. 0.494 in.	Water Content, w_o	13.68%	W_f	17.46%
Overburden Pressure, P_o T/sq. ft.		Void Ratio, e_o	0.6204	e_f	0.5236
Preconsol. Pressure, P_c T/sq. ft.		Saturation, S_o	60.2%	S_f	91.0%
Compression Index, C_c		Dry Density, γd	105.2 lb/ft^3		
Classification Tan and brown sandy clay					
LL 34	G_s 2.731	Project	Fort Polk UOF		
PL 16			Team Project No.: 102040		
Remarks		Boring No: 8A2S-TEMF-4		Sample No.: S-3	
		Depth: 7.5-9.5		Date: 6/30/10	
		CONSOLIDATION TEST REPORT			

Friday, October 15, 2010

TEAM Consultants, Inc.

Geotechnical, Environmental, Construction Materials Testing



Type of specimen: Undisturbed		Before Test		After Test	
Diam. 2.50 in.	Ht. 0.494 in.	Water Content, w_o	19.12%	W_f	18.25%
Overburden Pressure, P_o T/sq. ft.		Void Ratio, e_o	0.6189	e_f	0.5229
Preconsol. Pressure, P_c T/sq. ft.		Saturation, S_o	84.6%	S_f	95.6%
Compression Index, C_c		Dry Density, γd	105.6 lb/ft^3		
Classification Reddish brown and tan sandy clay					
LL 53	G_s 2.739	Project Fort Polk UOF			
PL 20		Team Project No.: 102040			
Remarks		Boring No: 8A2S-COF-18		Sample No.: S-1	
		Depth: 2.5-4.5		Date: 6/30/10	
		CONSOLIDATION TEST REPORT			

Friday, October 15, 2010

APPENDIX D

DYNAMIC CONE PENETROMETER (DCP) TESTING DATA PLOTS

DCP TEST DATA

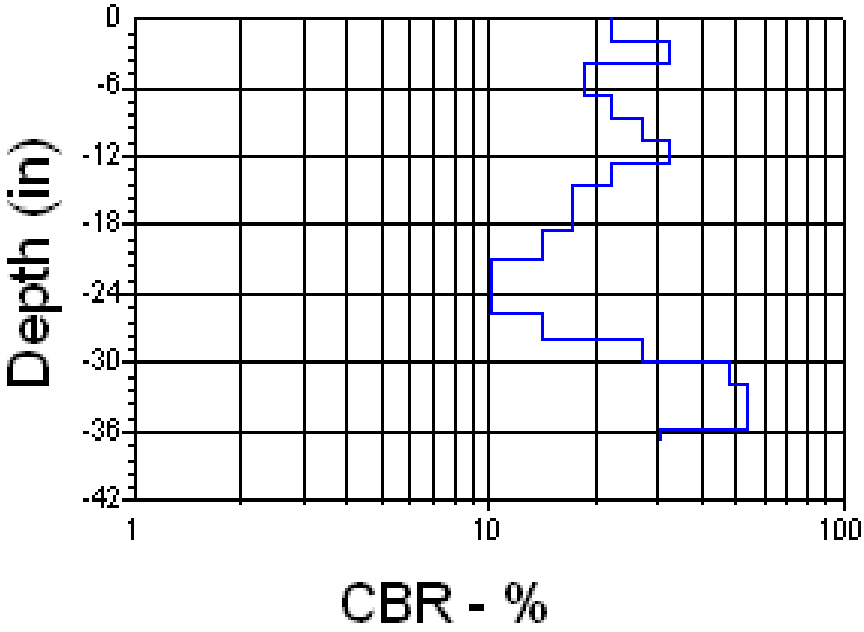
Project: Unit Operations Facilities (TEMF)

Date: 21 May 2010

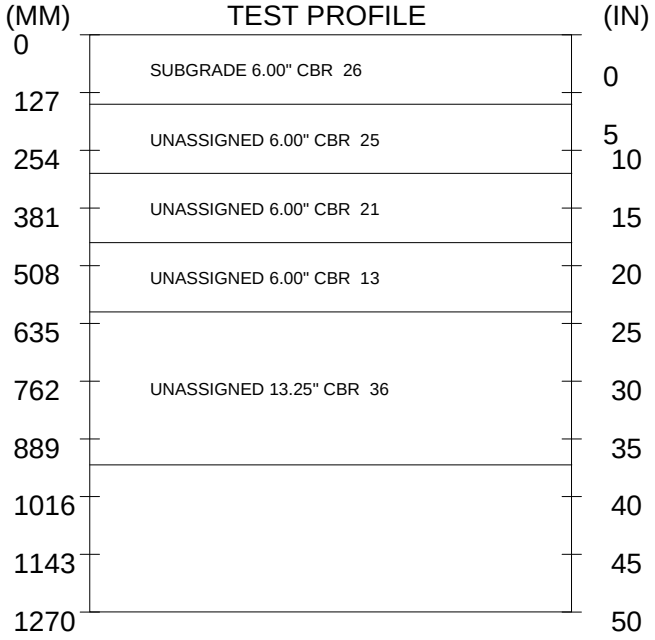
Feature: 10A2S-TEMF-01

Station: 10A2S-TEMF-01

CBR VS DEPTH



TEST PROFILE



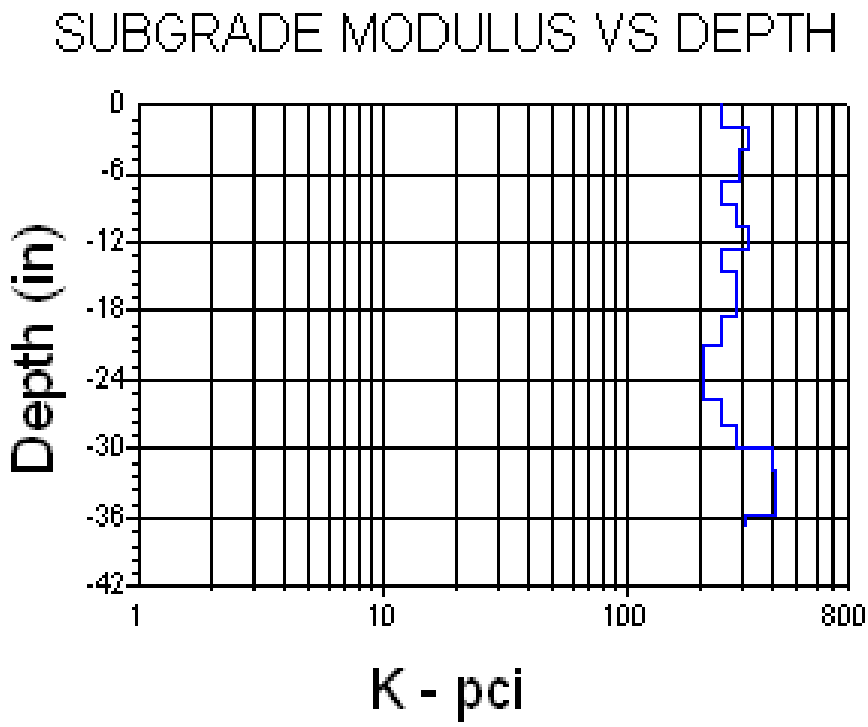
DCP TEST DATA

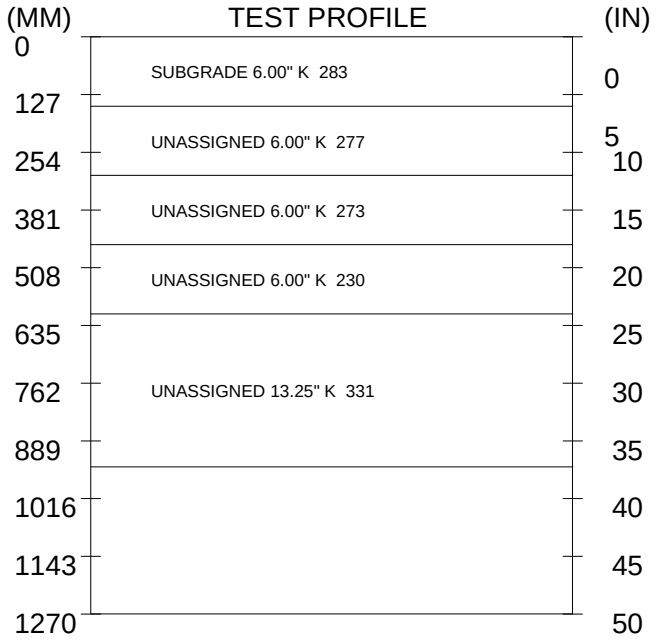
Project: Unit Operations Facilities (TEMF)

Date: 21 May 2010

Feature: 10A2S-TEMF-01

Station: 10A2S-TEMF-01





DCP TEST DATA

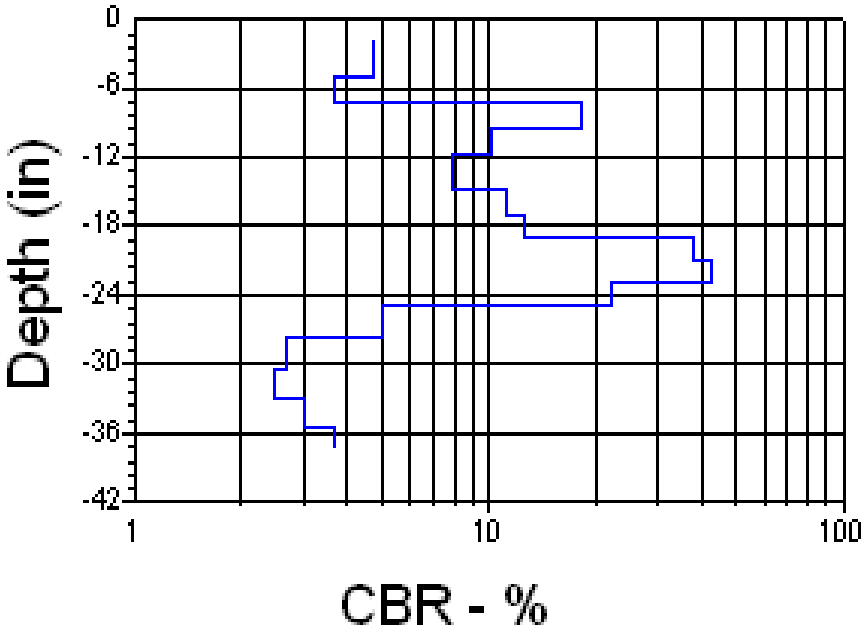
Project: Unit Operations Facilities (TEMF)

Date: 21 May 2010

Feature: 10A2S-TEMF-02

Station: 10A2S-TEMF-02

CBR VS DEPTH



TEST PROFILE

(MM)		(IN)
0	START DEPTH = 1.75"	
	UNASSIGNED 4.25" CBR 4	0
127		
	UNASSIGNED 6.00" CBR 11	5
254		10
	UNASSIGNED 6.00" CBR 11	
381		15
	UNASSIGNED 6.00" CBR 33	
508		20
635		25
762	UNASSIGNED 13.50" CBR 5	30
889		35
1016		40
1143		45
1270		50

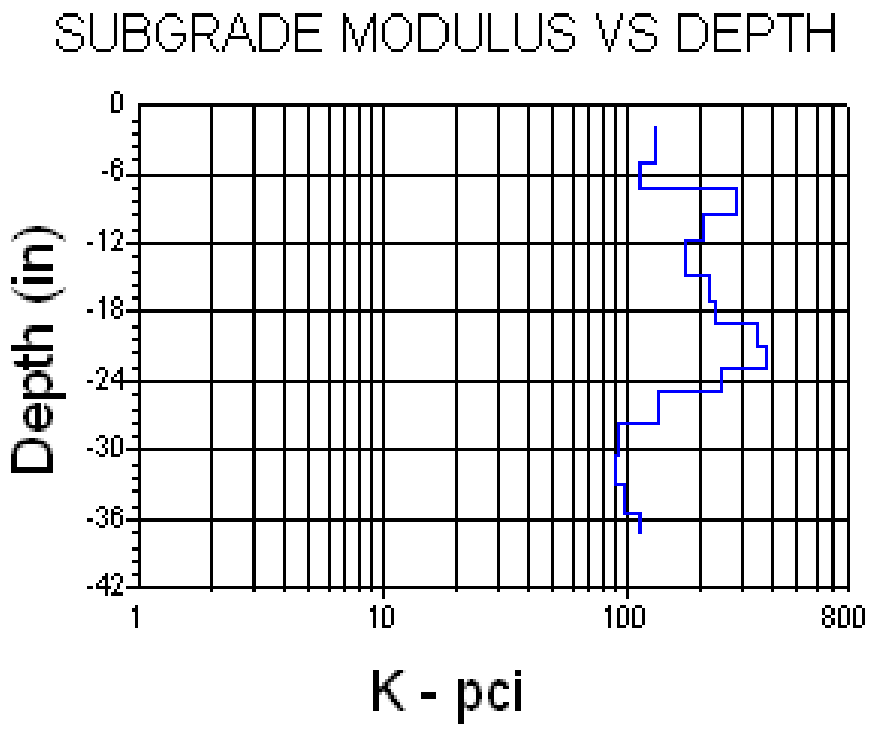
DCP TEST DATA

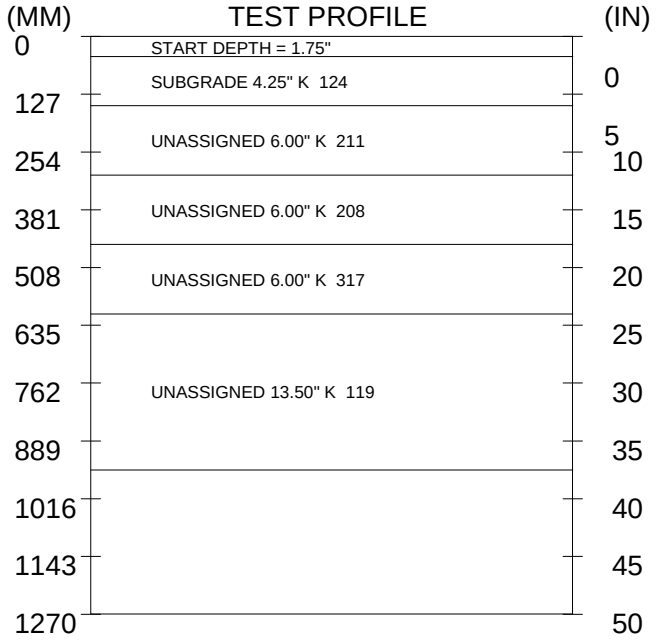
Project: Unit Operations Facilities (TEMF)

Date: 21 May 2010

Feature: 10A2S-TEMF-02

Station: 10A2S-TEMF-02





DCP TEST DATA

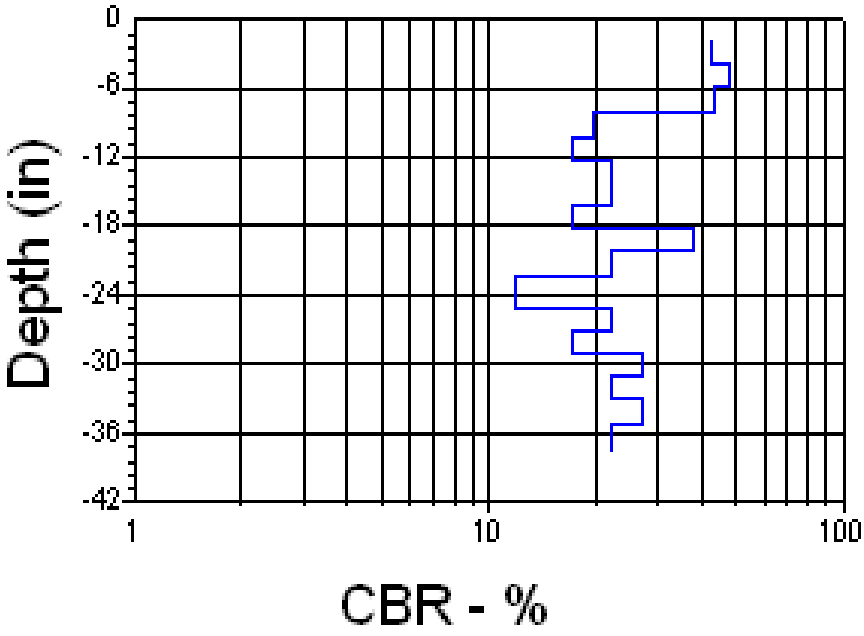
Project: Unit Operations Facilities (TEMF)

Date: 21 May 2010

Feature: 10A2S-TEMF-03

Station: 10A2S-TEMF-03

CBR VS DEPTH



TEST PROFILE

(MM)		(IN)
0	START DEPTH = 1.75"	
	SUBGRADE 4.25" CBR 45	0
127		
	UNASSIGNED 6.00" CBR 25	5
254		10
	UNASSIGNED 6.00" CBR 21	
381		15
	UNASSIGNED 6.00" CBR 25	
508		20
635		25
762	UNASSIGNED 14.00" CBR 22	30
889		35
1016		40
1143		45
1270		50

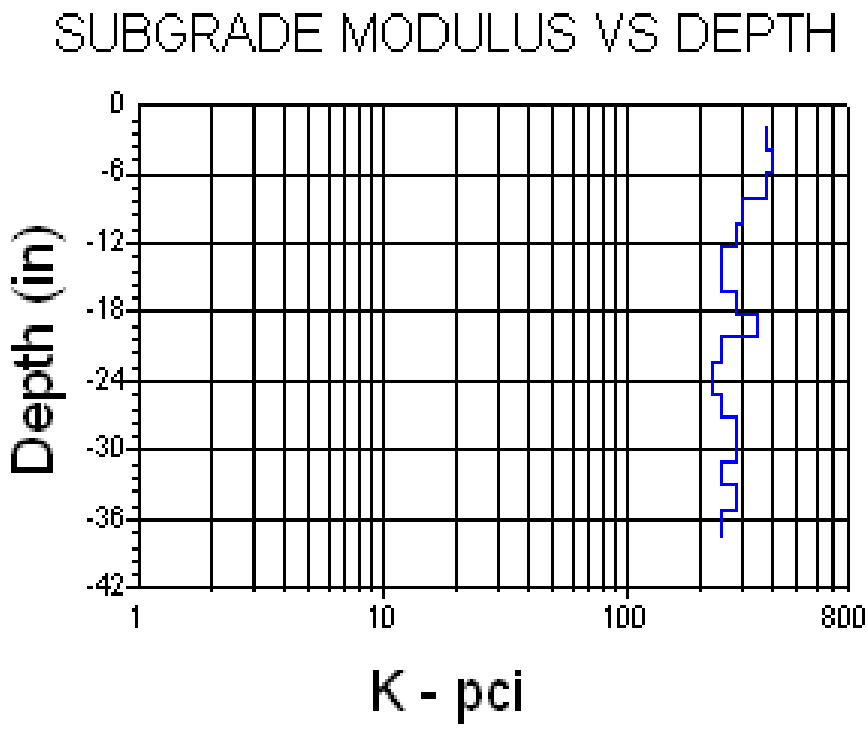
DCP TEST DATA

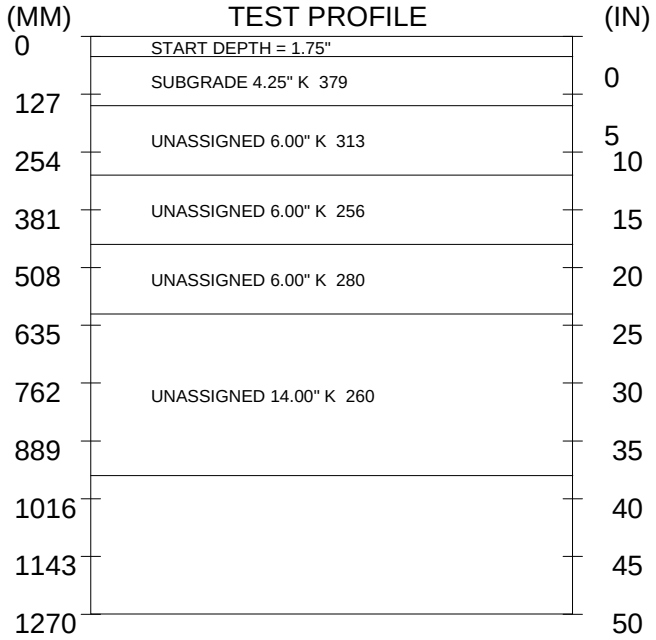
Project: Unit Operations Facilities (TEMF)

Date: 21 May 2010

Feature: 10A2S-TEMF-03

Station: 10A2S-TEMF-03





DCP TEST DATA

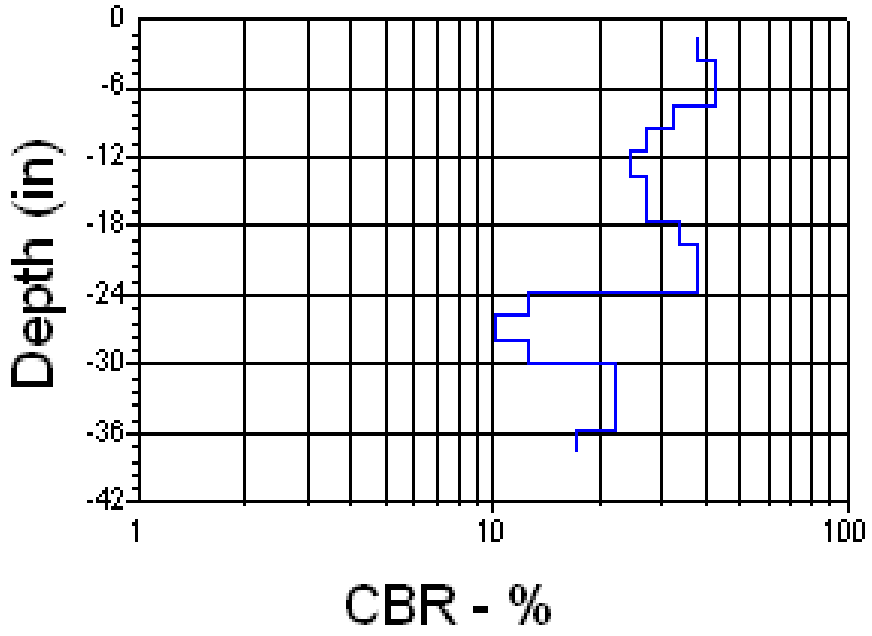
Project: Unit Operations Facilities (TEMF)

Date: 21 May 2010

Feature: 10A2S-TEMF-05

Station: 10A2S-TEMF-05

CBR VS DEPTH



TEST PROFILE

(MM)		(IN)
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	SUBGRADE 4.50" CBR 41	0
127		
	UNASSIGNED 6.00" CBR 31	5
254		10
	UNASSIGNED 6.00" CBR 28	
381		15
	UNASSIGNED 6.00" CBR 33	
508		20
635		25
762	UNASSIGNED 14.00" CBR 17	30
889		35
1016		40
1143		45
1270		50

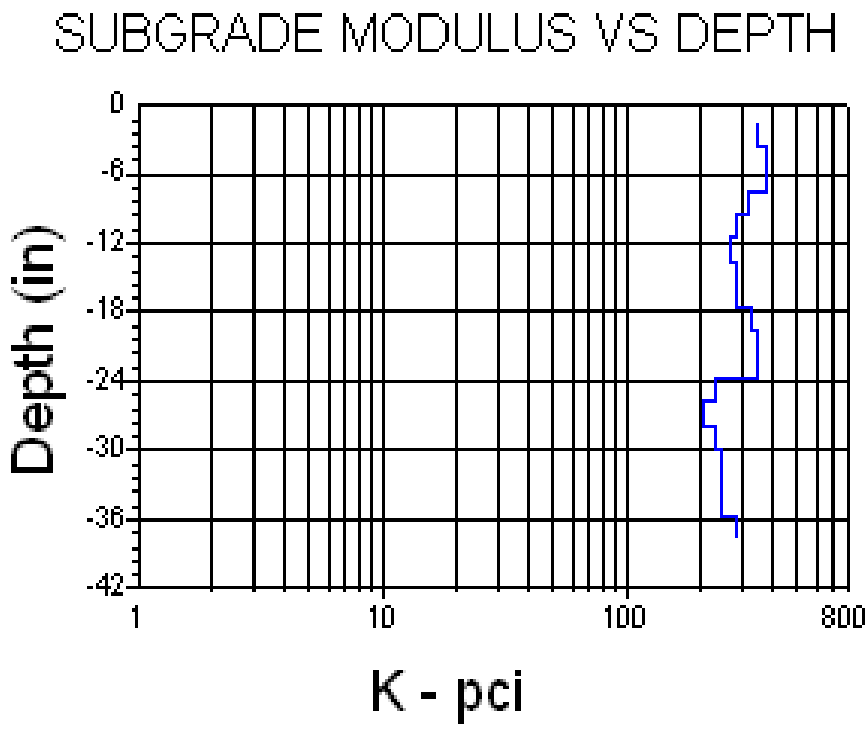
DCP TEST DATA

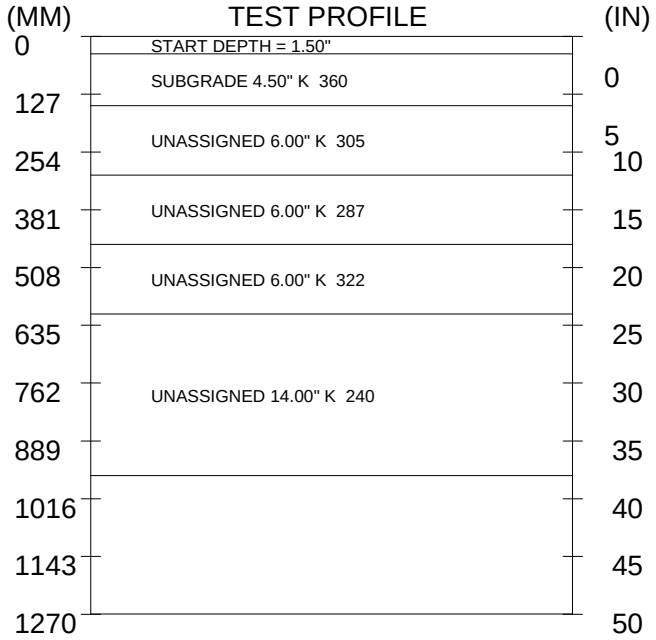
Project: Unit Operations Facilities (TEMF)

Date: 21 May 2010

Feature: 10A2S-TEMF-05

Station: 10A2S-TEMF-05





DCP TEST DATA

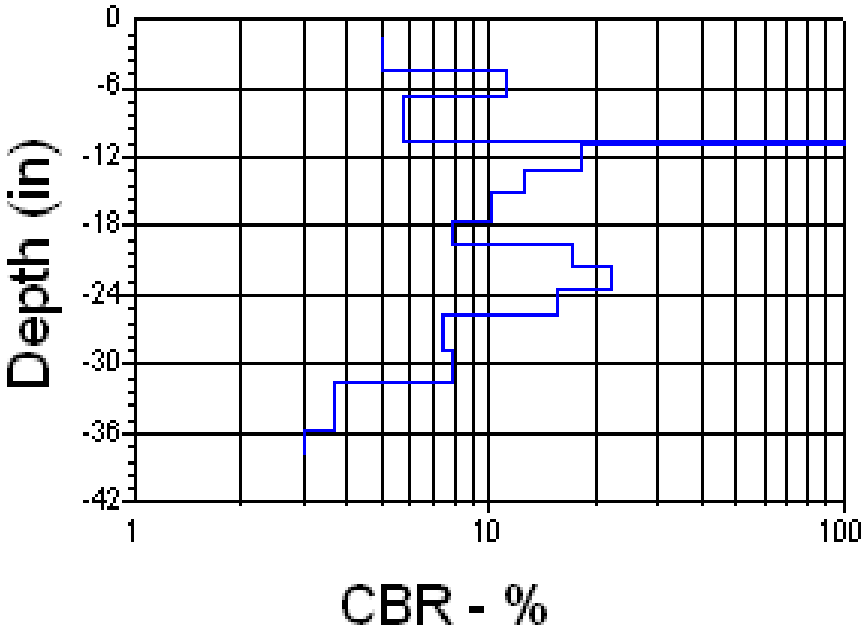
Project: Unit Operations Facilities (TEMF)

Date: 21 May 2010

Feature: 10A2S-TEMF-08

Station: 10A2S-TEMF-08

CBR VS DEPTH



TEST PROFILE

(MM)		(IN)
0	START DEPTH = 1.50"	
	SUBGRADE 4.50" CBR 7	0
127		
	UNASSIGNED 6.00" CBR 40	5
254		10
	UNASSIGNED 6.00" CBR 12	
381		15
	UNASSIGNED 6.00" CBR 17	
508		20
635		25
	UNASSIGNED 14.00" CBR 7	
762		30
889		35
1016		40
1143		45
1270		50

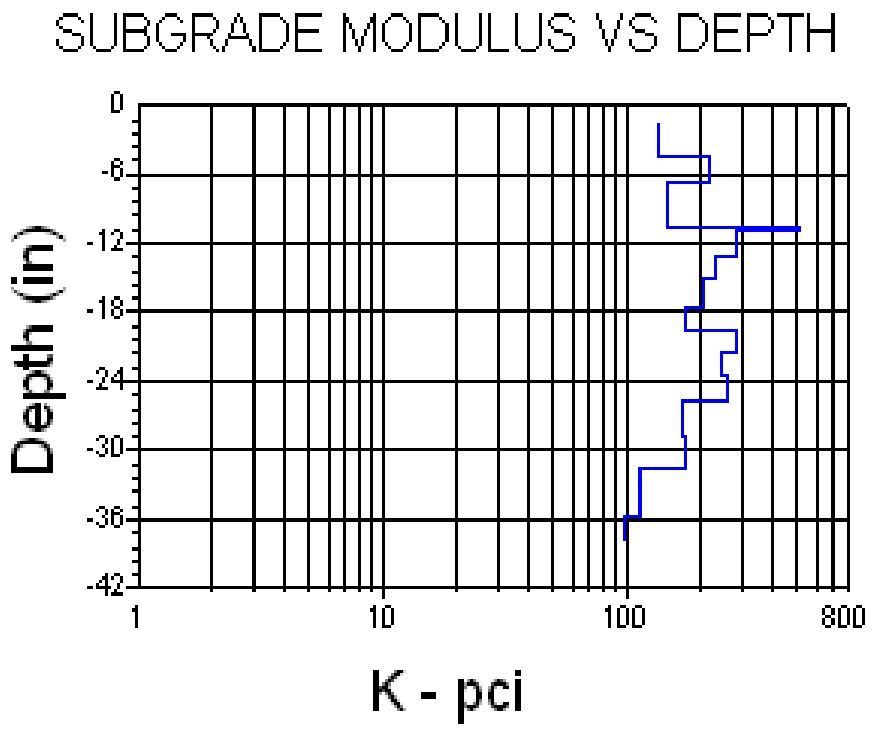
DCP TEST DATA

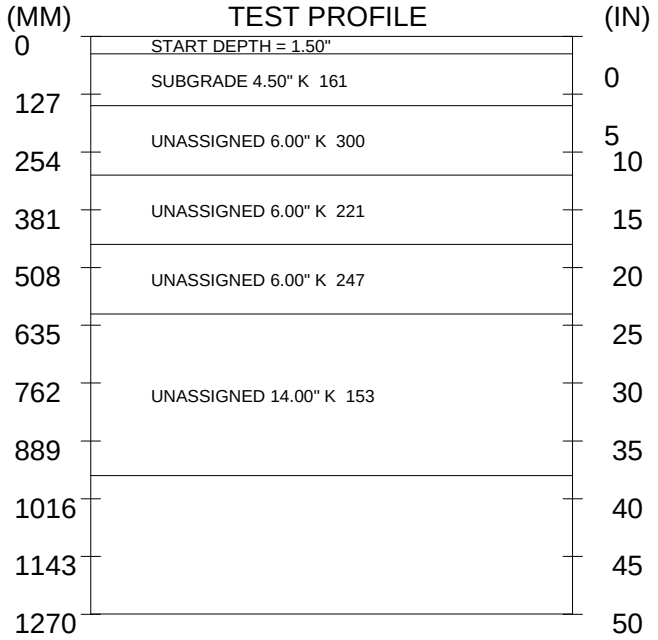
Project: Unit Operations Facilities (TEMF)

Date: 21 May 2010

Feature: 10A2S-TEMF-08

Station: 10A2S-TEMF-08





DCP TEST DATA

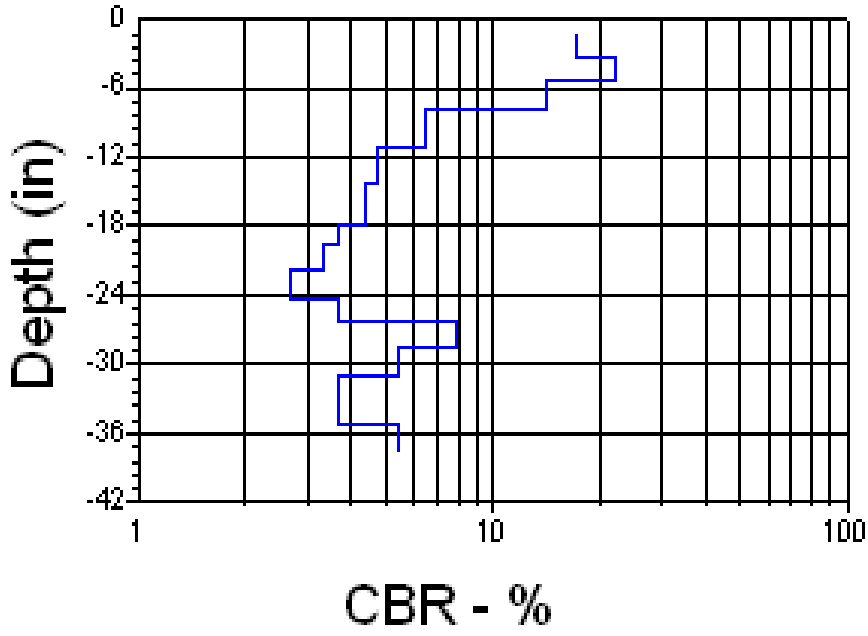
Project: Unit Operations Facilities (TEMF)

Date: 21 May 2010

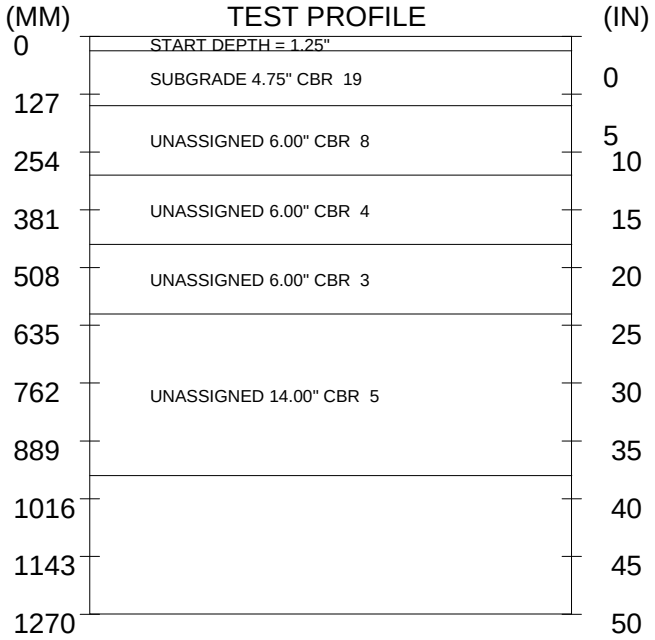
Feature: 10A2S-TEMF-09

Station: 10A2S-TEMF-09

CBR VS DEPTH



TEST PROFILE



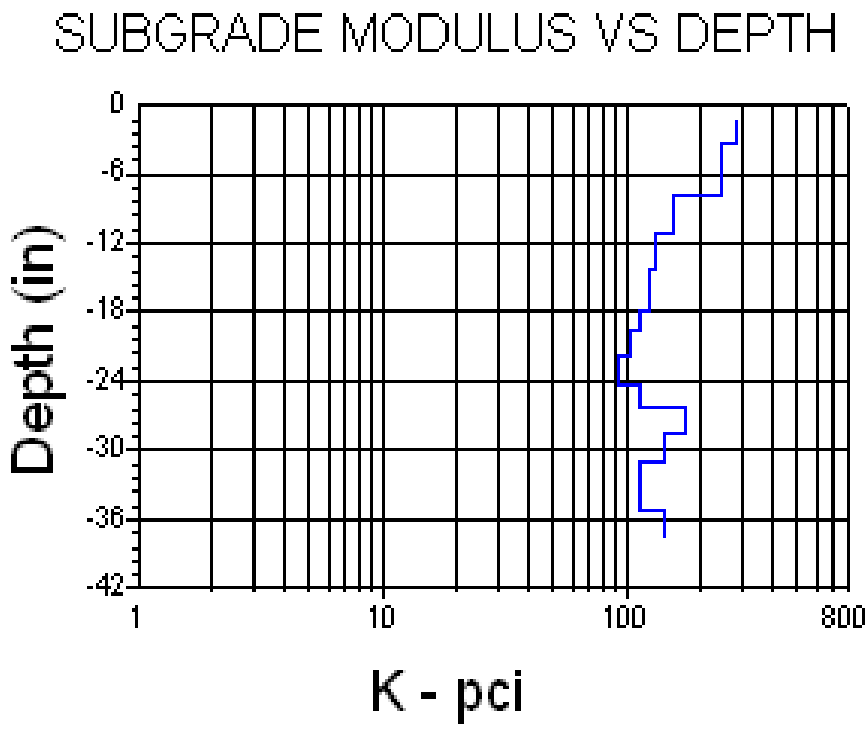
DCP TEST DATA

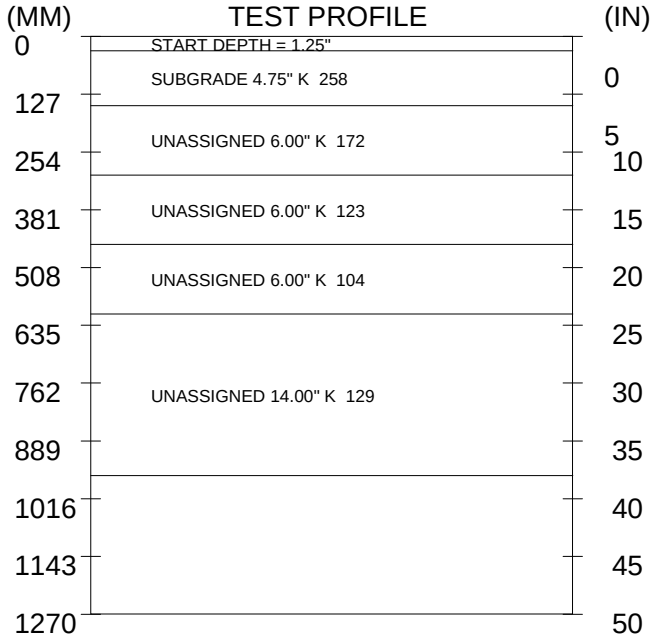
Project: Unit Operations Facilities (TEMF)

Date: 21 May 2010

Feature: 10A2S-TEMF-09

Station: 10A2S-TEMF-09





DCP TEST DATA

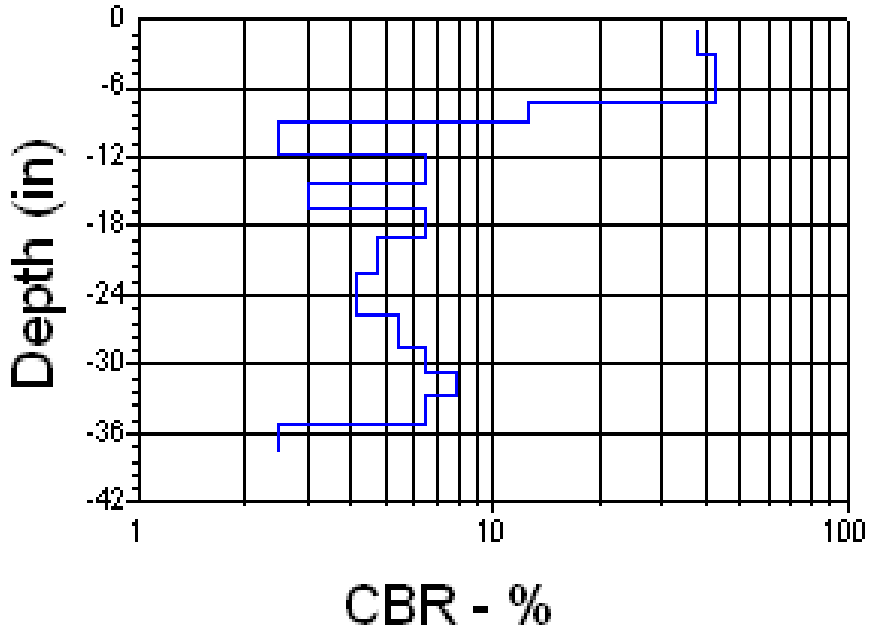
Project: Unit Operations Facilities (TEMF)

Date: 21 May 2010

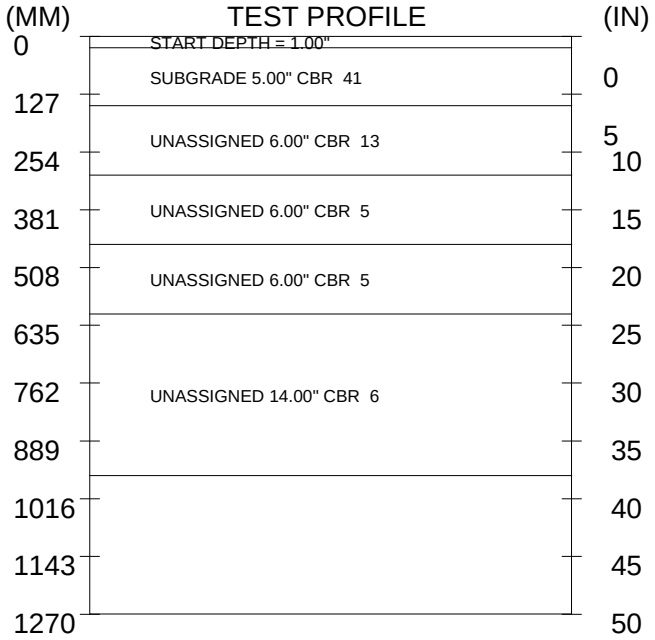
Feature: 10A2S-TEMF-10

Station: 10A2S-TEMF-10

CBR VS DEPTH



TEST PROFILE



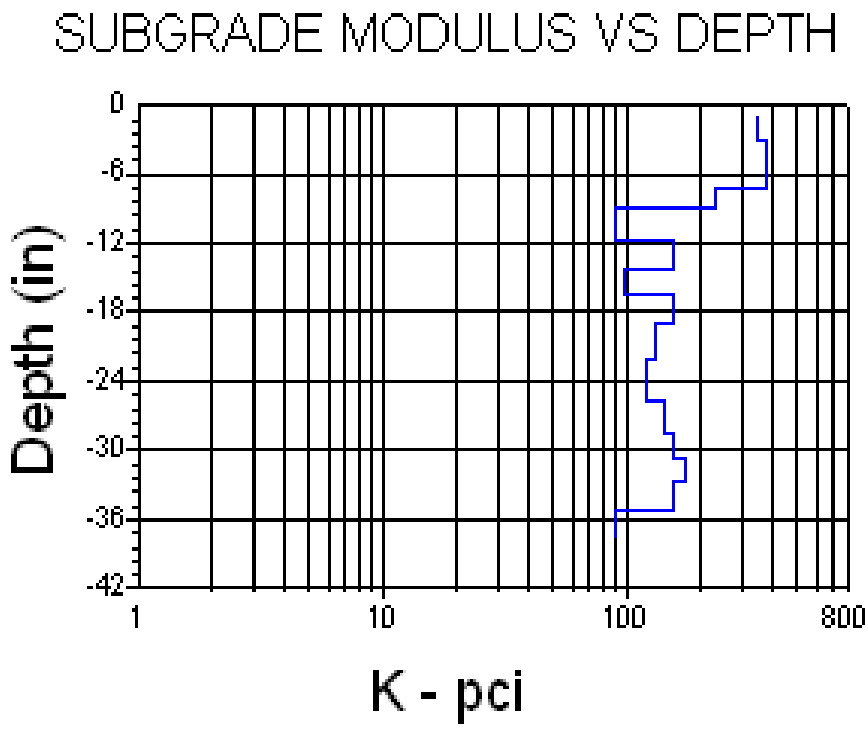
DCP TEST DATA

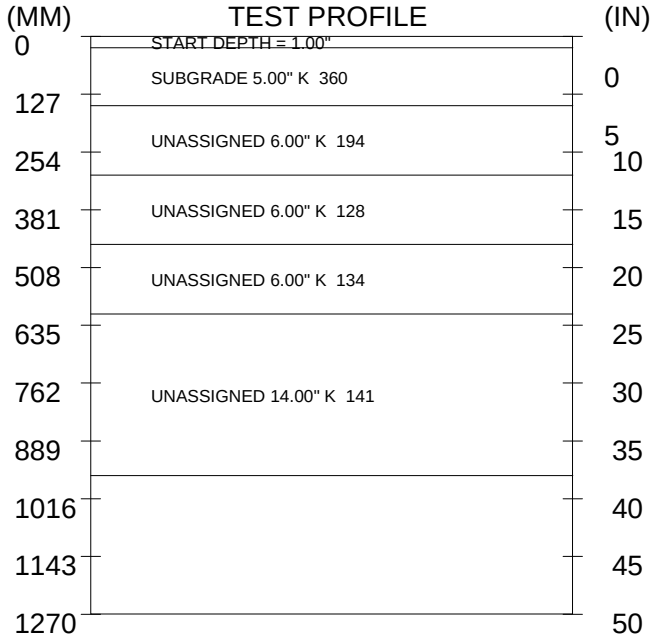
Project: Unit Operations Facilities (TEMF)

Date: 21 May 2010

Feature: 10A2S-TEMF-10

Station: 10A2S-TEMF-10





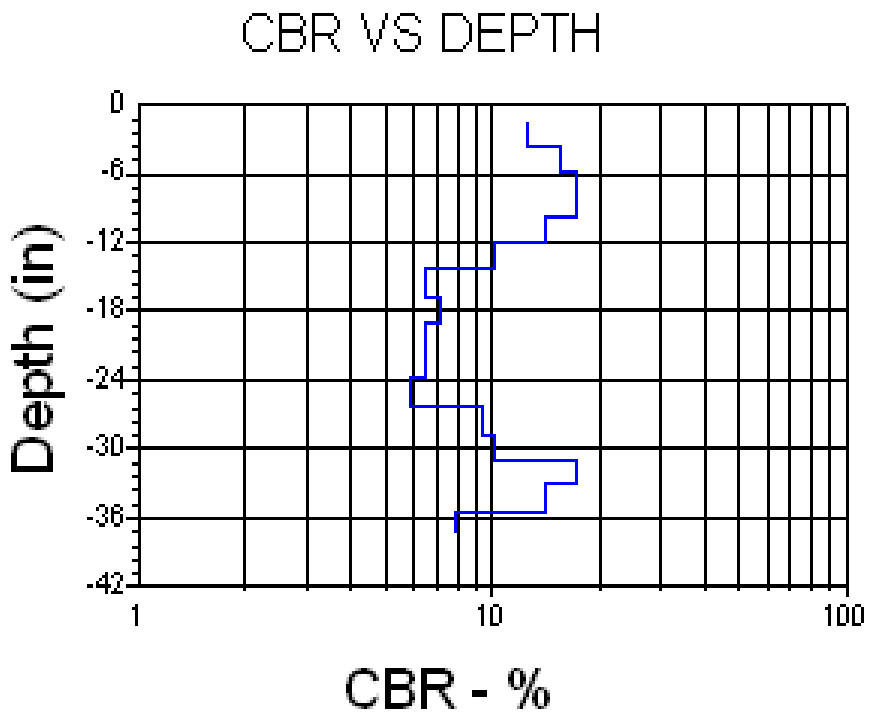
DCP TEST DATA

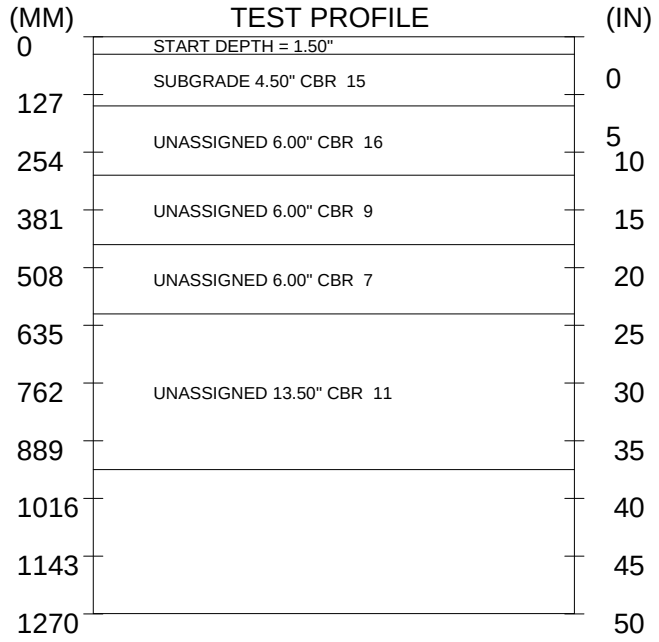
Project: Unit Operations Facilities (COF)

Date: 21 May 2010

Feature: 10A2S-COF-11

Station: 10A2S-COF-11





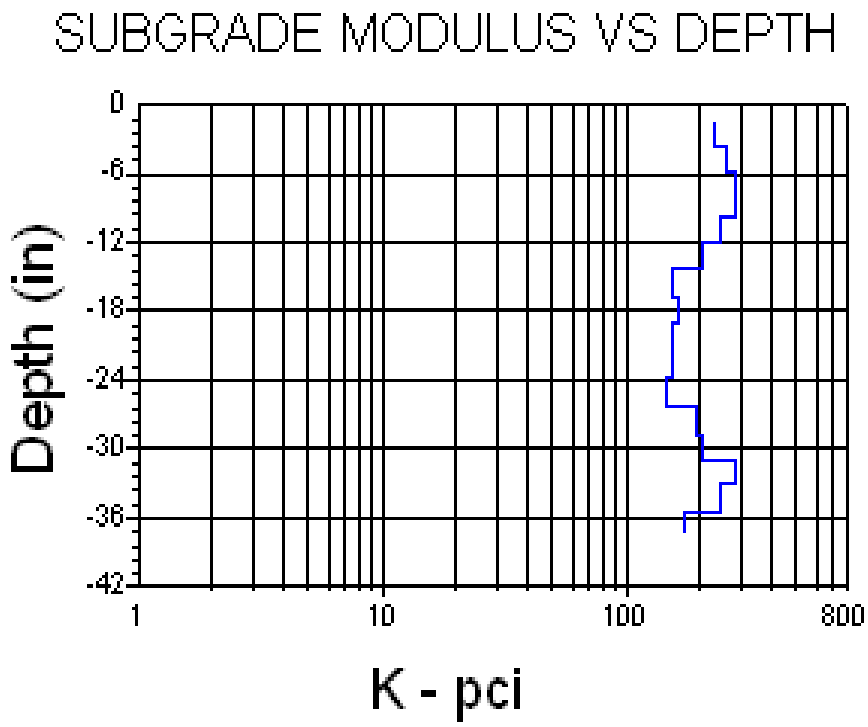
DCP TEST DATA

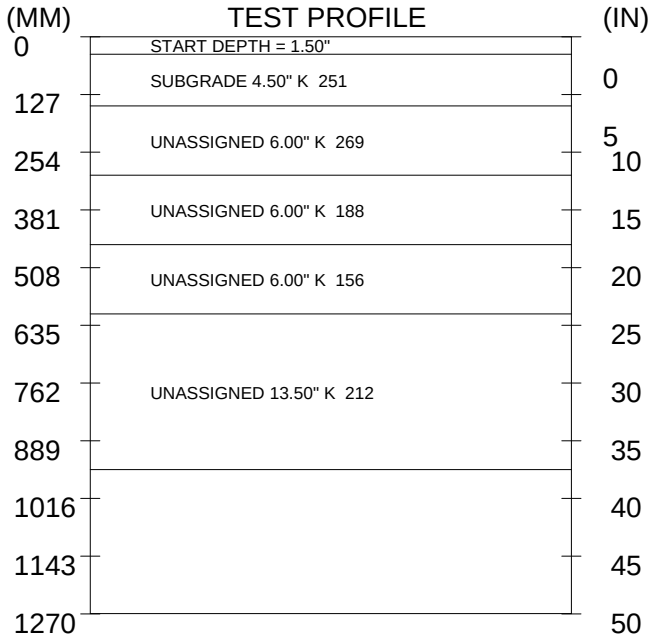
Project: Unit Operations Facilities (COF)

Date: 21 May 2010

Feature: 10A2S-COF-11

Station: 10A2S-COF-11





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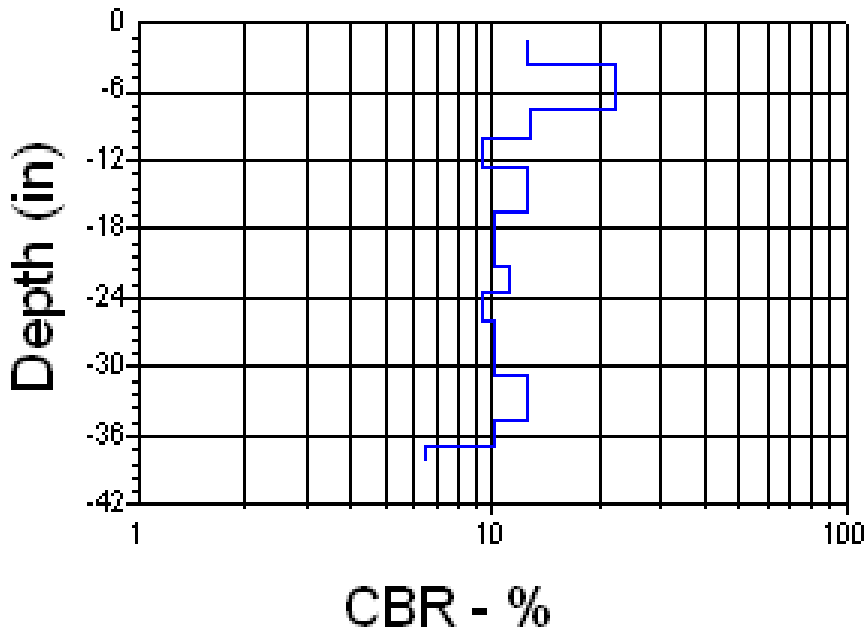
Project: Unit Operations Facilities (COF)

Date: 21 May 2010

Feature: 10A2S-COF-12

Station: 10A2S-COF-12

CBR VS DEPTH



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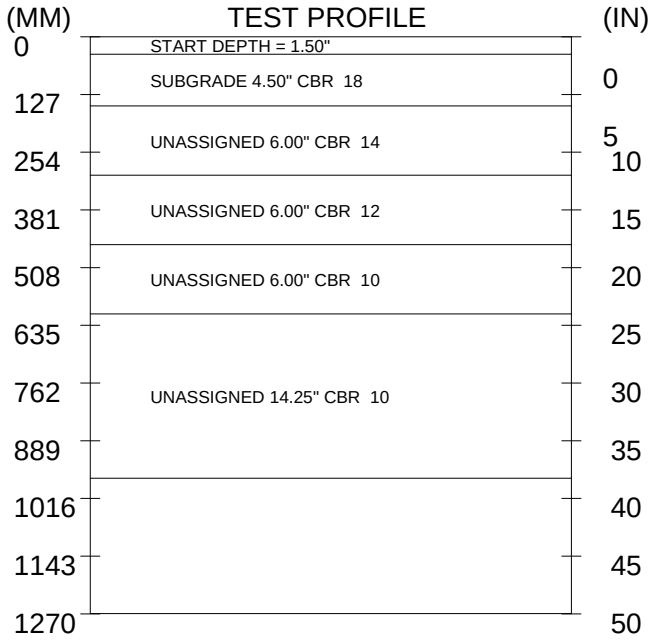

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Project: Unit Operations Facilities (COF)

Date: 21 May 2010

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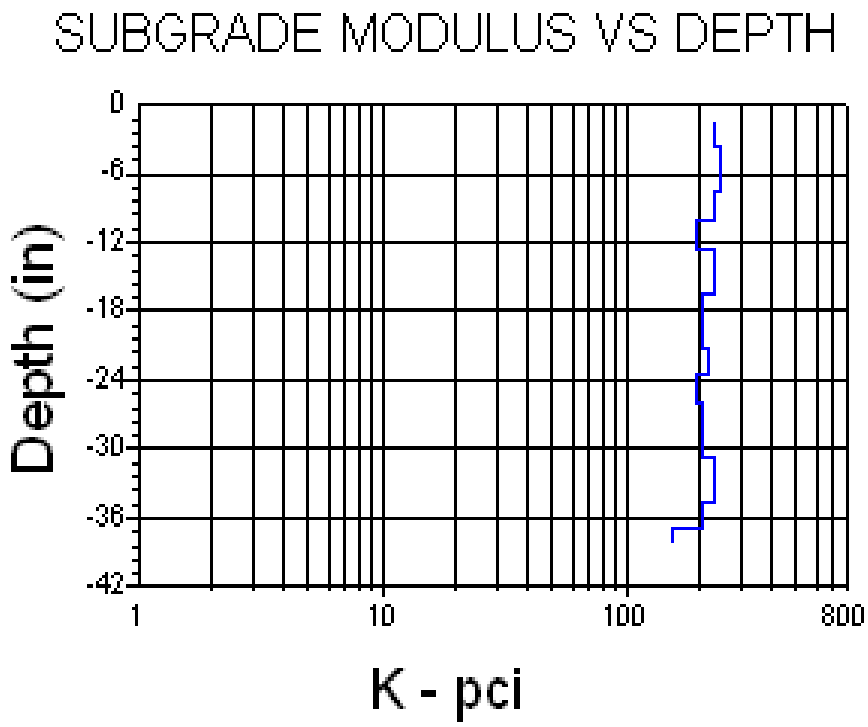

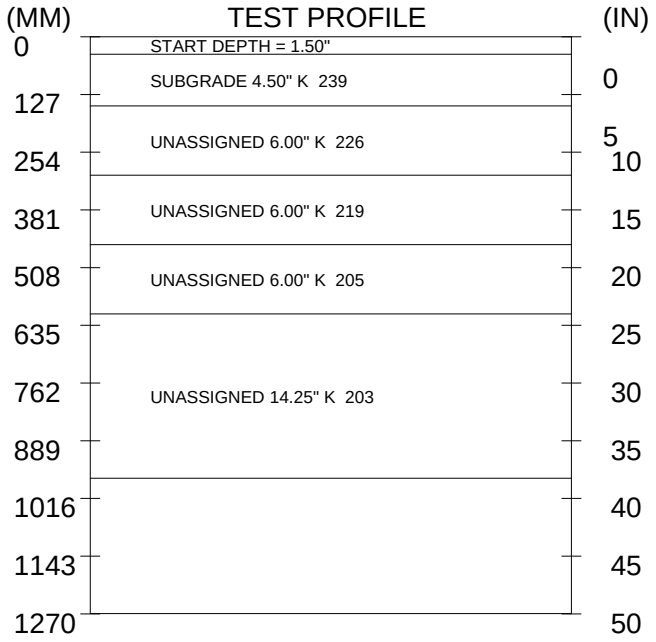

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Project: Unit Operations Facilities (COF)

Date: 21 May 2010

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Station: 10A2S-COF-15

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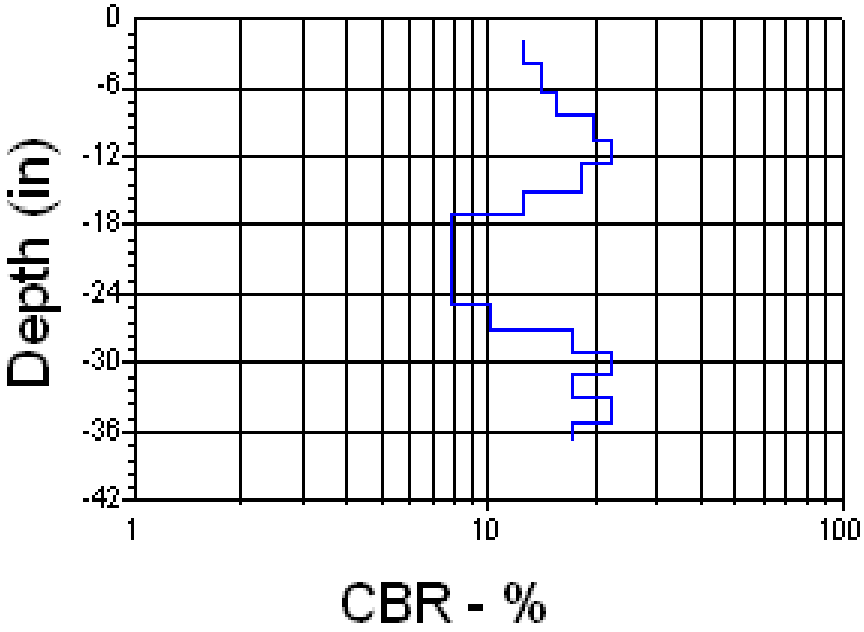

TEST PROFILE

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127		
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254		10
	UNASSIGNED 6.00" CBR 15	
381		15
	UNASSIGNED 6.00" CBR 8	
508		20
635		25
	UNASSIGNED 13.25" CBR 17	
762		30
889		35
1016		40
1143		45
1270		50

DCP TEST DATA

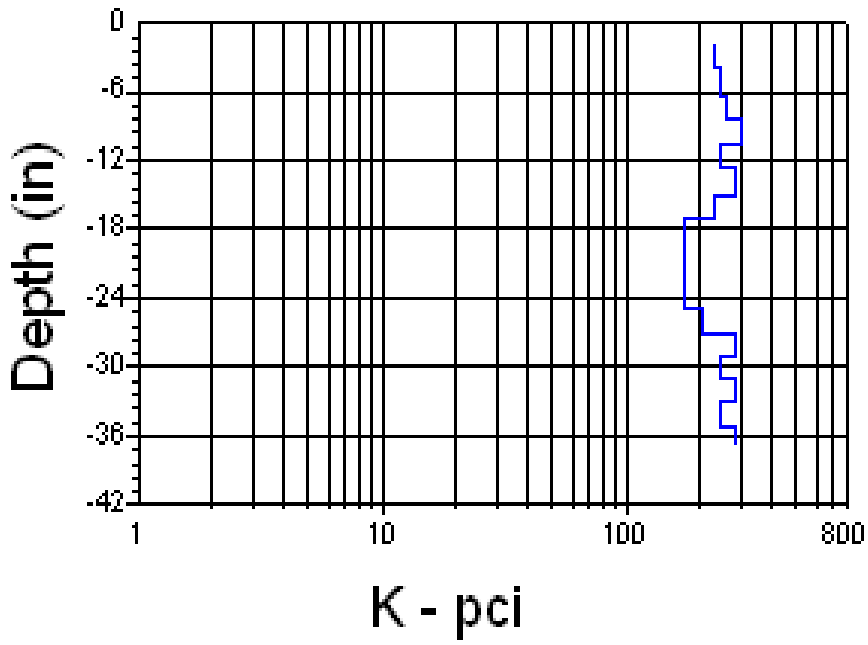
Project: Unit Operations Facilities (COF)

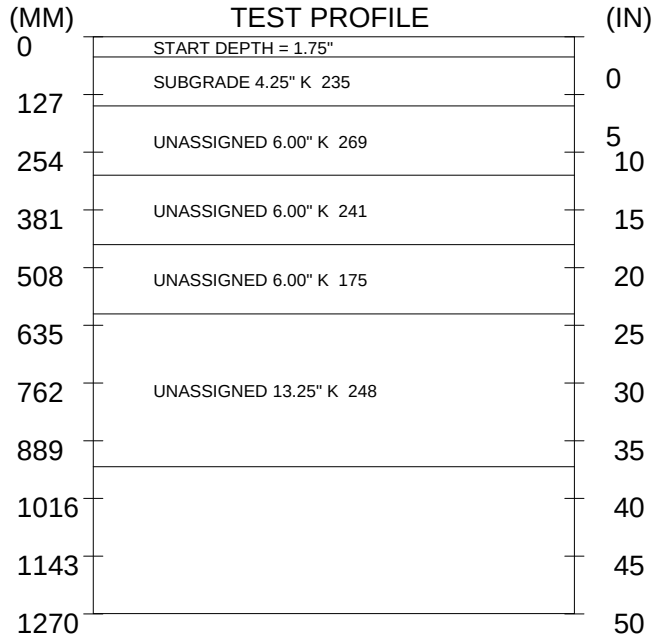
Date: 21 May 2010

Feature: 10A2S-COF-15

Station: 10A2S-COF-15

SUBGRADE MODULUS VS DEPTH





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Project: Unit Operations Facilities (COF)

Date: 21 May 2010

Feature: 10A2S-COF-16

Station: 10A2S-COF-16

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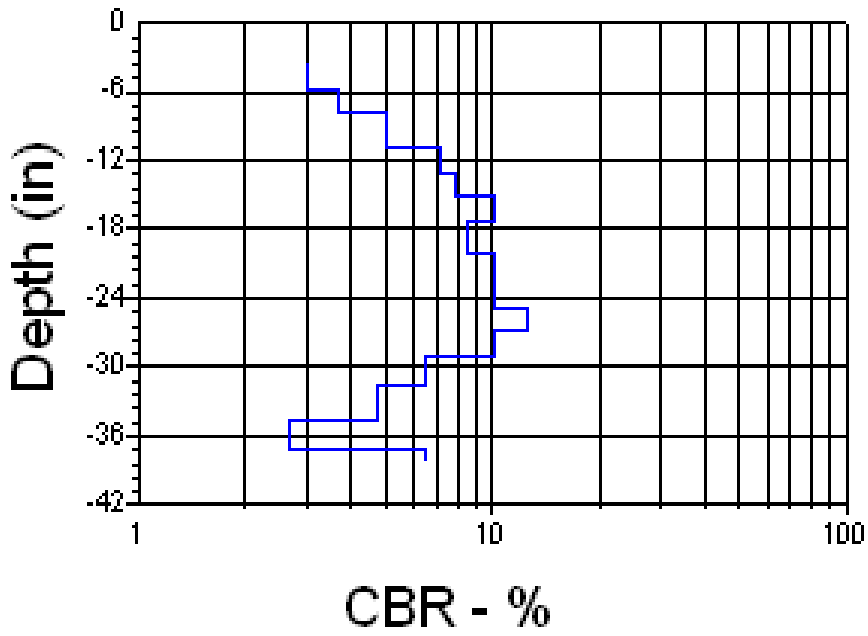

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	UNASSIGNED 6.00" CBR 9	
381		15
	UNASSIGNED 6.00" CBR 10	
508		20
635		25
762	UNASSIGNED 14.50" CBR 7	30
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1016		40
1143		45
1270		50

DCP TEST DATA

Project: Unit Operations Facilities (COF)

Date: 21 May 2010

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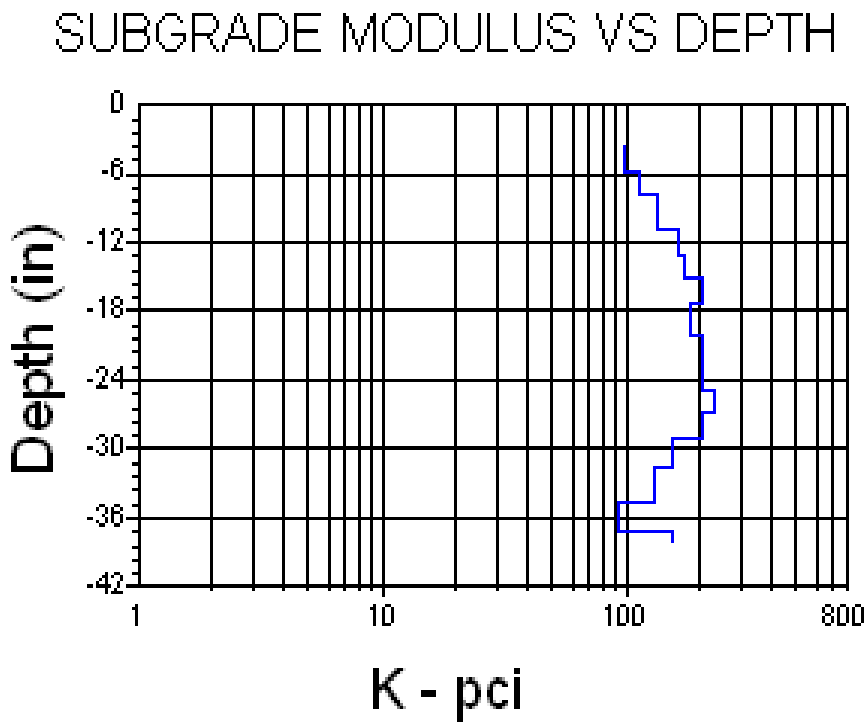
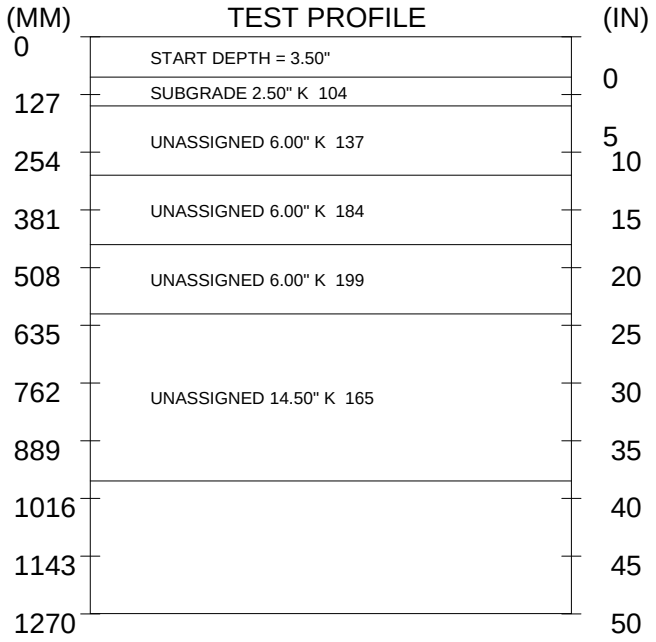
Station: 10A2S-COF-16





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Date: 21 May 2010

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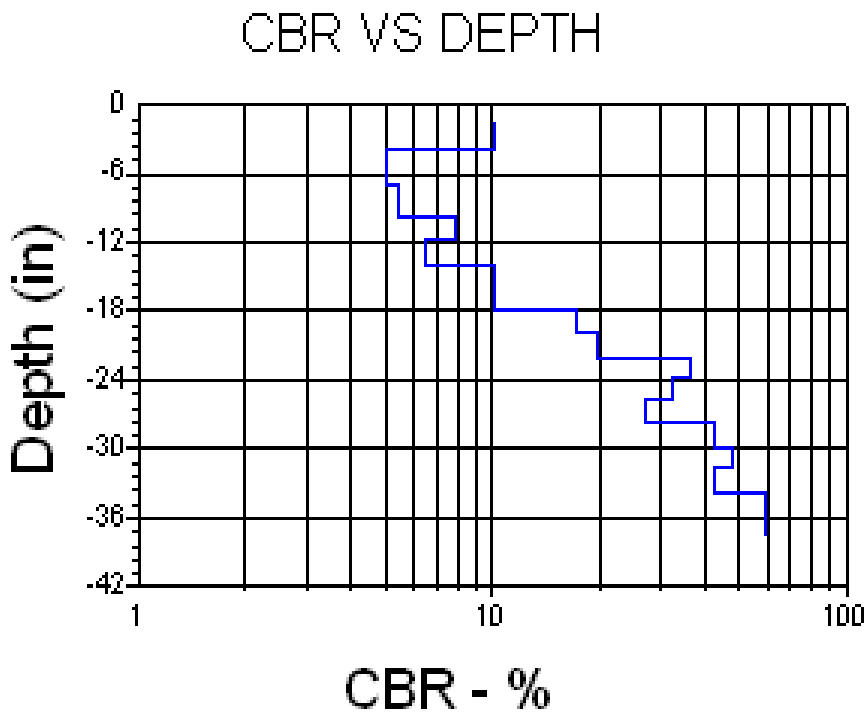

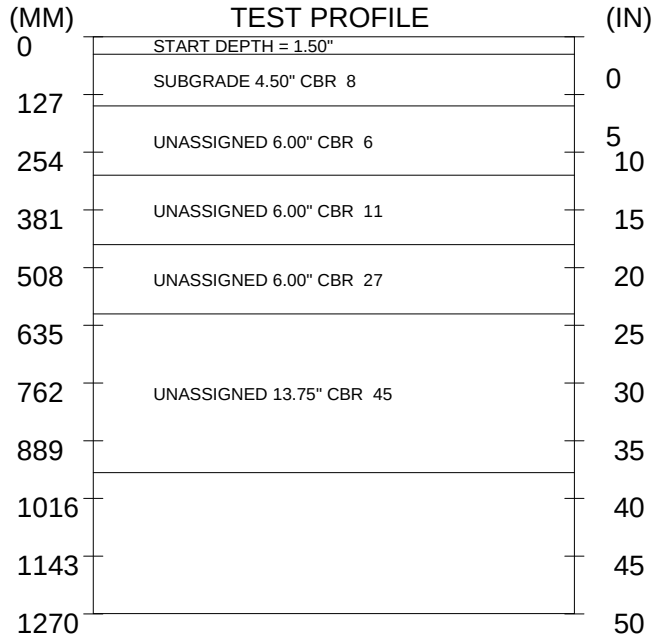

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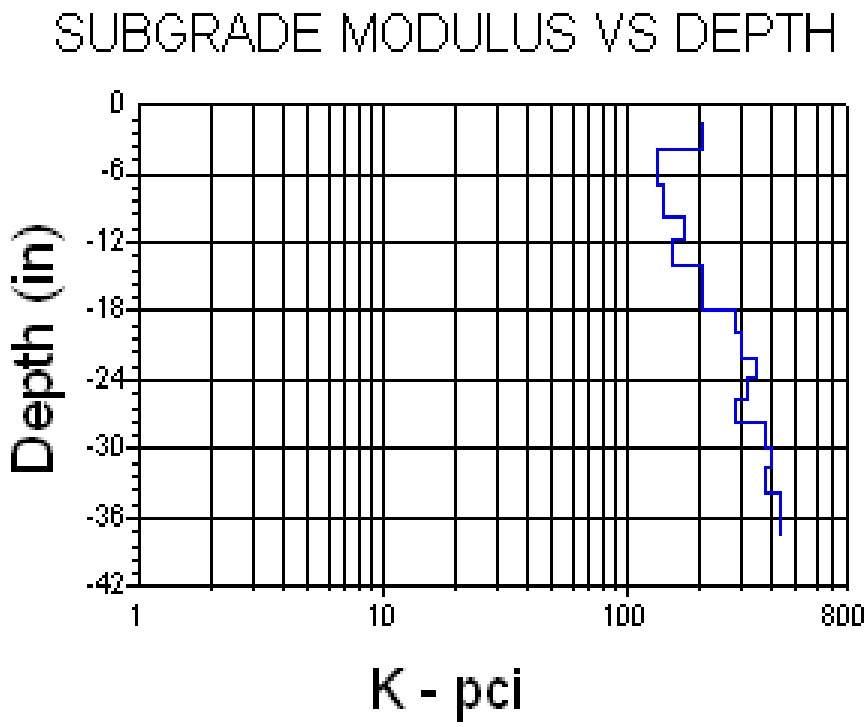
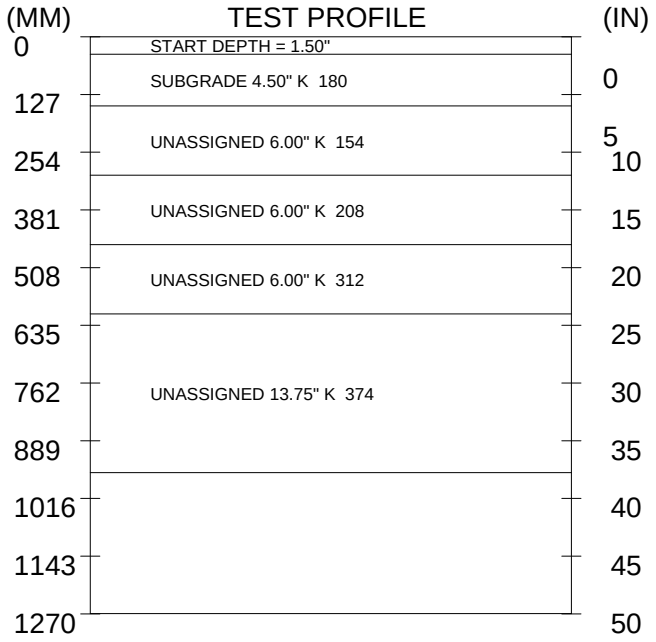




DCP TEST DATA

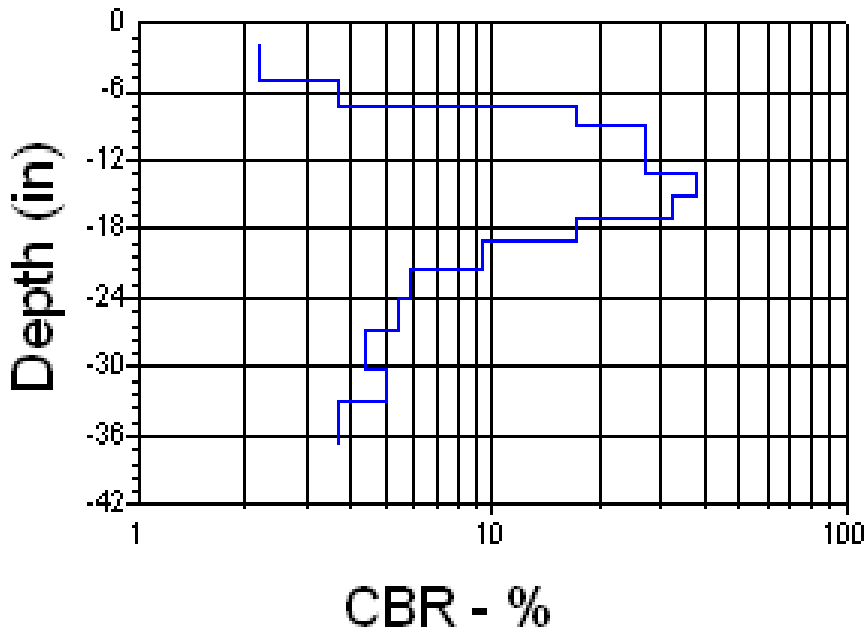
Project: Unit Operations Facilities (COF)

Date: 21 May 2010

Feature: 10A2S-COF-20

Station: 10A2S-COF-20

CBR VS DEPTH



TEST PROFILE

(MM)		(IN)
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127		
	UNASSIGNED 6.00" CBR 20	5
254		10
	UNASSIGNED 6.00" CBR 31	
381		15
	UNASSIGNED 6.00" CBR 10	
508		20
635		25
	UNASSIGNED 13.25" CBR 5	
762		30
889		35
1016		40
1143		45
1270		50

DCP TEST DATA

Project: Unit Operations Facilities (COF)

Date: 21 May 2010

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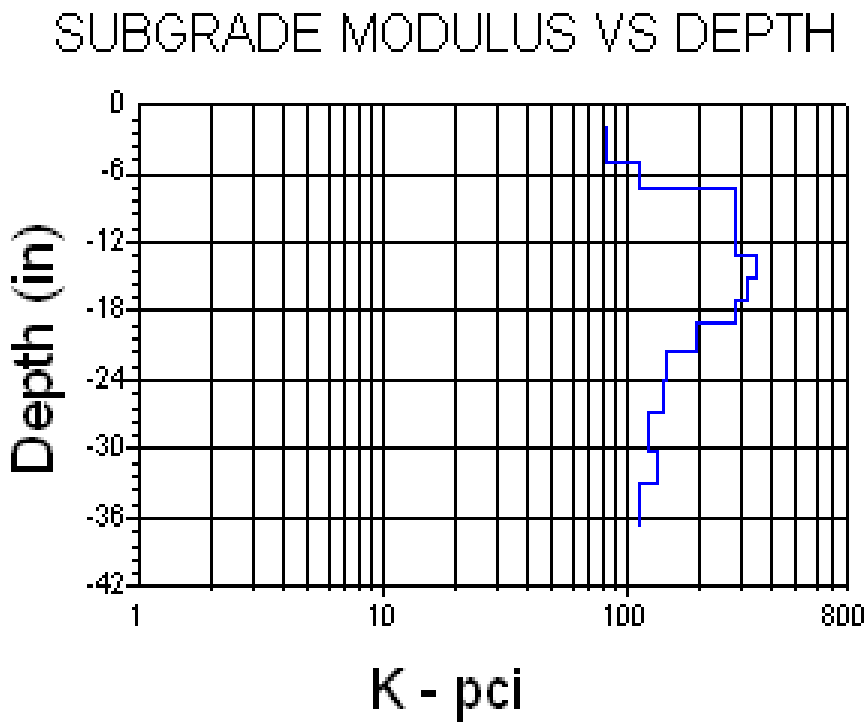
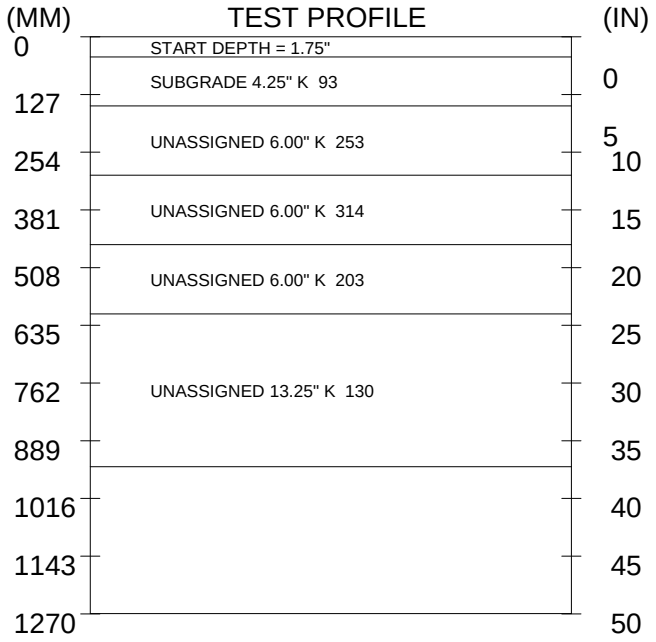
Station: 10A2S-COF-20





APPENDIX E

MAT FOUNDATION DESIGN CRITERIA

WALLACE

DEPARTMENT OF THE ARMY
SOUTHWESTERN DIVISION, CORPS OF ENGINEERS
1114 COMMERCE STREET
DALLAS, TEXAS 75242-0216

REPLY TO
ATTENTION OF

29 JAN 1988

CESWD-ED-TS/G (415a)

MEMORANDUM FOR:

Commander, Albuquerque District, ATTN: CESWA-ED
Commander, Fort Worth District, ATTN: CESWF-ED-DT
Commander, Galveston District, ATTN: CESWG-ED
Commander, Little Rock District, ATTN: CESWL-ED
Commander, Tulsa District, ATTN: CESWT-ED

SUBJECT: Design Criteria for Ribbed Mat Foundations

1. This letter supersedes criteria letter, SWDED-TS/G, 23 Dec 1986, SAB.

2. The enclosed criteria shall be used for design of all ribbed mat foundations. This criteria has been revised to conform with the definition of swell pressure (soil-beam interface pressure) as presented in criteria letter, SWDED-G, 16 Apr 1987, subject: Criteria for Developing Geotechnical Design Parameters for SWD Ribbed Mat Design Methodology. Also, clarification has been provided for application of the PTI design method to family housing.

3. This criteria is furnished to addressees only.

FOR THE COMMANDER:

ARTHUR D. DENYS, P.E.
Chief, Engineering Division

Encl

DESIGN OF RIBBED MAT FOUNDATIONS

BY

JOSEPH P. HARTMAN

AND

B. H. JAMES

U.S. ARMY CORPS OF ENGINEERS

SOUTHWESTERN DIVISION

DALLAS, TEXAS

REVISED

JANUARY 1988

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APPENDIX A - COMMENTARY ON PART II

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PART I - GENERAL REQUIREMENTS FOR RIBBED MATS

1. REFERENCES.

1.1 Engineering Instruction Manual, Corps of Engineers, Southwestern Division, (latest edition).

1.2 "Criteria for Selection and Design of Residential Slabs-on-Ground," Building Research Advisory Board (BRAB), Report No. 33 to the Federal Housing Administration, 1968.

1.3 "Design and Construction of Post-Tensioned Slabs-on-Ground," Post Tensioning Institute (PTI), 1980.

1.4 TM 5-818-7, Foundations in Expansive Soils, Corps of Engineers, 1983.

1.5 Letter, SWDED-G, 16 April 1987, Criteria for Developing Geotechnical Design Parameters for Ribbed Mat Design Methodology (Criteria Letter XV 7-12).

2. BACKGROUND. Ribbed mat foundations consist of a thin slab on grade which acts monolithically with a grid of stiffening beams beneath the slab. The beams (ribs) are cast in trenches dug in the foundation soil. Ribbed mats combine the economic advantages of shallow foundations with the performance advantages of monolithic floors. Ribbed mats are especially useful for minimizing differential foundation movements in areas with expansive soils.

3. DESIGN METHODS.

3.1 EXPANSIVE SOILS.

3.1.1 Behavior.

3.1.1.1 Center Lift. In the center lift condition the soil near the edge of the slab drops in relation to the soil near the center. This is due to moisture retention by the interior soils and the drying and shrinking of perimeter soils. As this occurs, the perimeter soil provides less support for the edge of the slab which then acts as a cantilever. This is illustrated in Figure A1 of Appendix A.

3.1.1.2 Edge Lift. In the edge lift condition the soil near the edge of the slab rises in relation to the soil near the center. This is due to the increasing moisture content and subsequent swelling of soil near the edge. The swelling soil raises the edge of the slab, causing some of the slab to lift off the soil. Interior loads cause the slab to sag and recontact the soil at some interior location. The slab thus tends to act as

a beam, simply supported by the soil at the edge, and by soil towards the center of the slab. The amount of support at the center depends on numerous parameters such as interior loads, rib bending stiffness, soil swell pressures, and the magnitude of soil swelling. Typical edge lift behavior is illustrated in Figure A3 of Appendix A.

3.1.2 SWD Method. All ribbed mats on expansive soils, except for family housing, shall be designed in accordance with the provisions of Part II of this report. Ribbed mats for family housing may be designed in accordance with Part II or paragraphs 3.1.3 or 3.1.4.

3.1.3 PTI Method. The PTI method (reference 1.3) may only be used for design of family housing foundations on expansive soils. Specifically, slab width (short dimension) should not exceed 40 feet, rib depths should not exceed 30 inches, loading should consist only of perimeter loads and light interior distributed loads ($DL+LL \leq 100$ psf), soils should be fairly weak in-situ materials with no extensive substitution of non-expansive fill. When using the PTI method, the following provisions shall apply: Rib spacing shall not exceed 15 feet; concrete tensile stress shall not exceed $4\sqrt{f'c}$; the minimum effective prestress shall be 100 psi.

3.1.4 BRAB Method. The BRAB report (reference 1.2) may only be used for design of foundations for family housing. However, the PTI method is preferred, since the BRAB method may produce unreasonable results for large foundations.

3.1.5 Computer Method. In lieu of paragraph 3.1.2, ribbed mats may be designed using appropriate computer programs. Such programs must be capable of modeling the variable soil swell due to moisture changes, and the non-linear soil-structure interaction near the perimeter of the foundation. One such computer program is CBEAMC, program X0050 in the Corps of Engineers Civil Engineering Library.

3.1.6 Load Factors. When using the above methods to design ribbed mats for center lift and edge lift conditions, load factors may be multiplied by .75 (strength method) or allowable stresses may be increased by one-third (working stress method). This provision does not apply to the allowables given for the PTI method, since those allowables have already been increased from the usual provisions of ACI.

3.2 NON-EXPANSIVE SOILS. Ribbed mat slabs on non-expansive soils need not be designed for bending due to center lift or edge lift conditions. Beam on elastic foundation analyses may be used to determine the effects of concentrated loads on ribs, or ribs may be designed as conventional strip or spot footings.

3.3 SOIL PROPERTIES. Soil properties for design of ribbed mats will be provided in the Foundation Design Analysis by the Corps of Engineers. Criteria for developing these properties is included in reference 1.5. The properties necessary for design in accordance with paragraph 3.1.2 consist of the following, which are defined in Appendix A:

qa - allowable bearing pressure
k - subgrade modulus
Ym - soil heave
Lm - edge moisture variation distance
Psw - pressure of swelling soil acting on perimeter rib

4. MINIMUM REQUIREMENTS.

4.1 SUBGRADE PREPARATION. A vapor barrier, capillary water barrier, and a minimum of 18 inches of non-expansive fill will normally be used beneath ribbed mats. Additional non-expansive fill will often be used to lessen the effects of highly expansive soils. These requirements will be detailed in the Foundation Design Analysis.

4.2 SLAB. For family housing and other small lightly loaded buildings a 4 inch slab may be used. For other buildings the minimum slab thickness will be 5 inches. Minimum slab reinforcing shall be 0.2 percent. Where slabs are subjected to vehicular loading they must be designed for the maximum wheel load, similar to paving. Use 650 psi flexural strength concrete for slabs subject to wheel loads.

4.3 GRID GEOMETRY. Ribs should be located to form a continuous grid. Rib spacing should not exceed 20 feet in expansive soils, or 25 feet in non-expansive soils. Locations of ribs should conform to significant wall and column loads, and may be used to resist thrusts from rigid frame reactions. Ribs should be provided around large openings in the slab. In expansive soils diagonal ribs are required at exterior corners.

Expansion joints should be provided at 250 foot intervals, and should also be used to break irregularly shaped buildings into rectangular segments. Foundations for family housing do not require expansion joints due to irregular shapes.

4.4 RIB SIZE. Minimum rib depth is 20 inches. Rib depths should usually not exceed 3 feet to minimize construction difficulties related to placing reinforcement and maintaining trench walls. If deeper ribs are used, rib width should also be increased. Minimum rib width is 12 inches except for family housing foundations, where 10 inch ribs may be used. Sufficient rib width must also be provided to transfer wall and column loads to the soil as strip footings. The allowable soil bearing capacity may not be exceeded when considering the width of the rib plus an effective slab width on each side of the rib. The

effective slab width for bearing is limited to the thickness of the slab. At column locations an alternate is to provide fillets at rib intersections, sufficient to act as spot footings for column loads.

4.5 RIB CAPACITY. Concrete should have a minimum compressive strength of f'c=3000 psi at 28 days. Reinforcing shall be grade 60, except ties may be grade 40. Minimum reinforcing ratio (As/Ag) shall be .0033 top and .0033 bottom, this may be reduced to .005 total in non-expansive soils. Use #3 ties at 24 inches, minimum. These minimums should be sufficient for shrinkage stresses and for unpredictable soil behavior.

4.6 PRESTRESSED MATS. For prestressed ribbed mats, not designed per PTI, all the above minimum requirements apply except that slab and rib top reinforcement may be deleted and replaced by appropriate post-tensioning strands. Mild steel shall still be provided in the bottom of ribs. Minimum effective prestress shall be 100 psi on the gross area of the slab, including effects of subgrade friction as calculated by the PTI method, reference 1.3. Concrete tensile stress shall be limited to $3\sqrt{f'c}$ and shear stress limited to $1.1\sqrt{f'c}$. A one-third overstress may be allowed per paragraph 3.1.6.

4.7 CONSTRUCTION DETAILS.

4.7.1 Conventionally Reinforced. Construction joint spacing should not exceed 50 feet in either direction. A horizontal construction joint may be provided in the ribs at the base of the capillary water barrier when unstable trench walls may cause construction difficulties. However, this joint is discouraged because of increased potential for shrinkage cracks in the slab.

4.7.2 Prestressed. Construction joint spacing shall not exceed 75 feet in either direction. Tendons within each placement shall be stressed to 15 percent of the final prestress not more than 24 hours after the concrete has attained sufficient strength to withstand the partial prestress. Other construction procedures for prestressed ribbed mats shall conform to reference 1.3.

4.7.3 Contractor Designs. Ribbed mat foundations may be designed as prestressed or conventionally reinforced as selected by the engineer. The plans and specifications shall not include the option of changing the ribbed mat from one type to another. The reason for this prohibition is that design parameters (e.g., moments of inertia) may be dependent on the type of ribbed mat being designed and may affect calculated shears and moments. This does not prohibit revisions of the slab type as a result of contractor value engineering proposals. However, such revisions must include a complete design of the ribbed mat foundation using appropriate design parameters in accordance with this report.

PART II - ANALYSIS OF RIBBED MAT FOUNDATIONS ON EXPANSIVE SOILS

1. SCOPE. This part of the report contains the basic rules for design of ribbed mats in expansive soils. This method may be used to predict shears, moments and deflections in ribs subject to soil movement due to changing moisture content. For a commentary on the design method refer to Appendix A; for example design calculations refer to Appendix B. The design method from Part II should be used in conjunction with the "minimum requirements" for ribbed mats, as presented in Part I.

2. GENERAL

2.1 NOTATION.

- C = Correction factor for equivalent cantilever length
- D = Beam deflection (IN)
- I = Moment of inertia per foot, I=Ir/S (IN^4/FT)
- Ir = Moment of inertia of rib (IN^4)
- * k = Modulus of subgrade reaction (PCI)
- Lo = Basic length of cantilever (FT)
- Lc = Equivalent length of cantilever, center lift (FT)
- Le = Equivalent length of simple beam, edge lift (FT)
- Li = Distance from perimeter to location of interior load (FT)
- * Lm = Edge moisture variation distance (FT)
- Lb = Width of soil bearing at perimeter, edge lift (FT)
- M = Bending moment per foot (FT-LB/FT)
- Mr = Bending moment per rib, Mr=MxS (FT-LB)
- Pi = Interior load (PLF)
- Pp = Perimeter load (PLF)
- * Psw = Pressure of swelling soil on perimeter rib (PSF)
- R = End reaction at perimeter for equivalent simple beam (PLF)
- S = Rib spacing (FT)
- w = Uniform load (PSF)
- V = Shear per foot (LB/FT)
- Vr = Shear per rib, Vr=VxS (LB)
- * Ym = Soil heave (IN)
- θ = Rotation of support of equivalent cantilever (RAD)

* q_a = ALLOWABLE BEARING PRESSURE (PSF)

2.2 UNITS. The equations presented in section 3 are written for units as defined in the above notation. If other units are used the equations must be modified appropriately.

2.3 RIB DEFINITIONS. Ribs are defined as perimeter, transverse or diagonal as shown in Figure 1. Note that transverse refers to ribs parallel to either axis of the building.

* VALUES NEEDED FROM GEOTECH

FIGURE 1 - RIB DEFINITIONS

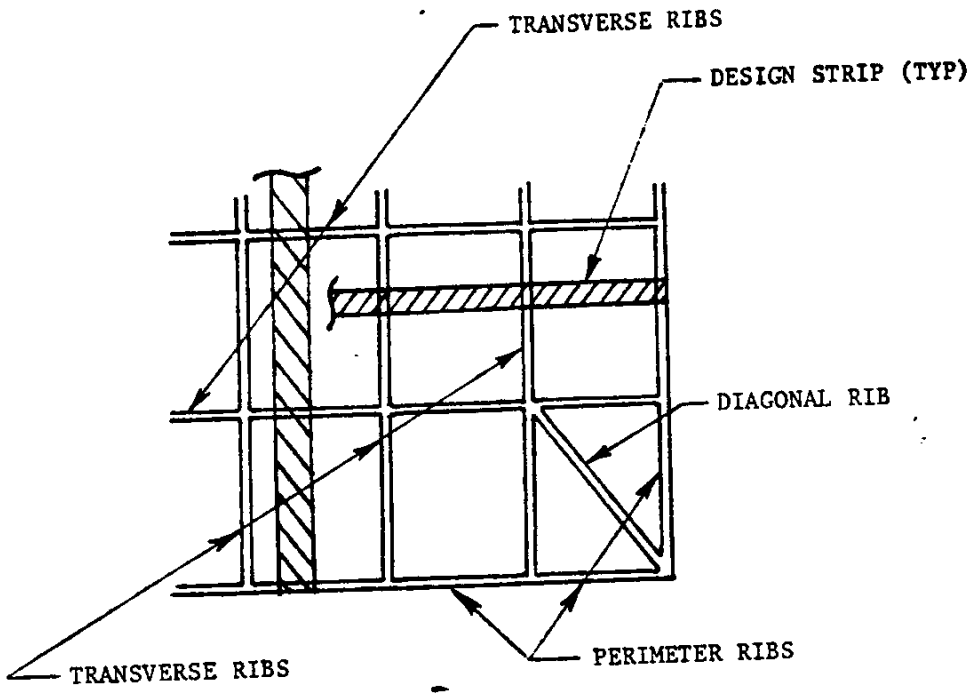
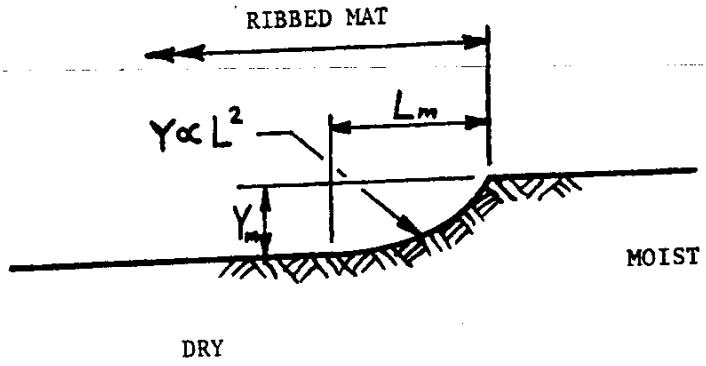


FIGURE 2 - SOIL EDGE PROFILE



2.4 STRIP ANALYSIS. The analysis is based on a strip assumption, ignoring the effects of the grid configuration of the ribs. The formulas and examples presented below are for an equivalent 1-foot strip, using "per foot" values for loads and stiffness.

2.5 SOIL EDGE PROFILE. For edge lift the maximum swell occurs at the perimeter and decreases rapidly toward the interior. The soil profile is assumed to be parabolic (in the unloaded condition) and is illustrated in Figure 2.

3. ANALYSIS METHOD.

3.1 TRANSVERSE RIB - CENTER LIFT.

3.1.1 General. Center lift analysis is based on an equivalent cantilever beam to determine moments, shears and deflections.

3.1.2 Moment. The length of the equivalent cantilever can be calculated as:

$$Lc = C \times Lo$$

where: $Lo = 2.3 + .4\ Lm$

$$C = .8\ Ym^{.12}\ I^{.16} / Pp^{.12}$$

The maximum moment may then be calculated from statics using conventional cantilever formulas such as:

$$M = Pp\ Lc + 1/2\ w\ Lc^2$$

The moment can then be assumed to be constant for a distance Lc/2 and then to decrease linearly to zero at a distance 5Lc from the perimeter. To obtain the design moment for a given rib, multiply the calculated per-foot moment by the appropriate rib spacing ($Mr = M \times S$).

3.1.3 Shear. The maximum shear may be calculated from statics using the same equivalent cantilever as for moment.

$$V = Pp + w\ Lc$$

The shear may then be assumed to decrease linearly from V at the cantilever support, to zero at a distance 5Lc from the perimeter. To obtain the design shear for a given rib, multiply the calculated per-foot shears by the appropriate rib spacing ($Vr = V \times S$).

3.1.4 Deflection. Deflection at the perimeter is the sum of three components: bending deflection of the equivalent cantilever, vertical translation of the cantilever support, and rotation

of the cantilever support. Rotation of the support may be calculated as:

$$\theta = M^{1.4} / 9800\ I\ k^{.5}$$

The perimeter deflection is then:

$$D = .11 + 12\ Lc\ \theta$$

where .11 inches is an approximation for the support translation plus the cantilever bending, and (12 Lc) is the length in inches.

Use the deflection calculated above to compare with allowable deflection. The allowable deflection may be determined by using 4Lc as the length between points of zero and maximum deflection.

3.2 TRANSVERSE RIB - EDGE LIFT.

3.2.1 General. Edge lift analysis is based on an equivalent simple beam, supported at the perimeter and at some interior location.

3.2.2 Deflection. The first step in calculating deflection is to determine the length of the equivalent simple beam. The appropriate length depends on many parameters, including the deflection. Therefore, deflection must first be estimated to determine equivalent length, then a deflection is calculated based on that length. The process is repeated until calculated deflection matches the assumed deflection. The equivalent simple beam length may be calculated as:

$$Le = 7.5\ I^{.17}\ Li^{.37}\ D^{.12} / w^{.07}\ Pi^{.11}$$

The perimeter end reaction for this beam may be calculated from statics. For a given case the reaction may be:

$$R = Pp + 1/2\ w\ Le + Pi(Le-Li)/Le$$

The width of soil bearing at the perimeter can be approximated as:

$$Lb = 1.1\ (R/Psw)$$

where Psw is selected from a curve of heave versus bearing pressure, corresponding to the estimated deflection used during this iteration (see reference 1.5).

The edge deflection is found by determining the soil swell at a distance Lb from the perimeter, based on the parabolic swell profile:

$$D = Ym(Lm-Lb)^2/Lm^2$$

When satisfying deflection criteria, use the calculated deflection and equivalent simple beam length.

3.2.3 Moment. Once the simple beam equivalent length has been determined, the bending moments may be calculated based on statics. To obtain rib design moments, multiply per-foot moments by the rib spacing.

3.2.4 Shear. Once the simple beam equivalent length has been determined, the shears may be calculated based on statics. To obtain rib design shears, multiply per-foot shears by the rib spacing. Near the interior support the design shear need not exceed:

$$V = Pi + w(Le-Li)$$

This is due to the effects of the actual distributed soil support, rather than the point support assumed in the simple beam analysis.

3.2.5 Special Cases. If Pi=0 or if Li>Le make the following substitution in the equation for Le:

$$1.4 = Li^{.37} / Pi^{.11}$$

The equation for the simple beam length then becomes:

$$Le = 10.5\ I^{.17}\ D^{.12} / w^{.07}$$

3.3 PERIMETER RIB.

3.3.1 Center Lift. For center lift the perimeter rib will have no support from the soil and must be designed to span between transverse ribs for the perimeter wall loads.

3.3.2 Edge Lift. For edge lift the soil pressure on the perimeter rib will exceed the applied perimeter loads. The perimeter rib must designed to span between transverse ribs for this net upward force.

3.4 DIAGONAL RIB. Diagonal ribs are used to support exterior corners for center lift conditions, if loss of support occurs under both perimeter ribs. Diagonal ribs must be designed to provide the same moment and shear capacity as the larger of the two adjacent transverse ribs.

3.5 INTERIOR RIB. Interior ribs and rib intersections should be located at significant wall and column loads. The ribs can be designed for these loads as strip or spot footings, using beam-on-elastic-foundation methods. Differential soil movement due to moisture change is assumed not to occur except at the perimeter. However, to account for unpredictable interior soil movements, interior ribs must have the minimum size and capacity as required in Part I.

APPENDIX A - COMMENTARY ON PART II

1. SCOPE. Actual behavior of ribbed mats in expansive soils involves complex, non-linear, soil-structure interaction. The best solution for such behavior is provided by computer programs. The hand design method has been developed to approximate such computer results. Hand solutions have been checked by computer analyses; results have been within acceptable limits of error. However, such checks have been made only for a limited range for each design parameter, as shown in Table A1, corresponding to the usual values for military construction within Southwestern Division. If a wider range of parameters is applied to the hand design formulas, the results may be less accurate.

TABLE A1

Parameter	Units	Minimum	Maximum
k	pci	50	200
Ym	in	0.5	3.0
Lm	ft	2	8
I	in^4/ft	750	6000
Pp	lb/ft	1000	5000
Pi	lb/ft	0	5000
Li	ft	6	20
w	psf	100	250
Psw	psf	2000	8000

2. GENERAL.

2.1 NOTATION.

Ir = moment of inertia of rib. For non-prestressed rib mats Ir should be the effective moment of inertia, calculated per ACI 318, Section 9.5.2.3.

k = Modulus of subgrade reaction. This parameter is the ratio of the soil pressure at the base of the concrete and the corresponding settlement. Since modulus values are typically determined by plate-load test at the ground surface, they should be corrected for depth and for footing size (expected high pressure area between concrete and soil). Analyses have indicated that the high bearing pressure area for center lift conditions will occur in an area several feet long parallel to the transverse rib and several feet on each side of the rib. A crude approximation for this area would be 5 feet square. This approximation should be adequate for design, since calcualations are not sensitive to small changes in the modulus of subgrade reaction.

qa = Allowable bearing pressure. This is the safe bearing capacity of the soil at the base of the ribs. A factor of safety of 3.0 is recommended for computing this value.

Lm = Edge moisture variation distance. This represents the distance, inward from the edge of the slab, over which the moisture content of the soil changes. Much judgement is required in determining this value.

Psw = Pressure of swelling soil on perimeter rib. This is the interface pressure between the soil and the base of the exterior rib, due to an increase in soil moisture content. The pressure which can be exerted by the swelling soil is dependent on the amount the surface of the soil is allowed to rise. Therefore Psw is usually presented as a curve of pressure versus heave, as described in reference 1.5 of Part I. The actual upward deflection of the edge of the slab is a complex interaction between swell potential, structural loads, and mat stiffness, all of which combine to determine the interface pressure near the perimeter.

Ym = Soil heave. This is the differential vertical movement of the soil representing either soil heave (edge lift) or soil shrinkage (center lift). The magnitude of Ym is the computed vertical movement of a particle of soil at the ground surface due to a change in moisture content. This value should be based on the accumulation of potential volume changes for the full thickness of the active zone (Za), with no significant loads applied to the foundation. The value of Ym may differ for edge lift and center lift conditions.

Pi, Pp, w = Applied loads. Loads should consist of full dead plus live loads, including dead load of the slab and ribs.

2.2 UNITS.

2.3 RIB DEFINITIONS.

2.4 STRIP ANALYSIS. The hand solution formulas have been developed for analysis of an equivalent 1 foot strip. This is convenient for uniform loads and for soil properties, but requires some calculations for appropriate concentrated loads and bending stiffness. Rib stiffness must be divided by rib spacing to get the per-foot stiffness. If column loads exist they must also be divided by the rib or column spacing to provide an equivalent load per foot. If interior wall loads are parallel to the transverse rib, they must be divided by the rib spacing. These calculations are illustrated in Appendix B.

2.5 SOIL EDGE PROFILE. The edge lift condition occurs when increased moisture content swells exterior soils, and this effect extends under the edge of the slab. The center lift condition occurs when soils under the slab are generally moist and seasonal drying occurs on the exterior, again extending under the slab. This causes the soil to shrink away from the edge of the slab.

The analysis method is based on an assumed parabolic swell profile which occurs uniformly along the perimeter. This is a convenient idealization of actual soil behavior, which is certainly more erratic. However, the parabolic profile has better correlation with measured swells than do other possible edge profile assumptions. Note that the soil profile is not used in the hand design formulas for center lift. However, a parabolic profile was used in the computer analyses for center lift, which formed the basis for the hand design forumlas.

3. ANALYSIS METHOD. Many of the formulas for shears, moments and reactions are idealized, assuming Pp and R are exactly at the perimeter and that w extends to the perimeter. These approximations should usually be acceptable, but the formulas may be modified to account for actual load patterns.

3.1 TRANSVERSE RIB - CENTER LIFT

3.1.1 General. Typical behavior of a transverse rib for center lift conditions is shown in Figure A1. This illustrates the soil bearing pressure and the shear, moment and deflection. Note that the effects of the soil movement extend much farther than the moisture variation distance. The moment and shear distribution close to the edge resemble cantilever behavior.

3.1.2 Moment. The extent of significant moments is illustrated in Figure A1. The length of the equivalent cantilever can be taken as a basic length (Lo) which is dependent on the moisture variation distance, times a correction factor (C) which accounts for secondary effects of several parameters. The value of the correction factor will usually be slightly greater or less than unity. The correction factor was developed to permit accurate approximations of computer results. It was developed from the ratios of actual values to usual values for significant parameters. For example, the "usual" values are: Ym = 1 in, I = 1500 in^4/ft, Pp = 3000 lb/ft. Thus:

$$C = (Ym/1.0)^{.12} (I/1500)^{.16} (3000/Pp)^{.12}$$

$$C = .8\ Ym^{.12}\ I^{.16}/\ Pp^{.12}$$

A similar approach was used to develop all the formulas in Part II which have an exponential format.

3.1.3 Shear. Maximum shear occurs near the support of the equivalent cantilever. The extent of significant shears is illustrated in Figure A1.

3.1.4 Deflection. Formulas for deflection include an assumed concrete modulus of elasticity Ec = 3,320,000 psi, for both center lift and edge lift.

Vertical movement at the perimeter is much greater than the bending deflection of the equivalent cantilever. To predict the deflection it is necessary to consider translation and rotation at the support of the equivalent beam. The most significant component is due to rotation at the support. These

components of deflection are shown in Figure A2. The sum of the cantilever bending and the support translation are approximated by the value 0.11 inch. The percent error due to this approximation is negligible when total deflections are large. The percent error is greater when total deflections are small, but then the deflections are not significant anyway.

Allowable deflections (see Part I, reference 1.1) are expressed as a ratio of the difference in vertical movement at any two points, compared to the distance between those points. For example: $D \leq L/600$, where D is the differential displacement. In such formulas it is appropriate to use the point of maximum deflection and a point of near-zero deflection as the two measuring points. For center lift behavior the maximum deflection occurs at the perimeter, and deflections tend to die out at approximately 4Lc (four times the equivalent cantilever length) from the perimeter. Therefore, the ratio D/4Lc is appropriate for comparison with allowable deflections.

3.2 TRANSVERSE RIB - EDGE LIFT.

3.2.1 General. Typical behavior of a transverse rib for edge lift conditions is shown in Figure A3. This illustrates the soil bearing pressure and the shear, moment and deflection. Soil swell lifts the edge of the ribbed mat, which actually rises off the soil for some distance from the perimeter. For shear and moment, this portion of the rib acts as a simply supported beam spanning between soil support at the perimeter and at an interior location.

3.2.2 Deflection. Vertical movement at the perimeter is driven by the tendency of the soil to swell, and is resisted by the downward loads applied on the soil. As the soil swells at the perimeter the slab is lifted off the interior soil. This concentrates soil reactions near the edge, causing very high pressures. The pressures rise so high that they limit the capacity of the soil to swell. Thus, the soil cannot swell as much as it would if not loaded. Deflections can be predicted by balancing the upward force of the soil (the swell pressure times the bearing width) with the downward force of applied loads. This downward force can be determined from statics once an equivalent simple beam length is determined. The method for determining the deflection is shown in Figure A4.

Allowable deflections are expressed as ratios, as discussed in the commentary on paragraph 3.1.4. From Figure A3 it can be seen that the appropriate values for this ratio are the edge deflection and the equivalent simple beam length (D/Lc).

Edge lift deflections are mainly a function of soil properties and applied loads, bending stiffness of the ribs has only a secondary effect. Therefore, it may not be possible to control deflections by increasing the rib stiffness. It may be necessary to accommodate calculated deflections by using a less brittle superstructure or by detailing the superstructure to make it less sensitive to deflections. Or it may be necessary to modify soil properties to minimize the edge heave.

3.2.3 Moment. The moments can be calculated by statics, using the equivalent simple beam. The maximum moment will occur at the point of zero shear. Note that the maximum moment is quite sensitive to the beam length, therefore the iterative solution for deflection and appropriate swell pressure must converge accurately before calculating moments.

3.2.4 Shear. Shears can also be calculated by statics from the equivalent simple beam. Note that shears will reduce gradually to near-zero around the interior end of the beam because of the distributed soil support.

3.2.5 Special Cases. If no concentrated interior load exists, or if it is very far from the perimeter, the formula for the simple beam length must be adjusted as shown. This adjusted formula was also developed to duplicate results from computer solutions.

3.3 PERIMETER RIB.

3.4 DIAGONAL RIB.

3.5 INTERIOR RIB. Potential soil heaves in the interior are unpredicatable and are generally due to localized moisture conditions, for example, due to a leaking pipe. Such conditions cannot be accounted for by design forumlas. Adequate strength and stiffness for such unpredictable heaves should be supplied by the minimum requirements listed in Part I of the report. For interior wall or column loads the interior ribs should be designed in accordance with Part I, section 3.2.

FIGURE A1 - CENTER LIFT BEHAVIOR

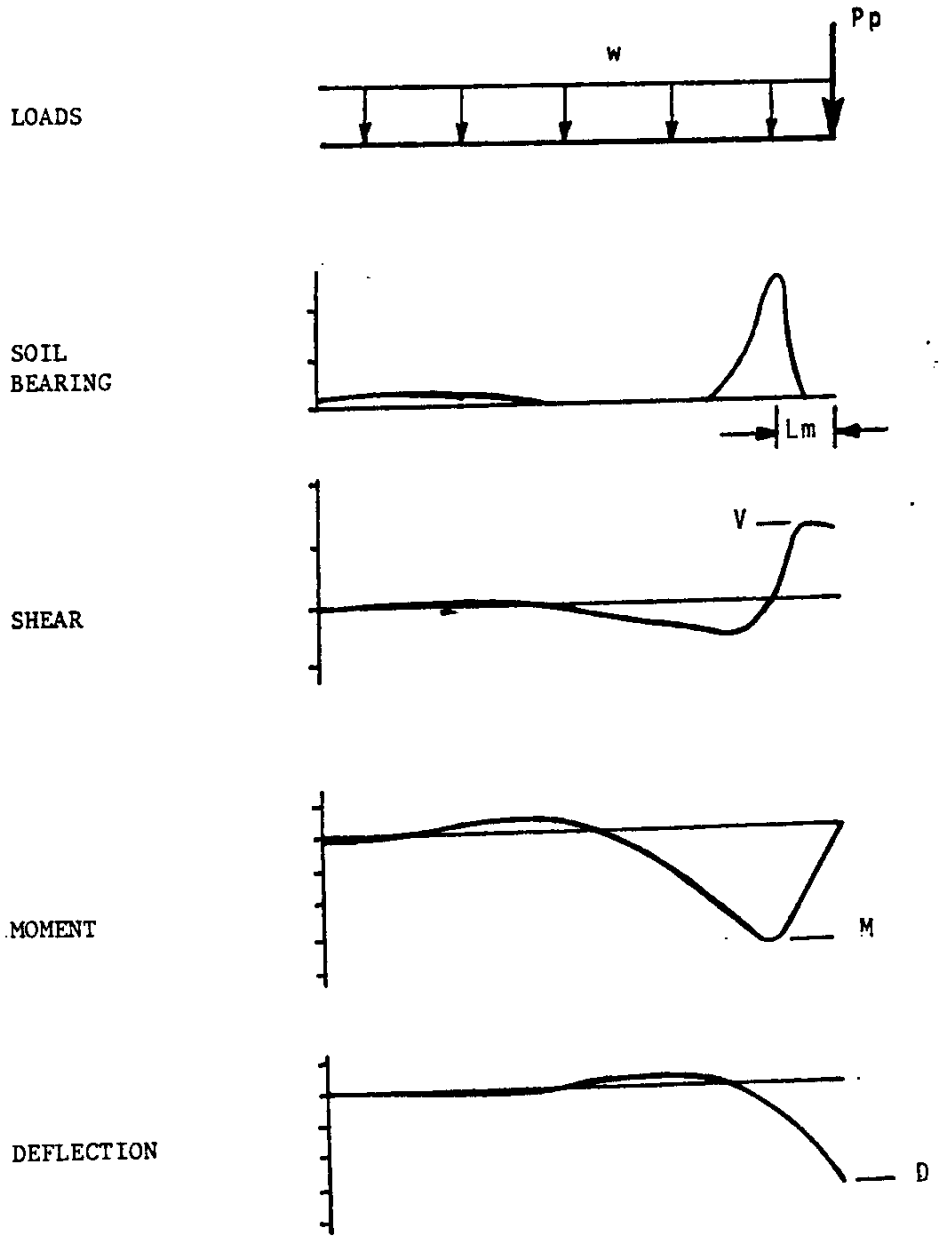
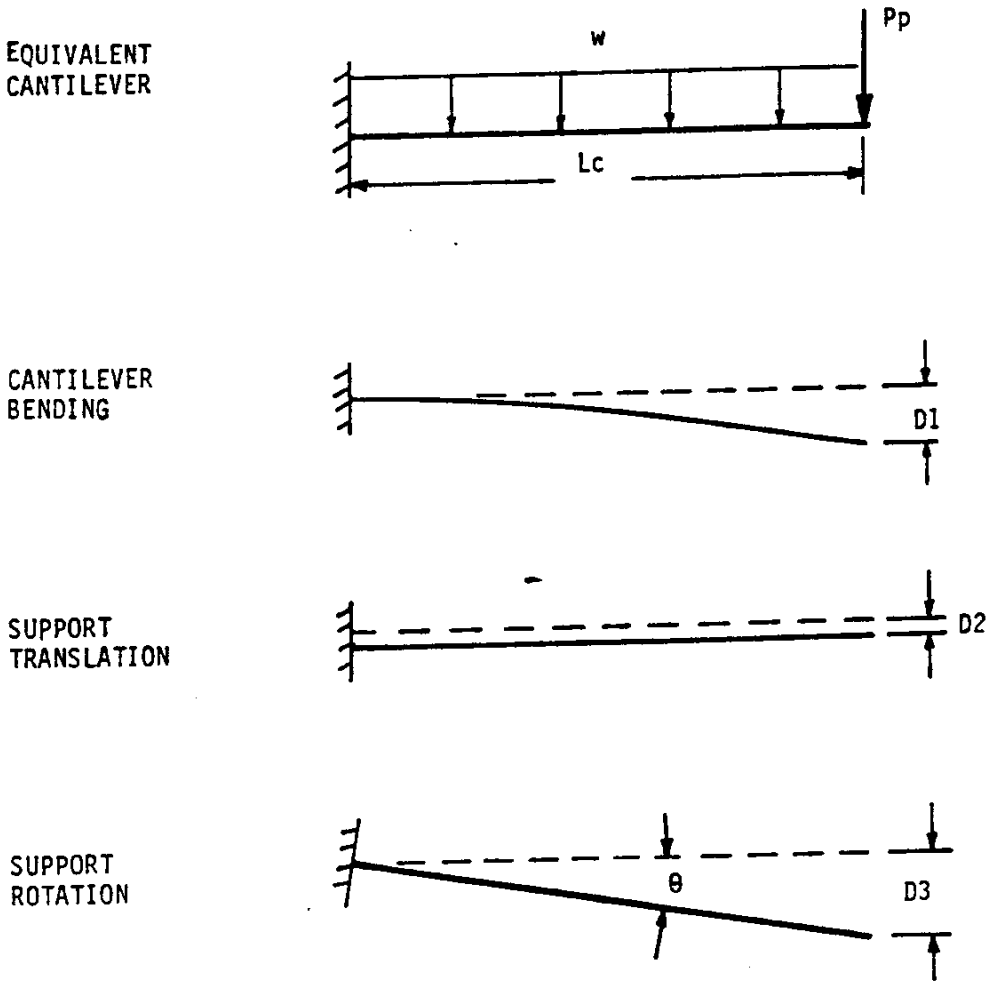


FIGURE A2 - CENTER LIFT DEFLECTION



$$D = D1 + D2 + D3$$

$$D1 + D2 = .11$$

$$D3 = 12\ Lc\ \theta$$

FIGURE A3 - EDGE LIFT BEHAVIOR

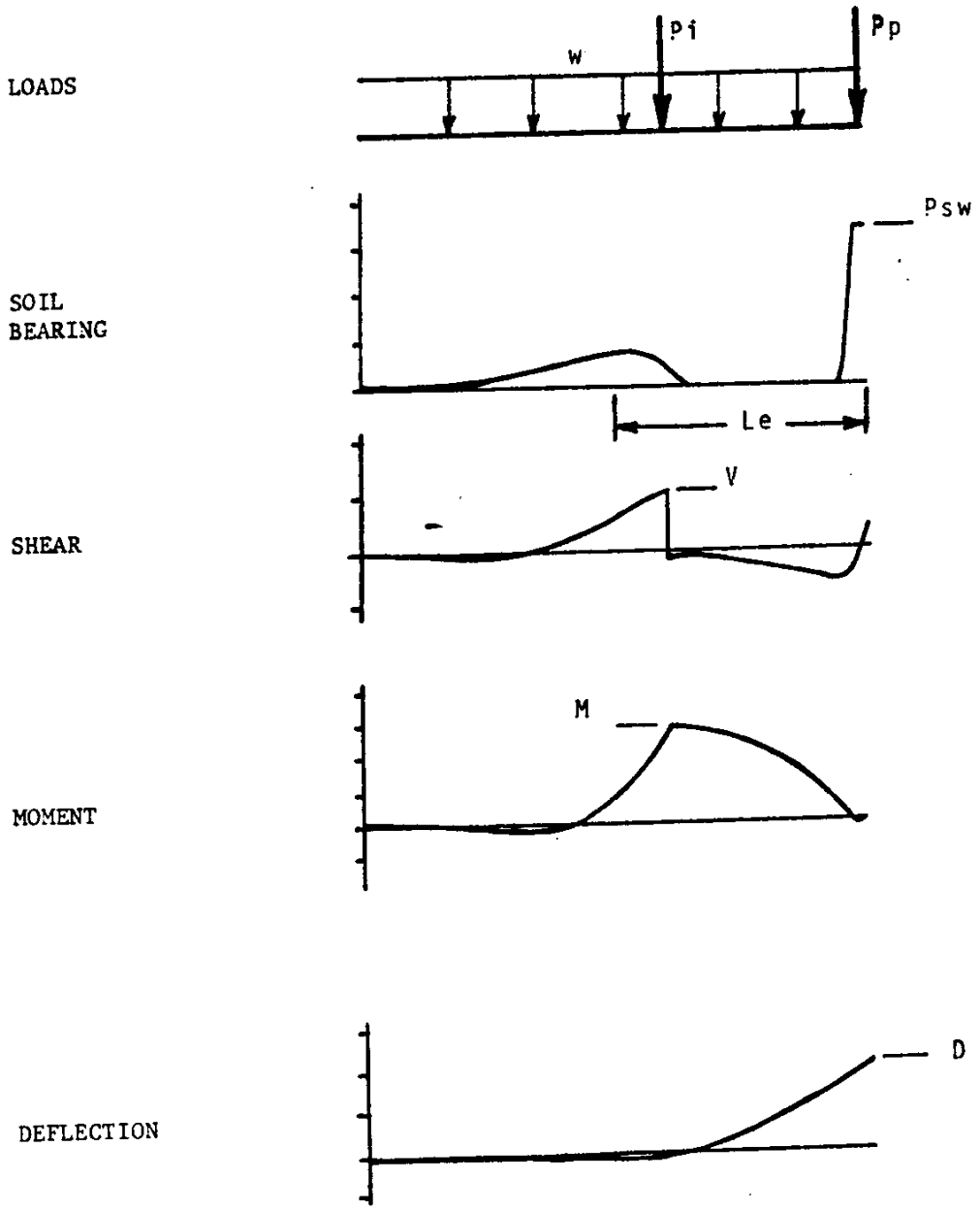
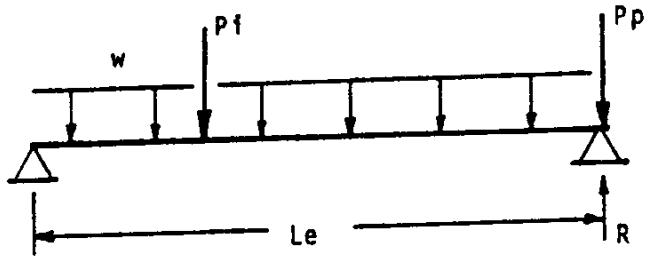
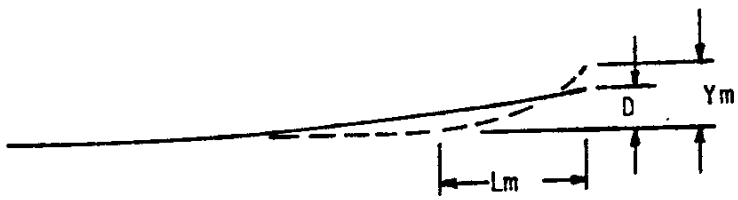


FIGURE A4 - EDGE LIFT DEFLECTION

EQUIVALENT SIMPLE BEAM

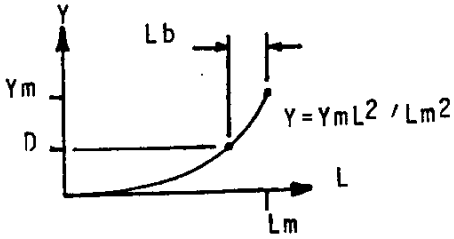


DEFLECTED SHAPE



BEARING PRESSURE

SOIL EDGE PROFILE



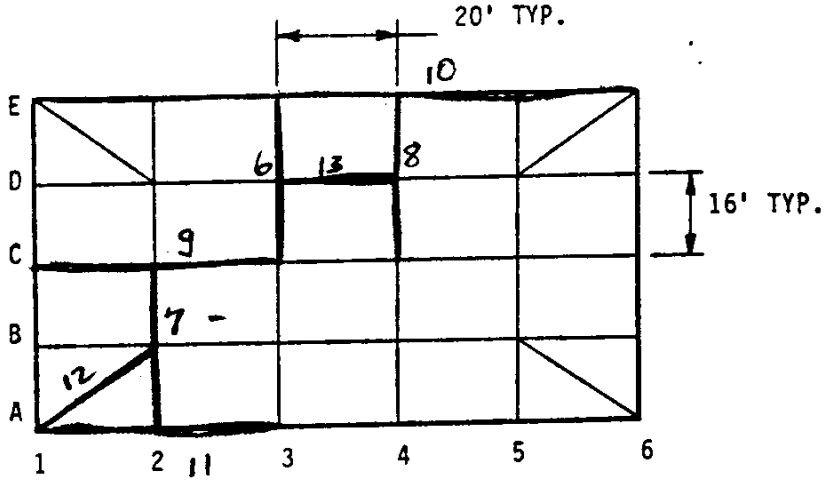
APPENDIX B - DESIGN EXAMPLE

(RIBBED MAT DESIGN IN EXPANSIVE SOIL)

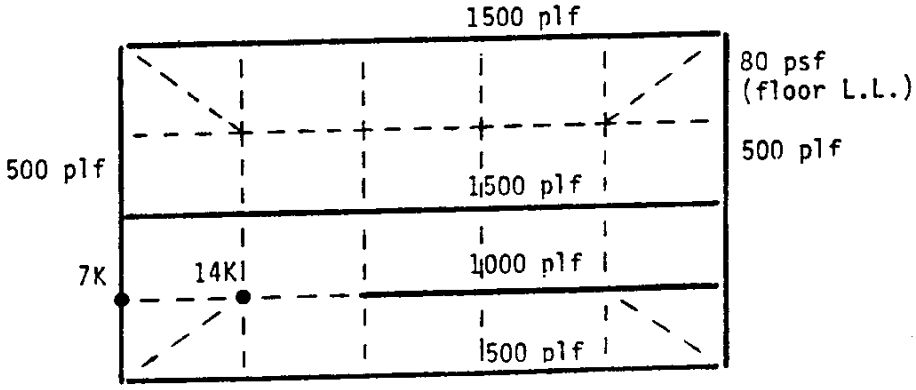
1. SOIL DATA (ref. Part I - 3.3)

qa = 2000 psf
Psw = (see page B9)
k = 100 pci
Lm = 6 ft
Ym = 1.5 in for center lift
Ym = 1.0 in for edge lift

2. FOUNDATION PLAN (ref. Part I - 4.3)



3. LOADS



4. BEARING DESIGN FOR RIBS (ref. Part I - 4.4)

Maximum wall load (P) = 1500 plf

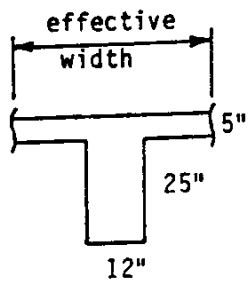
Width $\geq$ P/qa = 1500/2000 = .75 ft

Use 12 inch wide ribs (minimum)

5. INTERIOR RIB PROPERTIES (ref. Appendix A - 2.1)

Ec = 3,320,000 psi

(effective flange width per ACI 318, section 8.10.2 For "span length" use 4Lc for center lift or Le for edge lift)



Let Ir = 36,000 in^4 for center lift
Ir = 24,000 in^4 for edge lift
(ref. ACI 318, section 9.5.2.3, verify Ir after calculating M)

I = Ir/S (in^4/ft):

Rib spacing	16 ft	20 ft
Center lift	2250	1800
Edge lift	1500	1200

6. CENTER LIFT DESIGN - RIB E3/C3

6.1 Loads (ref. Appendix A - 2.1)

slab weight = 150 pcf x 5/12 ft = 62 psf

w = DL + LL = 62 + 80 = 142 psf

rib weight = 150 pcf x 2.5 ft x 1.0 ft = 375 plf

Pp = rib + wall = 375 + 1500 = 1875 plf

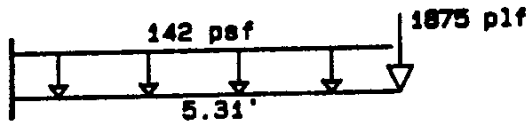
6.2 Equivalent cantilever (ref. Part II - 3.1)

$Lo = 2.3 + .4\ Lm = 2.3 + (.4 \times 6) = 4.7$ ft

$C = .8\ Ym^{.12}\ I^{.16} / Pp^{.12}$

$C = .8 \times 1.5^{.12} \times 1800^{.16} / 1875^{.12} = 1.13$

$Lc = Lo\ C = 4.7 \times 1.13 = 5.31$ ft



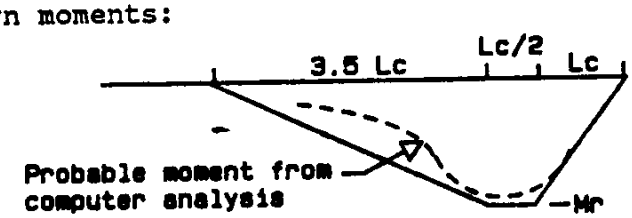
6.3 Moment (ref. Part II - 3.1.2)

$M = Pp\ Lc + 1/2\ w\ Lc^2$

$M = 1875 \times 5.31 + 1/2 \times 142 \times 5.31^2 = 12{,}000$ ft-lb/ft

$Mr = M \times S = 12000 \times 20 = 240{,}000$ ft-lb/rib

Design moments:

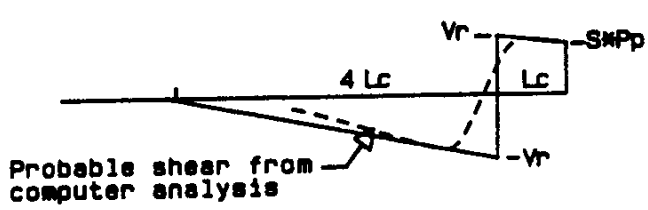


6.4 Shear (ref. Part II - 3.1.3)

$V = Pp + w\ Lc = 1875 + 142 \times 5.31 = 2630$ lb/ft

$Vr = V \times S = 2630 \times 20 = 52{,}600$ lb/rib

Design shears:



6.5 Reinforcing in rib (ref. Part I - 3.1.6 and 4.5)

As = (Mr/ad)/1.33

As = 240 / (1.76 x 28 x 1.33) = 3.66 in^2 (top)

use 3 #10 bars

v = Vr/bd = 52600 / (12 x 28) = 157 psi

vc = $(1.1\sqrt{f'c})1.33$ = 80 psi

Av = (v-vc)b s/(fs 1.33)

Av = (157-80) 12 x 12 / (24000 x 1.33) = .35 in^2/ft

use #4 stirrups @ 12 in

6.6 Deflection (ref. Part II - 3.1.4)

$\theta = M^{1.4} / 9800\ I\ k^{.5}$

$\theta = 12000^{1.4} / (9800 \times 1800 \times 100^{.5})$ = .0029 radians .0021

D = .11 + 12 Lc θ = .11 + 12 x 5.31 x .0029 = .29 in .24

D/4Lc = .29 / (4 x 5.31 x 12) = 1/879 O.K.

1/1062

7. EDGE LIFT DESIGN - RIB A2/C2

7.1 Loads

w = 142 psf (same as above)

Pp = rib + wall = 375 + 500 = 875 plf

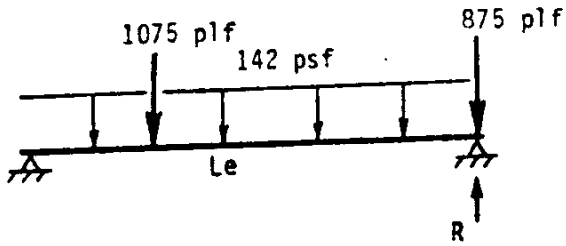
Pi = rib + wall* = 375 + 700 = 1075 plf

* equivalent wall load = column load / rib spacing

14000/20 = 700 plf (ref. Appendix A - 2.4)

Li = 16 ft

7.2 Equivalent simple beam (ref. Appendix A - 3.2.1)



7.3 Deflection (ref. Part II - 3.2.2)

$Le = 7.5\ I^{.17}\ Li^{.37}\ D^{.12} / w^{.07}\ Pi^{.11}$

$Le = 7.5 \times 1200^{.17} \times 16^{.37} \times D^{.12} / 142^{.07} \times 1075^{.11}$

$Le = 22.9\ D^{.12}$

assume D = .50 in (somewhat less than Ym = 1.0 in)

$Le = 22.9 \times .50^{.12} = 21.1$ ft

$R = Pp + 1/2\ w\ Le + Pi(Le-Li)/Le$

$R = 875 + (142 \times 21.1)/2 + 1075(21.1-16.0)/21.1 = 2633$ plf

from heave/pressure curve (p B9), for D=.50 find Psw=2000

$Lb = 1.1(R/Psw) = 1.1(2633/2000) = 1.45$ ft

$D = Ym(Lm-Lb)^2/Lm^2$

$D = 1.0(6.0-1.45)^2/6.0^2 = .575$ in $\neq$ .50 inch assumed!

assume D = .54 in

$Le = 22.9 \times .54^{.12} = 21.3$ ft

$R = Pp + 1/2\ w\ Le + Pi(Le-Li)/Le$

$R = 875 + (142 \times 21.3)/2 + 1075(21.3-16.0)/21.3 = 2655$ plf

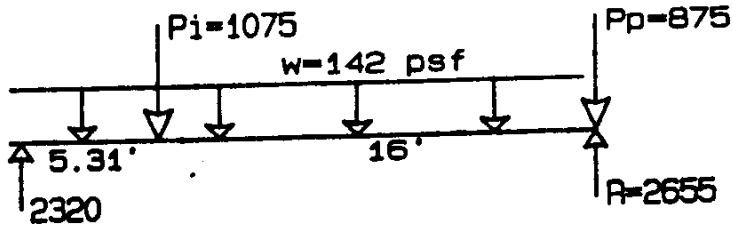
from heave/pressure curve, for D=.54 find Psw=1800 psf

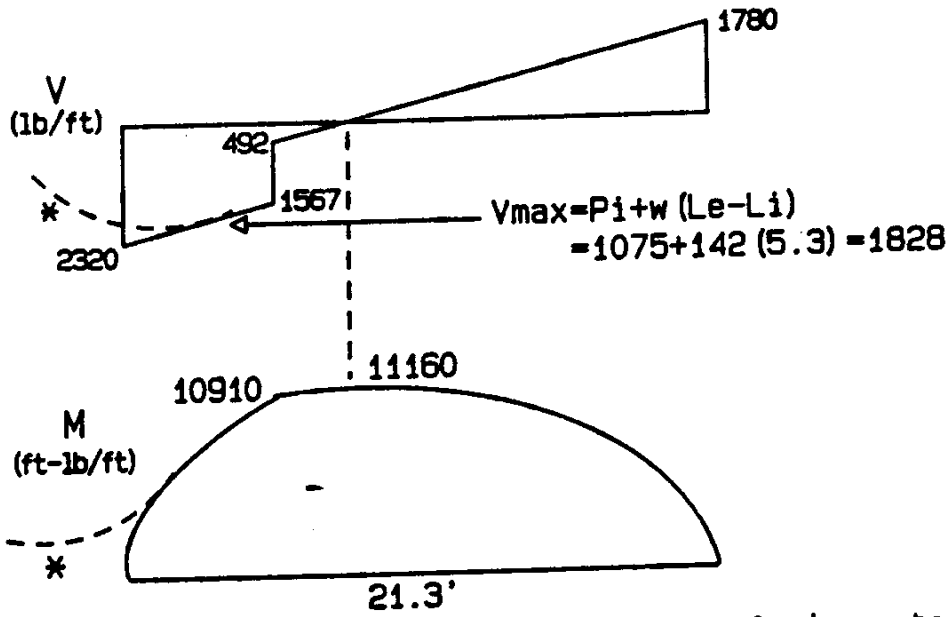
$Lb = 1.1(R/Psw) = 1.1(2655/1800) = 1.62$ ft

$D = 1.0(6.0-1.62)^2/6.0^2 = .533$ in CONVERGED!

$D/Le = .54/(21.3 \times 12) = 1/473$ O.K. for non-brittle walls

7.4 Moment and shear (ref. Part II - 3.2.3 and 3.2.4)





* probable shear and moment from computer analysis, note that calculated V=2320 lb will not occur, due to the effects of distributed support from the soil

8. EDGE LIFT DESIGN - RIB E4/C4

8.1 Loads

w = 142 psf (same as above)

Pp = 1875 plf (same as rib E3/C3)

Li = 32 ft (wall along rib C1/C6)

8.2 Deflection

since Li>Le use:

$Le = 10.5\ I^{.17}\ D^{.12} / w^{.07}$ (ref. Part II - 3.2.5)

$Le = 10.5 x 1200^{.17} x D^{.12} / 142^{.07} = 24.77\ D^{.12}$

assume D = .48 in

then $Le = 24.77 \times .48^{.12} = 22.7$ ft

$R = Pp + 1/2\ w\ Le = 1875 + (142 x 22.7)/2 = 3485$ plf

from heave/pressure curve, for D=.48 find Psw=2100 psf

$Lb = 1.1(R/Psw) = 1.1(3485/2100) = 1.825$ ft

$D = Ym(Lm-Lb)^2/Lm^2$

$D = 1.0(6.0-1.825)^2/6.0^2 = .484$ inch CONVERGED!

8.3 Find shears and moments by statics, similar to rib A2/C2.

9. CENTER LIFT DESIGN - RIB C1/C3

9.1 Loads

w = slab + LL + wall* = 62 + 80 + 94 = 236 psf

* wall = wall load / rib spacing = 1500/16 = 94 psf
(ref. Appendix A - 2.4)

Pp = rib + wall = 375 + 500 = 875 plf

9.2 Equivalent cantilever

$Lo = 2.3 + .4\ Lm = 2.3 + (.4 \times 6) = 4.7$ ft

$C = .8\ Ym^{.12}\ I^{.16} / Pp^{.12}$

$C = .8 \times 1.5^{.12} \times 2250^{.16} / 875^{.12} = 1.28$

$Lc = Lo\ C = 4.7 \times 1.28 = 6.02$ ft

9.3 Moment

$M = Pp\ Lc + 1/2\ w\ Lc^2$

$M = 875 \times 6.02 + (236 \times 6.02^2)/2 = 9544$ ft-lb/ft

$Mr = M \times S = 9544 \times 16 = 153{,}000$ ft-lb/rib

9.4 Shear

$V = Pp + w\ Lc = 875 + (236 \times 6.02) = 2296$ plf

$Vr = V \times S = 2296 \times 16 = 36{,}700$ lb/rib

9.5 Deflection

$\theta = M^{1.4} / 9800\ I\ k^{.5}$

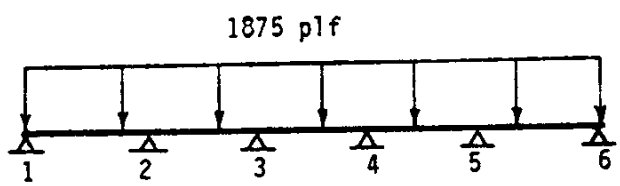
$\theta = 9544^{1.4} / 9800 \times 2250 \times 100^{.5} = .0017$ radian

$D = .11 + 12\ Lc\ \theta = .11 + (12 \times 6.02 \times .0017) = .23$ in

10. CENTER LIFT DESIGN - PERIMETER RIB E1/E6 (ref. Part II-3.3.1)

10.1 Span between transverse ribs

Pp = 1875 plf (from calculations for rib E3/C3)

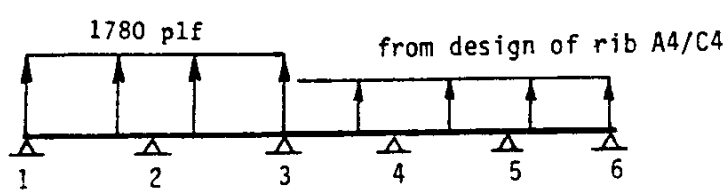


10.2 Analyze by conventional methods

11. EDGE LIFT DESIGN - PERIMETER RIB A1/A3 (ref. Part II - 3.3.2)

11.1 Span between transverse ribs for net upward force (from calculations on rib A2/C2)

R - Pp = 2655 - 875 = 1780 plf (upward)



11.2 Analyze by conventional methods

12. CENTER LIFT DESIGN - DIAGONAL RIB A1/B2 (ref. Part II - 3.4)

12.1 Provide the larger shear and moment capacity of rib B1/B2 or rib A2/B2.

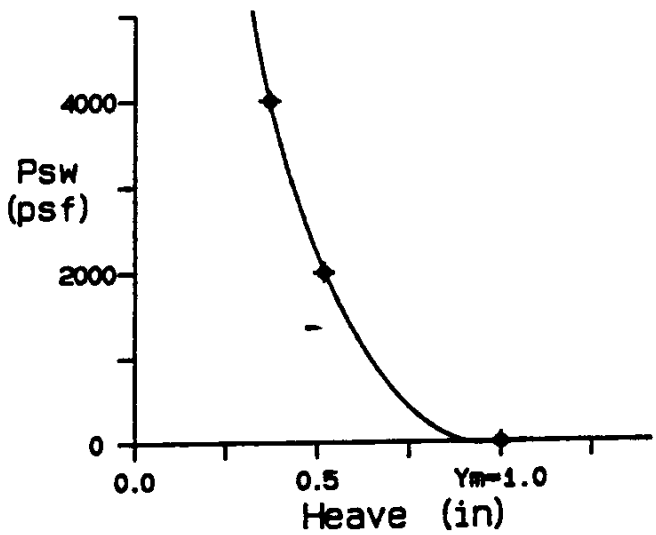
13. RIB D3/D4 (ref. Part I - 4.5)

13.1 Interior rib with no wall or column loads

$As \geq .0033\ Ag = .0033 \times 12 \times 30 = 1.20\ in^2$ (top and bot.)

This is the typical minimum reinforcement for the full length of all ribs.

14. HEAVE VERSUS SWELL PRESSURE CURVE (ref. Appendix A - 2.1)



DEPARTMENT OF THE ARMY
SOUTHWESTERN DIVISION, CORPS OF ENGINEERS
1114 COMMERCE STREET
DALLAS, TEXAS 75242-0216

REPLY TO ATTENTION OF

16 APR 1987

SWDED-G

SUBJECT: Criteria for Developing Geotechnical Design Parameter for SWD Ribbed Mat Design Methodology

Commander, Albuquerque District, ATTN: SWAED-TA
Commander, Fort Worth District, ATTN: SWFED-F
Commander, Galveston District, ATTN: SWGED-G
Commander, Little Rock District, ATTN: SWLED-G
Commander, Tulsa District, ATTN: SWTED-G

1. Reference is made to criteria letter SWDED-TS/G dated 23 December 1986, subject "Design Criteria for Ribbed Mat Foundation".

2. The above reference criteria letter require certain geotechnical parameters be furnished in the Foundation Design Analysis when a ribbed mat slab foundation is recommended in expansive soil areas. Enclosure 1, for addressees only, provides guidance for development of these parameters. These procedures were developed by the Ft. Worth District with review in the Southwestern Division. Questions and/or comments should be directed to either Mr. A.L. Branch, FTS 334-2117 or Mr. Jack Fletcher, FTS 729-6365.

FOR THE COMMANDER:

William Fisher
for ARTHUR D. DENYS, P.E.
Chief, Engineering Division

Encl

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5. APPENDIX A

5.1 EXAMPLE PROBLEM

DEVELOPMENT OF GEOTECHNICAL DESIGN PARAMETERS FOR RIBBED MAT FOUNDATIONS

1. REFERENCE.

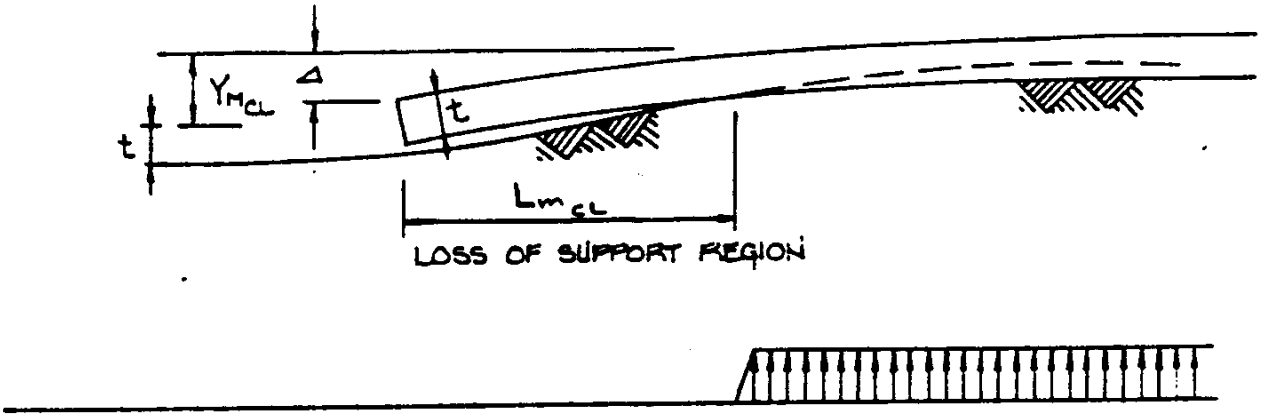
1.1 SWDED-TS/G, Design Criteria for Ribbed Mat Foundations, dated 23 Dec 86.

1.2 TM 5-818-7, Foundations in Expansive Soils, Corps of Engineers, 1983.

2. BACKGROUND. The recently developed structural design methodology (reference 1) models the interaction of a ribbed mat slab on an expansive subgrade for purposes of structural design. This method appears equally suited to stiffened mat systems such as flat mats, modified flat mats and inverted ribbed mats. Utilization of the methodology requires the expansion and refinement of the geotechnical design parameters furnished in the foundation design analysis. The purpose of this report is to (1) identify and (2) provide a rational method of determining these parameters.

3. SOIL-STRUCTURE INTERATION MODES. Two heave induced deformation conditions appropriate for ribbed mat slab structural analysis are (a) center lift and (b) edge lift.

3.1 CENTER LIFT. Center lift considers doming of the foundation in the interior region of a slab on grade differentially to the perimeter region as depicted on figure 1. This may be caused either by drying of the expansive subgrade around the perimeter beam or by wetting of the dry expansive subgrade in the interior region. Perimeter drying results from (1) below average precipitation and/or (2) reduced or no landscape watering and/or



CONTACT PRESSURE

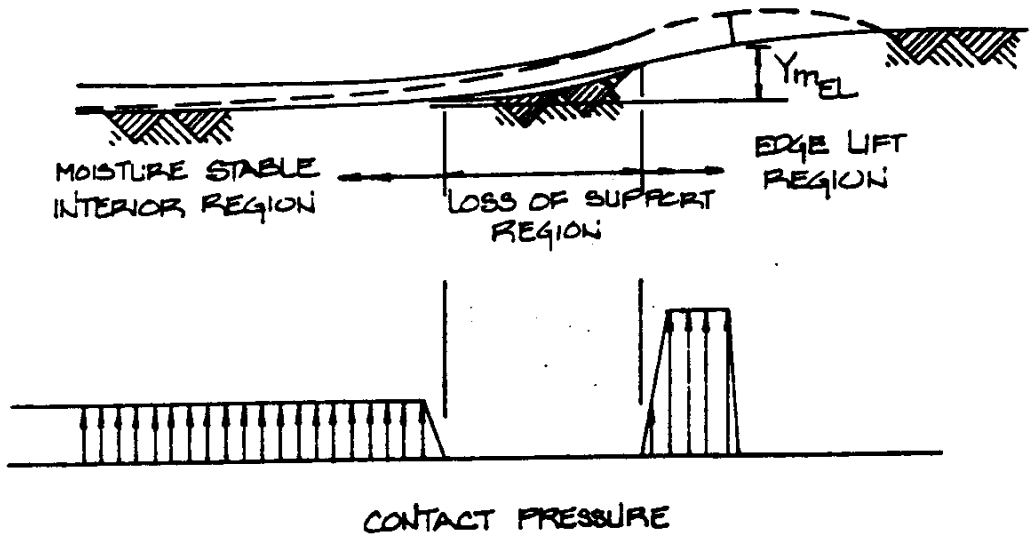
CENTER LIFT

FIGURE 1

(3) removal of old paving or hard stand. Interior wetting results from (1) disruption of the site moisture equilibrium by "capping" the site with the relatively impervious slab or by removal of thick brush or trees from the site (thus eliminating evapo-transportation) and/or (2) leaky inservice or abandoned utilities. Loss of support along perimeter and first interior transverse stiffener beam results if (1) the magnitude of center lift heave is large enough and (2) the beams are sufficiently rigid to cantilever from the supported interior region.

3.2 <u>EDGE LIFT</u>. Edge lift involves more complex soil-structure interactions than does center lift. In edge lift, the structure is supported by heaving subgrade in the perimeter region and in the relatively moisture stable interior region. Loss of support develops when (1) the edge lift heave deformation

is large enough and (2) the spanning beam is sufficiently rigid. Edge lift mode is depicted on figure 2.



EDGE LIFT
FIGURE 2

Soil-structure interaction within the interior supported region is reasonably represented as a beam on non-linear subgrade. Soil-structure interaction in the perimeter region is somewhat more complex because the soil deflects under the structural load as a beam on non-linear subgrade, but also the swelling soil either loads and/or deflects the beam upward. To further complicate matters, the amount of edge lift heave and the soil-beam interface pressure are interrelated and unique for each specific site. Background parameter studies for reference 1 indicate that the structural analyses are particularly sensitive

to edge lift parameters (edge lift heave magnitude and limiting beam-soil interface pressure). For example, large values for these may cause the solution to either fail to converge or indicate that the beam must be very deep and/or very heavily reinforced. While site conditions may sometimes dictate massive, very rigid stiffener beams, this is not generally the case. Generally, edge lift heave of less than 1.0 to 1.5 inches used in the design method given in reference 1 produce reasonable, constructable beams.

4. DETERMINATION OF CENTER LIFT AND EDGE LIFT PARAMETERS FOR STRUCTURAL DESIGN.

4.1 CENTER LIFT - Center lift parameters to be provided in the foundation design analysis includes (1) modulus of subgrade reaction (K_1), (2) design allowable bearing for beams (q_{all}), (3) magnitude of center lift (Y_{mcL}) and (4) loss of support distance around the perimeter (L_{mcL}).

4.1.1 MODULUS OF SUBGRADE REACTION - The modulus of subgrade reaction should be taken as K_1 = 200 pci for beams up to 12 inches wide bearing on compacted, nonexpansive fill. Higher values may be justified for granular nonexpansive fills consisting of gravel, crushed rock or limestone screenings or for cement stabilized materials if these materials extend significantly ($D \geq 3B$) below the stiffener beam of width B. The foundation design analysis should direct that K_1 values be factored to account for width effects such that $K_{design} = K_1/B$, where B is the effective beam width in feet for soil structure interaction. Note that the resultant effective beam width may include a significant width of the slab and is therefore

significantly greater than actual beam width. Studies indicate that significant load distribution occurs over an "effective" width of approximately five. It should be noted that structural design calculations are not sensitive to K value.

4.1.2 DESIGN ALLOWABLE BEARING. A design allowable bearing value (q_{all}) has historically been assigned for sizing of stiffener beams, perimeter beams and enlarged beam intersections beneath columns. Values are typically given considering the beam to be a continuous strip footing or the beam intersection to be a spot footing (carrying either line or concentrated loads, respectively). The allowable bearing value is typically developed based on the average strength of engineered fill at shallow depth with a factor of safety of not less than 3.0. Design loads typically include full dead load plus half live load. The purpose in sizing the beams and beam intersections for this design allowable is to provide uniform contact pressures at the beam-soil interface therefore limiting inservice differential settlement. The assumptions of minimal load sharing between the slab and beams, ample safety factor on the fill strength, and minimum beam widths specified in the SWD EIM combine to limit the mobilized soil strains to low levels. This leads to very small structurally induced deflections given uniform, nominal fill depths. Actual values assigned for design bearing allowables have seldom exceeded q_{all} = 2.0 KSF although values as high as 3.0 KSF have been assigned in limited cases where required and justifiable. Seldom are there structural requirements for larger allowables bearing values since specified minimum beam widths generally govern.

4.1.3 MAGNITUDE OF CENTER LIFT HEAVE POTENTIAL. - The magnitude of center lift heave potential (Y_{mcL}) given in the foundation design analysis should be the residual heave potential at the site. The value of Y_{mcL} should include effects due to subgrade removal and replacement criteria, any surcharge effects due to fill above original subgrade and the weight of the proposed structure. Maximum design value for center lift potential should not exceed 1.5 inches. Where attainable with reasonable removal/replacement depths ($\leq$36 inches), it is desirable to limit Y_{mcL} to not more than 1.0 inch, which is well within the "tolerable" inservice deformation range of most structures. Minimum remove/replace depth should be taken to the bottom elevation of the ribbed mat slab beams.

Function of Anticipated Loads

The heave potential is determined by three soil parameters: the coefficient of swell (C_s), depth of active zone (X_a) and expansion pressure (P_{exp}).

Caution should be used in selecting coefficient of swell (C_s) values for heave analyses since swell pressure test results significantly underestimate C_s values compared to controlled expansion-consolidation-rebound tests. Additionally, both test methods tend to give low C_s values since most rebound time curves are terminated well before primary swell is completed.

An appropriate design value of the depth of the active zone (X_a) typically lies between the present depth to the stable relative moisture content (estimated by observing the relationship of moisture content to the plastic limit) and the maximum depth observed, such as the maximum depth of weathering. Typical X_a values for the central and north Texas regions and

central Oklahoma region appear to vary from about 10 to 15 feet. These values have been estimated for (1) regression heave analyses for distressed structures and (2) depth of moisture variation versus approximate return/duration interval studies. Values smaller than 14 feet may be applicable in specific cases such as where the active zone is the distance between the structural foundation element or slab on grade and a perched water table; a condition common in these regions.

Center lift heave analyses should consider "saturated" conditions to a depth of X_a. If a nominal remove/replace depth and saturated subgrade assumptions indicate unreasonable residual heave potential, consider increasing the depth of remove/replace and/or recommending a more defensive design to prevent saturation of the subgrade.

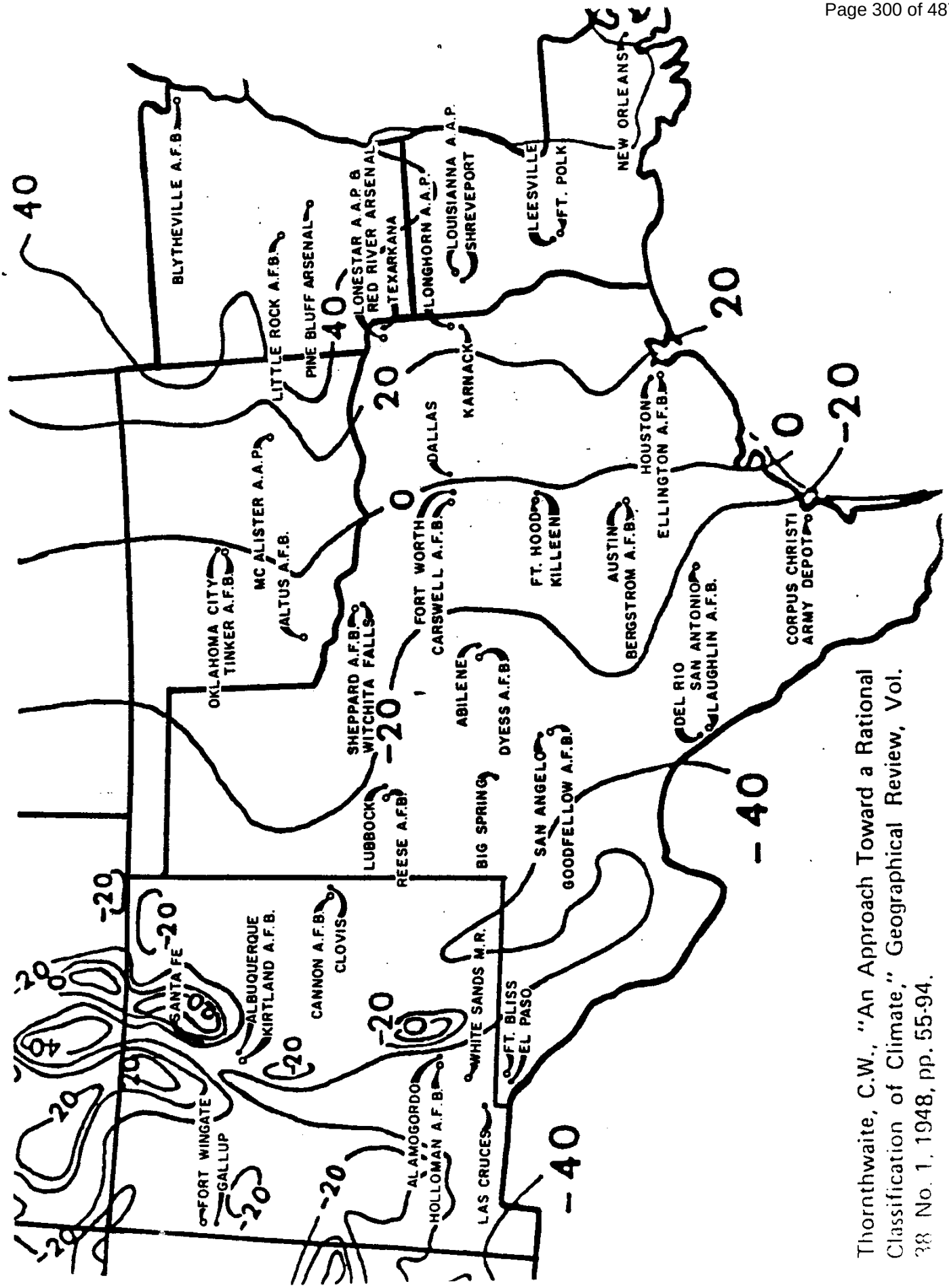
Expansion pressures should be developed versus depth using small depth intervals. These should be developed from laboratory data for the site. Additionally, these may be supplemented using proper correlations with nearby, preferably adjacent sites.

4.1.4 EDGE MOISTURE VARIATION DISTANCE. The edge moisture variation distance (L_{mcL}) may control the design of interior stiffener beams which are adjacent to the perimeter. The maximum moments and shear are induced in the transverse beams when these elements cantilever free of foundation support from the interior supported region to the outside of the perimeter beam. The length of cantilver is largely controlled by the value of L_{mcL}. SWD adopted this concept from Post-Tensioning Institute (PTI) guidelines, originally developed for lightly loaded flexible mats in the late 1970's and early 1980's. Standard practice in the

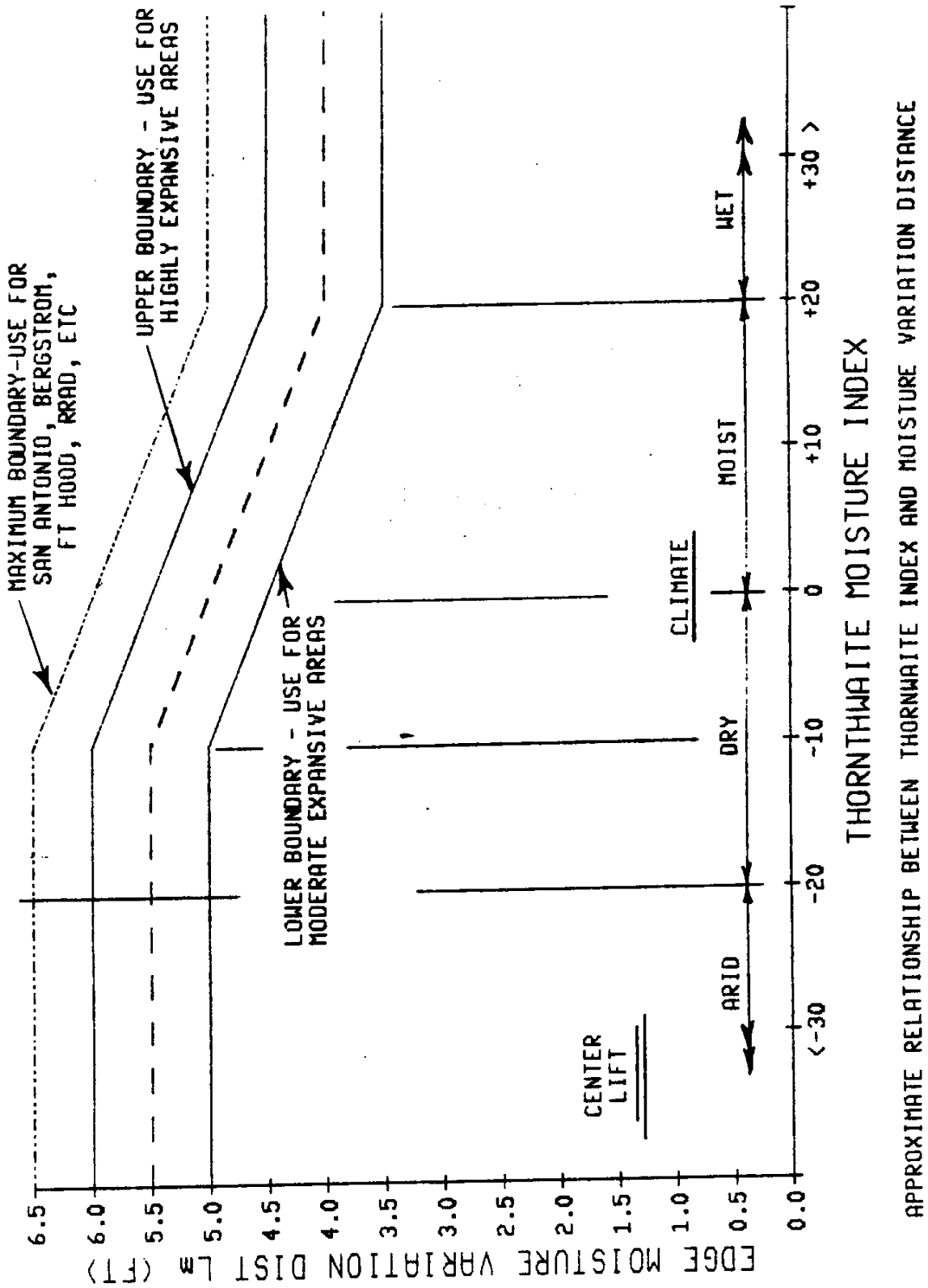
San Antonio area has been to assign upper or near upper bound values from TMI for design L_{mcL} values. At least two aspects of designs probably tend to moderate the actual edge moisture variation distance experienced; these being (1) relatively deep perimeter beams which act as a physical barrier and (2) the non-expansive fill blanket which tends to make changes in moisture content (and therefore any resultant heave or shrinkage) more uniform and provide a surcharge effect as well. Other factors, however, tend to offset these moderating effects. These include very short return interval of edge moisture variation events presented in TMI (reported by some sources to range from 1 to 2 years). Typical project design life of projects exceeds 20 or 30 years and, since we're still using many World War II facilities, it may well exceed 50 years. Estimated edge moisture variation values considering a 100 percent probability of experiencing a 20 to 30-year return interval event may well be twice typical TMI values.

Based on a subjective combination of all factors, it is suggested that L_{mcL} be taken as the edge moisture variation distance determined using figures 3 and 4. These values should be modified, either up or down, based on site secific soils investigations and engineering judgement.

4.2 <u>EDGE LIFT</u> - Edge lift parameters to be provided in the foundation design analysis include (1) modulus of subgrade reaction (K_1), (2) magnitude of edge lift heave (Y_{mEL}), (3) limiting soil-beam interface pressure (P_{SW}) for that portion of the beam being acted on by the heaving subgrade and (4) a value for edge moisture variation distance (L_{mEL}).



Thornthwaite, C.W., "An Approach Toward a Rational Classification of Climate," Geographical Review, Vol. 38 No. 1, 1948, pp. 55-94.



APPROXIMATE RELATIONSHIP BETWEEN THORNWAITE INDEX AND MOISTURE VARIATION DISTANCE

FIGURE 4

4.2.1 MODULUS OF SUBGRADE REACTION. - Values given for center lift are considered appropriate for edge lift also. $K_1 = 200$ pci

4.2.2 SOIL-BEAM INTERFACE PRESSURE. Discussion of both limiting soil-beam interface pressure and magnitude of edge lift heave parameters (P_{SW} and Y_{MEL}) are best handled concurrently since both are intimately related and the analysis necessary for solution determines both simultaneously.

The area of soil-beam contact in the swelling perimeter region involves a somewhat complex soil-structure interaction situation. As edge lift develops and loss of support occurs between the perimeter and interior regions, the heaving soil may well exert a pressure on the stiffener beams well in excess of typical design interface pressures (q_{all}). As the soil column swells and lifts the overlying beam, the soil-beam contact area increases toward the interior region to accommodate the greater structural reaction.

The soil-structure interaction in the edge lift region can be visualized as a three-component system; (1) a structural element (a beam or mat strip), (2) an element of nonexpansive fill beneath the structural element plus that piece of the expansive subgrade restrained against heave by the weight of the overlying fill and the stresses induced beneath the structural element, and (3) the heaving column of soil to a depth of X_a beneath the bottom of the nonexpansive fill blanket (figure 5).

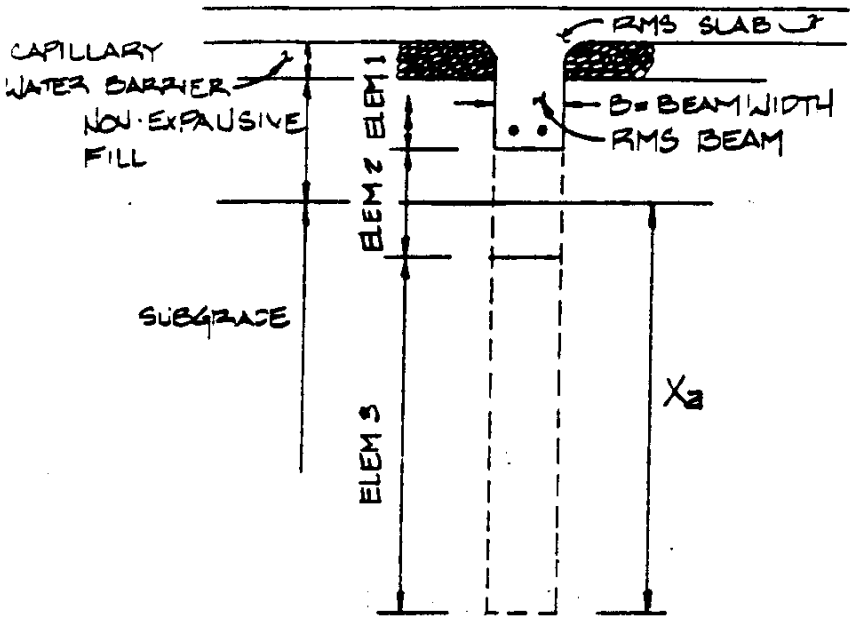


FIGURE 5

The load-deformation relationship of element 1 interacting with element 2 can be represented by a P-Y curve shown in figure 6.

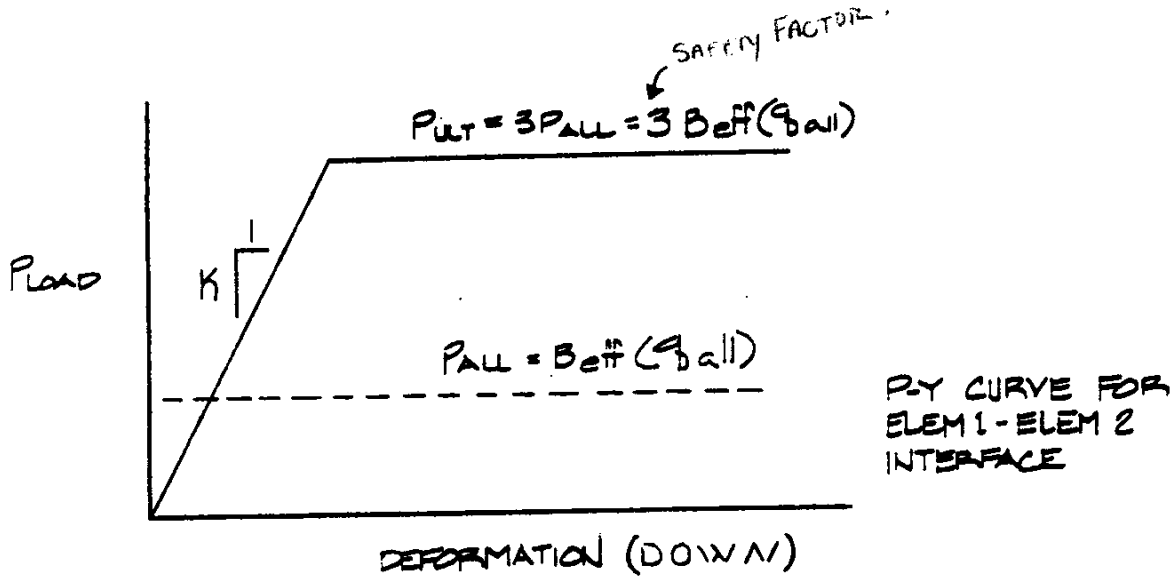


FIGURE 6

The load-deformation relationship of element 3 interacting with elements 1 and 2 in the column immediately below the beam as shown on figure 7. The plot consists of the net heave potential of the swelling soil column versus those forces resisting the tendency to swell, taken at the base of the structural beam.

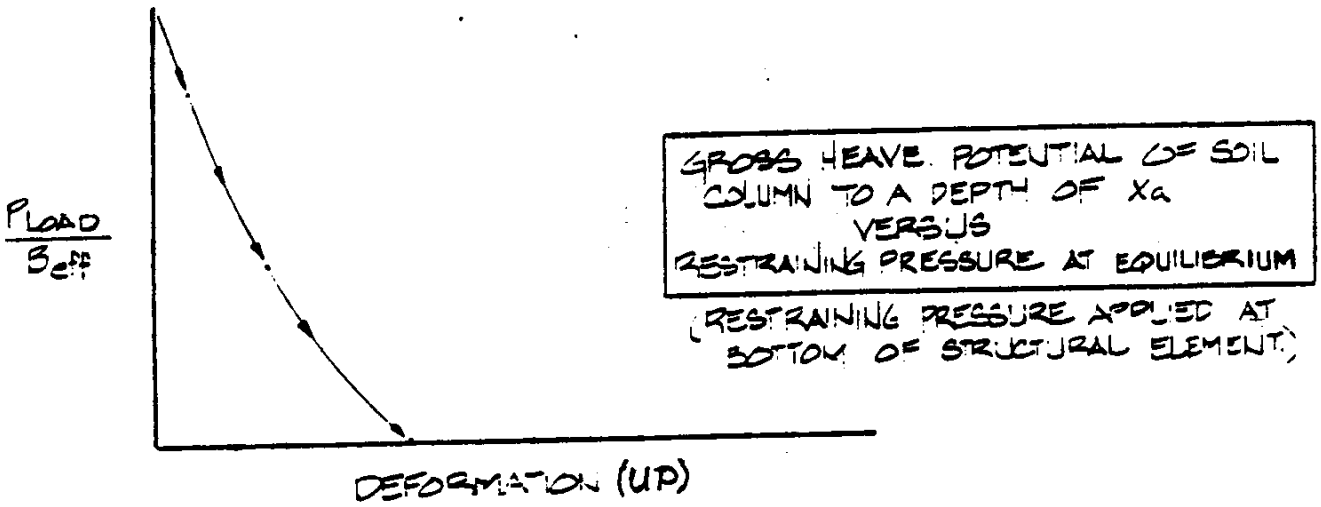
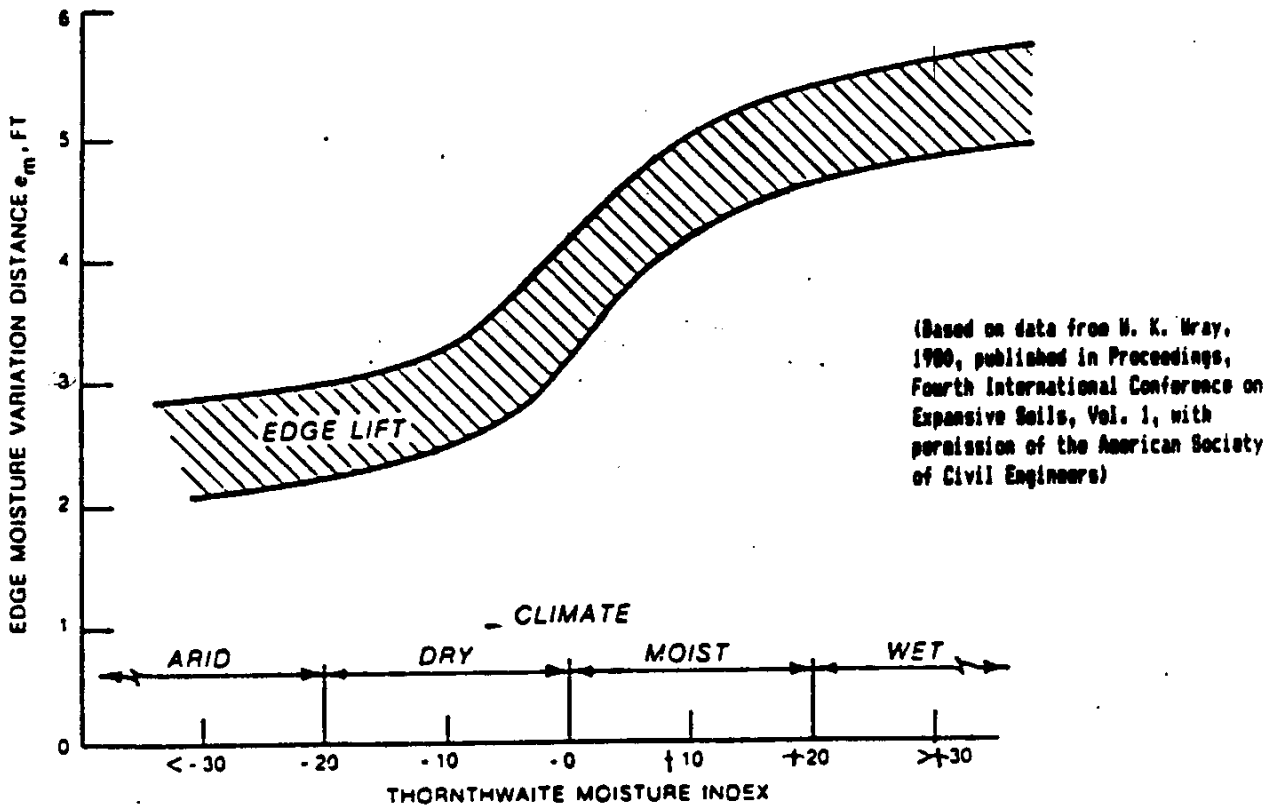


FIGURE 7

These relationships can be added algebracially to produce a composite p-y curve which can be easily utilized by available soil-structure interaction programs for structural analysis. Since such analysis is within the purview of the structural engineer, the geotechnical engineer need only furnish the pressure heave relationship in useable form in the Foundation Design Analysis. It is suggested that this information be provided in a tabulated format giving coordinates for at least three points. These minimum three points should be the Psw and YMBL coordinates for (1) pressure equal to Pult, (2) pressure equal to Pall and (3) pressure equal to zero.

PULT = F.S. x PALLOW

4.2.3 EDGE MOISTURE VARIATION DISTANCE. Edge moisture variation distance (L_{mL}) appropriate for edge lift analysis may be taken from the TMI chart given in figure 8.



Approximate relationship between the Thornthwaite Moisture Index and the edge lift-off distance.

FIGURE 8

The TMI values represent approximate environmentally induced events. As a result, upper bound values should be selected for design. It is recommended, however, that average values be used for all SWD projects. Additionally, recommendations should be made in the foundation design analysis to limit the potential for developing "hot spots" due to long term sources of free water around the building perimeter.

function of the type of bldg, ie, Brick stucco or Not

4.3 Certain structure-site situations may well warrant deleting edge lift analyses as follows:

4.3.1 Where the proposed structure is a pre-engineered metal building without interior masonry walls or heavy interior dead or permanent live loads.

4.3.2 Where defensive design efforts have been incorporated and reasonable confidence exists that these will be constructed and maintained as intended.

4.3.3 Where minor architectural distress (such as cracking of masonry walls, plaster walls, tiled surfaces) is not likely to cause undue user concern or raise inservice maintenance requirements significantly.

5. APPENDIX A

5.1 EXAMPLE PROBLEM. An example problem is provided in Appendix A.

APPENDIX A

EXAMPLE PROBLEM

1. Required. - Develop geotechnical parameters for the structural design of a ribbed mat slab given the following:

a. Proposed Structure. - Office/Administration type structure located in San Antonio, Texas, 60X150 feet in plan. The structure is to consist of double wythe masonry (face brick over CMU) load bearing exterior walls and isolated interior colums at 20 ft. centers.

b. Proposed Site. - One acre, minimal topographic relief, site covered with mesquite trees.

c. Subsurface Conditions. - Drilling program (5 borings) indicates the foundation materials consist of (1) a surface stratum of high plasticity clay grading into medium plasticity clay with depth to a total thickness of 14 feet, (2) a water bearing sand and gravel stratum from 1 to 7 feet thick overlying, (3) an expansive clay shale formation.

d. Summary Laboratory Test Data. -

Stratum	Depth (ft)	USCS	$\bar{W}_o$ (%)	γ_d (pcf)	LL	PI	P_{exp} (tsf) (net)	C_s	C_c	Cu (ts
1	0-4	CH	25	105	65	45	0.8 -1.0	0.06	0.02	0.
2	4-14	CL	14	108	44	30	0.6	0.06	0.18	0.
3	14-20	GC	6	-	25	12	0	-	-	5C B/
4	20 plus	Wea. Clay Shale	22	110	70	52	2.0	0.09	0.22	1.

2. Determine Parameters Required for Center Lift Analysis:

a. Modulus of Subgrade Reaction (K_1). - Mat slab will be founded on nonexpansive fill, therefore it is reasonable to assign a valve of K_1 = 200 PCI. The structural engineer should factor this value based on effective beam width such that $K_{design} = K_1$ (1ft/Beff, ft).

b. Design Bearing Allowable (q_{all}). - Since beams will be supported on nonexpansive fill and the building loads will range from light to moderate, it appears that a design bearing allowable of q_{all} = 2.0 KSF is appropriate.

c. Magnitude of Center Lift Heave Potential (Y_{mcl}). -

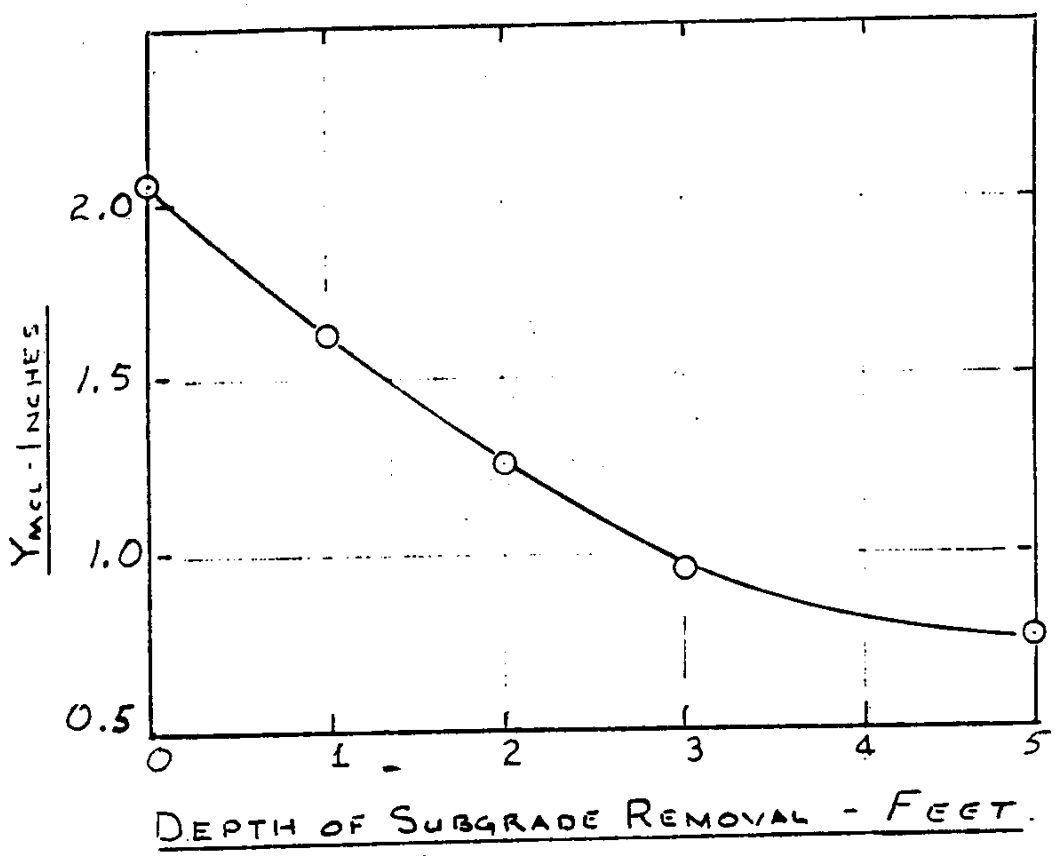
(a) Calculate site heave potential

Given: C_s = 0.06, e_o = 0.60, P_o = effective overburden pressure, P_{exp} = gross swell pressure, P_f = effective pressure resisting heave beneath mat including P_o, (surcharge due to fill and structural dead load, h_i = heave for soil layer h inches thick, and an X_a = 10 feet.

$C_s = .06$
$e_0 = .60$

Z (ft)	Z (ft)	Po (tsf)	Pexp (tsf)	Pf (tsf)	h (in)	$h_i = \frac{C_{sh}}{1+e_0} \log_{10} \frac{P_{exp}}{P_f}$ (inches)	h_i (bottom to top) (inches)
0-1	0.5	0.03	1.0	.07+.03 0.1	12	0.45	2.07
1-2	1.5	0.1	1.0	.07+.1 0.17	12	0.35	1.62
2-3	2.5	0.17	1.1	.07+.17 0.24	12	0.30	1.27
3-4	3.5	0.23	0.8	0.3	12	0.19	0.97
4-6	5	0.33	0.9	0.4	24	0.31	0.78
6-8	7	0.46	1.0	0.53	24	0.25	0.47
8-10	9	0.6	1.2	0.67	24	0.22	0.22
10-12	11	0.73	1.35	0.8	24	0.2	N/A
12-14	13	0.86	0.9	0.93	24	N/A	N/A

Determine required depth of subgrade replacement and residual heave potential after replacement with nonexpansive fill. A plot of replacement depth versus residual heave taken from the above table follows:



Removal and replacement to 3.0 feet will reduce the heave potential to approximately 1.0 inch, thus Y_{mcl} = 1.0 inch. Note that significant additional removal would be required to reduce the residual heave potential any sigificant additional amount.

d. Edge Moisture Variation Distance (L_{mcl}) - taken from figures 3 and 4 as L_{mcl} = 6.5 feet.

3. Determine parameters required for Edge Lift analyses:

a. Modulus of Subgrade Reaction (K_1). - Same as for Center Lift.

b. Design Allowable Bearing (q_{all}). - Same as for Center Lift.

c. Soil - Beam Interface Pressure (P_{sw}) and Magnitude of Edge Lift Heave Potential (Y_{mel}). -

Determine the residual heave potential for the soil column beneath a typical beam for a range of assumed interface pressures.

A summary of calulations and results is presented in tabulated form on page 6. A plot of soil-beam interface pressure versus heave potential is shown on page 7. A reasonable bilinear representation of the results, for use by the structural engineer, can be developed assuming a linear relationship between the following points:

P_{sw}, TSF	Y_{mel}, Inches
0.0	Y_{mel} = 1.25
q_{all} = 1.00	Y_{mel} = 1.0
q_{ult} = 3(q_{all}) = 3.00	Y_{mel} = 0.6

d. Edge Moisture Variation Distance. (L_{mel}). The edge moisture variation distance is taken from figure 8 as L_{mel} = 3.0 feet.

Given: D_f = 2.0ft B = 1.0ft

C_s = 0.06 e_o = 0.60

γ_m = 125pcf

								q_{app}											
								0.5tsf			1.0tsf			2.0tsf			4.0tsf		
Z ft	$\bar{Z}$ ft	h in	$\frac{\bar{Z}-D_f}{B}$	I_s	P_o tsf	P_o+P_s tsf	P_{exp} tsf	ΔP tsf	P_f tsf	Δh_i in	ΔP tsf	P_f tsf	Δh_i in	ΔP tsf	P_f tsf	Δh_i in	ΔP tsf	P_f tsf	Δh_i in
0-3	<----------COMPACTED NONEXPANSIVE FILL TO A DEPTH OF 3.0 FT.---------->																		
3-4	3.5	12	1.5B	0.28	0.23	0.30	0.8	0.14	0.37	0.15	0.28	0.51	0.08	0.56	0.79	0	1.12	1.35	0
4-6	5.0	24	3.0B	0.15	0.33	0.40	0.9	0.07	0.40	0.32	0.15	0.48	0.25	0.30	0.63	0.14	0.60	0.93	0
6-8	7.0	24	5.0B	0.09	0.46	0.53	1.0	0.05	0.53	0.25	0.09	0.55	0.23	0.18	0.64	0.17	0.36	0.82	0.09
8-10	9.0	24	7.0B	0.07	0.60	0.67	1.2	0.04	0.67	0.23	0.07	0.67	0.23	0.14	0.74	0.19	0.28	0.88	0.12
10-12	11.0	24	9.0B	0.05	0.73	0.80	1.35	0.03	0.80	0.20	0.05	0.80	0.20	0.1	0.83	0.2	0.20	0.93	0.16
12-14	13.0	24	11.0B	0.04	0.83	0.90	0.9	0.02	0.90	0.0	0.04	0.90	0.0	0.08	0.91	0	0.16	0.99	0
								$\Sigma\Delta h_i$ = 1.15			$\Sigma\Delta h_i$ = 0.99			$\Sigma\Delta h_i$ = 0.7			$\Sigma\Delta h_i$ = 0.38		

Where:

Z = depth interval

$\bar{Z}$ = mean depth

B = beam width

D_f = beam depth

q_{app} = stress with depth

P_o = overburden pressure

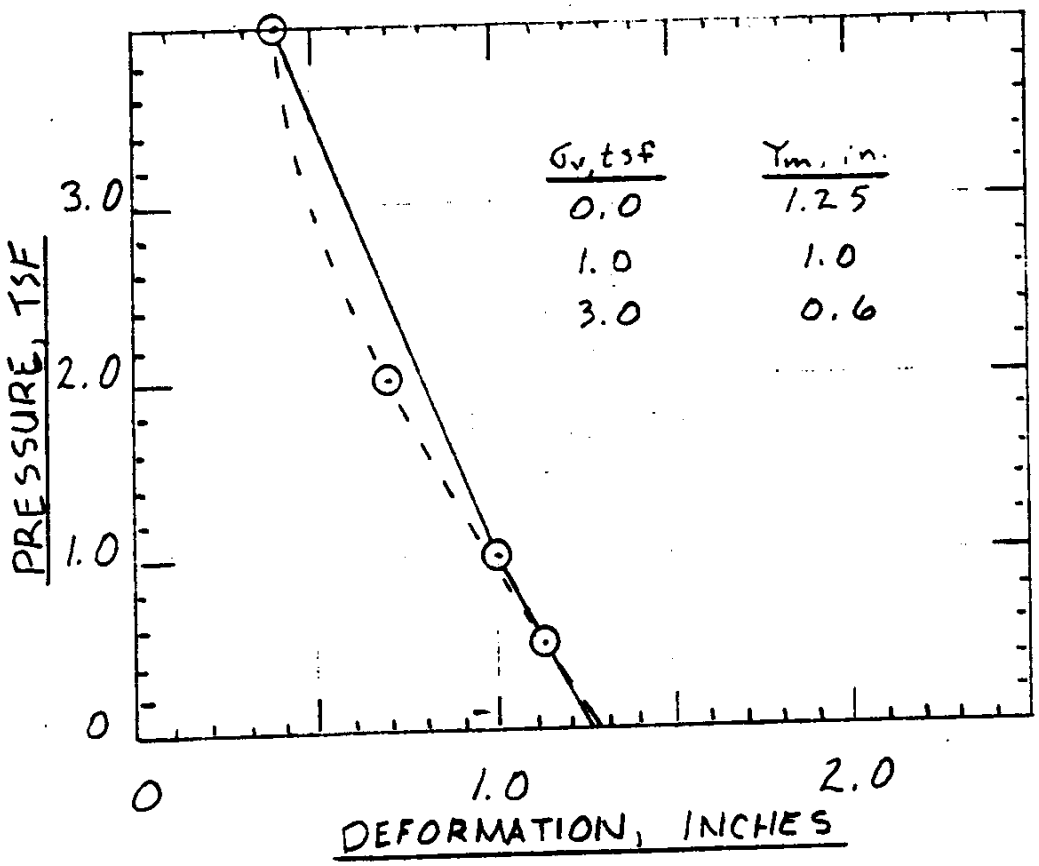
P_s = surcharge pressure next to beam

P_{exp} = expansion pressure

P_f = vertical pressure resisting heave below beam

P = stress @ depth due to to q_{app} $\Delta P = (I_s)(q_{app})$

$P_f = \left\{ \begin{array}{c} \Delta P + P_o \\ \text{or} \\ P_o + P_s \end{array} \right| \begin{array}{c} \text{whichever} \\ \text{is} \\ \text{greater} \end{array}$



EDGE LIFT PARAMETER

EXAMPLE PROBLEM

APPENDIX B

List of Drawings

Project No.: 101228.01

Updated: 7/1/10

UNIT OPERATIONS FACILITES TEMF SITE
FORT POLK, LA.

LOCATION: Ft.Polk, La.

X Submittal: Final RFP
Due Date: July 6, 2010
Remarks:

DRAWING FILE NAME	CALS FILE NAME	SEQ. NO.	SJEET NO.	SHEET TITLE		
fptemfg-000cvr				COVER SHEET		
fptemfg-001plm		1	G-001	PROJECT LOCATION PLAN	X	
fptemfb-101blx		2	B-101	BORING LOCATIONS	X	
fptemfb-201lb1		3	B-201	LOGS OF BORING 1 OF 2	X	
fptemfb-202lb2		4	B-202	LOGS OF BORING 2 OF 2	X	
fptemfv-101sh1		5	V-101	TOPOGRAPHICAL SURVEY SHEET 1 OF 4	X	
fptemfv-102sh2		6	V-102	TOPOGRAPHICAL SURVEY SHEET 2 OF 4	X	
fptemfv-103sh3		7	V-103	TOPOGRAPHICAL SURVEY SHEET 3 OF 4	X	
fptemfv-104sh4		8	V-104	TOPOGRAPHICAL SURVEY SHEET 4 OF 4	X	
fptemfc-101dem		9	C-101	SITE DEMOLITION PLAN	X	
fpuofc-102lay		10	C-102	SITE LAYOUT PLAN	X	
fptemfc-103pav		11	C-103	PAVING PLAN	X	
fptemfc-104utl		12	C-104	UTILITY SITE PLAN	X	
fptemfc-501pdx		13	C-501	PAVING DETAILS	X	
fptemfc-502udx		14	C-502	UTILITY DETAILS	X	
fptemfc-503ddx		15	C-503	DRAINAGE DETAILS	X	
fptemfc-504sdx		16	C-504	SANITARY SEWER DETAILS	X	
fptemfc-505dfx		17	C-505	CHAIN-LINK FENCE DETAILS	X	
fptemfc-506ecd		18	C-506	TEMPORARY EROSION SEDIMENT AND WATER POLLUTION CONTROL MEASURES	X	
fptemfes-101esp		19	ES-101	ELECTRICAL/COMMUNICATIONS SITE PLAN	X	

APPENDIX C
Utility Connections

Not Used

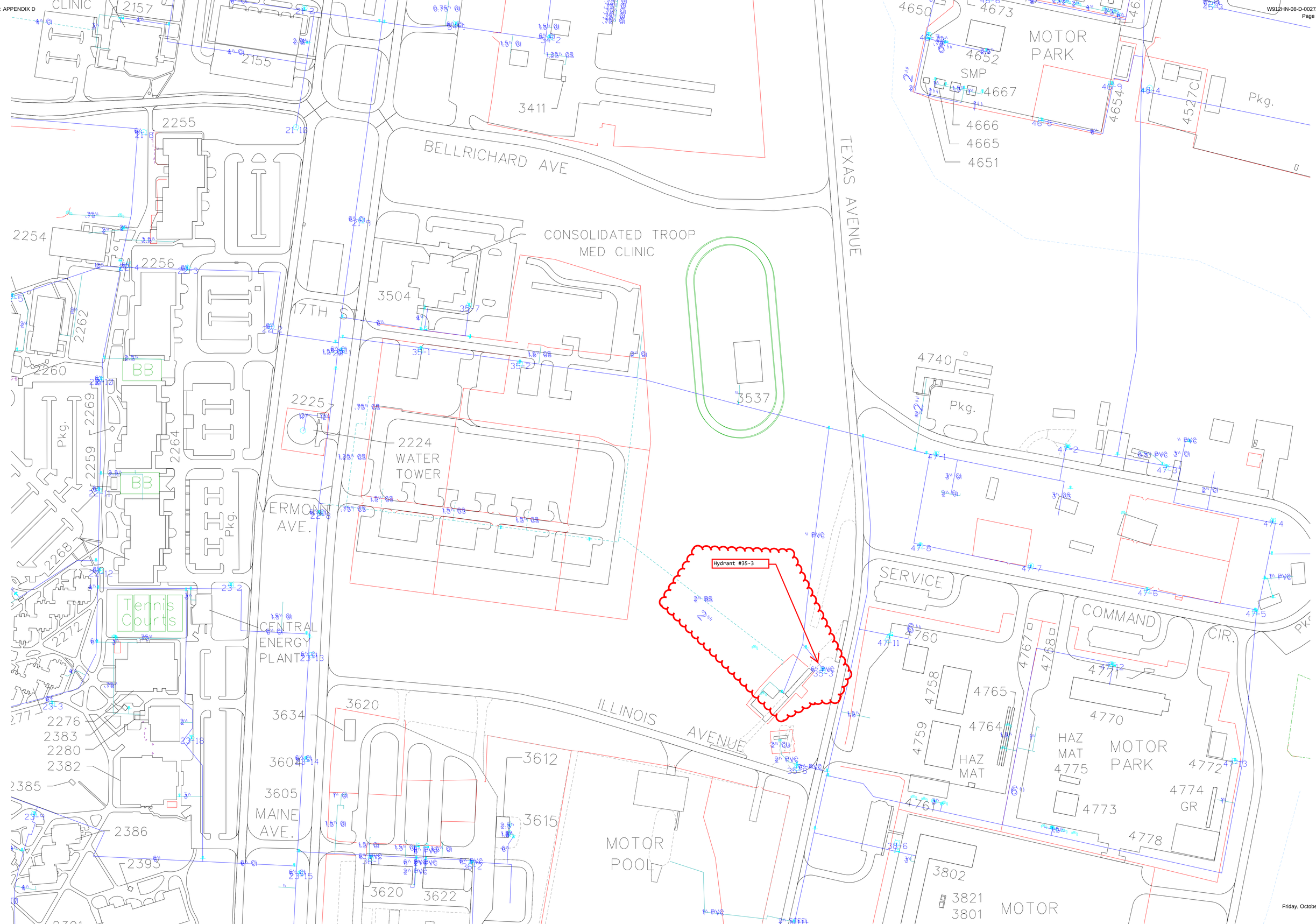
APPENDIX D

Results of Fire Flow Tests

Fire Hydrant 35-3 Hydraulic parameters

(Tested on August 3, 2010)
Static Pressure: 80 psi
Residual Pressure: 70 psi
Flow: 1124 gpm

See map attached for location of fire hydrant. It is located about 100' north of the Texas and Illinois intersection.


CLINIC
2157
2155
2255
2254
2256
2262
2260
2269
2259
2264
2268
2272
2276
2383
2280
2382
2385
2386
2393
2391
BB
Pkg.
Tennis Courts
VERMONT AVE.
CENTRAL ENERGY PLANT
3634
3620
3605
MAINE AVE.
3612
3615
3622
MOTOR POOL
ILLINOIS AVENUE
BELLRICHARD AVE
3411
CONSOLIDATED TROOP MED CLINIC
3504
17TH ST
2225
2224 WATER TOWER
3537
TEXAS AVENUE
Hydrant #35-3
4650
4673
4652
SMP
4667
4666
4665
4651
MOTOR PARK
4549
4527C
Pkg.
4740
SERVICE
COMMAND
CIR.
4760
4758
4759
4765
4764
HAZ MAT
4767
4768
4771
4770
HAZ MAT 4775
MOTOR PARK
4772
4774 GR
4773
4778
3802
3821
3801
MOTOR

APPENDIX E

Environmental Information

IMSE-POL-PD (420-1) February 22, 2010

MEMORANDUM FOR DPW, ENRMD

SUBJECT: Construction of TEMF and COF Facilities For PN 69199.

1. Request site-specific environmental surveys for NEPA compliance as applicable for subject project.

2. Record of Environmental Consideration (REC) is enclosed for your review and concurrence/non-concurrence. Request a copy of the enclosed REC with concurrence/non-concurrence be returned to this office.

3. Point of contact is Dwight Durrett, DPW Planning Division, 531-6617.

SCOTTY GOINS
Chief, Planning Division

Encl
REC

CY10091 ENRMD Control Number

DEPARTMENT OF THE ARMY
JOINT READINESS TRAINING CENTER AND FORT POLK
FORT POLK, LOUISIANA 71459

RECORD OF ENVIRONMENTAL CONSIDERATION

To: Environmental Officer

From: DPW Planning Division

CY10091 ENRMD Control Number

1. **Project Title**: Construction of TEMF and COF facilities to support Unit Ops PN 69199.

2. **Brief Description of Proposed Action**: Construct a Tactical Equipment Maintenance Facility (TEMF) and a Company Operations Facility (COF) to support Fort Polk Unit Operations, Project Number 69199. These facilities are needed to provide required maintenance and operations space. Project construction will include site preparation (i.e. clearing, grading, drainage work, demolition, etc.) and installation of utilities (i.e. electrical, communication, etc.) for the structures. During site preparation and prior to construction, vegetation may need to be removed. Any vegetative debris will be properly removed from the construction site and/or possibly burned on site, dependent on the type and/or amount of debris. In addition to the construction of the buildings, site preparation, and installation of utilities, this construction project will also include construction of various supporting facilities/structures (i.e. paving, fencing, parking lot, etc.). The contractor awarded the project will be required (and this requirement will be placed in the Scope of Work) to obtain appropriate permits and/or necessary approvals associated with and required for new construction projects, in accordance with State, Federal, and Fort Polk regulations (i.e. submit a Notice of Intent, completion of Storm Water Pollution Prevention Plan prior to any ground disturbance activities, submission of applicable documentation to the Louisiana Department of Environmental Quality, wetland/404 permits, etc.) If the limits of construction exceed the submitted project footprint all construction must stop and the new project footprint must be submitted to the Environmental and Natural Resources Management Division in order for further environmental impacts to be analyzed.

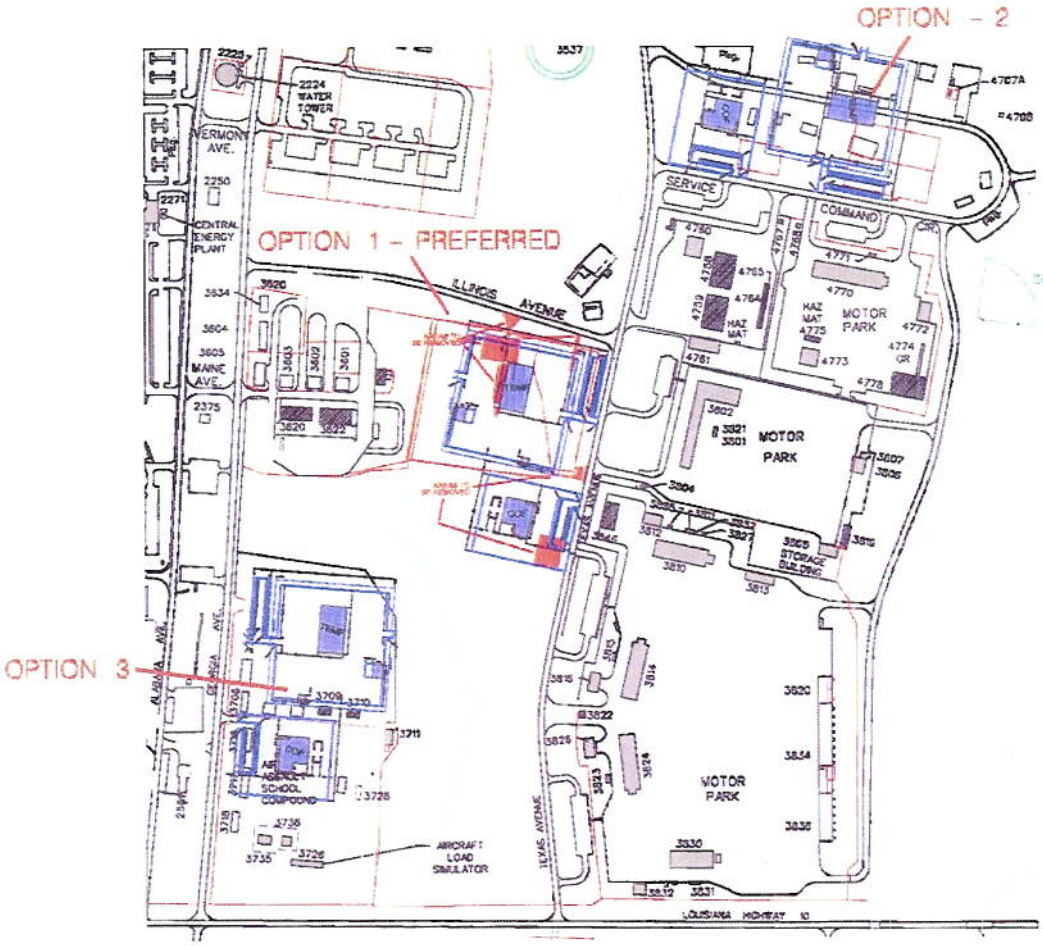
3. **Project Engineer/ Manager Determination**:

Environmental Parameters	YES	NO
Action will require DHH approval of water system changes.		X
Action will require DHH approval of wastewater changes.		X
Project footprint between 1 and 5 acres (storm water permit).		X
Project footprint greater than 5 acres (storm water permit).	X	
Action has the potential to disturb asbestos.		X
Action has the potential to disturb lead based paint.		X

4. **Purpose and Need:** The purpose of the project is to provide needed maintenance and operations space on Fort Polk.

5. **Anticipated Date and/or duration of Proposed Action**: 15 Mar 2010.

6. **A Map or Map(s) are attached**: See attached maps.



CY10091 ENRMD Control Number

7. **Reason for using record of environmental consideration:**

   a. Is categorically excluded under the provisions of categorical exclusion (CX) **C-1** 32 CFR 651, Appendix B [and no extraordinary circumstances exist and there are no adverse affects to sensitive resources, as defined in CFR 651.29(b), 651.29(c)] because: (1) See paragraph 8 below (Effects on the Environment), showing that there are no significant environmental impacts; and (2) this proposed action satisfies the screening conditions in 32 CFR 651.29(a), and meets all screening criteria in 32 CFR 651, Appendix B, Section I.

8. **Effects on the Environment:** The proposed action was evaluated by the proponent and an ENRMD Environmental Subject Matter Expert / Evaluator using the following parameters.

Environmental Parameters	Positive Impact	Negative Impacts	No Significant Impacts	Subject Matter Expert
Air quality			X See Enclosure #1 + #2	
Water quality			X See Enclosure # 3	
Water/Waste Water Systems			X See Enclosure #4	
Cultural Resources			X See Enclosure #5	
Does the property qualify as historical property under the National Historic Preservation Act (NHPA)? X no ____ yes (sign name) AST, 23 March 2010				
Natural Resources			X see Enclosure #6	
Endangered Species			X See Enclosure #7	
Noise			X AST, 23 March 2010	
Sensitive plants or bogs			X See Enclosure #8	
Wetlands			X AST, 23 March 2010	
Asbestos			X see Enclosure #9	
Lead based paint			X See Enclosure #9	
Biodiversity			X AST, 23 March 2010	
Solid Waste			X See Enclosure #10	
Hazardous Material \ Waste			X See Enclosure #10	
Toxic Substances			X	AST 23 March 2010
Environmental Justice			X	
Protection of Children			X	

CY10091 ENRMD Control Number

9. Coordination with other agencies and installation departments:
Fill out as many lines as necessary below and delete unused lines

Installation Organization or Other Agency	Coordination Date	Coordinating Person
Coordination with Master Planner	**Feb 2010**	**Scotty Goins**

10. NEPA Specialist survey report is attached as Appendix A. A NEPA staff person will assist you with this.

11. Conclusion: This proposed action has been evaluated in accordance with 32 CFR Part 651. It has been determined that this proposed action does not individually or cumulatively have significant effects on the human or natural environment. There will be no environmentally controversial changes to existing environmental conditions. There are no circumstances which would require an Environmental Assessment (EA) or an Environmental Impact Statement (EIS) under the National Environmental Policy Act (NEPA). This proposed action: (1) satisfies all screening conditions in 32 CFR 651.29(a); (2) meets all screening criteria in 32 CFR 651, Appendix B, Section I; (3) does not involve any extraordinary circumstances, as defined in 32 CFR 651.29(b), that would preclude the use of a CX; (4) will not adversely affect environmentally sensitive resources as defined in 32 CFR 651.29(c); (5) qualifies for categorical exclusion (CX) number(s) **C-1** in accordance with 32 CFR 651, Appendix B, Section II.

12. Other Environmental Laws: This document does not relieve the proponent of applicable federal and state laws and regulations.

Project Proponent

Dwight Durett
Community Planner

Date: 22 Feb 10

Installation Environmental Coordinator

Concur / ~~Nonconcur~~

Charles H. Stagg
Chief, Environmental and Natural Resources Management Division
Directorate of Public Works

Date: 25 March 2010

CY10091 ENRMD Control Number

Selected by Proponent see page 2 of field survey

	Timber Removed	Stormwater possible impacts	Cost / or Dist Work	Demolition Required	govt must Extinguish leases	Kick Tunnel at J
Alt 1	1.9ac	Yes	Worst	1 structure	NO	NO
Alt 2	.3ac	NO	middle	8 structures	Yes	NO
Alt 3 Environmentally Preferred	.3ac	NO	Best	4 structures	NO	Yes

Option 1 - Preferred Alternative

CY10091 ENRMD Control Number

Option 2

CY10091 ENRMD Control Number

Option 3

CY10091 ENRMD Control Number

CY10091 ENRMD Control Number

DEPARTMENT OF THE ARMY
JOINT READINESS TRAINING CENTER AND FORT POLK
FORT POLK LOUISIANA 71459
ENVIRONMENTAL ANALYSIS/FIELD SURVEY REPORT
of
Construction of TEMF and COF facilities to support Unit Ops, Fort Polk, LA (PN 69199).
CY10091

On 01 March 2010 a field survey was conducted by a NEPA staff member. An inspection of the site location was conducted as a baseline survey to evaluate potential impacts of the proposed action. The proposed action is for the construction of tactical equipment maintenance facility and company operations facility to support Fort Polk Unit Operations. The proposed project is needed to provide required maintenance and operations space. Project construction will include site preparation (i.e. clearing, grading, drainage work, demolition, etc.) and installation of utilities (i.e. electrical, communication, etc.) for the structures. During site preparation and prior to construction, vegetation may need to be removed. Any vegetative debris will be properly removed from the construction site and/or possibly burned onsite, dependent on the type and/or amount of debris. In addition to the construction of the buildings, site preparation, and installation of utilities, this construction project will also include construction of various supporting facilities/structures (i.e. paving, fencing, parking lot, etc.). The contractor awarded the project will be required (and this requirement will be placed in the Scope of Work) to obtain appropriate permits and/or necessary approvals associated with and required for new construction projects, in accordance with State, Federal, and Fort Polk regulations (i.e. submit a Notice of Intent, completion of Storm Water Pollution Prevention Plan prior to any ground disturbance activities, submission of applicable documentation to the Louisiana Department of Environmental Quality, wetland/404 permits, etc.). If the limits of construction exceed the submitted project footprint all construction must stop and the new project footprint must be submitted to the Environmental and Natural Resources Management Division in order for further impacts to be analyzed. To accomplish the proposed action three alternative site locations were developed and maps are attached. The purpose of the proposed action is to provide needed maintenance and operations spaces on Fort Polk. I observed that no environmental impacts would occur during the construction of a tactical equipment maintenance facility and company operations facility, as stated above, additionally, the action meets the screening criteria for a Record of Environmental Consideration.

The proposed action is covered under categorical exclusion (CX) number C-1 32 Code of Federal Regulations (CFR) 651. CX C-1 states - "Construction of an addition to an existing structure of new construction on a previously undisturbed site if the area to be disturbed has no more than 5.0 cumulative acres of new surface disturbance. This does not include construction of facilities for the transportation, distribution, use, storage, treatment, and disposal of solid waste, medical waste, and hazardous waste (REC required)." In order for a categorical exclusion to be used as stated in 32 CFR 651, a set of screening criteria must be met. Those screening criteria are listed below.

A CX may be used only when each of the following screening criteria is true:

- The action has NOT been segmented. **TRUE**
- The action does NOT have a reasonable likelihood of causing significant effects on public health, safety or the environment. **TRUE**
- This action does NOT cause an imposition of uncertain or unique environmental risks. **TRUE**
- This action is NOT of greater scope or size than is normal for this category of action. **TRUE**
- This action is NOT expected to produce reportable releases of hazardous or toxic substances as specified in 40 CFR part 302, Designation, Reportable Quantities, and Notification. **TRUE**
- This action is NOT expected to produce releases of petroleum, oils, and lubricants (POL) except from a properly functioning engine or vehicle, application of pesticides and herbicides, where the proposed

action results in requirement to develop or amend a Spill Prevention, Control, or Counter Measure Plan. **TRUE**

- There is NO reasonable likelihood of this action violating any federal, state, or local law or requirements imposed for the protection of the environment. **TRUE**
- This action does NOT involve effects on the environment that are highly uncertain, involve unique or unknown risks, or are scientifically controversial. **TRUE**
- This action does NOT establish a precedent for future actions that are reasonably likely to have a future significant effect. **TRUE**
- This action is not expected to potentially degrade an already existing poor environment or effect areas not already significantly modified from their natural condition. **TRUE**
- This action is NOT expected produce unresolved effects on (1) Proposed federally listed, threatened, or endangered species or the r designate critical habitats, (2) Properties listed or eligible for listing on the Natural Register of Historic Places, (3) Areas having special designation or recognition such as prime or unique agriculture lands; coastal zones; designated wilderness or wilderness study areas; wild and scenic rivers; National Historic Landmarks; 100-year flood plains; wetlands; sole source aquifers; National Wildlife Refuges; national Parks; areas of critical environmental concern; or other areas of high environmental sensitivity, or (4) Cultural Resources as defined in AR 200-4. **TRUE**

CY10091 ENRMD Control Number

Conclusion of Findings

An inspection of the three proposed sites for the construction of a tactical equipment maintenance facility and company operations facility, Fort Polk, La was conducted as a baseline survey to evaluate the potential environmental impacts of the proposed project. Three alternative site locations were evaluated for environmental impacts as a result of the proposed action (see maps). The three site locations were: Alternative 1, located on the west side of the southern end of Texas Avenue; Alternative 2, located on Command Circle; Alternative 3, located within the Air Assault School Compound (see maps). The proposed project and alternative site locations were reviewed by the Environmental and Natural Resources Management Division (ENRMD). The branches of ENRMD reviewing the proposed project were: Compliance Management Branch (CMB), Conservation Branch (CB), and Natural Resources Management Branch (NRMB).

3-25-10

X **Alternative 1 (located on the west side of the southern end of Texas Avenue)**

CY10091 ENRMD Control Number

Alternative 1 was reviewed by the Compliance Management Branch (CMB) program managers and subject matter experts for significant environmental impacts on CMB programs. CMB subject matter experts commented on air quality, indoor air quality, storm water quality, drinking and waste water quality, lead and asbestos, solid/hazardous material waste, and the restoration program. No indoor air quality or air quality impacts are expected as a result of the proposed action. For additional guidance regarding indoor air quality and air quality regulations please refer to Enclosure #1 and #2 of this document. For additional guidance regarding storm water/water quality, including drinking and waste water, regulations please refer to Enclosure #3 and #4 of this document. The construction of new facilities requires asbestos free certification upon completion of the project. For additional guidance regarding lead and asbestos regulations please refer to Enclosure #9 of this document. No impacts on the solid/hazardous material waste program are expected as a result of the proposed project (see Enclosure #10). Alternative 1 poses the possibility that past fueling operations may have impacted surface, subsurface, or groundwater media. For additional guidance regarding the restoration program, refer to Enclosure #11.

Alternative 1 was reviewed by the Conservation Branch (CB) program managers and subject matter experts for significant environmental impacts on CB programs. CB subject matter experts commented on cultural resources, endangered species, sensitive plants or bogs, pest management, and erosion control programs. No National Register eligible, potentially eligible archaeological sites, or historic cemeteries are located near or within the project footprint of Alternative 1, therefore no significant environmental impacts are expected on the cultural resources program as a result of the proposed project (see Enclosure #5). No significant environmental impacts are anticipated for the endangered species program as a result of the proposed project (see Enclosure #7). After an inspection of Alternative 1 for environmental impacts on sensitive plants or bogs, it was determined that no significant impacts are anticipated as a result of the proposed project (see Enclosure #8). Upon review of the proposed project by pest management, no environmental impacts are expected as a result of the proposed project, although the Installation Design Guide must be followed during construction as it pertains to the treatment of the building for termites during construction (see Enclosure #13). Alternative 1 is located on a relatively flat and mostly previously disturbed site, therefore no potential erosion control concerns are related to the proposed project (see Enclosure #12).

Alternative 1 was also reviewed by the Natural Resources Management Branch for environmental concerns. On 24 March 2010, a subject matter expert from the Natural Resources Management Branch inspected the site of Alternative 1 for the proposed project for concerns regarding timber removal, in which it was determined that no environmental concerns would result from the proposed action at Alternative 1. The timber was found to be merchantable and will be harvested by the Natural Resources Management Branch prior to construction (see Enclosure #6). Coordination with Mr. Bruce Martin, Chief of Natural Resources Management Branch or Mr. Chad Tilley, Natural Resources Management Branch, must be made before any timber removal from the project site is conducted. Mr. Martin's contact numbers are (337) 531-7912 (office) or (337) 208-2802 (cell) and Mr. Tilley's contact numbers are (337) 531-7912 (office) or (337) 208-2746 (cell).

CY10091 ENRMD Control Number

_____Alternative 2 (located on Command Circle)

Alternative 2 was reviewed by the Compliance Management Branch (CMB) program managers and subject matter experts for significant environmental impacts on CMB programs. CMB subject matter experts commented on air quality, indoor air quality, storm water quality, drinking and waste water quality, lead and asbestos, solid/hazardous material waste, and the restoration program. No indoor air quality or air quality impacts are expected as a result of the proposed action. For additional guidance regarding indoor air quality and air quality regulations please refer to Enclosure #1 and #2 of this document. For additional guidance regarding storm water/water quality, including drinking and waste water, regulations please refer to Enclosure #3 and #4 of this document. The construction of new facilities requires asbestos free certification upon completion of the project. For additional guidance regarding lead and asbestos regulations please refer to Enclosure #9 of this document. No impacts on the solid/hazardous material waste program are expected as a result of the proposed project (see Enclosure #10). Alternative 2 is not anticipated to impact any environmental areas of concern for the restoration program (see Enclosure #11).

Alternative 2 was reviewed by the Conservation Branch (CB) program managers and subject matter experts for significant environmental impacts on CB programs. CB subject matter experts commented on cultural resources, endangered species, sensitive plants or bogs, pest management, and erosion control programs. No National Register eligible, potentially eligible archaeological sites, or historic cemeteries are located near or within the project footprint of Alternative 2, therefore no significant environmental impacts are expected on the cultural resources program as a result of the proposed project (see Enclosure #5). No significant environmental impacts are anticipated for the endangered species program as a result of the proposed project (see Enclosure #7). After an inspection of Alternative 2 for environmental impacts on sensitive plants or bogs, it was determined that no significant impacts are anticipated as a result of the proposed project (see Enclosure #8). Upon review of the proposed project by pest management, no environmental impacts are expected as a result of the proposed project, although the Installation Design Guide must be followed during construction as it pertains to the treatment of the building for termites during construction (see Enclosure #13). Alternative 2 is located on a relatively flat and mostly previously disturbed site, therefore no potential erosion control concerns are related to the proposed project (see Enclosure #12).

Alternative 2 was also reviewed by the Natural Resources Management Branch for environmental concerns. On 24 March 2010, a subject matter expert from the Natural Resources Management Branch inspected the site of Alternative 2 for the proposed project for concerns regarding timber removal, in which it was determined that no environmental concerns would result from the proposed action at Alternative 2. The timber was found to be merchantable and will be harvested by the Natural Resources Management Branch prior to construction (see Enclosure #6). Coordination with Mr. Bruce Martin, Chief of Natural Resources Management Branch or Mr. Chad Tilley, Natural Resources Management Branch, must be made before any timber removal from the project site is conducted. Mr. Martin's contact numbers are (337) 531-7912 (office) or (337) 208-2802 (cell) and Mr. Tilley's contact numbers are (337) 531-7912 (office) or (337) 208-2746 (cell).

CY10091 ENRMD Control Number

_____Alternative 3 (located within the Air Assault School Compound)

Alternative 3 was reviewed by the Compliance Management Branch (CMB) program managers and subject matter experts for significant environmental impacts on CMB programs. CMB subject matter experts commented on air quality, indoor air quality, storm water quality, drinking and waste water quality, lead and asbestos, solid/hazardous material waste, and the restoration program. No indoor air quality or air quality impacts are expected as a result of the proposed action. For additional guidance regarding indoor air quality and air quality regulations please refer to Enclosure #1 and #2 of this document. For additional guidance regarding storm water/water quality, including drinking and waste water, regulations please refer to Enclosure #3 and #4 of this document. The construction of new facilities requires asbestos free certification upon completion of the project. For additional guidance regarding lead and asbestos regulations please refer to Enclosure #9 of this document. No impacts on the solid/hazardous material waste program are expected as a result of the proposed project (see Enclosure #10). Alternative 2 is not anticipated to impact any environmental areas of concern for the restoration program (see Enclosure #11).

Alternative 3 was reviewed by the Conservation Branch (CB) program managers and subject matter experts for significant environmental impacts on CB programs. CB subject matter experts commented on cultural resources, endangered species, sensitive plants or bogs, pest management, and erosion control programs. No National Register eligible, potentially eligible archaeological sites, or historic cemeteries are located near or within the project footprint of Alternative 3, therefore no significant environmental impacts are expected on the cultural resources program as a result of the proposed project (see Enclosure #5). No significant environmental impacts are anticipated for the endangered species program as a result of the proposed project (see Enclosure #7). After an inspection of Alternative 3 for environmental impacts on sensitive plants or bogs, it was determined that no significant impacts are anticipated as a result of the proposed project (see Enclosure #8). Upon review of the proposed project by pest management, no

CY10091 ENRMD Control Number

environmental impacts are expected as a result of the proposed project, although the Installation Design Guide must be followed during construction as it pertains to the treatment of the building for termites during construction (see Enclosure #13). Alternative 3 is located on a relatively flat and mostly previously disturbed site, therefore no potential erosion control concerns are related to the proposed project (see Enclosure #12).

Alternative 3 was also reviewed by the Natural Resources Management Branch for environmental concerns. On 24 March 2010, a subject matter expert from the Natural Resources Management Branch inspected the site of Alternative 3 for the proposed project for concerns regarding timber removal, in which it was determined that no environmental concerns would result from the proposed action at Alternative 3. The timber was found to be merchantable and will be harvested by the Natural Resources Management Branch prior to construction (see Enclosure #6). Coordination with Mr. Bruce Martin, Chief of Natural Resources Management Branch or Mr. Chad Tilley, Natural Resources Management Branch, must be made before any timber removal from the project site is conducted. Mr. Martin's contact numbers are (337) 531-7912 (office) or (337) 208-2802 (cell) and Mr. Tilley's contact numbers are (337) 531-7912 (office) or (337) 208-2746 (cell).

A decision matrix for the proposed project was not completed during the review of this proposed project.

<u>Summary of Findings</u>

Upon review of comments submitted by subject matter experts and the proposed project, it has been determined that the environmentally preferred alternative for the proposed project is Alternative 3 (located within the Air Assault School Compound), the 2nd environmentally preferred alternative is Alternative 2 (located on Command Circle), and the least environmentally preferred alternative is Alternative 1 (located on the west side of the southern end of Texas Avenue).

*** Alternative 3 is the environmentally preferred alternative site since most of the footprint of Alternative 3 has been previously disturbed and will require the least amount of tree removal from within the project footprint.**
***Alternative 2 was selected as the 2nd environmentally preferred alternative since the location of Alternative 2 consist of previously disturbed areas (although less than that of Alternative 3) and will require the least amount of tree removal (equal amount of tree removal with Alternative 3) from within the project footprint.**
***Alternative 1 was selected as the least environmentally preferred alternative since the footprint of Alternative 1 would require the most amount of new disturbance and therefore the most amount of tree removal from within the project footprint. Alternative 1 also poses impacts to the restoration program since past fueling operations may have impacted the project site.**

If there are no changes in this scope of work or with the alternative locations of the proposed action, no other environmental analysis is planned. In conclusion the nature of this action poses no significant environmental impacts to the environment. The proposed action meets the screening criteria for the completion of a Record of Environmental Consideration under categorical exclusion C-1 of the 32 CFR 651.

A. Sara Thames, 25 March 2010

A. Sara Thames, Ecologist
DPW/ENRMD-Conservation Branch
(337) 531-1653

Thames, Sara Ms CIV USA IMCOM

From: Veillon, Tammy G Ms CIV USA IMCOM
Sent: Thursday, March 11, 2010 1:30 PM
To: CEDARS, ALLISON Ms CIV USA IMCOM; Thames, Sara Ms CIV USA IMCOM
Subject: RE: CY10091, TEMF/COF; PN 69199 (UNCLASSIFIED)
Attachments: TEMF_Unit Ops Bldg Construction CY10091.doc

CY10091 ENRMD Control Number

Classification: UNCLASSIFIED
Caveats: FOUO

Attached is the IAQ response for this REC.

-----Original Message-----
From: CEDARS, ALLISON Ms CIV USA IMCOM
Sent: Tuesday, February 23, 2010 11:11 AM
To: Baker, Christina L CTR USA; Brewer, Kathleen B CTR USA; Broussard, Nathan G Mr CIV USA IMCOM; Fitzgerald, Timothy B CIV USA IMCOM; Guzman, Sheilla CIV USA IMCOM; Hartzell, Frederick J CIV USA; Jones, Aishah F CTR USA IMCOM; Madison, Raywood T CTR USA; Moltsau, Alan W CIV USA IMCOM; Moore, Joseph W Mr CIV USA IMCOM; Skinner, Harvey Mr CIV USA IMCOM; Veillon, Tammy G Ms CIV USA IMCOM
Cc: Thames, Sara Ms CIV USA IMCOM
Subject: CY10091, TEMF/COF; PN 69199 (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: FOUO

All,

The following REC has been submitted for environmental review:

CY10091 - Construction of Tactical Equipment Maintenance Facility (TEMF) and Company Operations Facility (COF) to Support Unit Operations (PN 69199).

Project Evaluator is Sara Thames, 531-1653.

Please submit all comments/responses to Sara Thames and Allison Cedars.

Thank you,
Allison Cedars
Ecologist
NEPA Section
DPW, ENRMD, Conservation Branch
1697 23rd Street, Building 2543
Office: (337) 531-6725
Fax: (337) 531-2627

Classification: UNCLASSIFIED
Caveats: FOUO

Classification: UNCLASSIFIED
Caveats: FOUO

CY10091 ENRMD Control Number

The following is the review of proposed projects regarding concerns related to Indoor Air Quality. This review applies to the following proposal CY10091.

1. The project described in the statement of work has the potential to significantly impact indoor air quality. Since the IAQ of a non-existent facility cannot be assessed the following recommendations provide guidance on providing a facility with IAQ that will be suitable for higher risk occupants. If mold growth is encountered during the construction the following information is provided as guidance to prevent significant negative impacts to IAQ. Care should also be taken during new construction to utilize materials which inhibit mold growth.

2. Providing the appropriate amount of outside air also has the potential to positively impact the overall indoor air quality present in a facility. ASHRAE 62.1 (2007 version) provides guidance on the appropriate level of outside air required per person. It should be noted that this is the minimum recommended outside air (OA) and that significant improvements in indoor air quality are observed when the flow is increased to approximately 20 cfm/person OA.

3. Insulating wraps and other building materials utilized in this project should minimize the use of cellulose containing materials as these provide a potential food source for mold. This is especially critical in attic spaces where warm, moist air is already present.

4. Additional improvements in indoor air quality can also be accomplished through the following measures in HVAC design:

A. HVAC system which allows for filters to be placed in series, where outside and return air are first passed through an arrestance filter (MERV 7) and then passed through a filter with a higher efficiency rating (MERV 11).

B. Run return air through a metal ductwork system to minimize debris in the return air system to discourage mold growth.

C. System design should allow for dehumidification of outside air such that a facility may maintain relative humidity at 40-60%.

5. A properly operating HVAC system will allow for proper dehumidification of the climate controlled space. For best results for thermal comfort and inhibiting mold growth, 40 - 50% relative humidity is recommended. This is easily accomplished by installing a humidity monitoring device in-line with the HVAC system.

6. Building materials should be utilized which inhibit mold growth through the use chemical treatment or cellulose-free construction.

7. Care should be taken during construction to minimize the migration of dust into the HVAC ductwork. All intake and exhaust vents should be sealed while performing activities which may generate large amounts of particulates during construction.

8. The use of ceiling tile composed primarily of cellulose should be avoided. Cellulose readily absorbs moisture from the air serving as a

food and moisture source for mold. These ceiling tiles also require frequent replacement due to the absorption of moisture.

9. Solvents and sealants may contain high levels of volatile organic compounds (VOCs). Proper industrial hygiene practices should be used when handling any of these substances and should always be handled in a well-ventilated area.

10. Any debris collected from rooms suspected of containing excessive mold spores should be double bagged in 6 mil plastic bags and sealed with duct tape.

11. The supply air filters on the HVAC system may quickly become clogged due to increased particulates present in the facility due to renovation activities and should be changed frequently to avoid filter breakthrough.

12. Contractor should ensure that measures are taken during renovation to minimize the potential exposure of personnel to poor indoor air quality. This should include at a minimum PPE designed to inhibit exposure of personnel to microbial growth. Contractors should obtain recommendations from an industrial hygienist for a determination of the acceptable level of risk associated with the different levels of mold remediation.

CY10091 ENRMD Control Number

MEMORANDUM FOR ENRMD, Conservation Branch (Attn: NEPA Staff)

SUBJECT: Construction of TEMF and COF Facilities for PN 69199, Fort Polk, LA CY10091

CY10091 ENRMD Control Number

1 Review of the proposed scope of work to construct a Tactical Equipment Maintenance Facility (TEMF) and a company Operations Facility (COF) to support Fort Polk Unit Operations, Project Number 69199. This project is considered a "design build" and as such the exact size and type of any comfort heating and cooling have yet to be determined. Based on the expected size and operational characteristics it is not anticipated to significantly impact the JRTC and Fort Polk Clean Air Act (Title V) requirements. The act of preparing the site for construction is not expected to have a negative impact on the installations air quality. As information concerning any potential air emission sources is finalized a more detailed assessment of air quality impacts will be made. Please notify this office of any changes in the Scope of Work to ensure final product is in compliance with Title V and Title VI of the Clean Air Act.

2 New HVAC units should not contain Ozone Depleting Compounds, rather alternative refrigerants should be used.

3 All work associated with this project must be performed in accordance with 40 CFR 82, Protection of Stratospheric Ozone; Titles V and VI of the Clean Air Act; and Army Regulation (AR) 200- Specifically:

A. All work on equipment containing ODCs must be performed by certified technicians using certified equipment, IAW 40 CFR 82.154.

B. All persons disposing of appliances containing ODCs, must evacuate the refrigerant in the entire unit to a recovery or recycling machine certified pursuant to 40 CFR 82.158.

C. Per 40 CFR 82.154, no person maintaining, servicing, repairing, or disposing of appliances may knowingly vent or otherwise release into the environment any class I or class I1 substance used as refrigerant in such equipment. All releases of ODCs shall be reported to DPW, Environmental and Natural Resources Management Division, Compliance Management Branch as soon as possible.

4. Point of contact is the undersigned at (337) 531-6026, or Harvey.Skinner@us.army.mil.

Harvey Skinner
Installation Air Quality Manager

From: Baker, Christina L CTR USA
Sent: Tuesday, February 23, 2010 1:07 PM
To: CEDARS, ALLISON Ms CIV USA IMCOM; Thames, Sara Ms CIV USA IMCOM
Subject: RE: CY10091, TEMF/COF; PN 69199 (UNCLASSIFIED)
Attachments: Storm Water REC INFO FINAL.docx

CY10091 ENRMD Control Number

Classification: UNCLASSIFIED
Caveats: FOUO

Please see the attached storm water comments in reference to the narrative provided and the environmental parameters selected for CY10091.

Christina Baker, Contractor
Innovar Environmental Inc.
DPW-ENRMD
1647 23rd Street Building 2516
Fort Polk, LA 71459-5509
Christina.baker2@us.army.mil
COMM: 337.531.2894
DSN: 863.2894
FAX: 337.531.8950

-----Original Message-----
From: CEDARS, ALLISON Ms CIV USA IMCOM
Sent: Tuesday, February 23, 2010 11:11 AM
To: Baker, Christina L CTR USA; Brewer, Kathleen B CTR USA; Broussard, Nathan G Mr CIV USA IMCOM; Fitzgerald, Timothy B CIV USA IMCOM; Guzman, Sheilla CIV USA IMCOM; Hartzell, Frederick J CIV USA; Jones, Aishah F CTR USA IMCOM; Madison, Raywood T CTR USA; Moltsau, Alan W CIV USA IMCOM; Moore, Joseph W Mr CIV USA IMCOM; Skinner, Harvey Mr CIV USA IMCOM; Veillon, Tammy G Ms CIV USA IMCOM
Cc: Thames, Sara Ms CIV USA IMCOM
Subject: CY10091, TEMF/COF; PN 69199 (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: FOUO

All,

The following REC has been submitted for environmental review:

CY10091 - Construction of Tactical Equipment Maintenance Facility (TEMF) and Company Operations Facility (COF) to Support Unit Operations (PN 69199).

Project Evaluator is Sara Thames, 531-1653.

Please submit all comments/responses to Sara Thames and Allison Cedars.

Thank you,
Allison Cedars
Ecologist
NEPA Section
DPW, ENRMD, Conservation Branch
1697 23rd Street, Building 2543

POC: Christina Baker
337-531-2894
Christina.baker2@us.army.mil

CY10091 ENRMD Control Number

Best Management Practices (BMPs) for Construction Activity of Any Size: Only storm water should enter the storm water conveyances and inlet systems; the installation has a separate storm sewer system that drains directly to receiving streams. **Dumping into the storm sewers or natural water bodies is prohibited.**

- Employ soil erosion measures such as silt fences and inlet protection to prevent sediment from leaving the site and entering the storm drains
- Vegetate or re-vegetate areas of ground that have been disturbed as soon as possible to prevent soil erosion and subsequent storm water conveyance/receiving stream sedimentation
- On-site preventative measures should be taken to ensure that potential pollutants are not released into the environment
- During construction and upon completion, the site should be free of excess construction debris and associated litter to prevent contamination of storm water

Small Construction (1 Acre to 4.99999 Acres) Storm Water General Permit (#LAR200000):

- No permit fees will be assessed by the Louisiana Department of Environmental Quality (LDEQ) for coverage under this permit
- Discharge storm water from construction activities will be automatically covered for those that meet the applicability requirements defined in the permit
- Written notification of intent (NOI) under this general permit is not required
- Site/contact information and a Storm Water Pollution Prevention Plan (SWPPP) will be developed, implemented, and kept on site
- A Project Completion Report will be submitted to LDEQ upon completion and stabilization of the construction site in accordance with the permit guidelines
  For further information and guidance, please contact LDEQ customer service at 225-219-5337 or go to the link below.

www.deq.louisiana.gov/portal/Portals/0/permits/lpdes/LAR200000.pdf

Storm Water General Permit for Construction Activities of 5 Acres or More (#LAR100000):

- Permit fees will be assessed by LDEQ for coverage under this permit
- An NOI must be submitted to LDEQ before permitees are authorized to discharge storm water
- Site/contact information and a Storm Water Pollution Prevention Plan (SWPPP) will be developed, implemented, and kept on site
- All permitees must submit a Notice of Termination (NOT) within thirty days upon completion and stabilization of the construction site in accordance with the permit guidelines
  For further information and guidance, please contact LDEQ customer service at 225-219-5337 or go to the link below.

www.deq.louisiana.gov/portal/Portals/0/permits/lpdes/LAR100000.pdf

From: Thames, Sara Ms CIV USA IMCOM
Sent: Friday, February 26, 2010 4:33 PM
To: Thames, Sara Ms CIV USA IMCOM
Subject: FW: CY10091, TEMF/COF; PN 69199 (UNCLASSIFIED)
Attachments: modified new constrution statement.docx

CY10091 ENRMD Control Number

Classification: UNCLASSIFIED
Caveats: NONE

A. Sara Thames
Ecologist, DPW/ENRMD/Conservation Branch
1647 23rd Street, Building 2543
Fort Polk, Louisiana 71459
e-mail: sara.thames@us.army.mil
office: (337) 531-1653
DSN: 863-1653
fax: (337) 531-2627

-----Original Message-----
From: Jones, Aishah F CTR USA IMCOM
Sent: Thursday, February 25, 2010 4:50 PM
To: CEDARS, ALLISON Ms CIV USA IMCOM; Thames, Sara Ms CIV USA IMCOM
Subject: RE: CY10091, TEMF/COF; PN 69199 (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Please find the attached memo in regarding the proposed action. Let me know if you have any questions.
AJ

-----Original Message-----
From: CEDARS, ALLISON Ms CIV USA IMCOM
Sent: Tuesday, February 23, 2010 11:11 AM
To: Baker, Christina L CTR USA; Brewer, Kathleen B CTR USA; Broussard, Nathan G Mr CIV USA IMCOM; Fitzgerald, Timothy B CIV USA IMCOM; Guzman, Sheilla CIV USA IMCOM; Hartzell, Frederick J CIV USA; Jones, Aishah F CTR USA IMCOM; Madison, Raywood T CTR USA; Moltsau, Alan W CIV USA IMCOM; Moore, Joseph W Mr CIV USA IMCOM; Skinner, Harvey Mr CIV USA IMCOM; Veillon, Tammy G Ms CIV USA IMCOM
Cc: Thames, Sara Ms CIV USA IMCOM
Subject: CY10091, TEMF/COF; PN 69199 (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: FOUO

All,

The following REC has been submitted for environmental review:

CY10091 - Construction of Tactical Equipment Maintenance Facility (TEMF) and Company Operations Facility (COF) to Support Unit Operations (PN 69199).

IMWE-POL-PWE 25 February 2010

MEMORANDUM FOR ENRMD, Conservation Branch (ATTN: NEPA Staff)

SUBJECT: REC CY10091 - Construction of Tactical Equipment Maintenance Facility (TEMF) and Company Operations Facility (COF) to Support Unit Operations (PN 69199).

CY10091 ENRMD Control Number

1. The Louisiana Department of Health and Hospitals(LDHH) requires changes to the sanitary sewer system and drinking water systems be approved **prior to start of construction.**

2. Coordination with American Water is required prior to submitting plans and specifications to the LDHH to ensure the hydraulic capacity is not adversely impacted by increased loading and demand on the drinking water and waste water systems. Please contact Al Weinnig at (337) 531- 1178 for additional specifications.

3. Water meters will are required on new construction and significant renovations IAW with Army water conservation requirements.

4. Pumps, pipes, and new parts of the drinking water must be thoroughly disinfected by the use of chlorine before placing in use or furnishing water to consumers, water from new parts of the distribution system must be sanitized and found to be free of coliform bacteria IAW with state regulations.

5. Point of contact is undersigned (337) 531-7547 or aishah.f.jones@us.army.mil.

Aishah F. Jones
Drinking Water/ Water Quality Program Manager

IMSE-POL-PWE

19 Mar 2010

MEMORANDUM OF RECORD

SUBJECT: Construction of TEMF and COF Facilities For PN 69199 (CY10091)

CY10091 ENRMD Control Number

Alternative 1:

No eligible or potentially eligible sites or structures are located near the proposed alternative and none will be impacted by the proposed project.

Alternative 2:

No eligible or potentially eligible sites or structures are located near the proposed alternative and none will be impacted by the proposed project.

Alternative 3:

No eligible or potentially eligible sites or structures are located near the proposed alternative and none will be impacted by the proposed project.

BRADLEY LAFFITTE
STAFF ARCHAEOLOGIST
DPW/ENRMD/CB

From: Martin, Bruce Mr CIV USA IMCOM
Sent: Thursday, March 25, 2010 9:22 AM
To: Thames, Sara Ms CIV USA IMCOM
Subject: RE: CY10091 (UNCLASSIFIED)
Signed By: bruce.d.martin@us.army.mil

CY10091 ENRMD Control Number

Classification: UNCLASSIFIED
Caveats: FOUO

Thanks for you and Chad reviewing the site..I concur with Chad's memo and recommend the merchantable timber harvest by our timber salvage contractor.

Bruce D. Martin
Chief, Natural Resources
Management Branch
bruce.d.martin@conus.army.mil
COM 337.531.7912
DSN 863.7912
cell 337.208.2802
fax 337.531.2122

-----Original Message-----
From: Thames, Sara Ms CIV USA IMCOM
Sent: Thursday, March 25, 2010 9:07 AM
To: Martin, Bruce Mr CIV USA IMCOM; Tilley, Chad T CIV USA IMCOM
Subject: CY10091 (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: FOUO

Attached is the memo that will attached to the REC-CY10091 regarding the timber. Please review. Thanks!

Sara

A. Sara Thames
Ecologist, DPW/ENRMD/Conservation Branch
1647 23rd Street, Building 2543
Fort Polk, Louisiana 71459
e-mail: sara.thames@us.army.mil
office: (337) 531-1653
DSN: 863-1653
fax: (337) 531-2627

Classification: UNCLASSIFIED
Caveats: FOUO

Classification: UNCLASSIFIED
Caveats: FOUO

CY10091-Construction of TEMF and COF Facilities (PN 69199).

March 24, 2010

CY10091 ENRMD Control Number

The proposed project (CY10091) was reviewed by the Natural Resources Management Branch for environmental concerns. On 24 Mar 2010, a subject matter expert from the Natural Resources Management Branch inspected the proposed project footprint sites for concern regarding timber removal, in which it was determined that no environmental concerns would result from the proposed action at any of the three proposed alternative sites. The timber at each of the three proposed alternative sites was determined to be merchantable. Coordination with Mr. Bruce Martin, Chief of Natural Resources Management Branch, must be made before any timber removal from the project is conducted. Mr. Martin's contact numbers are (337) 531-7912 (office) or (337) 208-2802 (cell).

Please contact me if additional information is needed.

Mr. Chad Tilley
Forestry Technician
Natural Resources Management Division
531-7912 (office); 208-2746 (cell)

From: Moore, Kenneth Mr CIV USA IMCOM
Sent: Wednesday, March 24, 2010 12:23 PM
To: Thames, Sara Ms CIV USA IMCOM
Subject: RE: REC-CY10091 (UNCLASSIFIED)
Attachments: CY10091 (RCW).docx

CY10091 ENRMD Control Number

Classification: UNCLASSIFIED
Caveats: FOUO

Sara,

Attached is the memo for CY10091. Thanks!

KM

Kenneth R. Moore
Endangered Species Ecologist
DA Civilian
DPW ENRMD Conservation Branch
337-531-7078 Fax 337-531-2396
kenneth.moore4@conus.army.mil

-----Original Message-----
From: Thames, Sara Ms CIV USA IMCOM
Sent: Wednesday, March 17, 2010 12:49 PM
To: Reynolds, Lloyd G CTR US USA IMCOM; Moore, Kenneth Mr CIV USA IMCOM
Subject: REC-CY10091 (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: FOUO

Ken/Lloyd,

Attached is a REC for the new construction of a TEMF and COF Facility. Can you please check the three alternative sites to see if any of the habitat is HMU and please provide appropriate comments, etc. Also, Lloyd do you see any issues with erosion, etc..., please comment also. If you have any questions, please let me know. Thanks!

Sara

A. Sara Thames
Ecologist, DPW/ENRMD/Conservation Branch
1647 23rd Street, Building 2543
Fort Polk, Louisiana 71459
e-mail: sara.thames@us.army.mil
office: (337) 531-1653
DSN: 863-1653
fax: (337) 531-2627

Classification: UNCLASSIFIED

CY10091-Construction of TEMF and COF Facilities, Fort Polk, LA (PN 69199).

March 24, 2010

CY10091 ENRMD Control Number

The proposed project (CY10091) was reviewed by the Conservation Branch, Endangered Species for environmental concerns. The proposed project footprint sites are located within the cantonment area and are not considered HMU (Habitat Management Unit) for the RCW or potential LA Pine Snake habitat, therefore no environmental impacts on Endangered Species are expected as a result of the project at any of the proposed sites.

Please contact me if additional information is needed.

Mr. Ken Moore
Ecologist, Conservation Branch
531-7078 (office)

Thames, Sara Ms CIV USA IMCOM

From: Allen, Charles M Dr CTR US USA IMCOM
Sent: Wednesday, March 24, 2010 1:55 PM
To: Thames, Sara Ms CIV USA IMCOM
Subject: memo for REC-CY10091 (UNCLASSIFIED)
Attachments: botany memo CY10091.docx
Signed By: charles.m.allen1@us.army.mil

CY10091 ENRMD Control Number

Classification: UNCLASSIFIED
Caveats: FOUO

Attached is a memo regarding the botanical evaluation of the sites.

Dr. Charles Allen
Botanist

Classification: UNCLASSIFIED
Caveats: FOUO

CY10091-Construction of TEMF and COF Facilities (PN 69199).

March 24, 2010

The proposed project (CY10091) was reviewed by the Conservation Branch, Botanical Section, for environmental impacts. The three sites for the project were reviewed in the database and map for rare plants for Fort Polk and no rare plant species have been located in or adjacent to any of the three sites and no rare plants would be expected within any of the three sites. Based on on-site observation and rare plant information, either of the three sites would not have any impact on any rare plant species.

Please contact me if additional information is needed.

Dr. Charles M. Allen
Botanist, Senior Research Associate
531-7535/charles.m.allen1@us.army.mil

CY10091 ENRMD Control Number

IMSE-POL-PWE 24 Feb. 2010

CY10091 ENRMD Control Number

MEMORANDUM FOR ENRMD, Conservation Branch (Attn: NEPA Staff)

Construction of Tactical Equipment Maintenance Facility (TEMF) and Company Operations Facility (COF) to Support Unit Operations CY10091

1. Reviewed the proposed scope, Construction of Tactical Equipment Maintenance Facility (TEMF) and Company Operations Facility (COF) to Support Unit Operations.
2. Construction of new facilities requires an Asbestos Free Certification at the completion of the project. Paint containing > .06% is prohibited.

3. Point of contact is the undersigned at (337) 531-9128, or Sheilla.guzman@us.army.mil

Sheilla Guzman

From: Fitzgerald, Timothy B CIV USA IMCOM
Sent: Tuesday, March 16, 2010 9:36 AM
To: Blume, Timothy CTR USA; CEDARS, ALLISON Ms CIV USA IMCOM; Lehnhoff, Lisa M Ms CIV USA; Thames, Sara Ms CIV USA IMCOM

CY10091 ENRMD Control Number

REC 10091 requires no comment from solid waste

Tim Fitzgerald
Installation Solid Waste Manager
Environmental and Natural Resources Management Division
1647 23rd Street Bldg 2516
Fort Polk, La 71403
Comm: (337) 531.6029
FAX: 531.8950
E-Mail: timothy.fitzgerald1@us.army.mil

From: Moore, Joseph W Mr CIV USA IMCOM
Sent: Monday, March 15, 2010 2:49 PM
To: CEDARS, ALLISON Ms CIV USA IMCOM; Thames, Sara Ms CIV USA IMCOM
Subject: CY10091, TEMF/COF; PN 69199 - IRP concerns (UNCLASSIFIED)

CY10091 ENRMD Control Number

Classification: UNCLASSIFIED
Caveats: FOUO

After review of site map, the installation restoration program has approved the REC. My concerns are documented below.

I have reviewed the REC for CY10091, TEMF/COF to support Unit Operations (PN 69199).

The locations of Option 2 and Option 3 do not have a potential impact to any environmental Areas of Concern under the Installation Restoration program (IRP) at Fort Polk.

Phil and I spoke with Mr. Durrett today and he is aware of ENRMD concerns about the location.

At the preferred location, Option 1, there is a possibility that past fueling operations may have impacted surface, subsurface, or groundwater media.
An underground fuel network was located in the 3500-3600 Block area. The network is shown on as-built drawings (Plan number M-1043) as Motor Fuel Unit #6. The environmental concern is that fuel may have leaked or been spilled from the AST area, the network of piping, and/or the fuel dispensing areas.
A railroad spur extended from the curve on Texas Avenue to just north of the present Used Oil Facility (corner of Illinois and Texas). The spur has since been removed. From the spur, railcars off-loaded fuel through a pump house into a group of 3 aboveground storage tanks (AST). Each AST held 12,000 gallons. The fuels were leaded gasoline, naphtha and possibly diesel fuel. From the AST farm, fuel was pumped via underground lines to 2 remote fuel dispensing areas. The pump house and ASTs were located less than 100 feet northwest of the present-day used oil recycling area.

The first concern is that, if soil and groundwater contamination occurred in the UST/pump house, it may have migrated in a southeasterly direction and may now underlie the northeast corner of the proposed TEMF/COF site.

The second concern is at the former fuel dispensing area, located just east of Bldg 3601. Six fuel dispensers were located to the west of the existing wash rack. On the 1940's map, they are shown as area MM. If contamination is present, it may have migrated, again to the southeast. This would impact the southwest corner of the proposed site.

Included on the M-1043 map are a total of seven similar Motor Fuel Units. Petroleum contamination from the units was confirmed as the source of contamination at Solid Waste Management Unit 26 (2900 Block) and at the Bldg 3401 restoration site.
During excavations at the 3200 Block several years ago, underground fuel lines were discovered several years ago. The underground fuel line was found to contain leaded gasoline, which indicates that the old Motor Fuel Unit networks were abandoned sometime in the past without removing the fuel. Because a preliminary assessment has not been performed at the site, there is no data with which to confirm or disprove the presence of environmental impacts. Nor is there enough justification for AEC to approve the creation of a new restoration site in the AEDB-R database at this time.

During construction of the project, workers must be on the alert for the possibility that fuel components could be unearthed. This may cause the work to be delayed pending further investigation.

Thank You:

Joe Moore

Installation Restoration Program Manager
DPW- ENRMD
1647 23rd Street - Bldg 2516
Fort Polk, LA 71459 - 5509
Ph 337-531-6305 (DSN 863)
Joe.w.moore1@us.army.mil

CY10091 ENRMD Control Number

-----Original Message-----
From: CEDARS, ALLISON Ms CIV USA IMCOM
Sent: Tuesday, February 23, 2010 11:11 AM
To: Baker, Christina L CTR USA; Brewer, Kathleen B CTR USA; Broussard, Nathan G Mr CIV USA IMCOM; Fitzgerald, Timothy B CIV USA IMCOM; Guzman, Sheilla CIV USA IMCOM; Hartzell, Frederick J CIV USA; Jones, Aishah F CTR USA IMCOM; Madison, Raywood T CTR USA; Moltsau, Alan W CIV USA IMCOM; Moore, Joseph W Mr CIV USA IMCOM; Skinner, Harvey Mr CIV USA IMCOM; Veillon, Tammy G Ms CIV USA IMCOM
Cc: Thames, Sara Ms CIV USA IMCOM
Subject: ** SMWU ** CY10091, TEMF/COF; PN 69199 (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: FOUO

All,

The following REC has been submitted for environmental review:

CY10091 - Construction of Tactical Equipment Maintenance Facility (TEMF) and Company Operations Facility (COF) to Support Unit Operations (PN 69199).

Project Evaluator is Sara Thames, 531-1653.

Please submit all comments/responses to Sara Thames and Allison Cedars.

Thank you,
Allison Cedars
Ecologist
NEPA Section
DPW, ENRMD, Conservation Branch
1697 23rd Street, Building 2543
Office: (337) 531-6725
Fax: (337) 531-2627

Classification: UNCLASSIFIED
Caveats: FOUO

Classification: UNCLASSIFIED
Caveats: FOUO

From: Reynolds, Lloyd G CTR US USA IMCOM
Sent: Thursday, March 18, 2010 3:29 PM
To: Thames, Sara Ms CIV USA IMCOM
Subject: RE: REC-CY10091 (UNCLASSIFIED)
Attachments: Alternative 1.jpg; Alternative 2.jpg; Alternative 3.jpg

CY10091 ENRMD Control Number

Classification: UNCLASSIFIED
Caveats: FOUO

Sara-

Here are the project locations with aerial photos. Since all of the sites are relatively flat and mostly previously disturbed, there are no potential erosion concerns.

Lloyd Reynolds, Contractor
Freese & Nichols, Inc.
DPW-ENRMD
1697 23rd Street Building 2543
Fort Polk, LA 71459
lloyd.reynolds@us.army.mil
COMM: 337.531.1561
DSN: 863.1561
MOBILE: 337.513.1255
FAX: 337.531.2627

-----Original Message-----
From: Thames, Sara Ms CIV USA IMCOM
Sent: Wednesday, March 17, 2010 12:49 PM
To: Reynolds, Lloyd G CTR US USA IMCOM; Moore, Kenneth Mr CIV USA IMCOM
Subject: REC-CY10091 (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: FOUO

Ken/Lloyd,

Attached is a REC for the new construction of a TEMF and COF Facility. Can you please check the three alternative sites to see if any of the habitat is HMU and please provide appropriate comments, etc. Also, Lloyd do you see any issues with erosion, etc..., please comment also. If you have any questions, please let me know. Thanks!

Sara

A. Sara Thames
Ecologist, DPW/ENRMD/Conservation Branch
1647 23rd Street, Building 2543
Fort Polk, Louisiana 71459
e-mail: sara.thames@us.army.mil
office: (337) 531-1653
DSN: 863-1653
fax: (337) 531-2627

CY10091-Construction of TEMF and COF Facilities (PN 69199).

March 18, 2010

CY10091 ENRMD Control Number

The proposed project (CY10091) was reviewed by the Pest Management Program for environmental concerns. After review of the REC, it was determined that no environmental concerns would result from the proposed action at any of the three alternative sites as long as the contractor and COR follow the information in the Installation Design Guide as it pertains to the treatment for termites (i.e. the structure, including all footing and slabs, must be pre-treated for termites, etc.).

Please contact the following if additional information is needed.

Mr. Darrell Huckaby
Environmental Protection Specialist
Conservation Branch
531-1645 (office); 208-2706 (cell)

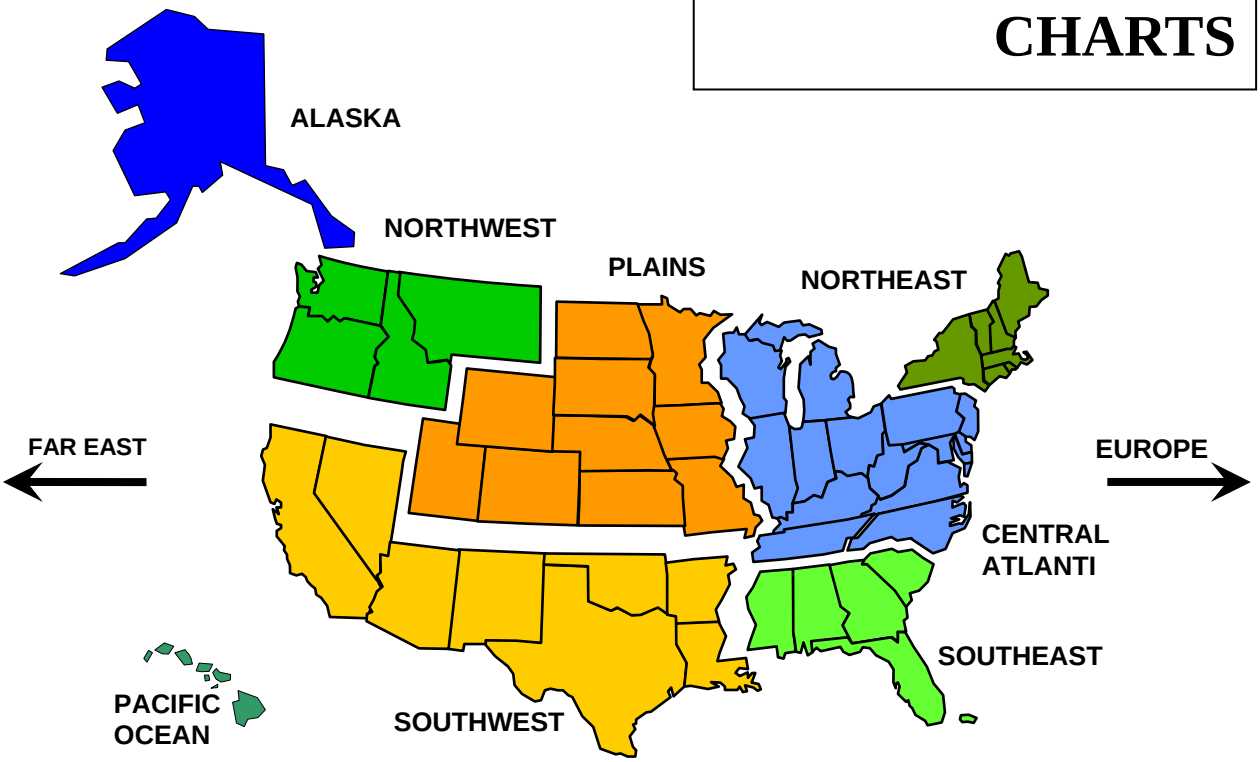
Mr. Mike Nicholson
Environmental Protection Specialist
Conservation Branch
531-6373 (office); 208-2745 (cell)

W912HN-08-D-0027/0032/0033, RFP W912HN-07-X-9717, Amendment No. 0003

APPENDIX F

Conceptual Aesthetics Considerations

APPENDIX L
EXTERIOR COLOR CHARTS



EXTERIOR COLOR REGIONS

Page	Area
L7-8	Southwest USA

L.1 EXTERIOR COLOR CHARTS for INSTALLATION BUILDINGS

Colors schemes and building materials are critical design elements in relating adjacent buildings and creating a compatible visual environment within an installation. Related Army Standards are

found in Chapter 3, Paragraph 3.5.5 Color, 3.5.5.2 Historic Buildings, 3.5.6 Texture, 3.5.7 Material, and 3.11 Renovations and Additions. This section identifies the Army standard palette of colors that will unify installations. A sufficient color palette 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 colors on a facade. The exterior color scheme should consist of a wall color, trim color, and an accent color, all of which should work together with the choice of roofing to provide a harmonious appearance compatible with adjacent structures and environs.

- Select colors from the following Exterior Color Chart based upon their appropriateness to the building type, desired appearance, material to be painted, and prevailing architectural design and landscape character of the installation. Sustainability and ease of maintenance should also be considered.

- Avoid garish colors. Strong or vibrant colors should be used with restraint and should be limited to accents or focal points such as entrance doors where appropriate.

L.2 PANTONE® COLORS

The six-digit color designations found in the Exterior Color Charts are numbers taken from the PANTONE for architecture and interiors color guide, which have been cross-referenced to the PANTONE process guide coated. The colors in the PANTONE process guide coated are intended for viewing on a color monitor and for printing on a four-color process printer (CMYK) using ISO 2846-1 inks. With proper calibration, colors viewed and printed should accurately represent the specified color.

- Calibration for Dell FP E171 and 1800FP Monitor is per manufacturer's recommendation.
- Calibration for Hewlett Packard Color 4500 is per manufacturer's recommendation.
- For calibration of equipment other than the above, contact Pantone, Inc. at (201) 935-5500.

L.3 COLOR VALIDATION

L.3.1 Due to calibration and other technical problems, the color of paint to be used should be based on manufacturer's correspondence to the six-digit PANTONE Number and shall not be predicated on matching a computer-generated sample as seen in the Exterior Color Charts.

L.3.2 "White" when given without a number shall be construed as generic and is intended to cover those manufacturer's paints and finished materials called "white". Some slight variance may be discernible from one manufacturer to another.

L.4 COLOR NAMES

Names given for colors are not those assigned by Pantone, Inc., but are the generic names used by the Army for general color identification only. Always use the six-digit PANTONE for architecture and interiors color guide number instead of the generic name when specifying a color.

L.5 SUPPLEMENTAL COLOR BOARD

L.5.1 Included in this Appendix is a supplemental Color Board (Page L-4) containing squares with a simulation of each color used in the Exterior Color Charts. The electronic reproduction of this Color Board is, however, subject to some distortion and the color will probably be inaccurate to a greater or lesser degree depending on the printer used. A hard copy is available which contains accurate representations of all of the Army's standard exterior colors. This hard copy is the **COLOR BOARD for the IDS APPENDIX L: HARD COPY VERSION** and may be requested by E-mail at:

Baxter.Lawrence@mantech.com with a copy to Dannie.Fason@mantech.com

If the E-mail is not acknowledged within three business days, call (703) 378-1030 to verify the request.

L.5.2 Provide the following information: quantity of color boards requested; name, title, and telephone number of person placing the order; mailing address; and the name of the installation.

L.6 FACTORY FINISHED MATERIALS

Colors given for surfaces that will be factory finished during manufacturing are intended for guidance and are not intended to constitute a directive for a custom color or finish. Colors shall be selected from standard manufacturer colors with the exception of those products, which can be finished with a custom color at no additional cost or that would not result in diminishment of the standard material guarantee or serviceability.

L.7 SPECIALTY FINISHES

Site Elements, addressed in Chapter 11, are painted one of the colors used in the Color Charts and shown on the Color Board. Fire Hydrants (see Paragraph 11.6.6.5) which shall be Red in color shall be finished in a standard manufacturer's paint, suitable for this application, to which glass beads or other suitable reflective material has been added so as to create a light reflective finish meeting NFPA standards.

L.8 WATER STORAGE TANK FINISHES

Water storage tank finishes shall be in accordance with guidance provided in Chapter 11, paragraph 11.6.6.4.

COLOR BOARD for the Army Installation Design Standards / Appendix L

The color squares shown here are approximations of the PANTONE® for architecture and interiors color numbers indicated. They have been simulated using RGB values and are intended to be reproduced electronically. Color quality may vary with printer. PANTONE colors are a standard. In order to accurately reproduce the specified colors on these sheets and meet the required US Army standard, you must use the actual PANTONE swatch of the color indicated. A hard copy supplemental sheet with accurate color representations is available. See Paragraph L.5 for details.

PANTONE 11-0604 TPX SHELL

PANTONE 11-0907 TPX ALMOND

PANTONE 12-0910 TPX CUSTARD

PANTONE 12-4607 TPX PASTEL SKY

PANTONE 13-1009 TPX TAN

PANTONE 13-1013 TPX ALLSPICE

PANTONE 13-1107 TPX BEIGE

PANTONE 14-4506 TPX BLUEGRAY

PANTONE 15-1306 TPX TAUPE

PANTONE 15-1309 TPX NATURAL

PANTONE 15-5704 TPX GRAY

PANTONE 16-1210 TPX MOCHA

PANTONE 16-1221 TPX BROWN

PANTONE 16-6216 TPX METAL GREEN

PANTONE 18-1027 TPX DARK BROWN

PANTONE 18-1444 TPX SALSA

PANTONE 19-1540 TPX MAROON

PANTONE 14-4318 TPX SKY BLUE

PANTONE 18-11658 TPX POMPEIAN RED

PANTONE colors displayed here may not match PANTONE-identified standards. Consult current PANTONE for architecture and interiors color publications for accurate color. PANTONE® and other Pantone, Inc. trademarks are the property of Pantone, Inc. © Pantone, Inc., 2004. All rights reserved.

LISTING OF ORGINAL SOURCE FEDERAL OR COMMERCIAL MANUFACTURER'S DESIGNATION WITH NEW IDS NAME & ACCEPTABLE PANTONE@ DESIGNATIONS

Source	Old Federal Color Name and/or Number	Other Name and/or Number	Sherwin Williams Color (closest match)	PANTONE Color Number	Process Number	Sherwin Williams Color Number	(C-M-Y-K)
Federal Paint Number	Tan 23717		CUSTARD	PANTONE 12-0910 TPX	22-8 C	SW 6379 Jersey Cream	0-5-15-0
Federal Paint Number	Gray 26492		GRAY	PANTONE 15-5704 TPX	329-9 C	SW 7058 Magnetic Grey	0-0-3-30
Federal Paint Number	White 20372		TAUPE	PANTONE 15-1306 TPX	31-8 C	SW 6150 Universal Khaki	5-10-20-20
Federal Paint Number	Metal Green 24373		METAL GREEN	PANTONE 16-6216 TPX	285-7 C		25-0-30-25
Federal Paint Number	Brown 20313		BROWN	PANTONE 16-1221 TPX	76-8 C	SW 6060 Moroccan Brown	0-25-25-20
Federal Paint Number	Mocha 20372		MOCHA	PANTONE 16-1210 TPX	48-9 C	SW 6080 Utterly Beige	10-15-25-15
Federal Paint Number	Gray 25526		BLUEGRAY	PANTONE 14-4506 TPX	213-9 C	SW 6220 Interesting Aqua	20-03-03-15
Federal Paint Number	Ochre 31643		ALLSPICE	PANTONE 13-1013 TPX	36-8 C	SW 6359 Sociable	0-15-25-0
Duron	Oyster White 921	(Oyster White) Almond 5910W	ALMOND	PANTONE 11-0907 TPX	32-9 C	SW 6112 Biscuit	0-5-10-0
Duron	Alcazar Brown 8306N	Dark Brown 5225N	DARK BROWN	PANTONE 18-1027 TPX	318-1 C	SW 6090 Java	70-80-100-30
Duron	Shell White 917	White 5770W	SHELL	PANTONE 11-0604 TPX	No Match	SW 7000 Ibis White	0-3-3-0
Generic (no mfg. ref.)	Chocolate		DARK BROWN	PANTONE 18-1027 TPX	318-1 C		70-80-100-30
ICI	Dusty Trail # 425		NATURAL	PANTONE 15-1309 TPX	44-7 C	SW 6087 Trusty Tan	20-20-30-5
ICI	Sand Motif # 422		MOCHA	PANTONE 16-1210 TPX	48-9 C	SW 6080 Utterly Beige	10-15-25-15
ICI	Bisque # 436		BEIGE	PANTONE 13-1107 TPX	43-9 C	SW 6085 Simplify Beige	10-10-15-0
ICI	Salsa # 123		SALSA	PANTONE 18-1444 TPX	83-3 C	SW 6320 Bravado Red	30-75-75-0
ICI	Liberty Red # 159		MAROON	PANTONE 19-1540 TPX	69-2 C	SW 6328 Fireweed	20-75-80-30
Generic (no mfg.ref.)	Pastel Sky		PASTEL SKY	PANTONE 12-4607 TPX	247-8 C	SW 6498 Byte Blue	20-0-5-3
Sherwin Williams			SKY BLUE	PANTONE 14-4318 TPX	229-7 C	SW 6507 Resolute Blue	40-5-5-0
Sherwin Williams			POMPEIAN RED	PANTONE 18-1658 TPX	Unknown	SW 6871 Positive Red	27-100-96-29

NOTE: The suffix TPX indicates that the color is shown on paper. PANTONE® and other Pantone, Inc. trademarks are the property of Pantone, Inc., 2004. All rights reserved.

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EXTERIOR COLOR CHART *Southwest USA*

Building Design Element		Required Color Standard	Color Sample	Notes (Hyperlinked)
Walls	Base (primary) Material	Tan Brick or native stone		
	Secondary Material	For Almond use PANTONE® 11-0907 TPX or for Custard use PANTONE 12-0910 TPX		
		For Mocha use PANTONE 16-1210 TPX		
Roof	Sloped Areas	Metal Bronze or Terracotta		
		Dark Bronze or Galvalume®		
		Fiberglass Shingle Gray/White		
		Clay Terracotta		
Fenestration	Doors	Wood: For White use PANTONE 11-0604 TPX		
		Steel: For Dark Brown use PANTONE 18-1027 TPX		
	Storm Doors	White		
	Door & Window Frames	For Brown use PANTONE 16-1221 TPX		
	Storm Window or Sash	White		
	Window	White		
Trim Items	Fascia	White		
	Soffit	White		
	Gutters and D.S.	For Brown use PANTONE 16-1221 TPX		
	Awnings and Canopies	For Tan use PANTONE 12-0910 TPX		
	Stair or Balcony Railings, Balusters, and related Trim	For Dark Brown use PANTONE 18-1027 TPX		
	Handrails	For Brown use PANTONE 16-1221 TPX		

Building Design Element		Required Color Standard	Color Sample	Notes
Trim Items	Fire Escapes	For Dark Brown use PANTONE® 18-1027 TPX		
	Grilles and Louvers	For Brown use PANTONE 16-1221 TPX		
	Coping	For Brown use PANTONE 16-1221 TPX		
	Roof Ventilators	Blend to match roof		
Related Site Structures	Courtyard Enclosure Walls, Retaining Walls, Fences, Dumpster Enclosures	Red Brick or For Dark Brown use PANTONE 18-1027 TPX		
	Signage	Duradonic Bronze	Not Available	
	Porch Crawl Space Enclosure	White		

NOTES:	
Note 1	Identify type, color, and texture of local brick and stone, to include mortar color and joint style.
Note 2	Color samples are electronic approximations of colors, which should not be construed as accurately representing the color standard. Paint shall match the PANTONE color number.
Note 3	The colors shown here and throughout these guidelines have not been evaluated by Pantone, Inc. for accuracy and may not match the PANTONE Color Standards. Consult current PANTONE for architecture and interiors color publications for accurate color. PANTONE® and other Pantone, Inc. trademarks are the property of Pantone, Inc.

APPENDIX G

GIS Data

Not Used

APPENDIX H

Exterior Signage

JRTC & Fort Polk Installation Design Guide

Final
March 2006

11.4.13 Types of Signs

11.4.13.1 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. 11.29). 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. These signs are designed to include the following:

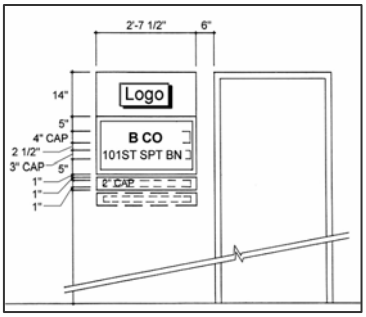

Fig. 11.29 – Building Mounted Information Sign

11.4.13.1.1 Typeface:

- Lettering is self-adhesive backing material.
- Building Title: Helvetica Medium, Upper and Lower Case
- Building Numbers: Helvetica regular
- Building Addresses: Helvetica Medium, Upper and Lower Case

11.4.13.1.2 Color:

- Panel: Dark Brown
- Lettering: White
- Post: Dark Brown
- Exposed Panel Backs and Edges: Dark Brown
- All Paint: Semi-Gloss

11.4.13.1.3 Materials:

- Panel: Double-Face 1/8" Thick Aluminum
- Post: Steel Pipe
- Foundation: Concrete Pier or Direct Burial

11.4.13.1.4 Building Identification

11.4.13.1.4.1 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:

Fig. 11.30 – Use street addresses on all building identification signs.

All DoD addresses 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).

Only geographically locatable civilian-style street address (such as 4102 Cindy Avenue) shall be used (C3.3.2.2.4) (Fig. 11.30).

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).

11.4.13.1.4.2 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. 11.29). Buildings without identification signs shall have the address number and street name centered above the main entrance or located to the right side (Fig. 11.31).

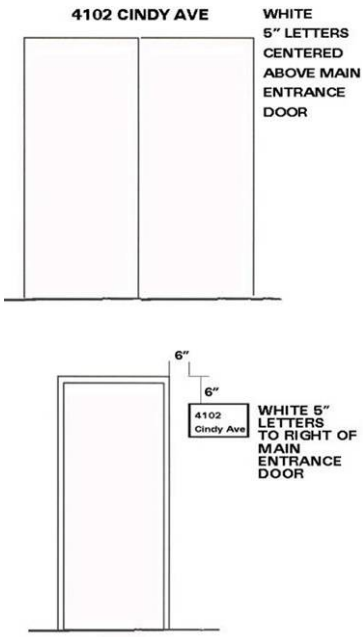

Fig. 11.31 - Street address location at entrance doors.

11.4.13.1.5 Housing Areas
11.4.13.1.5.1 The sign should be complementary to the architectural setting of the housing area and approved by the installation Real Property Planning Board.

11.4.13.1.5.2 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.

11.4.13.1.6 Installation Identification Signs.
11.4.13.1.6.1 Installation identification signs name the installation and display the official US Army plaque. 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, Joint Readiness Training Center & Fort Polk", and gate name (Fig. 11.32). 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 (ACP) of entry. When used service-wide,

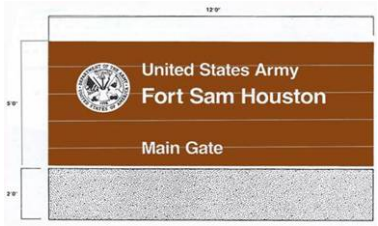

Fig. 11.32 – Installation Entrance Signs

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.

11.4.13.1.6.2 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.

11.4.13.1.6.3 See Technical Manual (TM) 5-807-10, Signage, paragraph 3-3, for sign specifications and paragraph 3-11 for sign placement guidelines.

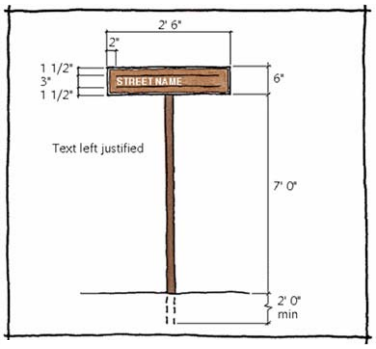

Fig. 11.33 – Typical Street Signs

11.4.13.1.7 Street Signs Street name identification signs should be designed with the same lettering, color, and materials as other information (Fig. 11.33).

11.4.13.1.8 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 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.

11.4.13.2 Directional Signs These signs guide the motorist or pedestrian in, around, and out of the installation (Figs. 11.34 and 11.35). 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. These signs are designed to include the following:

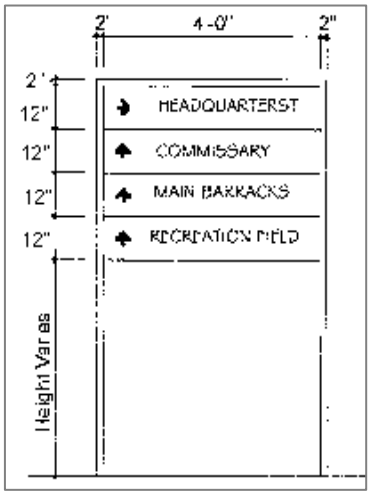

Fig. 11.34 – Direction Sign

11.4.13.2.1 Typeface:

- Lettering is self-adhesive backing material.
- Helvetica Medium Upper and Lower Case

11.4.13.2.2 Arrow:

- Place at end indicating direction.
- Stroke Width: Helvetica Medium Cap

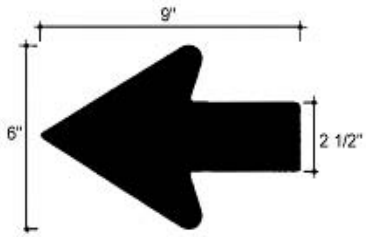

Fig. 11.35 – Use a typical arrow on all destination signs.

11.4.13.2.3 Color:

- Panel: Dark Brown

- Lettering: White
- Post: Dark Brown
- Exposed Panel Backs and Edges: Dark Brown
- All Paint: Semi Gloss

11.4.13.2.4 Materials:

- Panel: Double-face 1/8” Thick Aluminum
- Post: Steel Pipe
- Foundation: Concrete Pier or Direct Burial

11.4.13.3 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. (Figs. 11.36 and 11.37). Related to these signs are pavement markings and traffic signals. These signs are designed to include the following:

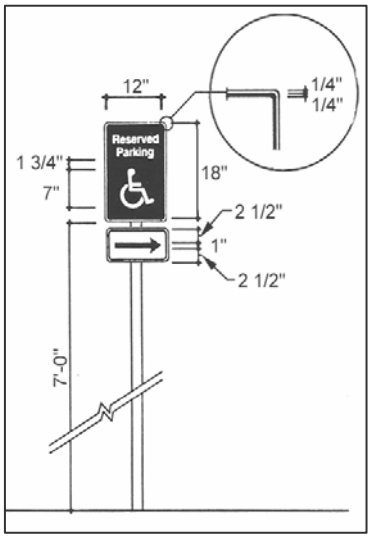

Fig. 11.36 – Regulatory sign.

11.4.13.3.1 Typeface:

- Lettering is self-adhesive backing material.
- Helvetica Medium Upper and Lower Case

11.4.13.3.2 Color:

- Panel: Dark Brown
- Lettering: White
- Post: Dark Brown
- Exposed Panel Backs and Edges: Dark Brown
- All Paint: Semi Gloss

11.4.13.3.3 Materials:

- Panel: Double-face 1/8” thick aluminum
- Post: Steel Pipe
- Foundation: Concrete Pier or Direct Burial

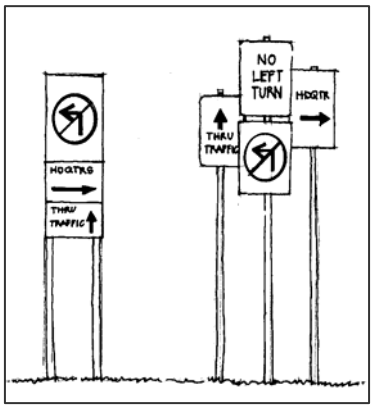

Fig. 11.37 – Sign should be simple, legible, and combined.

11.4.13.3.4 Traffic Control Signs

11.4.13.3.4.1 CONUS Installations National highway standards will be used for signs to regulate vehicular traffic on CONUS installations (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.

11.4.13.3.4.2 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).

11.4.13.3.5 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.

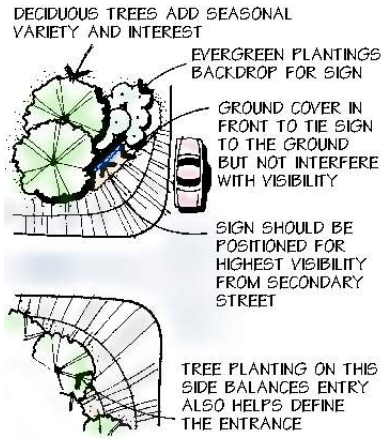

Fig. 11.38 – Consider basic planning and design objectives in sign placement.

11.4.14 Electronic Exterior Signs

All exterior flashing signs, traveling lights, or signs animated by lights of changing degrees of intensity or color are prohibited.

11.4.15 Sign Placement and Mounting

Placement of signs differs according to the type of sign and the specific site constraints (Fig. 11.38). 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.

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 11.39). Provide proper placement to avoid a hazard to children.

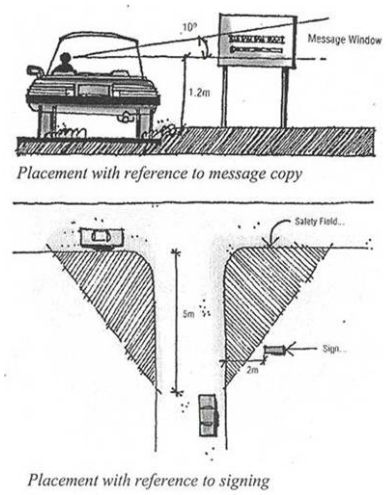

Fig. 11.39 – Placement of signs is critical to ensure easy readability.

Locate identification signs generally at building entrances and/or other parts of the building visible from the main access street. Building signs should be visible from the main circulation paths to the building (vehicular or pedestrian).
Place building and/or facility identification signs within the first 20 percent of the distance closest to the road between the road and the building. These signs shall be placed as not to obscure any other identification, information or vehicular regulatory signs.

Signs unable to be located perpendicular to the direction of traffic may be rotated to a 45-degree angle or parallel to traffic.

The minimum distance between sign and driveway or intersection should normally be 100 feet.

One identification sign for each building is sufficient unless vehicular access occurs on two or more sides of the building.

Provide signs to identify facilities dedicated to or accessible to the handicapped, such as parking spaces, building entrances, and restroom facilities.

Mounting signs on buildings:

- No sign may be mounted on the outside of the door, except small signs (one square foot or less) that indicate required use of an alternate entrance. Signs such as "Escort Required" or changeable signs are not permitted.

- No sign may be attached or mounted to roofs and parapets.

- No sign shall be painted or applied directly onto the surface of a building.

- No permanent signs shall obstruct any window, door, fire escape, ladder, or opening intended for light, air, or egress.

- No temporary sign in windows or glass walls is allowed to cover more than 20 percent of the glass area.

- No signs shall interrupt the vertical and horizontal features of the facade.

- No sign may be tacked, posted, painted, or otherwise affixed to site elements such as sheds, trees, or other structures.

- No sign may be attached to utility poles except for pole identification or warning signs.

- Fasten projecting signs directly to the supporting building wall and integrate the frame into the sign. These signs shall intersect at right angles to the building front and shall not extend above the roofline or the parapet wall. Signs may not project more than five

feet from a wall or two-thirds the width of the sidewalk, whichever is less. In no case may signs be closer than 18 inches to the curb line. A clear height of eight feet above the ground is required.

11.4.16 Sign Details

Signage details include the following:

- All signs will either be pre-manufactured or fabricated by DPWE. Low quality and "homemade" type signs are prohibited.
- Any sign that is mechanically animated (i.e., revolves, rotates, or moves in any way) is prohibited.
- Locate signs where they are most visible and the view unobstructed.
- Signs will be brown Federal Specification Color Number 20140 and white (i.e., Park Service colors).
- Universally recognized color schemes such as the state highway and safety signs may follow the Federal Highway Administration's "Standard Alphabets for Highway Signs and Pavement Markings" standards.
- Signs generally are not landscaped; however, if ornamental planting occurs in the vicinity of the sign, locate the sign in the planting bed.
- Temporary signs do not require landscaping; changeable signs are not considered temporary.
- Any exposed lighting tubes, strings of lights, spotlights, or any illumination that causes direct glare upon an unrelated building are prohibited.
- Any flashing signs, traveling lights, or signs animated by lights of changing degrees of intensity or color are prohibited.
- Signs may be lit by remote lamps or backlit where nighttime identification is required such as at clubs, shopping areas, and post entry points.
- Internally lit signs must have an opaque message surface displayed at all times, and at no period will views be allowed to the inside of the sign regardless of whether a message is on the sign or not.

- Kiosks, informational signs, and "You Are Here" maps are to be centrally located in "Activity Nodes" as defined by the District Plate graphics.
- For military building signs, quantities are limited to one of each type allowed.
- Quantities are limited regardless of whether facilities are located on corners, have exposure to multiple roads/drives, or have building entrances visually separated from roads/parking lots.
- All signs use Helvetica font (Fig 11.40).
- Traffic signs will follow guidelines in the Federal Highway Administration's "Standard Alphabets for Highway Signs and Pavement Markings" standards.

ABCDEFGHIJKLMN
OPQRSTUVWXYZ
abcdefghijklmn
opqrstuvwxyz

Fig. 11.40 – Use Helvetica type style on signage.

11.4.17 Sign System Typography

11.4.17.1 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.

11.4.17.2 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.

11.4.17.3 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.

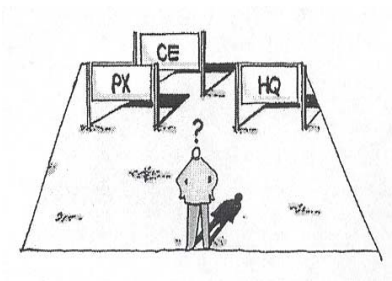

Fig. 11.41 – Visual clutter causes confusion.

11.4.18 Reduce Visual Clutter

11.4.18.1 Over-signing detracts from a uniform sign system and if left uncontrolled will eventually destroy the integrity of the system.

APPENDIX I

Acceptable Plant List

JRTC & Fort Polk Installation Design Guide

Final
March 2006

APPENDIX O
PLANT PALETTE

Links
Go to Appendix P
Go to Table of Contents

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Plant Material Suitability Matrix

Botanical Name	Common Name	Type		Growth			Flower			Interest			Light			Salt Tolerant			Resistant		Soil Moisture			Function							
		Deciduous	Evergreen	Slow	Medium	Fast	Fall	Summer	Spring	Flower	Bark	Foliage	Shade	Sun/shade	Sun	Low	Medium	High	Drought	Pest	Moist	Average	Dry	Street tree	Shade tree	Screen	Massing	Windbreak	Hedge	Bank cover	Specimen
		Characteristics														Culture								Use							
SHADE TREES																															
Ulmus parvifolia	Chinese Elm	X				X	X				X				X				X				X	X	X						X
Taxodium distichum	Bald Cypress	X			X						X			X	X				X		X	X	X	X		X	X				X
Fraxinus pennsylvanica	Green Ash	X				X			X			X			X				X		X	X	X	X	X						X
Quercus falcata	Southern Red Oak	X			X	X			X			X			X				X				X	X	X						X
Quercus acutissima	Sawtooth Oak	X							X			X			X							X		X	X						X
Liriodendron tulipifera	Tulip Poplar	X				X			X	X					X								X		X						X
Pistacia chinensis	Chinese Pistache	X			X				X		X	X			X						X	X	X		X						
Betula nigra	River Birch	X				X	X				X			X	X	X					X	X		X	X	X					
INTERMEDIATE TREES																															
Cornus florida	Dogwood	X			X				X	X	X		X	X	X				X		X	X	X	X		X					X
Crataegus opaca	Mayhaw	X			X				X	X		X		X												X					X
Lagerstroemia indica	Crape Myrtle	X				X		X	X	X	X				X	X			X			X		X			X				X
Chionanthus virginicus	Fringe Tree	X		X					X	X				X	X					X		X	X				X				X
Cercis canadensis	Eastern Redbud		X			X			X			X		X	X			X	X				X			X					X
Crataegus marshallii	Parsley Hawthorn	X				X			X	X				X	X				X		X		X	X							X
Acer rubrum	Red Maple	X							X	X		X			X								X				X				X
Nyssa sylvatica	Blackgum Tupelo	X		X								X		X	X	X					X	X		X							X
Pyrus calleryana 'Bradford'	Bradford Callery Pear	X				X			X	X					X				X	X	X	X	X	X							X

Plant Material Suitability Matrix

Botanical Name	Common Name	Type		Growth			Flower			Interest			Light			Salt Tolerant			Resistant		Soil Moisture			Function							
		Deciduous	Evergreen	Slow	Medium	Fast	Fall	Summer	Spring	Flower	Bark	Foliage	Shade	Sun/shade	Sun	Low	Medium	High	Drought	Pest	Moist	Average	Dry	Street tree	Shade tree	Screen	Massing	Windbreak	Hedge	Bank cover	Specimen
		Characteristics														Culture								Use							
EVERGREEN TREES																															
Magnolia grandiflora	Southern Magnolia		X		X			X	X	X		X		X	X		X				X	X	X	X	X						X
Ilex vomitoria	Yaupon																														
Vitex trifolia	Vitex		X			X		X		X				X	X	X			X				X			X	X		X		X
Myrica cerifera	Wax Myrtle		X			X			X			X		X	X			X			X	X	X			X	X		X		X
SHRUBS																															
Abelia x grandiflora	Glossy Abelia		X		X		X	X	X	X				X	X		X			X		X	X			X	X	X	X	X	
Feijoa sellowiana	Pineapple Guava		X	X					X	X		X		X	X	X			X				X			X			X	X	
Aucuba japonica	Acuba		X		X				X			X	X				X						X				X	X		X	
Buxus mirophylla	Boxwood		X	X					X			X		X	X								X					X	X		
Chaenomeles speciosa	Flowering Quince	X			X				X	X					X							X				X	X	X			X
Berberis thunbergii	Japanese Barberry	X	X		X				X			X	X	X	X		X						X				X	X			
Callicarpa Americana	Beauty Berry	X				X			X					X	X	X							X				X	X		X	X
Calycanthus floridus	Sweet Shrub	X		X				X	X	X		X	X	X	X							X				X		X			
Elaeagnus pungens	Russian Olive					X			X					X	X			X	X				X			X	X		X		
Forsythis spp.	Forsythia	X	X			X			X	X					X						X	X	X				X				X
Gardenia jasminoides	Gardenia				X				X	X				X	X							X	X			X	X	X	X	X	X
Hibiscus syriacus	Rose of Sharon	X	X		X			X		X				X	X		X		X				X			X		X			X
Ilex crenata	Japanese Hollies		X	X					X			X		X			X		X		X					X	X	X	X	X	
Myrica cerifera	Southern Wax Myrtle		X		X			X	X	X		X		X					X	X	X	X	X			X	X	X	X	X	

Plant Material Suitability Matrix

		Type		Growth			Flower			Interest			Light			Salt Tolerant			Resistant		Soil Moisture			Function							
		Deciduous	Evergreen	Slow	Medium	Fast	Fall	Summer	Spring	Flower	Bark	Foliage	Shade	Sun/shade	Sun	Low	Medium	High	Drought	Pest	Moist	Average	Dry	Street tree	Shade tree	Screen	Massing	Windbreak	Hedge	Bank cover	Specimen
Botanical Name	**Common Name**	**Characteristics**														**Culture**								**Use**							
Philadelphus coronarius	Mock Orange		X		X				X	X	X	X		X	X				X		X	X	X			X					
Nandina domestica	Dwarf Nandina		X		X					X		X	X	X	X			X	X		X	X	X			X			X	X	
Nerium oleander	Oleander		X		X			X				X	X	X	X				X		X	X	X			X			X	X	
Rhaphiolepis indica	Indian Hawthorn		X		X				X	X		X		X	X							X				X	X		X	X	
Rhododendron spp.	Azalea		X		X			X	X	X				X	X						X	X					X				X
Spirea spp.	Spirea	X			X				X	X		X	X	X	X				X		X	X	X				X				X
GROUNDCOVERS/VINES																															
Gardenia jasminoides	Dwarf Gardenia		X		X			X	X	X		X		X								X				X					X
Hosta spp.	Hosta	X			X			X		X		X		X							X						X			X	
Trachelospermum asiaticum	Asian Jasmine		X		X							X		X	X						X									X	
Liriope muscari	Liriope		X		X			X		X		X		X	X						X	X	X				X				
Clematis spp.	Clematis	X			X		X	X	X	X					X							X				X	X	X			
Gelsemim sempervirens	Carolina Jasmine		X			X		X	X	X				X	X							X				X	X	X	X		
Trachelospermum jasminioides	Confederate Jasmine		X			X		X	X	X				X	X							X				X	X	X	X	X	
GRASSES																															
Cynodon dactylon	Bermuda (Common)				X		X					X	X	X	X						X	X								X	

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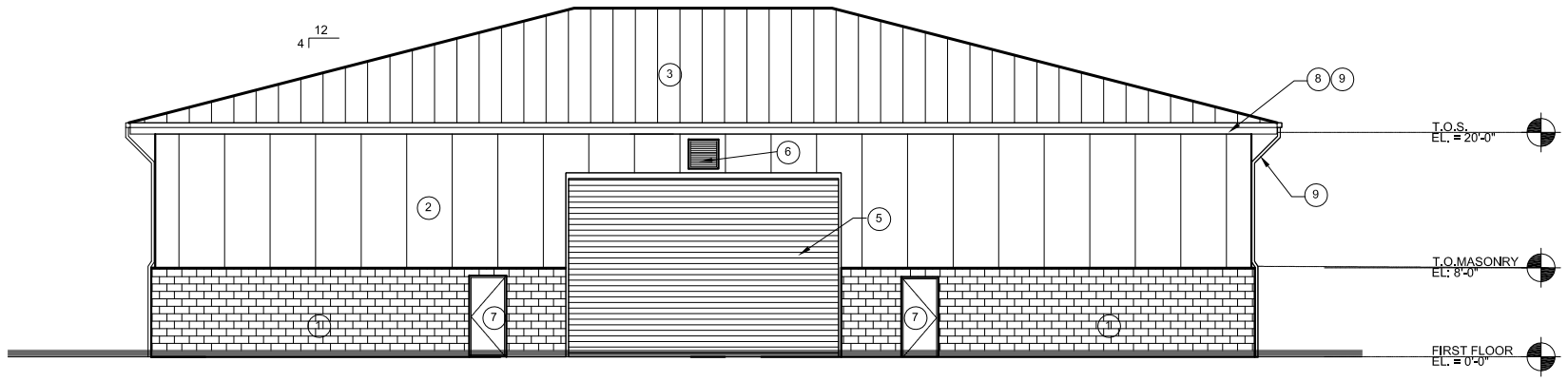
W912HN-08-D-0027/0032/0033, RFP W912HN-07-X-9717, Amendment No. 0003

APPENDIX J

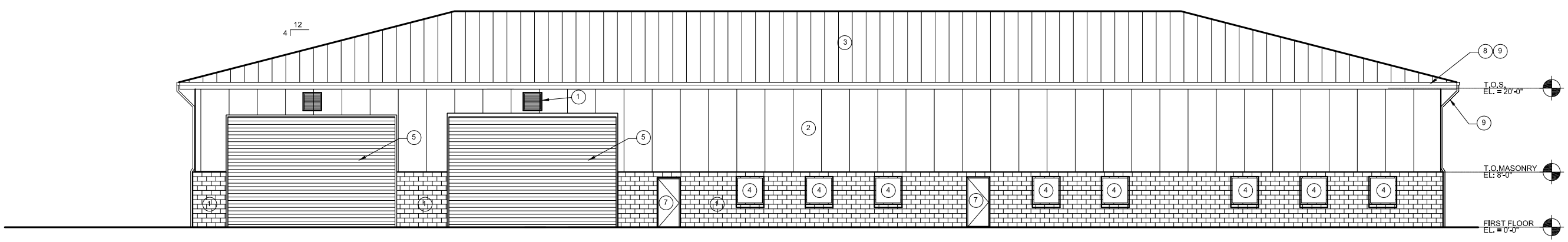
Drawings: Tactical Equipment Maintenance Facility Elevations

Drawing Index

A-102 TEMF Elevation



1 A-102 TACTICAL EQUIPMENT MAINTENANCE FACILITY
1/8" = 1' 0"



2 A-102 TACTICAL EQUIPMENT MAINTENANCE FACILITY
1/8" = 1' 0"

ELEVATION KEYED NOTES

1. SPLIT FACE CMU BLOCK UP EXTENDING UP 8'-0" AFF, COLOR: "NATURAL STONE".
2. PRE FINISHED INSULATED METAL PANELS FROM TOP OF CMU TO UNDERSIDE OF ROOF, COLOR: "CUSTARD" PANTONE 12-0910 TPX.
3. PRE FINISHES STANDING SEAM METAL ROOF (SSMR) SYSTEM, COLOR: "METAL BRONZE",
4. ALUMINUM BLAST PROOF WINDOW COMPLYING WITH AT/FP REQUIREMENTS, PRE FINISHED, COLOR: "DARK BROWN" PANTONE 18-1027 TPX.
5. 24' W X 14' H ROLL UP DOOR, PRE FINISHED COLOR: "DARK BROWN" PANTONE 18-1027 TPX.
6. 30" X 30' METAL LOUVERS, PRE FINISHED, COLOR: "DARK BROWN" PANTONE 18-1027 TPX.
7. HOLLOW METAL DOORS AND FRAMES, COLOR: "DARK BROWN" PANTONE 18-1027 TPX.
8. FASCIA PANEL, PAINTED COLOR: "WHITE".
9. METAL GUTTERS AND DOWN SPOUTS, COLOR: "BROWN" PANTONE 16-1221 TPX.

US Army Corps of Engineers
Fort Worth District

RFP SUBMITTAL
NOT FOR
CONSTRUCTION

Symbol	Description	D.O. NO.	Action	Date

Date: JUNE 2010
Designed by: X
Dwn by: X
Reviewed by: X
Submitted by: KUNG M. NG, PE ENGINEER
Sol No.
Cont# No.
Rev.
File name:
Plot date: JUN. XX, 2010
Plot scale: AS SHOWN

U.S. ARMY ENGINEER DISTRICT,
CORPS OF ENGINEERS
FORT WORTH, TEXAS

K. M. NG & ASSOCIATES, INC.
CONSULTING ENGINEERS
TEXAS REGISTERED ENGINEERING FIRM F-242

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
UNIT 09L
PROJECT NO. 089199

ELEVATIONS

Sheet reference number:
A-102A
Sheet XXX of X

DESIGN FILE:

Cont# No.

APPENDIX K

Fuel Cost Information

APPENDIX K
Fuel Cost Information

The following utility rates for this installation are provided for design

Electrical:
Energy Charge - $ 0.0797 per kilowatt-hour

Natural Gas:
Commodity Charge Rate - $ 7.915 per thousand cubic feet

Water:
Commodity Charge Rate - $2.0463 per thousand gallons

Sewer:
Commodity Charge Rate - $2.4176 per thousand gallons

Refuse Material:
Commodity Charge Rate - $13.60 per cubic yard

APPENDIX L

LEED Project Credit Guidance

LEED Project Credit Guidance

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 2.2 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 for information relating to this credit.

SS2	Development Density & Community Connectivity - OPTION 1 DENSITY		X	See paragraph LEED CREDITS COORDINATION for information relating to this credit.
	Development Density & Community Connectivity - OPTION 2 CONNECTIVITY		X	See paragraph LEED CREDITS COORDINATION for information relating to this credit.
SS3	Brownfield Redevelopment		X	See paragraph LEED CREDITS COORDINATION for information relating to this credit.
SS4.1	Alternative Transportation: Public Transportation Access		X	See paragraph LEED CREDITS COORDINATION for information relating to this credit.
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		
WATER EFFICIENCY				
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			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 for information relating to this credit.
MATERIALS AND RESOURCES				

MRPR1	Storage & Collection of Recyclables (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met. Installation provides collection service and outside receptacle needs coordination.
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. If Statement of Work indicates smoking is permitted in these types of facilities, the requirements of LEED-NC 2.2 Option 3 apply.
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 for Army projects.
EQ6.1	Controllability of Systems: Lighting			
EQ6.2	Controllability of Systems: Thermal Comfort			
EQ7.1	Thermal Comfort: Design			
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 for information relating to this.

APPENDIX M

LEED Owner's Projection Requirements

Not Used

APPENDIX N
LEED Requirements for Multiple Contractor Combined Projects

Not Used

LEED Credit Paragraph	**LEED 2.2 Strategy Table**	Building CTR Substitution Permitted	Site CTR Substitution Permitted	**Required Points Strategy**	YELLOW ITEMS: GD please fill in indicating whether site will earn these credits and return to COS. GREEN ITEMS: GD please review and confirm feasibility/revise as needed and return to COS. BLUE ITEMS: GD please highlight any added building and shared points proposed.

BUILDING: TACTICAL EQUIPMENT MAINTENANCE FACILITIES

PAR	FEATURE				REMARKS
CATEGORY 1 – SUSTAINABLE SITES					
SSPR1	Construction Activity Pollution Prevention (PREREQUISITE)	NIC	NO	R	Site CTR is primary permittee. Building CTR is secondary permittee to primary permittee.
SS1	Site Selection	NIC	NO		Site CTR responsible.
SS2	Development Density & Community Connectivity	NIC	NO		Site CTR responsible.
SS3	Brownfield Redevelopment	NIC	NO		Site CTR responsible.
SS4.1	Alternative Transportation: Public Transportation Access	NIC	NO		Site CTR responsible.
SS4.2	Alternative Transportation: Bicycle Storage & Changing Rooms	NO	NO	1	Combined Bldg/Site credit. Site CTR responsible for bicycle storage. Building CTR responsible for shower/changing rooms.
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 1	NIC	YES		Site CTR responsible.
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 2	NIC	YES	1	Site CTR responsible.
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 3	NO	NO		Combined Bldg/Site credit.
SS4.4	Alternative Transportation: Parking Capacity	NIC	YES	1	Site CTR responsible.
SS5.1	Site Development: Protect or Restore Habitat	NIC	YES		Site CTR responsible.
SS5.2	Site Development: Maximize Open Space	NIC	YES	1	Site CTR responsible.
SS6.1	Stormwater Design: Quantity Control	NIC	YES		Site CTR responsible.
SS6.2	Stormwater Design: Quality Control	NIC	YES		Site CTR responsible.
SS7.1	Heat Island Effect: Non-Roof	NO	YES		Building CTR responsible for 100% reflective pavement (concrete meets requirement). Site CTR responsible for ensuring balance of paving in combined project results in 50% compliant when added to TEMF paving.
SS7.2	Heat Island Effect: Roof	YES	NIC	1	Building CTR responsible.
SS8	Light Pollution Reduction	NO	NO	1	Combined Bldg/Site credit. Building CTR responsible for building lighting rqmts. Site CTR responsible for site lighting rqmts.
CATEGORY 2 – WATER EFFICIENCY					
WE1.1	Water Efficient Landscaping: Reduce	NIC	YES	1	Site CTR responsible.
WE1.2	Water Efficient Landscaping: No Potable Water Use or No Irrigation	NIC	YES	1	Site CTR responsible.

LEED Credit Paragraph	**LEED 2.2 Strategy Table**	Building CTR Substitution Permitted	Site CTR Substitution Permitted	**Required Points Strategy**	YELLOW ITEMS: GD please fill in indicating whether site will earn these credits and return to COS. GREEN ITEMS: GD please review and confirm feasibility/revise as needed and return to COS. BLUE ITEMS: GD please highlight any added building and shared points proposed.

BUILDING: TACTICAL EQUIPMENT MAINTENANCE FACILITIES

PAR	FEATURE				REMARKS
WE2	Innovative Wastewater Technologies - OPTION 1	YES	YES		Proposed credit must fall within CTR scope or be coordinated with other CTR.
WE2	Innovative Wastewater Technologies - OPTION 2	NIC	YES		Site CTR responsible.
WE3.1	Water Use Reduction: 20% Reduction	YES	NIC	1	Building CTR responsible.
WE3.2	Water Use Reduction: 30% Reduction	YES	NIC	1	Building CTR responsible.
CATEGORY 3 – ENERGY AND ATMOSPHERE					
EAPR1	Fundamental Commissioning of the Building Energy Systems (PREREQUISITE)	NO	NO	R	Building CTR responsible for commissioning of building systems. Site CTR responsible for commissioning of site systems.
EAPR2	Minimum Energy Performance (PREREQUISITE)	NO	NIC	R	Building CTR responsible.
EAPR3	Fundamental Refrigerant Management (PREREQUISITE)	NO	NIC	R	Building CTR responsible.
EA1	Optimize Energy Performance	YES	NIC	6	Building CTR responsible. Must comply with EPACT
EA2	On-Site Renewable Energy	YES	NO		Proposed credit must fall within CTR scope or be coordinated with other CTR.
EA3	Enhanced Commissioning	NO	NO		
EA4	Enhanced Refrigerant Management	YES	NIC	1	Building CTR responsible.
EA5	Measurement & Verification	YES	NIC		Building CTR responsible.
EA6	Green Power	NO	NIC		Building CTR responsible.
CATEGORY 4 – MATERIALS AND RESOURCES					
MRPR1	Storage & Collection of Recyclables (PREREQUISITE)	NO	NIC	R	Building CTR responsible.
MR1.1	Building Reuse: Maintain 75% of Existing Walls, Floors & Roof	N/A	N/A		
MR1.2	Building Reuse: Maintain 95% of Existing Walls, Floors & Roof	N/A	N/A		
MR1.3	Building Reuse: Maintain 50% of Interior Non-Structural Elements	N/A	N/A		
MR2.1	Construction Waste Management: Divert 50% From Disposal	NO	NO	1	Aggregate credit. Building CTR responsible for diversion of minimum 50% of waste generated. Site CTR responsible for diversion of minimum 50% of waste generated.

LEED Credit Paragraph	**LEED 2.2 Strategy Table**	Building CTR Substitution Permitted	Site CTR Substitution Permitted	**Required Points Strategy**	YELLOW ITEMS: GD please fill in indicating whether site will earn these credits and return to COS. GREEN ITEMS: GD please review and confirm feasibility/revise as needed and return to COS. BLUE ITEMS: GD please highlight any added building and shared points proposed.

BUILDING: TACTICAL EQUIPMENT MAINTENANCE FACILITIES

PAR	FEATURE				REMARKS
MR2.2	Construction Waste Management: Divert 75% From Disposal	NO	NO		Aggregate credit. Building CTR responsible for diversion of minimum 75% of waste generated. Site CTR responsible for diversion of minimum 75% of waste generated.
MR3.1	Materials Reuse: 5%	NO	NO		Aggregate credit. Building CTR responsible for 5% materials reuse. Site CTR responsible for 5% materials reuse.
MR3.2	Materials Reuse: 10%	NO	NO		Aggregate credit. Building CTR responsible for 10% materials reuse. Site CTR responsible for 10% materials reuse.
MR4.1	Recycled Content: 10% (post-consumer + 1/2 pre-consumer)	NO	NO	1	Aggregate credit. Building CTR responsible for minimum 15% recycled materials. Site CTR responsible for minimum 1% recycled materials.
MR4.2	Recycled Content: 20% (post-consumer + 1/2 pre-consumer)	NO	NO		Aggregate credit. Building CTR responsible for minimum 30% recycled materials. Site CTR responsible for minimum 1% recycled materials.
MR5.1	Regional Materials:10% Extracted, Processed & Manufactured Regionally	NO	NO	1	Aggregate credit. Building CTR responsible for minimum 3% regional materials. Site CTR responsible for minimum 30% regional materials.
MR5.2	Regional Materials:20% Extracted, Processed & Manufactured Regionally	NO	NO		Aggregate credit. Building CTR responsible for minimum 6% regional materials. Site CTR responsible for minimum 60% regional materials.
MR6	Rapidly Renewable Materials	YES	NIC		Building CTR responsible.
MR7	Certified Wood	YES	NIC		Building CTR responsible.
CATEGORY 5 – INDOOR ENVIRONMENTAL QUALITY					
EQPR1	Minimum IAQ Performance (PREREQUISITE)	NO	NIC	R	Building CTR responsible.
EQPR2	Environmental Tobacco Smoke (ETS) Control (PREREQUISITE)	NO	NO	R	Smoking is prohibited in non-residential federal facilities. Building CTR responsible for building ETS control features. Site CTR responsible for site ETS features.
EQ1	Outdoor Air Delivery Monitoring	YES	NIC		Building CTR responsible.
EQ2	Increased Ventilation	YES	NIC		Building CTR responsible.
EQ3.1	Construction IAQ Management Plan: During Construction	YES	NIC	1	Building CTR responsible.
EQ3.2	Construction IAQ Management Plan: Before Occupancy	YES	NIC	1	Building CTR responsible.
EQ4.1	Low Emitting Materials: Adhesives & Sealants	YES	NIC	1	Building CTR responsible.
EQ4.2	Low Emitting Materials: Paints & Coatings	YES	NIC	1	Building CTR responsible.
EQ4.3	Low Emitting Materials: Carpet Systems	YES	NIC	1	Building CTR responsible.
EQ4.4	Low Emitting Materials: Composite Wood & Agrifiber Products	YES	NIC	1	Building CTR responsible.

LEED Credit Paragraph	**LEED 2.2 Strategy Table**	Building CTR Substitution Permitted	Site CTR Substitution Permitted	**Required Points Strategy**	YELLOW ITEMS: GD please fill in indicating whether site will earn these credits and return to COS. GREEN ITEMS: GD please review and confirm feasibility/revise as needed and return to COS. BLUE ITEMS: GD please highlight any added building and shared points proposed.

BUILDING: TACTICAL EQUIPMENT MAINTENANCE FACILITIES

PAR	**FEATURE**				**REMARKS**
EQ5	Indoor Chemical & Pollutant Source Control	YES	NIC	1	Building CTR responsible.
EQ6.1	Controllability of Systems: Lighting	YES	NIC		Building CTR responsible.
EQ6.2	Controllability of Systems: Thermal Comfort	YES	NIC		Building CTR responsible.
EQ7.1	Thermal Comfort: Design	YES	NIC	1	Building CTR responsible.
EQ7.2	Thermal Comfort: Verification	YES	NIC		Building CTR responsible.
EQ8.1	Daylight & Views: Daylight 75% of Spaces	YES	NIC		Building CTR responsible.
EQ8.2	Daylight & Views: Views for 90% of Spaces	YES	NIC		Building CTR responsible.
CATEGORY 6 – FACILITY DELIVERY PROCESS					
IDc1.1	Innovation in Design	YES	YES		Proposed credit must fall within CTR scope or be coordinated with other CTR.
IDc1.2	Innovation in Design	YES	YES		Proposed credit must fall within CTR scope or be coordinated with other CTR.
IDc1.3	Innovation in Design	YES	YES		Proposed credit must fall within CTR scope or be coordinated with other CTR.
IDc1.4	Innovation in Design	YES	YES		Proposed credit must fall within CTR scope or be coordinated with other CTR.
IDc2	LEED Accredited Professional	NO	NO	1	
	TOTAL			29	

APPENDIX P

USGBC Registration of Army Projects

APPENDIX P

USGBC Registration of Army Projects

Typical Registration Procedure
1. Complete the online registration form (see guidance below) at the USGBC website http://www.usgbc.org/showfile.aspx?documentid=875 and submit it online.
2. Pay the registration fee via credit card (USACE staff: credit card PR&C is funded by project design or S&A funds).
3. The USGBC will follow up with a final invoice, the LEED-online passwords and template information.
4. If you have any questions, the USGBC contact (as of October 08) is:
Courtney Yan, LEED Program Assistant
U.S. Green Building Council
202/587-7180
cyan@usgbc.org

Completing the Registration Form

BEFORE YOU BEGIN:

Create a personal account with USGBC if you do not have one.
You will need the following information:
Project name as it appears in P2 (obtain from USACE Project Manager)
Building number/physical address of project
Zip code for Installation/project location
Total gross area all buildings in project
Total construction cost for buildings only (see Project Details Section instructions below)

ACCOUNT/LOGIN INFORMATION SECTION

1. The person registering the project **must have an account with USGBC** (login and password) to complete the form. If you have an account, select "I already have a USGBC Web site account" and enter email and password (twice). If you do not have an account, you may select "Create a new USGBC website account" and follow the instructions. It is recommended that you create an account separately on the USGBC website before you start the form. IMPORTANT: USACE team members are members of USGBC and are eligible for Member prices. USACE team members registering projects should be sure to include the USACE Corporate Access ID on the form (if you do not have it contact richard.l.schneider@usace.army.mil or judith.f.milton@usace.army.mil for the number).
2. The Account/Login Information section is filled out by the person registering the project. It may be a contractor or a USACE staff member.

PROJECT TYPE SECTION

Self-explanatory. As of October 08 USACE projects use LEED for New Construction V2.2. USACE staff members are USGBC members.

GENERAL PROJECT INFORMATION SECTION
Project Title: Match the project name used in P2. Contact the USACE Project Manager for this information.
Is Project Confidential: Indicate NO except if project has security sensitivity (elements that are FOUO or higher security) indicate YES.
Project Address 1 and 2: This is the physical location of the project. Provide building number, street address, block number or whatever is known to best describe the location of the project on the Installation.
Project City: Installation Name
State, Country, Zip Code: Self-explanatory

How Did You Hear About LEED: USACE requirement

PRIMARY CONTACT INFORMATION

The Primary Contact may be a Contractor or a USACE staff member. USGBC considers this individual the primary point of contact for all aspects of the project. It is recommended this person be the Contractor Project Manager or the USACE Project Manager.

PROJECT OWNER INFORMATION

Project Owner First Name, Last Name, email: The Project Owner is the USACE Project Manager.
Organization Name: U.S. Army Corps of Engineers. This field MUST be completed this way because it will be used as a search field by higher HQ to find all USACE registered projects.

PROJECT DETAILS

Owner Type: Military Base
Project Scope: Provide brief description (example: barracks complex)
Site Conditions: Provide brief description (example: wooded with steep grades)
Occupant Type: Provide brief description (example: military and civilian employees)
Owner Occupied: No
Gross Square Footage: Provide total area all buildings in project
Project Budget: Do not include the cost for design, site work, demolition, abatement or other work – do not include Government contingency or supervision costs. For design-build and construction projects registered after award, use the awarded contract cost for construction of buildings only. For projects registered prior to award of design-build or construction contract, use the total Primary Facility cost from DD1391 or updated Primary Facility cost based on design development if available.
Current Project Phase: Identify phase at time of registration (example: design start, construction start)
Project Type: Self-explanatory

PAYMENT INFORMATION

Self-explanatory

APPENDIX Q
REV 1.1 – 31 MAY 2009
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 ≥6′-11″ (as measured to the underside of the structural system) and having perimeter walls which are ≥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 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

RMS Submittal Register Input Form

RMS SUBMITTAL REGISTER INPUT FORM

CONTRACT NUMBER

DELIVERY ORDER

TITLE AND LOCATION

Button <-----Right click for Instructions

SECTION	PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL											CLASSIFICATION						REVIEWING OFFICE					
			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	FIO - FOR INFORMATION ONLY	GA - GOVERNMENT APPROVED	DA - DESIGNER OF RECORD APPROVAL	CR - CONFORMANCE REVIEW	DA / CR	DA / GA	DO - DISTRICT OFFICE	AO - AREA OFFICE	RO - RESIDENT OFFICE	PO - PROJECT OFFICE	DR - DESIGNER OF RECORD	AE - ARCHITECT / ENGINEER
00 72 00	52.236-13	Accident Prevention Plan	X														X				X				
00 73 00	1.11	Dev. From Accept. Design. No Deviation from Contract					X											X			X			X	
00 73 00	1.11	Dev. From Accepted Design - Deviates from Contract					X												X		X			X	
00 73 00	1.17	Supplemental Price Breakdown	X											X							X				
00 73 00	1.18	SSHO Qualifications	X												X						X				
01 10 00	5.2.3.1	(if concrete pavement) Joint Layout Plan with design drawings					X										X								
01 10 00	5.5.2	Building Envelope Sealing Performance Testing						X						X							X				
01 10 10	***	Tests as Req by Codes - DOR Develops Test Program						X						X							X			X	
01 10 00	5.8.3	BAS Review Information		X														X		X	X			X	
01 10 00	5.8.3	BAS Performance Verification Test						X						X							X			X	
01 10 00	5.8.4	Testing Adjusting and Balancing						X						X							X			X	
01 10 00	5.8.5	Commissioning						X						X							X			X	
01 10 00	6.15	Environmental As Required for Site Specific					X										X				X			X	
01 10 00	6.16	Permits as required for Site specific					X										X				X			X	
01 10 00	5.10.2	Fire Protection Tests						X	X					X							X			X	
01 32 01.00 10	3.4.1	Preliminary Project Schedule	X												X						X				
01 32 01.00 10	3.4.2	Initial Project Schedule	X												X						X				
01 32 01.00 10	3.4.3	Design Package Schedule	X												X						X				
01 32 01.00 10	3.6.1	Periodic schedule updates from the Contractor	X												X						X				
01 32 01.00 10	3.7	Time Extension Request (Schedule)	X												X						X				
01 33 00	1.8	Submittal Register - DOR Input Required	X												X						X			X	
01 33 00	1.8	Submittal Register Updates (Design Packages, etc.)	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				
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				
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	3.2.5/3.8	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 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											X		X										
01 78 02.00 10	1.2.3.11	Non-Hazardous Solid Waste Diversion Reports											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											X				X				X				

APPENDIX AA

Termite Treatment

Pretreatment of Termites on Fort Polk

Pier Foundations

The termiticide of choice for pier foundations is Termador. Use of any other product must be approved by the Installation Pest Management Office.

The footings of each pier will be treated at label rate prior to the pier being installed. Additionally, the soil around the pier will be treated at label rate once back fill dirt is added and prior to completion of project.

Slab Foundations

The termiticide of choice for pier foundations is Termador. Use of any other product must be approved by the Installation Pest Management Office.

All footings will be treated at label rate prior to the footing being poured. The ground will be treated at label rate prior to rebar or plastic being installed. Additionally, the back fill soil will be treated at label rate, after back fill is complete and prior to completion of project.

Additional Requirements

1. The Pest Control company performing the treatment must have a Louisiana Commercial Applicators License.
2. The Pest Control company is required to provide the Pest Management Office a photo ID and a copy of the Applicator's license.
3. All termiticides will be mixed onsite.
4. The Pest Control company will provide Pest Management with the following upon completion of each treatment.
    a. Name of Termiticide
    b. Lot Number of product
    c. Total gallons applied
    d. Total Pounds of Active Ingredients applied

APPENDIX BB

Utility Dig Permit

PRIDE INDUSTRIES

Building 3304
Fort Polk, La. 71459
Phone: 337-531-2967
Fax: 337-653-3508

Fort Polk Utility Location & Dig Permit Request

Date	
Location	
What is being done	
POC Name/Company	
POC Number	

Directions:

1. **Contractor** will **MARK AREA** to be excavated in ***WHITE***.
2. Louisiana Law requires you **(CONTRACTOR)** to contact Louisiana 1 Call, representing all private and public utility companies. Dial 1-800-272-3020 – seven days in advance and have digging location information available at time of call. Any company with utilities in the area will mark the respective utility **within 48 hours**.

Louisiana 1 Call Ticket Number: _____

3. For Telephone, Data Lines and Fiber Optic Line utility locations on Fort Polk:
   - **Contact DOIM/ATS Contractor (GSTek) at 531-4019, bldg 3604**
   - Request location services seven days prior to digging.
   - Contractors are responsible to maintain marks.

DOIM/ATS Ticket Number: _____

4. Sprint/ADSS 537-4711 or **208-2025**.

Sprint/ADSS Ticket Number: _____

5. Gas and Exterior Electric. When you have completed 1 thru 4 above, hand carry this form along with a sketch of the area to be excavated to the **Work Reception Office in Bldg. 3307**. DPW will initiate service orders to locate gas and exterior electric. When you have received these service orders bring this form along with sketches to **Bldg 3304**. After all dates and times have been met you may pick up the approved dig permit, and proceed to excavate.

- Ext. Electric Service Order #:_____
- Natural Gas Service Order #:_____
- Chilled Water Service Order #:_____
- Hot Water Service Order #:_____

6. Permit to dig on Fort Polk is approved on _____

Approved by PRIDE Public Works Dpt._____

APPENDIX CC

Electrical Metering

SHARK®200

UPGRADABLE FULLY FEATURED POWER & ENERGY METER

Revenue Grade with Advanced I/O and Power Quality

Shark® 200
Meter/Transducer

Shark® 200T
Transducer Only

www.electroind.com

From Simple to Sophisticated

- Simple Multifunction Meter: V-Switch™ 1
- Historical Data-logging: V-Switch™ 2
- Advanced Power Quality Waveform Recorder: V-Switch™ 5 or 6

Industry Leading Performance

- Highly Accurate Metering Technology
- Expandable I/O with 100BaseT Ethernet
- V-Switch™ Technology Upgrade
- Extensive Data Logging
- Power Quality Recording
- Up to 512 Samples/Cycle

Electro Industries/GaugeTech
The Leader in Web Accessed Power Monitoring
1800 Shames Drive Westbury, NY 11590
1-877-EIMETER | 516-334-0870 | www.electroind.com

HIGH PERFORMANCE WAVEFORM RECORDING

Basic Features Summary

- **0.2% Class Revenue Certifiable Energy and Demand Metering**
- **Meets ANSI C12.20 and IEC 687 (0.2% Class)**
- **Multifunction Measurement**
- **3 Line .56" Inch LED display**
- **% of Load Bar for Analog Perception**
- **Standard RS485 (Modbus and DNP 3.0)**
- **IrDA Port for PDA Read**
- **Ultra-Compact**
- **Fits both ANSI and DIN Cutouts**

Advanced Features Summary

- **High Performance Waveform Recorder**
- **Up to 4 Megabytes Flash for Historical Data Logging & PQ Recording**
- **Extremely Configurable Field Upgradable I/O**
- **100BaseT Ethernet**
- **V-Switch™ Technology**

APPLICATIONS

- **Utility Metering**
- **Substations**
- **Power Generation**
- **Submetering**
- **Power Quality Studies**
- **Load Studies**
- **Commercial Metering**
- **Industrial Metering**
- **Campus Metering**
- **Analog Meter Replacement**
- **Disturbance Recording**
- **Voltage Recording**

ACCURACY AND UPGRADE SWITCHES

Electro Industries introduces a new standard in panel mounted power metering. The Shark® 200 metering system is an ultra- compact power metering device providing industry leading revenue metering functionality combined with advanced data-logging, power quality, communication and I/O traditionally found only in high performance and high cost systems. This product is designed to incorporate advanced features in a cost effective small package for large scale, low cost deployment within an electrical distribution system.

V-Switch™ Technology

The Shark® 200 meter is equipped with EIG's exclusive V-Switch™ technology. This technology allows users to upgrade and add features by using communication commands as needed, even after the meter is installed.

V-Switches Include the Following Features:

Feature	V1	V2	V3	V4	V5	V6
Multifunction Measurement with I/O Expansion	✓	✓	✓	✓	✓	✓
2 Megabytes Data-Logging		✓	✓	✓		
3 Megabytes Data-Logging					✓	
4 Megabytes Data-Logging						✓
Harmonic Analysis			✓	✓	✓	✓
Llimit and Control Functions				✓	✓	✓
64 Sample per Cycle Waveform Recorder					✓	
512 Sample per Cycle Waveform Recorder						✓

ACCURACY

Measured Parameters	Accuracy %	Display Range
Voltage L-N	0.1%	0-9999 Scalable V or kV
Voltage L-L	0.2%	0-9999 V or kV Scalable
Current	0.1%	0-9999 Amps or kAmps
+/- Watts	0.2%	0-9999 Watts, kWatts, MWatts
+/-Wh	0.2%	5 to 8 Digits Programmable
+/-VARs	0.2%	0-9999 VARs, kVARs, MVARs
+/-VARh	0.2%	5 to 8 Digits Programmable
VA	0.2%	0-9999 VA, kVA, MVA
VAh	0.2%	5 to 8 Digits Programmable
PF	0.2%	+/- 0.5 to 1.0
Frequency	+/- 0.03 Hz	45 to 65 Hz
%THD	+/- 2.0%	1 to 99.99%
% Load Bar	+/- 1 Segment	(0.005 to 6) A

Note: *Applies to 3 element WYE and 2 element Delta connections. See full accuracy specifications in Shark® 200 Meter User Manual. Neutral current 2% accuracy.*

Tracable Watt-Hour Test Pulse for Accuracy Verification

The Shark® 200 is a traceable revenue meter. It contains a utility grade test pulse allowing power providers to verify and confirm that the meter is performing to its rated accuracy. This is an essential feature required of all billing grade meters.

- **Utility Block and Rolling Average Demand**
- **Historical Load Profiling**

EXTENSIVE DATA-LOGGING CAPABILITY (V2 and Higher)

The Shark®200 meter offers the capability of having 2 Megabytes of data-logging to be used for historical trends, limit alarms, I/O changes and sequence of events. The unit has a real-time clock that allows for time stamping of all the data in the instrument when log events are created.

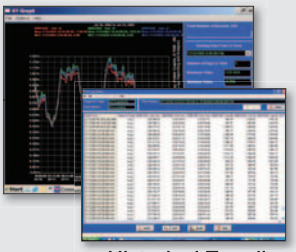
Historical Logs

- 3 Assignable Historical Logs
- Independently Program Trending Profiles
- Up to 64 Parameters per Log

System Events Log

To protection critical billing information, the meter records and logs the following with a time stamp:

- Demand Resets
- Password Requests
- System Startup
- Energy Resets
- Log Resets
- Log Reads
- Programmable Settings Changes



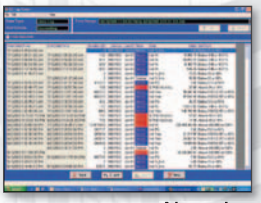
Historical Trending

I/O Change Log

- Provides a Time Stamped Log of any Relay Output
- Provides Time Stamped Log of Input Status Changes
- 2048 Events Available

Limit/Alarm Log

- Provides Magnitude and Duration of an Event
- Includes Time Stamps and Alarm Value
- 2048 Events Available

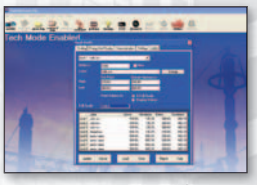


Alarm Log

Limits Alarms and Control Capability (V4 Option)

Limit Events

- Any measured parameter
- Up to 16 Limits
- Voltage Imbalance
- Current Imbalance
- Based on % of full scale settings



Limit Set Up

HIGH PERFORMANCE POWER QUALITY ANALYSIS (V5 AND V6)

Simultaneous Voltage and Current Waveform Recorder

The unit records up to 512 samples per cycle for a voltage sag or swell or a current fault event. The unit provides the following pre-event and post-event recording capability. Waveform records are programmable to the desired sampling rate. V5 provides up to 3 Megabytes storage and V6 provides a total of 4 Megabytes.

The meter's advanced DSP design allows Power Quality triggers to be based on a 1 cycle updated RMS. Up to 170 events can be stored until the memory fills. The meter stores waveform data in a first-in/first -out circular buffer to insure data is always recording.

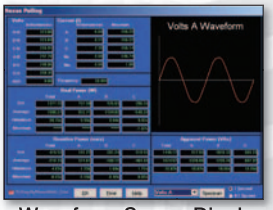
Optional Waveform Recorder

	Samples per Cycle	Pre Event Cycles	Post Event Cycles	Max Waveform per Event	Number of Stored
V5	16	32	96	256	85
	32	16	48	128	85
	64	8	24	64	85
V6	128	4	12	32	170
	256	2	6	16	170
	512	1	3	8	170

Note: Sampling rate based on 60Hz. 50Hz systems, divide sample rate by 0.83.

Waveform Scope

The unit uniquely offers a waveform scope to view the real time waveform for voltage and current. Waveform scope allows the meter to be used as a basic oscilloscope throughout a power system.



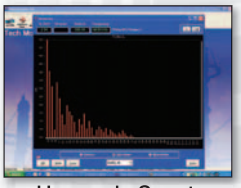
Waveform Scope Display

Independent CBEMA Log Plotting

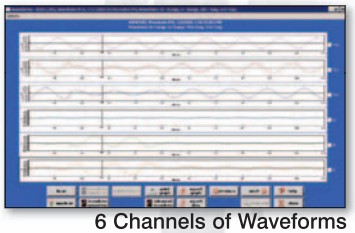
The meter stores an independent CBEMA log for magnitude and duration of voltage events. This allows a user to quickly view total surges, total sags and duration without retrieving waveform data.

Harmonic Recording to the 40th Order

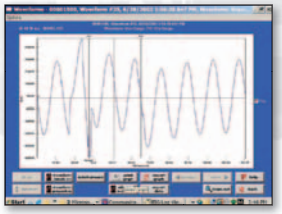
The Shark® 200 meter provides advanced harmonic analysis to the 40th order for each voltage and current channel in real time. Using the stored waveforms, harmonic analysis is available to the 255th order. The harmonics algorithm uses sophisticated active anti-aliasing filtering to provide true and accurate harmonics even when higher level harmonic conditions are present.



Harmonic Spectrum (40th Order)



6 Channels of Waveforms



Waveform Zoomed

STANDARD COMMUNICATION CAPABILITY

The Shark® 200 meter provides two independent communication ports with advanced features.

Rear Mounted Serial Port with KYZ Pulse

- RS485 - This port allows RS485 communication using Modbus or DNP3.0 Protocols. Baud rates are from 9600 to 57.6k.
- KYZ Pulse - In addition to the RS485, the meter also includes Pulse Outputs mapped to absolute energy.

Front Mounted IrDA Communication

Uniquely, the Shark® meter also has an optical IrDA port, allowing the unit to be set up and programmed using a PDA or remote laptop without need for a communication cable. Just point at the meter with an IrDA-equipped PC or PDA and configure it. COPILOT EXT is a Windows CE software package that allows you configure the meter and poll readings.

FIELD EXPANDABLE I/O AND COMMUNICATION CAPABILITIES

The Shark® 200 meter offers unequaled I/O expandability. Using the two universal option slots, the unit can easily be configured to accept new I/O cards even after installation. The unit auto-detects installed I/O option cards. Up to 2 cards of any type can be used per meter.

1. INP100S: 100BaseT Ethernet Capability –
The meter can provide 100BaseT Ethernet functionality. This advanced card is equipped with EIG's exclusive Total Web Solutions.

- WEBMOD - 12 Socket Modbus TCP
- WEBEXPLORER - Built-in web pages

2. 1mAOS: Four Channel Bi-directional 0-1mA Outputs

- Assignable to any parameter
- 0.1% of full scale
- 0 to 10K Ohms, no accuracy losses
- Range +/- 1.20mA

3. 20mAOS: Four Channel 4-20mA Outputs

- Assignable to any parameter
- 0.1% of full scale
- 0 – 500 Ohms, no accuracy losses
- Loop Powered using up to 24 Volts DC

4. RO1S: Two Relay Outputs / Two Status Inputs

- 250VAC/30VDC - 5A Relays, Form C
- Trigger on user set alarms
- Set delays and reset delays
- Status Inputs – Wet / Dry Auto Detect (Up to 150 VDC)
- Must be used with V4 or higher V-Switch™ option for limit based alarms and control

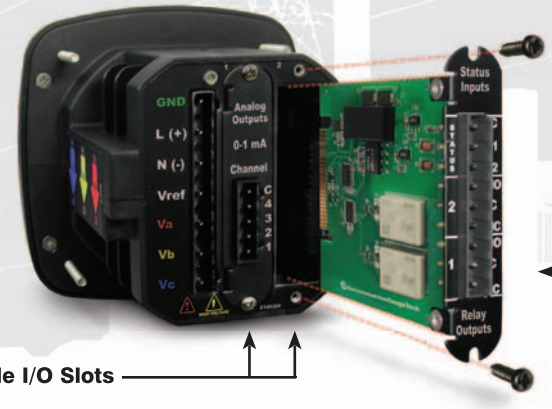
5. PO1S: Four Pulse Outputs / Four Status Inputs

- Programmable to any energy parameter and pulse value
- Form A: Normally open contacts
- Also used for End of Interval pulse
- Can function for manual relay control and limit based control (V4-V6 Options)
- 120mA continuous load current
- Status Inputs - Wet/Dry Auto Detect (Up to 150 VDC)

6. FOVPS or FOSTS: Fiber Optic Card

- EIG's exclusive Fiber Optic Daisy Chain switchable built in logic mimics RS485 half duplex bus allowing you to daisy chain meters for lower installation cost. Full duplex is also assignable.
- ST Terminated Option (-FOST)
- Versatile Link Terminated Option (-FOVP)
- Modbus and DNP 3.0 protocols available

Meter Auto Detects I/O Card Type



Simple Field Upgrade

Field Expandable I/O Slots

Note: I/O cards can be ordered seperately - see last page.

100 BASE T ETHERNET WITH TOTAL WEB SOLUTIONS ETHERNET (INP 100S)

Total Web Solutions—Advanced Metering Data Integration with the Web

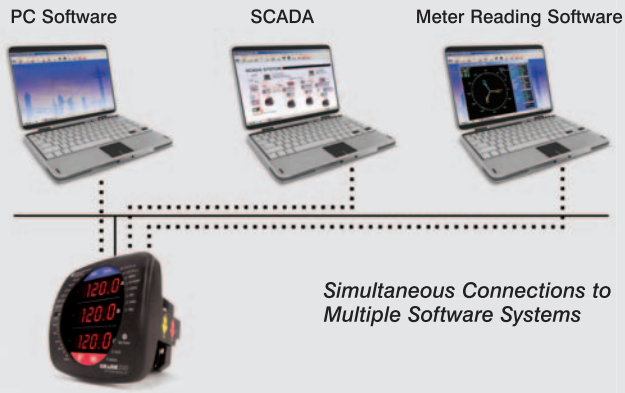
Total Web Solutions is an advanced Ethernet Communication Architecture that allows you to view metering data and host your meter power information web site directly on a Shark® meter. The meter directly hosts the web data without any need for dedicated server software, Active X Controls or Java Applets. The meter does the data collection, the formatting and the page hosting. Additionally, this solution is very Information Technology Dept. friendly because it causes almost no network traffic and provides all formatted data through an HTTP interface without using resident client software.

Advanced Features Include:

- 100BaseT Ethernet
- Direct Web Page Hosting With Live Readings
- Read Direct From Meters (No Server Software Needed)
- No Active Controls or Java Downloads
- Simultaneous 12 socket connection
- Modbus TCP
- Low Cost / High Functionality

WEB MOD is a 10/100BaseT design that allows the unit to speak with 12 simultaneous sockets of Modbus TCP. Once the card is placed inside the meter, up to 12 different software packages can request data from the meter concurrently.

Simultaneous Data Connections



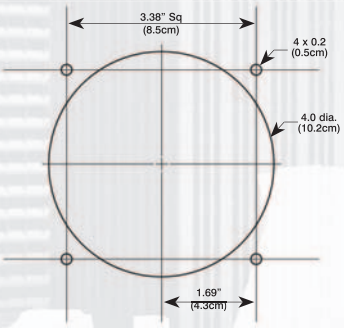
Simultaneous Connections to Multiple Software Systems

WEB EXPLORER provides you with direct access to all measured data through Internet Explorer without needing to download Active X Controls or Java Applets.

SHARK® 200 METER ANSI AND DIN MOUNTING

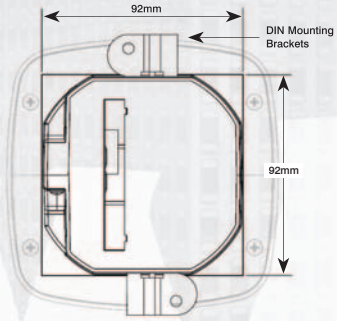
The unit mounts directly in an ANSI C39.1 (4" Round form) or an IEC 92 mm DIN square form. This is perfect for new installations and for existing panels. In new installations, simply use existing DIN or ANSI punches. For existing panels, pull out old analog meters and replace them with the Shark 200 meter. The meter uses standard voltage and current inputs so that CT and PT wiring does not need to be replaced.

ANSI Mounting



American

DIN Mounting

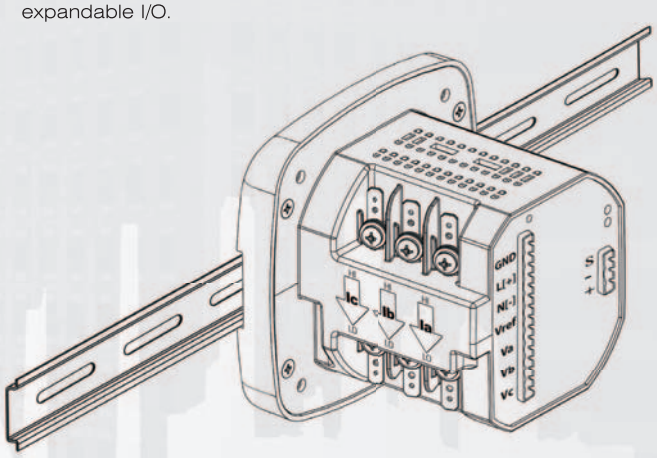


European

(One meter fits both standards)

SHARK® 200T TRANSDUCER

This transducer version of the Shark® 200 meter which does not include a display. The unit mounts directly to a DIN rail and provides an RS485 Modbus or DN P 3.0 output and the expandable I/O.



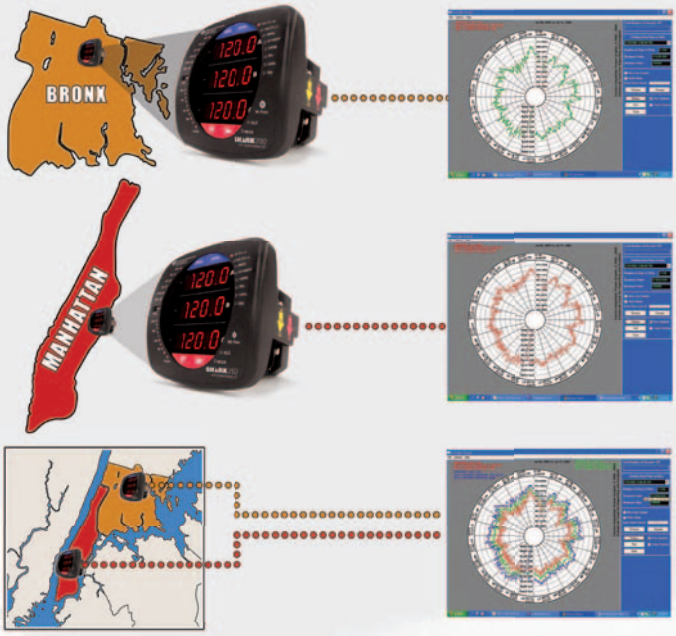
Shark® 200T - DIN Rail Mounted Transducer

Typical Substation Solutions

SUBSTATION VOLTAGE RECORDING

Traditionally, voltage recording meters were relegated to high cost metering or monitoring solutions. The Shark® 200 meter can be placed throughout an electrical distribution network. The meter provides one of the industry's lowest cost methods of collecting voltage information within a Utility power distribution grid.

- Voltage reliability analysis insuring proper voltage to customers
- Compare voltage reliability throughout transmission or distribution networks
- Monitor the output of substation transformers or line regulators
- Initiate conservation voltage reduction, reducing system demand



LOAD PROFILING

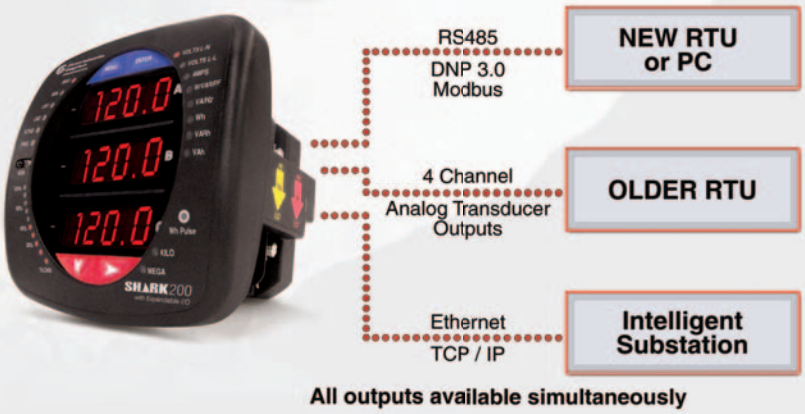
The Shark® 200 meter allows you to log substation data over time with regard to electrical usage, demand, voltage, current, PF and many other parameters. This enables a complete analysis of the power system over time.

- Provide revenue accurate load profiling
- Determine substation usage
- Analyze feeder capacity and utilitization
- Provide time based load profile for planning one estimation
- Data trend PF distribution and imbalances for system efficiency analysis

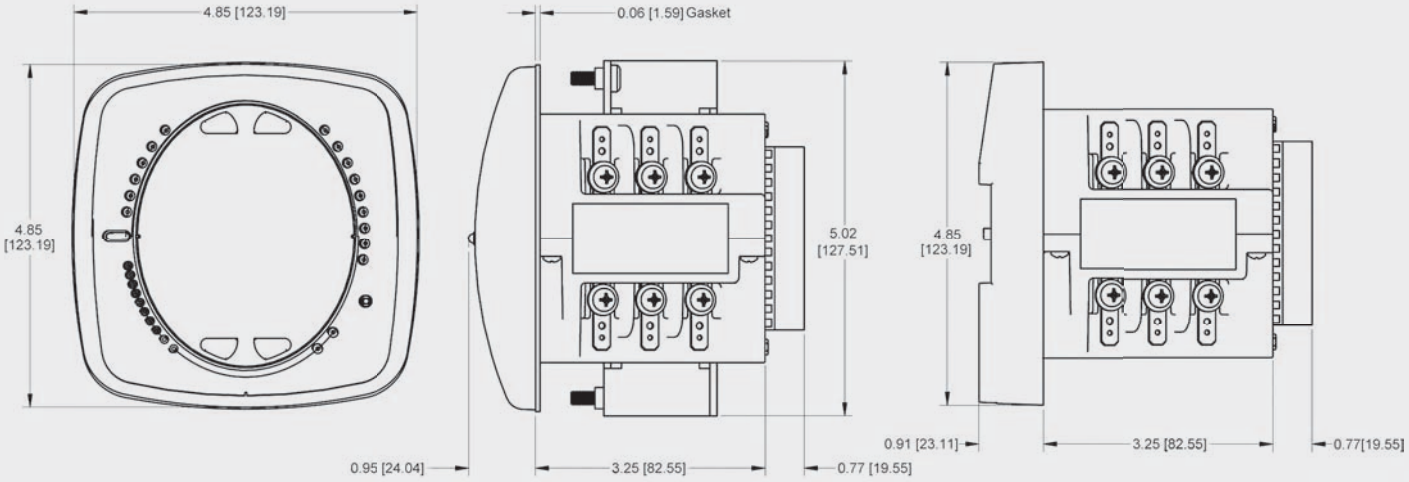
LOW COST SUBSTATION TELEMETRY

The Shark® 200 meter's advanced output capability brings back data using many different communication mediums such as RS485, Ethernet and analog outputs. This insures that one meter can be used for almost every substation application no matter what communication infrastructure is needed.

- Perfect for new or retrofit applications
- Multiple com paths
- One meter provides outputs for every application
- Multiple systems and/or user accessing data simultaneously

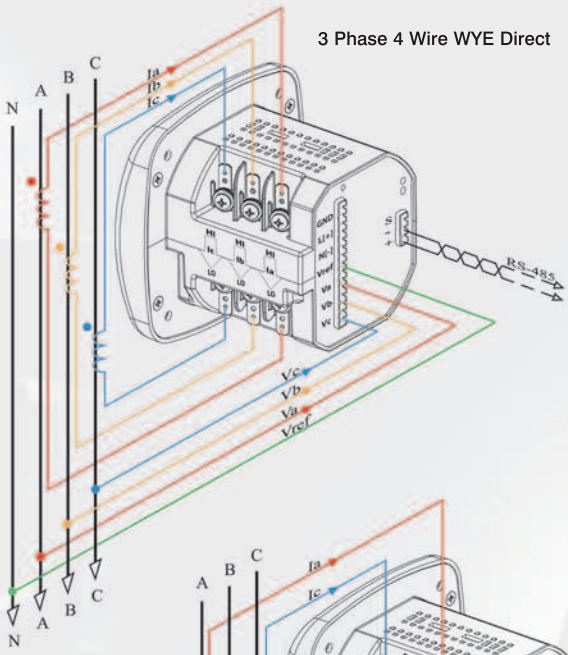


DIMENSIONAL DRAWINGS

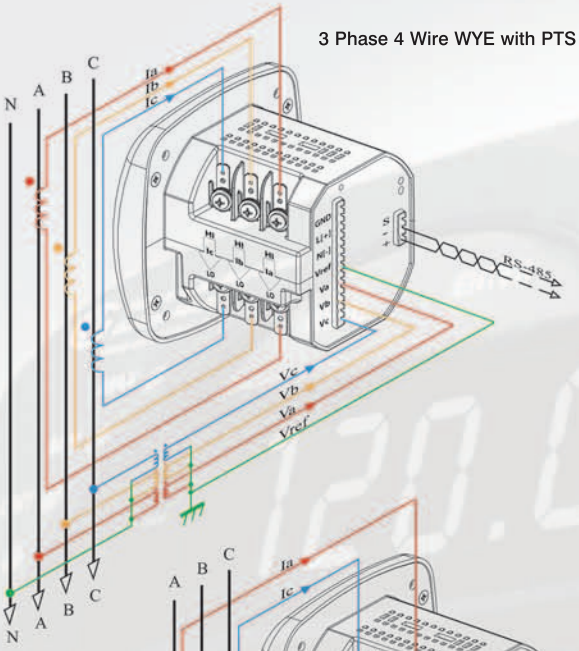


Shark® 200 Meter Face | Shark® 200 Meter Side | Shark® 200T Transducer Side

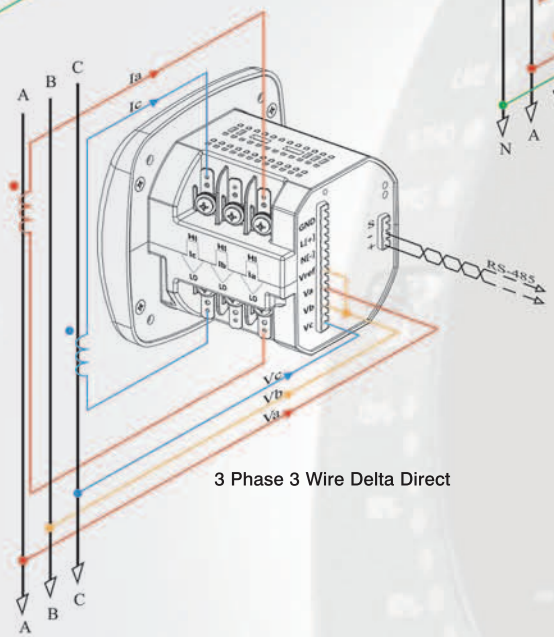
WIRING DIAGRAMS



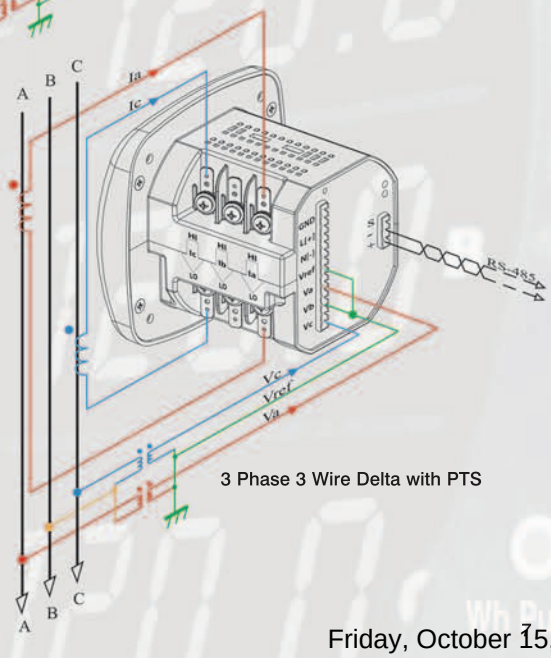
3 Phase 4 Wire WYE Direct



3 Phase 4 Wire WYE with PTS



3 Phase 3 Wire Delta Direct



3 Phase 3 Wire Delta with PTS

Specifications

Voltage Inputs

- 20-576 Volts Line To Neutral, 0-721 Volts Line to Line
- Universal Voltage Input
- Input Withstand Capability – Meets IEEE C37.90.1 (Surge Withstand Capability)
- Programmable Voltage Range to Any PT ratio
- Supports: 3 Element WYE, 2.5 Element WYE, 2 Element Delta, 4 Wire Delta Systems
- Burden: Input Impedance 1 Mega Ohms. Burden 0.014W at 120Volts
- Input wire gauge max (AWG 12 / 2.5mm^2)

Current Inputs

- Class 10: (0.005 to 11) A, 5 Amp Nominal
- Class 2: (0.001 to 2) A, 1A Nominal Secondary
- Fault Current Withstand: 100 Amps for 10 Seconds, 300 Amps for 3 Seconds, 500 Amps for 1 Second
- Continuous current withstand : 20 Amps for Screw Terminated or Pass Through Connections
- Programmable Current to Any CT Ratio
- Burden 0.005VA per phase Max at 11Amps
- Pickup Current: 0.1% of Nominal Class 10: 5mA Class 2: 1mA
- Pass through wire diameter: 0.177" / 4.5mm

Isolation

All Inputs and Outputs are galvanically isolated to 2500 Volts

Environmental Rating

Storage: (-20 to +70)° C
Operating: (-20 to +70)° C
Humidity: to 95% RH Non-Condensing
Faceplate Rating:
NEMA12
(Water Resistant)
Mounting Gasket Included

Sensing Method

- True RMS
- Sampling at over 400 samples / cycle on all channels measured readings simultaneously
- Harmonics resolution to 40th order
- Waveform up to 512 samples/cycle

Update Rate

- Watts, VAr and VA-100msec
- All other parameters-1second

Power Supply

Option D2:
- (90 to 265) Volts AC and (100 to 370) Volts DC. Universal AC/DC Supply

Option: D:
- (18-60) Volts DC (24-48 VDC Systems)

Burden: 10VA Max

Standard Communication Format

- 2 Com Ports (Back and Face Plate)
- RS485 Port (Through Back Plate)
- IrDA (Through Faceplate)
- Com Port Baud Rate: (9,600 - 57,600)
- Com Port Address: 1-247
- 8 Bit, No parity
- Modbus RTU, ASCII or DNP 3.0 Protocols

KYZ Pulse

- Type Form C Contact
- On Resistance: 35 Ohms Max
- Peak Voltage: 350 VDC
- Continuous Load Current: 120 mA
- Peak Load Current: 350mA (10ms)
- Off State Leakage Current @ 350VDC: 1 uA

Dimensions and Shipping

- Weight: 2 lbs
- Basic Unit: H4.85 x W4.85 x L4.65
- Shark® 200 meter mounts in 92mm DIN & ANSI C39.1 Round Cut-outs
- Shark® 200T Transducer DIN rail mounted
- 2-inch Din Rail Included
- Shipping Container Dimensions: 6" cube

Meter Accuracy

- See page 3
- *Note: Accuracy specs doubled for 2.5 Element connections (less accurate).*

Compliance:

- IEC 687 (0.2% Accuracy)
- ANSI C12.20 (0.2% Accuracy)
- ANSI (IEEE) C37.90.1 Surge Withstand
- ANSI C62.41 (Burst)
- IEC1000-4-2 – ESD
- IEC1000-4-3 – Radiated Immunity
- IEC 1000-4-4 – Fast Transient
- IEC 1000-4-5 – Surge Immunity

Patents:

US 6,751,563 - Total Web Solutions
US 7,155,350 - V-Switch™ Capability
D525,893 - Mechanical Design
Other Patents Pending

Ordering Information

All fields must be filled in to create a valid part number.

	Model		Frequency		Current Input		V-Switch Pack		Power Supply		I/O Slot 1*		I/O Slot 2*
Option Numbers:		–		–		–		–		–		–	
Example:	Shark200	-	-60	-	-10	-	-V2	-	-D2	-	-INP100S	-	-X
	Shark200 (Meter/Transducer)		-50 50 Hz System		-10 10 Amp Secondary		-V1 Multifunction Meter Only		-D2 90-265V AC/DC		-X None		-X None
	Shark200T (Transducer Only)		-60 60 Hz System		-2 2 Amp Secondary		-V2 Standard Data-Logging Memory		-D 18-60V DC		-RO1S 2 Relays / 2 Status		-RO1S 2 Relays / 2 Status
							-V3 Power Quality Harmonics				-PO1S 4 Pulses / 4 Status		-PO1S 4 Pulses / 4 Status
							-V4 Limits & Control				-1mAOS 4 channel Analog Output 0-1 (bidirectional)		-1mAOS 4 channel Analog Output 0-1 (bidirectional)
							-V5 64 Samples/cycle Waveform Recording				-20mAOS 4 Channel Analog Output 4-20mA		-20mAOS 4 Channel Analog Output 4-20mA
							-V6 512 Samples/cycle Waveform Recording				-FOSTS Fiber Optic Output ST Terminated		-FOSTS Fiber Optic Output ST Terminated
											-FOVPS Fiber Optic Output VPIN Terminated		-FOVPS Fiber Optic Output VPIN Terminated
											-INP100S 100BaseT Ethernet		-INP100S 100BaseT Ethernet

* *I/O cards can be ordered seperately using the above part numbers.*

Additional Accessories

Communication Converters

9PINC – RS232 Cable

CAB6490 - USB to IrDA Adapter

Unicom 2500 - RS485 to RS232 Converter

Unicom 2500-F – RS485 to RS232 to Fiber Optic Converter

Modem Manager, Model #, MM1 – RS485 to RS232 Converter for Modem Communication

IrDA232 - IrDA to RS232 Adapter for Remote Read

Compliance Documents

Certificate of Calibration, Part #: CCal – This provides Certificate of Calibration with NIST traceable Test Data.

Current Transformer Kits

CT200K – 200/5 Ratio .94" Window 3 CTs
CT400K – 400/5 Ratio, 1.25" Window, 3 CTs
CT800K – 800/5 Ratio, 2.06" Window, 3 CTs
CT2000K – 2000/5 Ratio, 3.00" Window, 3 CTs

CT Specifications:

Frequency: 50 to 400Hz; Insulation: 600 Volts, 10kV BIL
Flexible Leads: UL 1015 105°C, CSA Approved, 24" Long, #16AWG

Software Option Numbers

COMEXT3 – CommunicatorEXT 3.0 for Windows®

* Consult factory application engineer for additional transformer ratios, types or window sizes.

Electro Industries/GaugeTech
1800 Shames Drive • Westbury, NY 11590
1-877-EIMETER (1-877-346-3837) • **E-Mail:** sales@electroind.com
Tel: 516-334-0870 • **Web Site:** www.electroind.com • **Fax:** 516-338-4741

APPENDIX DD

Gas Metering

Ultrasonic Sonix 880

Sonix is nothing short of a transformation in gas metering. Unlike mechanical diaphragm meters, the Sonix digital design completely eliminates moving parts, relying instead on the proven technology of ultrasonics to measure gas flow. The digital design provides a host of additional advantages. It creates a platform for extensive diagnostic capabilities and highly accurate temperature correction. Its compact size drastically reduces installation and labor costs and space requirements. A true expression of the principle that "less is more," Sonix's compact size and simple, no-moving parts design offers unprecedented levels of accuracy, reliability, and performance available in no other gas meter, all backed by a full 15 year warranty – the best in the industry.

Specifications

General

Meter Type: Single path ultrasonic
Meter Model: Sonix 880 Imperial – Sonix 25 Metric
Connections: 30Lt, 45Lt, 60Lt., 1A spg., #2Spg., #3Spg., #4Spg., 1-1/2" FTP, 2" FTP
Connection Configuration: Top in / top out, 6" center
Mounting: Connections Up Preferred
MAOP: 20 psig
Temperature range: -30° to 130°F correction
Temperature range: -30° to 150°F ambient
Gas Application: Clean, dry natural gas insensitive to liquid, particulate, and freezing
Gases with specific gravity between 0.6 (Natural Gas) and 1 (air)
Filter/flow conditioning: None required

Rangeability

Capacity: 880 cfh at ΔP of 0.5" w.c.
- 22:1 (±1% from 40 – 880 CFH)
- 110:1 (±2% from 8 – 40 CFH)
- Low flow cutoff: 0.21 CFH

Capacity: 1,625 cfh at ΔP of 2.0" w.c.
- 40:1 (±1% from 40 – 1,625 CFH)
- 203:1 (±2% from 8 – 40 CFH)
- Low flow cutoff: 0.21 CFH

Physical

Display: 3/8" LCD
4, 5, or 6 digit capacity registration
3 digit alarm/high resolution index
Imperial/metric units
Case: 383 aluminum alloy
Dimensions: 10.25" x 9.5" x 6.8"
Weight: 12 lbs.

Power

Voltage range: 2.5 – 3.7 vDC
Battery: single "D" cell lithium thionyl chloride
10 year Year battery life warranty
Battery: field replaceable
Flash memory for permanent information retention without power

Communications

Optical reading port requires optical probe and SONIXCOM software
Pulse type: Form A
Pulse duration: 50ms
Pulse rate: user scaleable
- 1 cu ft/pulse or liter/pulse
- 10 cu ft/pulse or liter/pulse
- 100 cu ft/pulse or liter/pulse
- 1000 cu ft/pulse or liter/pulse

AMR type: any Form A pulse collector

Features

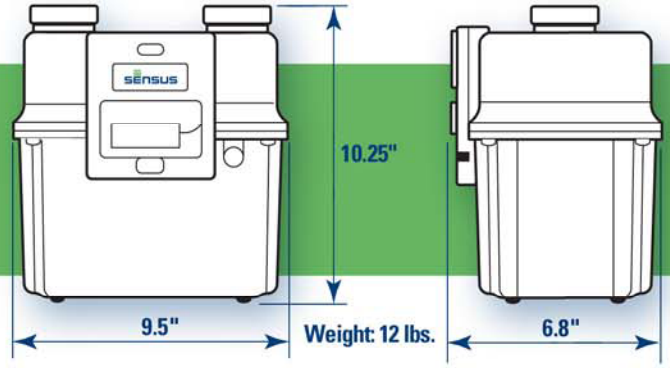
Warranty: 15-years meter
10-years battery
Diagnostics: anti-tamper alarms detect and log reverse flow and air in the meter
Temperature Compensation: Internal thermistor
Pressure Compensation: programmable Fixed Factor
Mechanical parts: None
Proof verification: compatible with sonic nozzle provers
Data logging: hourly for 60-days

Regulatory Standards

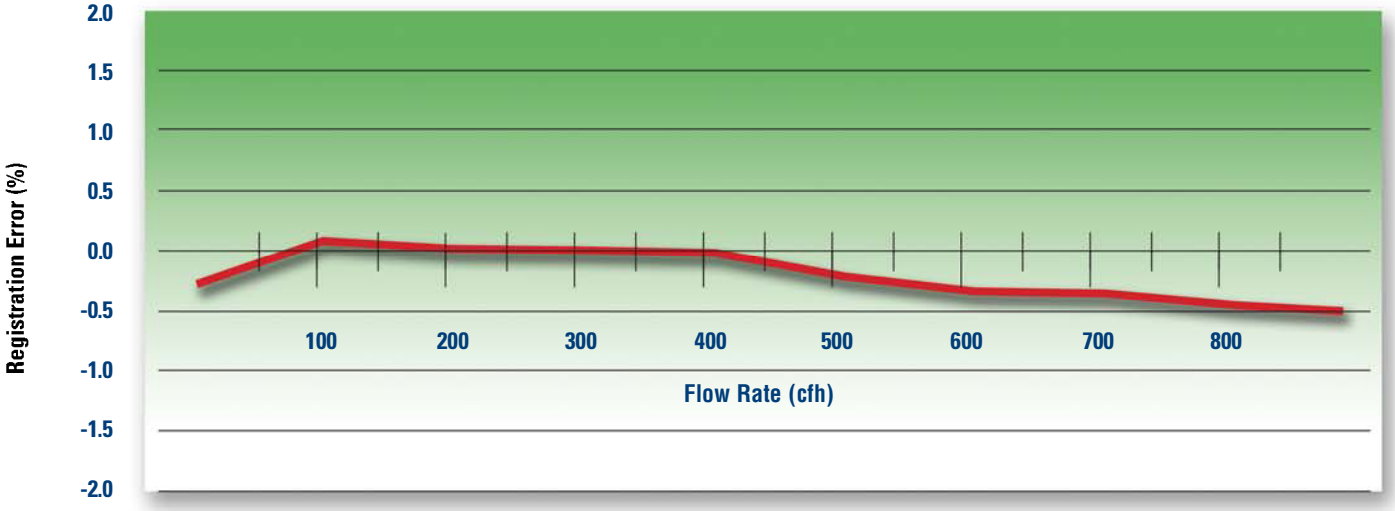
Safety approvals: Certifications to CSA C22.2 No 213 Class 1 Division 2
Certification to ATEX II 1 G EEx ia IIB T4 Zone 0, Type i
Metrology Approvals: Measurement Canada Approval AG-0514

Ultrasonic Gas Meter
Sonix 880

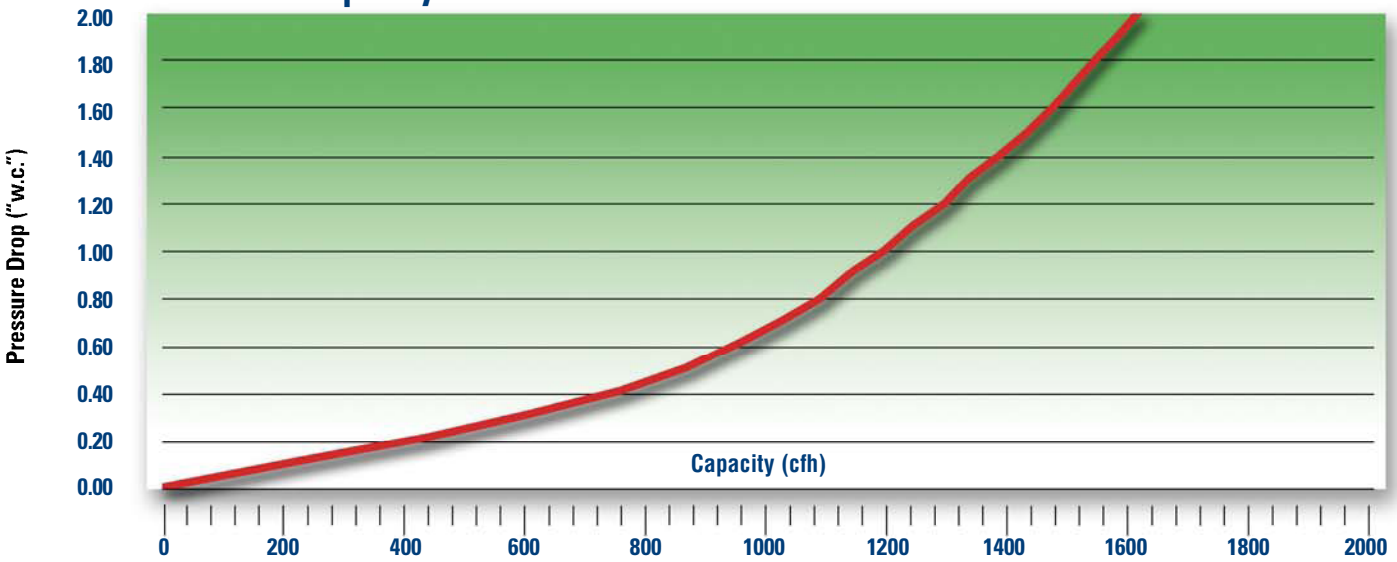
SONIX™



Sonix 880 Proof Curve



Sonix 880 Capacity Curve



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805 Liberty Boulevard • DuBois, PA 15801
800-375-8875 • Fax: (814) 375-8460
www.sensus.com/gas

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APPENDIX EE

Check Valves I

For Health Hazard Applications

Job Name _____ Contractor _____

Job Location _____ Approval _____

Engineer _____ Contractor's P.O. No. _____

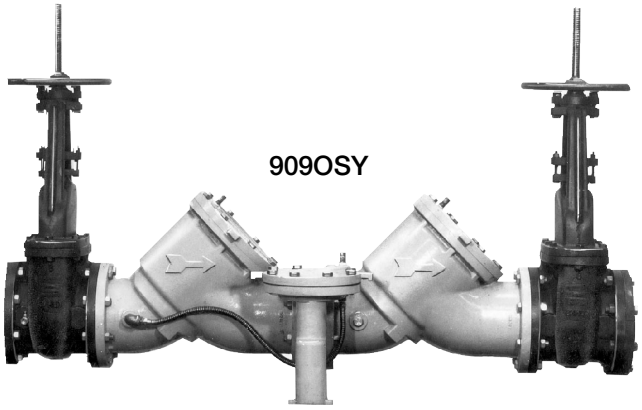
Approval _____ Representative _____

Series 909

Reduced Pressure Zone Assemblies

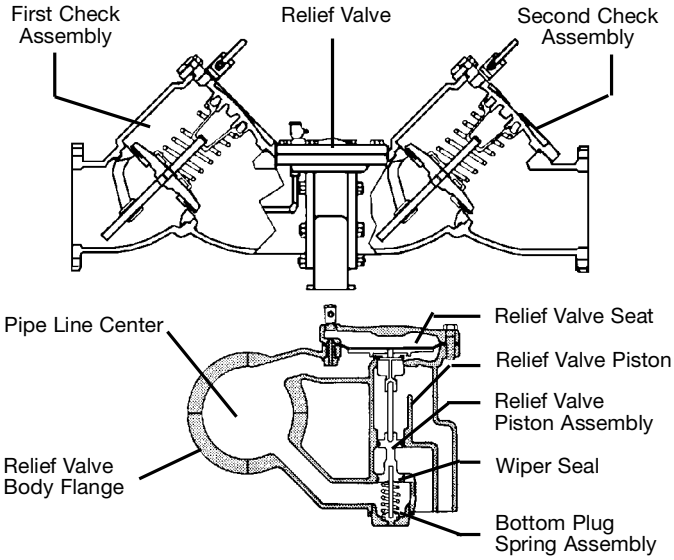
Sizes: 2½" – 10" (65–250mm)

Series 909 Reduced Pressure Zone Assemblies are designed to provide cross-connection control protection of the potable water supply in accordance with national plumbing codes. This series can be utilized in a variety of installations, including health hazard cross-connections in plumbing systems or for containment at the service line entrance. With its exclusive patented relief valve design incorporating the "air-in/water-out" principle, it provides substantially improved relief valve discharge performance during the emergency conditions of combined backsiphonage and backpressure with both checks fouled.



Features

- Replaceable bronze seats
- Stainless steel internal parts
- No special tools required for servicing
- Captured spring check assemblies
- Fused epoxy coated & lined checks
- Industrial strength sensing hose
- Field reversible relief valve
- Air-in/water-out relief valve design provides maximum capacity during emergency conditions



Available Models

Suffix:

BB –	bronze body (2½", 3" only) (64, 76mm)
LF –	without shutoff valves
NRS –	non-rising stem resilient seated gate valves
OSY -	UL/FM outside stem & yoke resilient seated gate valves
QT-FDA –	FDA epoxy coated quarter-turn ball valves
S –	cast iron strainer
S-FDA –	FDA epoxy coated strainer

Note: The installation of a drain line is recommended. When installing a drain line, an air gap is necessary.

Specifications

A Reduced Pressure Zone Assembly shall be installed at each cross-connection to prevent backsiphonage and backpressure backflow of hazardous materials into the potable water supply. The assembly shall consist of a pressure differential relief valve located in a zone between two positive seating check valves and captured springs. Backsiphonage protection shall include provision to admit air directly into the reduced pressure zone via a separate channel from the water discharge channel. The assembly shall include two tightly closing shutoff valves before and after the valve and test cocks. The assembly shall meet the requirements of ASSE Std. 1013; AWWA Std. C511-92; CSA B64.5; and UL Classified File No. EX3185. Listed by IAPMO (UPC). Approved by the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California. The assembly shall be a Watts Regulator Company Series 909.

Now Available
WattsBox Insulated Enclosures.
For more information, send for literature ES-WB.

IMPORTANT: *INQUIRE WITH GOVERNING AUTHORITIES FOR LOCAL INSTALLATION REQUIREMENTS*

WATTS®

Watts product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact Watts Technical Service. Watts reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligation to make such changes and modifications on Watts products previously or subsequently sold.

Materials

Check Valve Bodies: FDA epoxy coated cast iron or bronze
Seats: bronze
Trim: stainless steel
Relief Valve Body: 2½"-3" (60-80mm) bronze
4"-10" (100-250mm) FDA epoxy coated cast iron
Test Cocks: bronze body ball valve

Pressure — Temperature

Temperature Range: 33°F-110°F (5°C-43°C) continuous, 140°F (60°C) intermittent

Maximum Working Pressure: 175psi (12.06 bar)

Standards

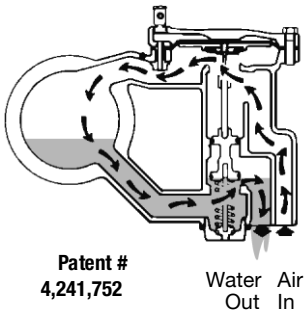
AWWA C511-92

IAPMO PS 31, SBCCI (Standard Plumbing Code)

USC manual for Cross-Connection Control, 8th Edition

How It Operates

The unique relief valve construction incorporates two channels: one for air, one for water. When the relief valve opens, as in the accompanying air-in/water-out diagram, the right-hand channel admits air to the top of the reduced pressure zone, relieving the zone vacuum. The channel on the left then drains the zone to atmosphere. Therefore, if both check valves foul, and simultaneous negative supply and positive backpressure develops, the relief valve uses the air-in/water-out principle to stop potential backflow.



Patent # 4,241,752

Approvals

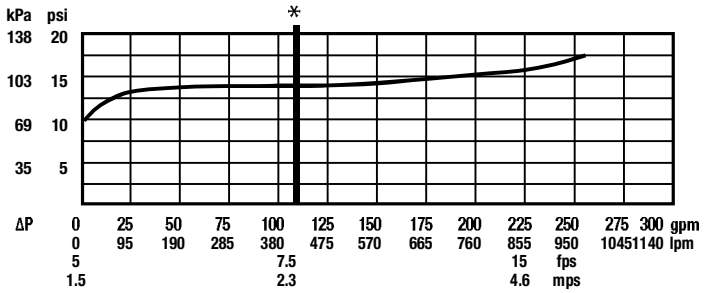
1013 B64.4

Approved by the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California.

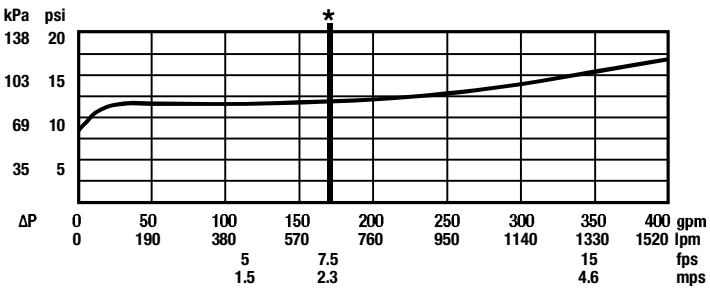
Capacity

*Typical maximum flow rate (7.5 feet/sec.)

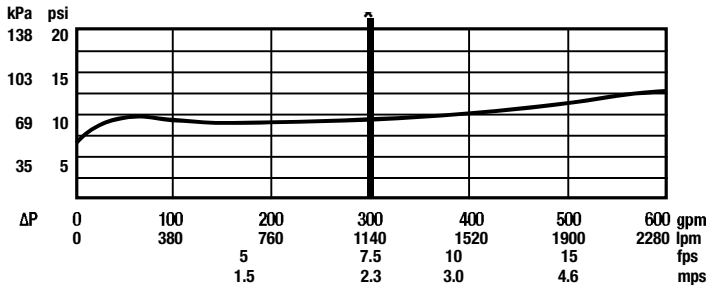
2½" (65mm)



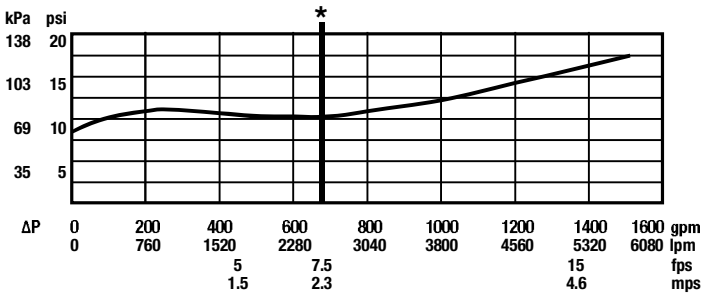
3" (80mm)



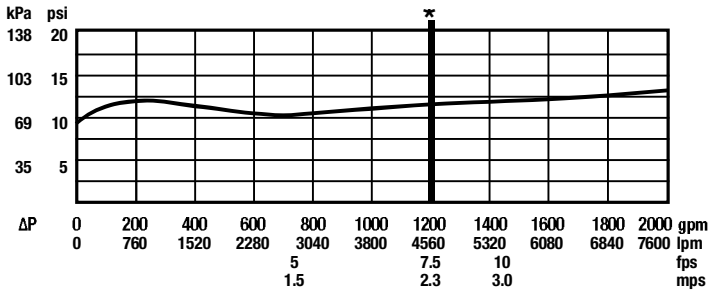
4" (100mm)



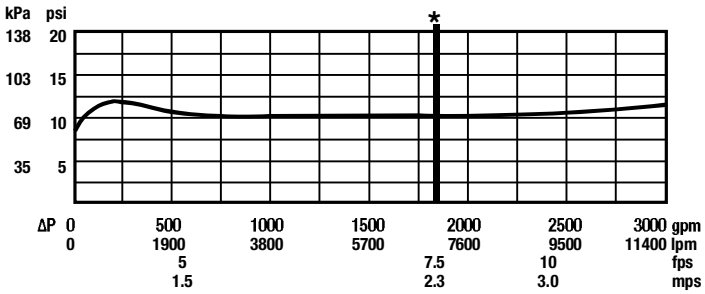
6" (150mm)



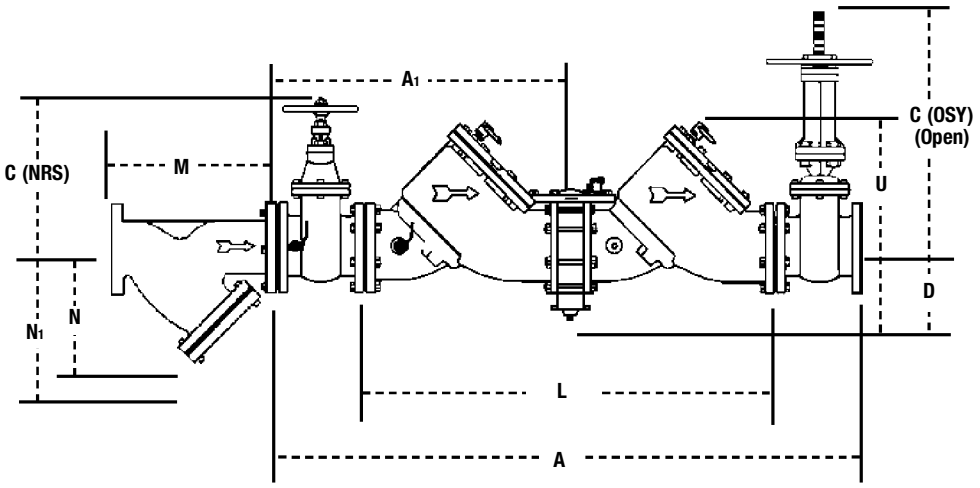
8" (200mm)

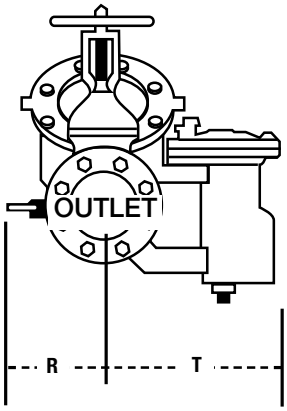


10" (250mm)

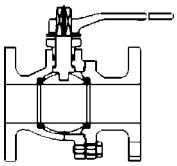


Dimensions — Weights





Quarter-turn (QT) Valve



Watts G-4000 Series Ball Valves Send for F-G4000

NOTE: Valve may be furnished with (2) OSY or (2) NRS Shutoffs.
NOTE: Relief valve section is reversible, therefore, can be on either side and is furnished standardly as shown.

SIZE (DN)		DIMENSIONS																		WEIGHT					
		A		A1		C (OSY)*		C (NRS)		D		L		clearance for check U		R		R (QT)		T		NRS		OSY		QT	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kgs.	lbs.	kgs.	lbs.	kgs.
2½	65	41¼	1048	20⅝	524	16⅜	416	9⅜	238	5¼	133	26⅛	663	11	279	4	102	16	406	9 1/16	230	195	88.4	198	89.8	182	82.6
3	80	42¼	1073	21¼	540	18⅞	479	10¼	260	5¼	133	26⅛	663	11	279	5	127	16	406	9 1/16	230	225	102	230	104	190	86
4	100	55⅛	1400	27⅝	702	22¾	578	12 3/16	310	6	152	37	940	14	356	6	152	19¾	502	14⅜	365	455	206	470	213	352	160
6	150	65½	1664	32¾	832	30⅛	765	16	406	6	152	44½	1130	16	406	11	279	26	660	14⅜	365	718	326	798	362	762	346
8	200	78½	2000	39⅜	1000	37¾	959	19 15/16	506	9¾	248	55¼	1403	21	533	11¼	286	11¼	286	19¼	489	1350	612	1456	660	2286	1037
10	250	93⅝	2378	46⅞	1190	45¾	1162	23 13/16	605	9¾	248	67⅜	1711	21	533	12½	318	12½	318	21	533	2160	980	2230	1011	3716	1685

*UL, FM approved backflow preventers must include UL/FM approved OSY gate valves.

Strainer Dimensions

SIZE (DN)		DIMENSIONS						WEIGHT	
		M		N1†		N			
in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kgs.
2½	65	10	254	10	254	6½	165	28	12.7
3	80	10⅛	257	10	254	7	178	34	15.4
4	100	12⅛	308	12	305	8¼	210	60	27
6	150	18½	470	20	508	13½	343	133	60
8	200	21⅝	549	22¾	578	15½	394	247	112
10	250	26	660	28	711	18½	470	370	168

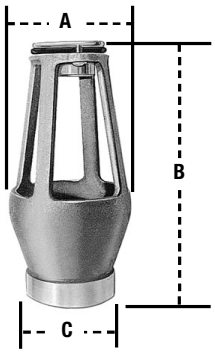
† – Dimension required for screen removal

Air Gap Dimensions

When installing a drain line on Series 909 backflow preventers that are installed horizontally, use 909 AG series air gaps.

			DIMENSIONS						WEIGHT	
Iron Body Model No.	Ordering Code	Series/Sizes	A in.	A mm	B in.	B mm	C in.	C mm	lbs	kgs
909AG-F	0881378	1¼" – 3" 009/909 1¼" – 2" 009 M1 2" 009 M2	4⅜	111	6¾	171	2	51	3.25	1.47
909AG-K	0881385	4" – 6" 909 8" – 10" 909 M1	6⅜	162	9⅝	244	3	76	6.25	2.83
909AG-M	0881387	8" – 10" 909	7⅜	187	11¼	286	4	102	15.50	7.03

For flange size backflow preventers installed vertically (flow down), a fabricated air gap is recommended.



For additional information, visit our website at: www.watts.com

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APPENDIX FF

Check Valves II

For Health Hazard Applications

Job Name _____ Contractor _____

Job Location _____ Approval _____

Engineer _____ Contractor's P.O. No. _____

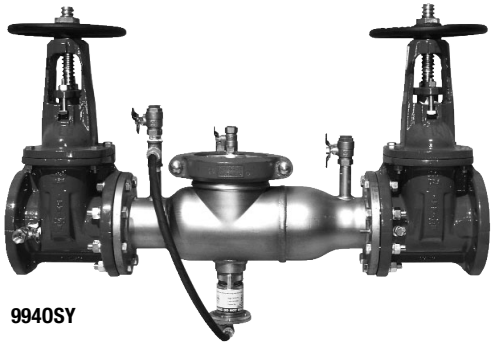
Approval _____ Representative _____

Series 994

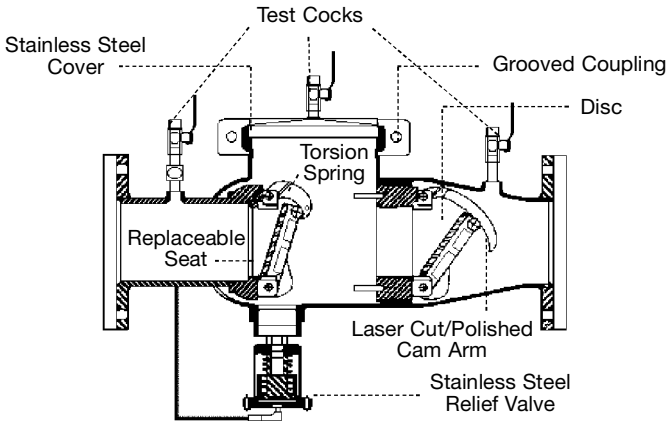
Reduced Pressure Zone Assemblies

Sizes: 2½" – 10" (65 – 250mm)

Series 994 Reduced Pressure Zone Assemblies are designed to provide protection of the potable water supply in accordance with national codes. This series can be used where approved by the local authority having jurisdiction on health hazard cross-connections. Series 994 features a short lay length, light-weight stainless steel body, corrosion resistant stainless steel relief valve, and patented torsion spring check valves.



9940SY



Features

- Stainless steel construction provides long term corrosion resistance and maximum strength
- Stainless steel body is half the weight of competitive designs reducing installation & shipping costs
- Short end-to-end dimensions makes retrofit easy
- Bottom mounted relief valve reduces clearance requirements when installed against an outside wall
- Patented torsion spring check valves provides maximum flow at low pressure drop
- Thermoplastic & stainless steel check valves for trouble-free operation
- No special tools required for servicing
- Compact construction allows for smaller enclosures
- Stainless steel relief valve features a balanced rolling diaphragm to eliminate sliding seals and lower maintenance costs

Specifications

A Reduced Pressure Zone Assembly shall be installed at each cross-connection to prevent backsiphonage and backpressure of hazardous materials into the potable water supply. The assembly shall consist of a pressure differential relief valve located in a zone between two positive seating check valves. The main valve body shall be manufactured from 300 Series stainless steel for corrosion resistance. The check valves shall be of thermoplastic construction with stainless steel hinge pins, cam arm, and cam bearing. The check valve shall utilize a single torsion spring design to minimize pressure drop through the assembly. The check valves shall be modular and shall seal to the main valve body by the use of an O-ring. There shall be no brass or bronze parts used within the check assembly or relief valve. The use of seat screws to retain the check valve seat is prohibited. All internal parts shall be accessible through a single cover on the valve assembly securely held in place by a two-bolt grooved coupling. The differential relief valve shall be of stainless steel construction and shall utilize a rolling diaphragm and no sliding seals. The relief valve shall be bottom mounted and supplied with a steel reinforced sensing hose. The assembly shall include two resilient seated shutoff valves & four ball type test cocks. The assembly shall be a Watts Regulator Company Series 994.

***IMPORTANT:** INQUIRE WITH GOVERNING AUTHORITIES FOR LOCAL INSTALLATION REQUIREMENTS*

Models

Suffix:

NRS –	non-rising stem resilient seated gate valves
OSY –	UL/FM outside stem & yoke resilient seated gate valves
*OSY FxG –	flanged inlet gate connection and grooved outlet gate connection
*OSY GxF –	grooved inlet gate connection and flanged outlet gate connection
*OSY GxG –	grooved inlet gate connection and grooved outlet gate connection
LF –	without shutoff valves
S –	cast iron strainer

Available with grooved NRS gate valves - consult factory*
Post indicator plate and operating nut available - consult factory*
*Consult factory for dimensions

Note: The installation of a drain line is recommended. When installing a drain line, a 994AGK-P air gap is necessary. See ES-AG/EL/TC for additional information.

Now Available
WattsBox Insulated Enclosures.
For more information, send for literature ES-WB.

WATTS® REGULATOR

Watts product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact Watts Technical Service. Watts reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligation to make such changes and modifications on Watts products previously or subsequently sold.

Materials

All internal metal parts: 300 Series stainless steel
Main valve body: 300 Series stainless steel
Check assembly: Noryl®
Flange dimension in accordance with AWWA Class D

Pressure – Temperature

Temperature Range: 33°F – 110°F (5°C – 43°C) continuous
Maximum Working Pressure: 175psi (12.06 bar)

Standards

AWWA C511-92, CSA B64.5, UL Classified

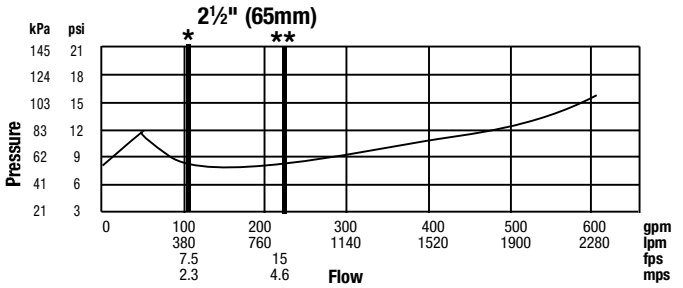
Approvals

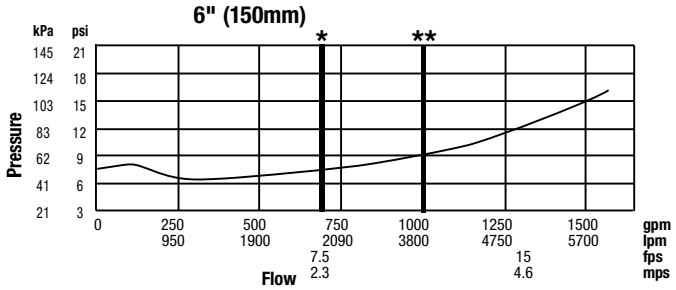
1013 B64.5 (OSY only) (2½" – 10", OSY only)

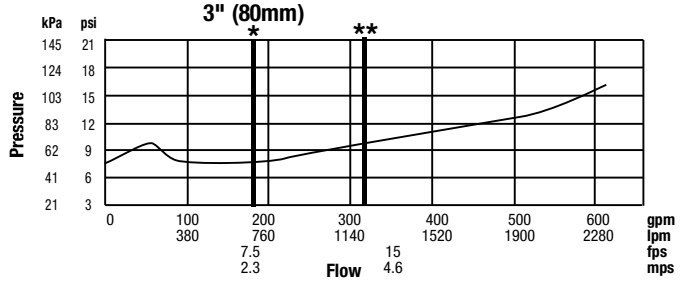
Approved by the Foundation for Cross Connection Control & Hydraulic Research at the University of Southern California Sizes 2½" – 6" (65 – 250mm)

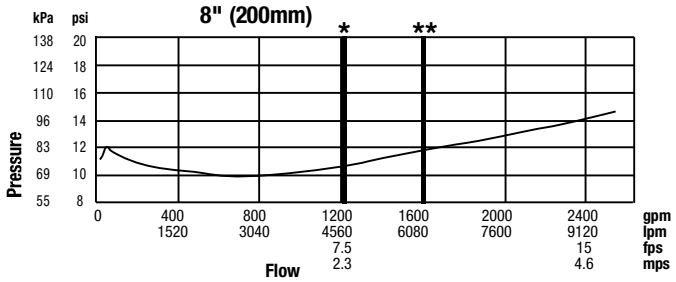
Capacity *Typical maximum flow rate (7.5 feet/sec.) **UL rated flow

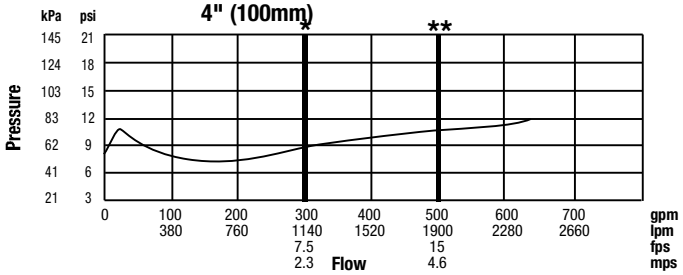
Series 994 performance as established by an independent testing laboratory (1996 UL)

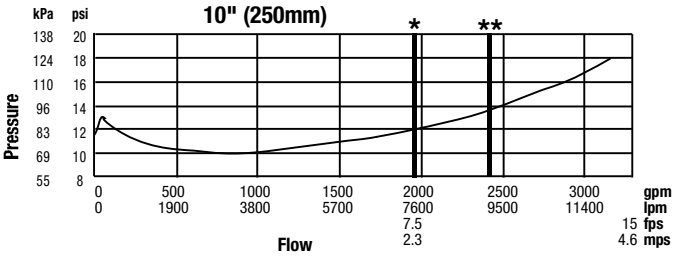




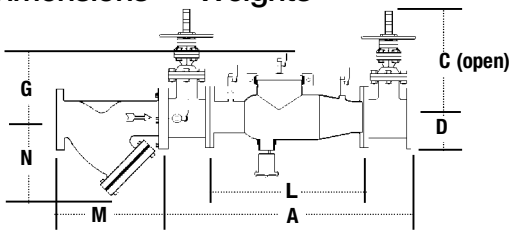


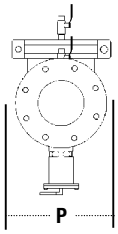




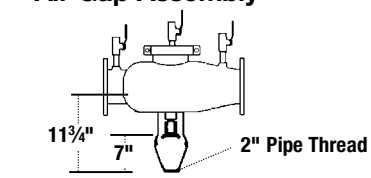


Dimensions — Weights





Air Gap Assembly



Horizontal Air Gap Fitting 2½" – 10"
Model 994 AGK-P

SIZE (DN)		DIMENSIONS																		WEIGHT			
		A		C (OSY)		C (NRS)		D		G		L		M		N		P		w/Gates		w/o Gates	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lb.	kg.	lb.	kg.
2½	65	37	940	16⅜	416	9⅜	238	10½	267	10	254	22	559	10	254	6½	165	7	178	148	67	60	27
3	80	38	965	18⅞	479	10¼	260	10½	267	10	254	22	559	10⅛	257	7	178	7½	191	226	103	62	28
4	100	40	1016	22¾	578	12 3/16	310	10½	267	10	250	22	559	12⅛	308	8¼	210	9	229	235	107	65	30
6	150	48½	1232	30⅛	765	16	406	11½	292	15	381	27½	699	18½	470	13½	343	11	279	380	172	110	50
8	200	52½	1334	37¾	959	19 15/16	506	12½	318	15	381	29½	749	21⅝	549	15½	394	13½	343	571	259	179	81
10	250	55½	1410	45¾	1162	23 13/16	605	12½	318	15	381	29½	749	26	660	18½	470	16	406	773	351	189	86

Noryl® is a registered trademark of General Electric Company

WATTS® REGULATOR ISO 9001 CERTIFIED

USA: 815 Chestnut St., No. Andover, MA 01845-6098; www.wattsreg.com
Canada: 5435 North Service Rd., Burlington, ONT. L7L 5H7;www.wattscanada.ca

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APPENDIX JJ

Site Work Documents

UNIT OPERATIONS FACILITY FORT POLK, LOUISIANA

US ARMY CORPS
OF ENGINEERS
Ft. Worth District

UNIT OPERATIONS FACILITY
FORT POLK, LOUISIANA

LOCATION
FORT POLK, LOUISIANA

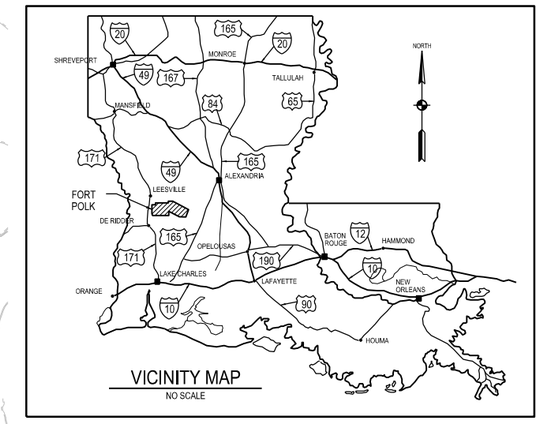
SOLICITATION NO. RFP W912HN–07–X–9717
DATED: JULY 2010

K. M. NG & ASSOCIATES, INC.
CONSULTING ENGINEERS
SAN ANTONIO, TEXAS 78201
TEXAS REGISTERED ENGINEERING FIRM F-442

CONTR. NO. W912HN–08–D–0027,
Task Order DY01

Friday, October 15, 2010

UNIT OPERATIONS FACILITY FORT POLK, LOUISIANA
SOL. NO. RFP W912HN-07-X-9717
UNIT OPERATIONS FACILITY FORT POLK, LOUISIANA
CONTR. NO. W912HN–08–D–0027, Task Order DY01
SOL. NO. RFP W912HN–07–X–9717
FORT POLK, LA.



NORTH

2000 0 2000 4000
SCALE OF FEET

1 G-001 | G-001 PROJECT LOCATION PLAN SCALE: 1" = 2000'

US Army Corps of Engineers
Fort Worth District

FINAL RFP SUBMITTAL NOT FOR CONSTRUCTION

Symbol	Description	Date
1	REVISED SHEET OF NUMBER	JULY 2010

Date: JULY 2010
Rev.
Sol No. RFP W912HN-07-A-0717
Contr No. W912HN-08-D-0027, Task Order DY01
File name:
Plot date: JULY 6, 2010
Plot scale: AS SHOWN
Designed by: K.Vil, CHAN
Dwn by: E.CHAVEZ
Reviewed by: K.M. NG
Submitted by: KUNG M. NG, PE
ENGINEER
DESIGN FILE:

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS

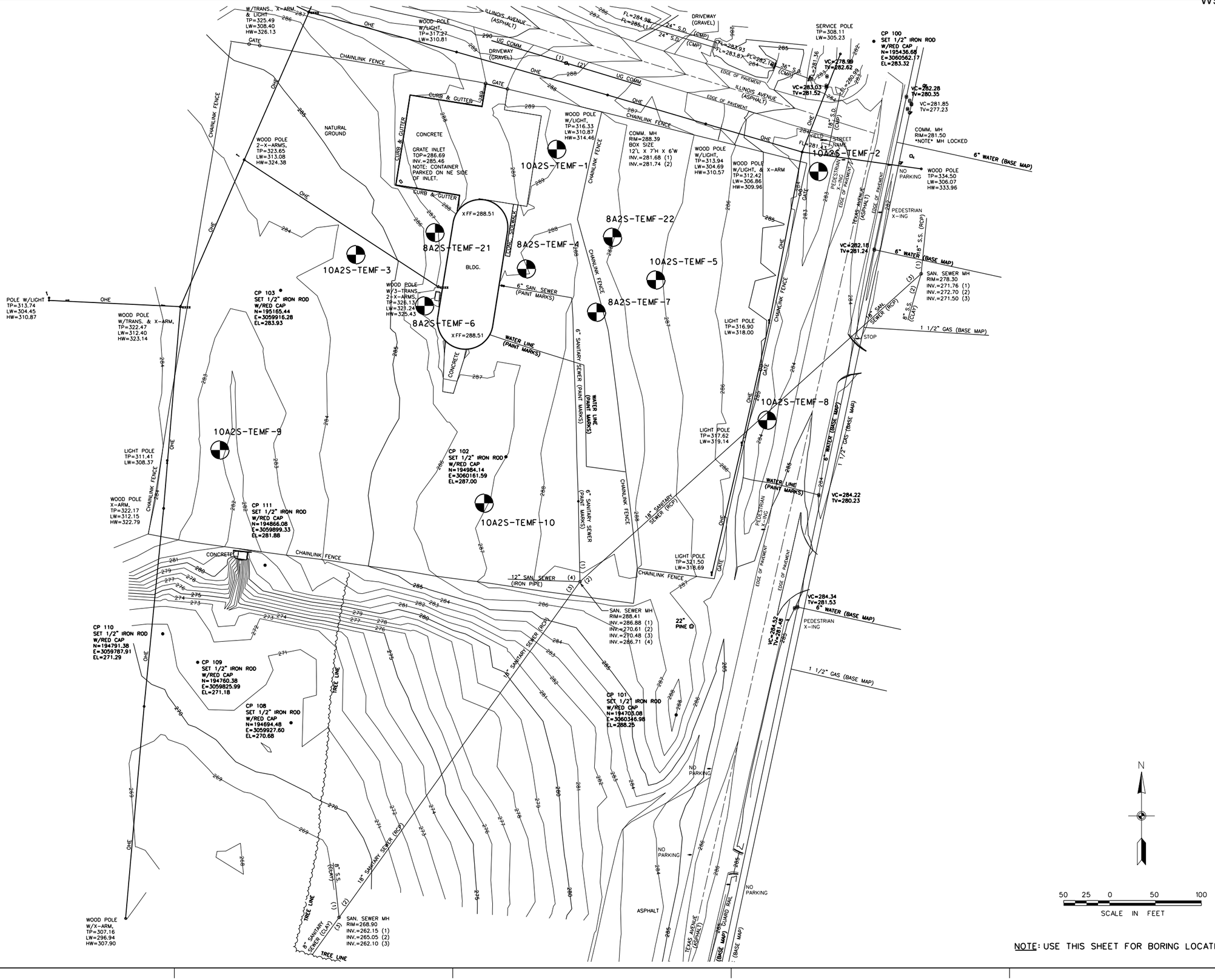
K. M. NG & ASSOCIATES, INC.
CONSULTING ENGINEERS
SAN ANTONIO, TEXAS 78230
TEXAS REGISTERED ENGINEERING FIRM F-442

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PROJECT NO. 069199

PROJECT LOCATION PLAN

Sheet reference number: G-001

10/6/2010 I:\Projects\Active\10_Coe\1228.01\TEMF\tptemfg-001plm.dgn
Contr No. W912HN-08-D-0027, Task Order DY01



NOTE: USE THIS SHEET FOR BORING LOCATIONS ONLY

US Army Corps of Engineers
Fort Worth District

FINAL RFP
SUBMITTAL
NOT FOR
CONSTRUCTION

Symbol	Description	Date
1	REPLACED SHEET	JULY 2010
	AM 0002	

Date: JULY 2010
Rev.
Sol No. RFP W912HN-07-A-0717
Cont No. W912HN-08-D-0027, Task Order 0101
File name:
Plot date: JULY 6, 2010
Plot scale: AS SHOWN

Designed by: J. PICKERING
Dwn by: J. PICKERING
Reviewed by: K. MCCLESKEY
Submitted by: RAMANUJA KAYNAN, P.E., CHIEF, GEOTECHNICAL SECTION

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS

ENGINEERING/ CONSTRUCTION DIVISION DESIGN BRANCH

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PROJECT NO. 069199

BORING LOCATIONS

Sheet reference number:
B-101

DESIGN FILE:

Sheet 2 of 21

Cont No. W912HN-08-D-0027, Task Order 0101

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LOG OF BORING NO. 10A2S-TEMF-1

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger — LOCATION: See Figure 1

DEPTH, ft	DESCRIPTION OF MATERIAL	BLOWS PER FT
	CLAY, Sandy, Firm, Reddish Brown, with ferric staining (possible fill)	
	SAND, Silty, Clayey, Loose, Pinkish Brown, Damp possible fill from 0 to 11.5 ft.	9
5	CLAY, Silty, Sandy, Pinkish Brown, Damp	8
	SAND, Silty, Clayey, Loose, Pinkish Brown, Damp	8
10		8
	Boring Terminated	
15		

DEPTH DRILLED: 11.5 ft — DEPTH TO WATER: N/A — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/21/2010 — DATE MEASURED: 5/21/2010 — FIGURE: 1

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 10A2S-TEMF-2

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger — LOCATION: See Figure 1

DEPTH, ft	DESCRIPTION OF MATERIAL	BLOWS PER FT
	CLAY, Silty, Sandy, Soft, Dark Brown, Damp, with ferric staining (possible fill)	
	– fill to a depth of 4 ft.	4
5	CLAY, Silty, Sandy, Firm, Reddish Brown, Damp, with ferric staining –possible fill to a depth of 11.5 ft.	5
		7
10		15
	Boring Terminated	
15		

DEPTH DRILLED: 11.5 ft — DEPTH TO WATER: N/A — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/19/2010 — DATE MEASURED: 5/19/2010 — FIGURE: 2

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 10A2S-TEMF-3

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger — LOCATION: See Figure 1

DEPTH, ft	DESCRIPTION OF MATERIAL	BLOWS PER FT
	CLAY, Sandy, Firm, Reddish Brown, with ferric staining	
	SAND, Silty, Clayey, Firm, Loose to Medium Dense, Pinkish Brown, Damp – possible fill from 0 to 11.5 ft.	5
5		9
		11
10		10
	Boring Terminated	
15		

DEPTH DRILLED: 11.5 ft — DEPTH TO WATER: N/A — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/21/2010 — DATE MEASURED: 5/21/2010 — FIGURE: 3

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-4

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary — LOCATION: See Figure 1

DEPTH, ft	DESCRIPTION OF MATERIAL	BLOWS PER FT
	CLAY, Silty, Sandy, Firm to Stiff, Reddish Brown to Pink, Damp, with ferric staining	
	SILT, Clayey, Sandy, Firm to Stiff, Reddish Brown to Pink, Damp, with ferric staining	
5	CLAY, Silty, Sandy, Firm to Stiff, Reddish Brown to Pink, Damp, with ferric staining	11
10	SAND, Silty, Clayey, Loose to Medium Dense, Reddish Brown to Pink, Damp to Wet, with ferric staining (medium to fine grain sand)	8
	– possible fill at 11.5 ft	
		6
15		7
		4

DEPTH DRILLED: 61.5 ft — DEPTH TO WATER: 18.5 ft — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 — DATE MEASURED: 5/20/2010 — FIGURE: 4a

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-4

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary — LOCATION: See Figure 1

DEPTH, ft	DESCRIPTION OF MATERIAL	BLOWS PER FT
	SAND, Silty, Clayey, Loose to Medium Dense, Reddish Brown to Pink, Damp to Wet, with ferric staining (medium to fine grain sand) (continued)	5
		5
25		17
		10
30	SAND, Silty, Clayey, Loose to Medium Dense, Tan, Wet	12
		20
35		5
		16

DEPTH DRILLED: 61.5 ft — DEPTH TO WATER: 18.5 ft — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 — DATE MEASURED: 5/20/2010 — FIGURE: 4b

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-4

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary — LOCATION: See Figure 1

DEPTH, ft	DESCRIPTION OF MATERIAL	BLOWS PER FT
	SAND, Silty, Clayey, Loose to Medium Dense, Tan, Wet (continued)	11
		20
45		27
		9
50	CLAY, Silty, Sandy, Soft, Reddish Brown, Wet, with ferric stains	3
	CLAY, Stiff, Gray, Wet, with reddish brown layers	
55		12
	SAND, Silty, Gray, Wet, with reddish brown layers	

DEPTH DRILLED: 61.5 ft — DEPTH TO WATER: 18.5 ft — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 — DATE MEASURED: 5/20/2010 — FIGURE: 4c

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-4

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary — LOCATION: See Figure 1

DEPTH, ft	DESCRIPTION OF MATERIAL	BLOWS PER FT
	CLAY, Stiff, Gray, Wet, with reddish brown layers (continued)	8
	Boring Terminated	
65		
70		
75		

DEPTH DRILLED: 61.5 ft — DEPTH TO WATER: 18.5 ft — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 — DATE MEASURED: 5/20/2010 — FIGURE: 4d

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

NOTES:

1. USE THIS SHEET FOR BORING LOGS ONLY.
2. MOISTURE CONTENT, WHERE SHOWN, IS EXPRESSED AS PERCENT DRY WEIGHT AT TIME OF LABORATORY CLASSIFICATION.
3. LEGEND SHOWS OVERBURDEN MATERIALS CLASSIFIED ACCORDING TO ASTM D 2487 AND ASTM D 2488.
4. DESCRIPTION OF OVERBURDEN MATERIALS CHANGED TO CORRESPOND WITH LABORATORY CLASSIFICATION AS NECESSARY.
5. ORIGINAL DRILLING LOGS AVAILABLE AT CORPS OF ENGINEERS OFFICES.

US Army Corps of Engineers
Fort Worth District

FINAL RFP SUBMITTAL
NOT FOR CONSTRUCTION

Symbol	Description	Date
1	REPLACED SHEET	JULY 2010

AM 0002 — 0.0 NOL

Date: JULY 2010 — Rev.
Sol No. RFP W912HN-07-A-0717
Contr No. W912HN-08-D-0027, Task Order D101
File name:
Plot date: JULY 6, 2010
Plot scale: AS SHOWN
DESIGN FILE:

Designed by: J. PICKERING
Dwn by: J. PICKERING
Reviewed by: K. MACLESKEY
Submitted by: RAMANUJA KANNAN, P.E., CHIEF, GEOTECHNICAL SECTION

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS

ENGINEERING/ CONSTRUCTION DIVISION DESIGN BRANCH

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PROJECT NO. 069199

LOGS OF BORING 1 OF 4

Sheet reference number: B-201

Sheet 3 of 21

Contr No. W912HN-08-D-0027, Task Order D101

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LOG OF BORING NO. 10A2S-TEMF-5

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger — LOCATION: See Figure 1

DEPTH, ft	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT
			FILL material Clay, Silty, Sandy, Very Stiff, Reddish Brown, Damp with ferric staining	9
5			CLAY, Silty, Sandy, Firm, Reddish Brown, Damp with ferric staining – possible fill from 5 to 11.5 ft.	18
				20
10				19
			Boring Terminated	
15				

DEPTH DRILLED: 11.5 ft — DEPTH TO WATER: N/A — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/19/2010 — DATE MEASURED: 5/19/2010 — FIGURE: 5

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-6

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary — LOCATION: See Figure 1

DEPTH, ft	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT
			FILL, Clay, Silty, Loose to Medium Dense, Reddish Brown to Pink, Damp, with ferric staining	
5				5
			FILL, Sand, Clayey, Silty, Loose to Medium Dense	
10			CLAY, Sandy, Silty, Low Plasticity	9
			SAND, Clayey, Silty, Loose to Medium Dense, Reddish Brown to Pink, Damp to Wet, with ferric staining	
15				9
				14

DEPTH DRILLED: 61.5 ft — DEPTH TO WATER: 18.2 ft — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 — DATE MEASURED: 5/20/2010 — FIGURE: 6a

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-6

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary — LOCATION: See Figure 1

DEPTH, ft	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT
			SAND, Clayey, Silty, Loose to Medium Dense, Reddish Brown to Pink, Damp to Wet, with ferric staining (continued)	6
25				13
				10
30				4
				11
35				18
				25
			SAND, Silty, Clayey, Loose to Medium Dense, Tan, Wet, with ferric staining	7

DEPTH DRILLED: 61.5 ft — DEPTH TO WATER: 18.2 ft — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 — DATE MEASURED: 5/20/2010 — FIGURE: 6b

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-6

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary — LOCATION: See Figure 1

DEPTH, ft	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT
			SAND, Silty, Clayey, Loose to Medium Dense, Tan, Wet, with ferric staining (continued)	5
45				24
			CLAY, Stiff, Reddish Brown, Wet, with ferric staining, tan layers, and gray mottling	22
50				10
			CLAY, Soft to Stiff, Gray, Wet, with ferric staining	3
55				14

DEPTH DRILLED: 61.5 ft — DEPTH TO WATER: 18.2 ft — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 — DATE MEASURED: 5/20/2010 — FIGURE: 6c

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-6

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary — LOCATION: See Figure 1

DEPTH, ft	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT
			CLAY, Soft to Stiff, Gray, Wet, with ferric staining (continued)	6
65			Boring Terminated	
70				
75				

DEPTH DRILLED: 61.5 ft — DEPTH TO WATER: 18.2 ft — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 — DATE MEASURED: 5/20/2010 — FIGURE: 6d

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-7

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary — LOCATION: See Figure 1

DEPTH, ft	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT
			CLAY, Sandy, Silty, Firm to Stiff, Reddish Brown, Damp with ferric staining and traces of gravel (grades to pink with depth)	
			SAND, Clayey, Silty, Firm to Stiff, Reddish Brown, Damp with ferric staining and traces of gravel (grades to pink with depth)	
5			CLAY, Sandy, Silty, Firm to Stiff, Reddish Brown, Damp with ferric staining and traces of gravel (grades to pink with depth)	5
			SAND, Silty, Clayey, Loose to Medium Dense, Pinkish Brown, Damp to Wet, with ferric staining	
10			– possible fill to 10.2 ft.	9
15			– clayey to 14.5 ft (purple and tan layers throughout)	9
				14

DEPTH DRILLED: 61.5 ft — DEPTH TO WATER: 19.5 ft — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/19/2010 — DATE MEASURED: 5/19/2010 — FIGURE: 7a

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-7

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary — LOCATION: See Figure 1

DEPTH, ft	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT
			SAND, Silty, Clayey, Loose to Medium Dense, Pinkish Brown, Damp to Wet, with ferric staining (continued)	6
25				13
				10
30				4
				11
35				18
				25
			SAND, Silty, Clayey, Loose to Medium Dense, Tan, with ferric staining	7

DEPTH DRILLED: 61.5 ft — DEPTH TO WATER: 19.5 ft — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/19/2010 — DATE MEASURED: 5/19/2010 — FIGURE: 7b

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-7

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary — LOCATION: See Figure 1

DEPTH, ft	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT
			SAND, Silty, Clayey, Loose to Medium Dense, Tan, with ferric staining (continued)	5
45				24
			CLAY, Silty, Sandy, Stiff to Very Stiff, Reddish Brown, with ferric staining	22
50				12
			CLAY, Silty, Soft to Stiff, Grayish Brown, with ferric staining	3
55				14

DEPTH DRILLED: 61.5 ft — DEPTH TO WATER: 19.5 ft — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/19/2010 — DATE MEASURED: 5/19/2010 — FIGURE: 7c

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

NOTES:

1. USE THIS SHEET FOR BORING LOGS ONLY.
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3. LEGEND SHOWS OVERBURDEN MATERIALS CLASSIFIED ACCORDING TO ASTM D 2487 AND ASTM D 2488.
4. DESCRIPTION OF OVERBURDEN MATERIALS CHANGED TO CORRESPOND WITH LABORATORY CLASSIFICATION AS NECESSARY.
5. ORIGINAL DRILLING LOGS AVAILABLE AT CORPS OF ENGINEERS OFFICES.

US Army Corps of Engineers
Fort Worth District

FINAL RFP SUBMITTAL NOT FOR CONSTRUCTION

Symbol	Description	Date
1	REPLACED SHEET	JULY 2010

Date: JULY 2010
Sol No. RFP W912HN-07-A-0717
Cont No. W912HN-08-D-0027, Task Order D101
File name:
Plot date: JULY 6, 2010
Plot scale: AS SHOWN
Designed by: J. PICKERING
Dwn by: J. PICKERING
Reviewed by: K. MCCLESKEY
Submitted by: RAMAYULIA KANNAN, P.E., CHIEF, GEOTECHNICAL SECTION

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS

ENGINEERING/ CONSTRUCTION DIVISION DESIGN BRANCH

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PROJECT NO. 069199

LOGS OF BORING 2 OF 4

Sheet reference number: B-202

Sheet 4 of 21

DESIGN FILE:

Cont No. W912HN-08-D-0027, Task Order D101

Friday, October 15, 2010

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US Army Corps of Engineers
Fort Worth District

FINAL RFP SUBMITTAL
NOT FOR CONSTRUCTION

LOG OF BORING NO. 8A2S-TEMF-7

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary — LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT2 (PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT)	PLASTICITY INDEX	% -200
			CLAY, Silty, Soft to Stiff, Grayish Brown, with ferric staining (continued)	6				
			Boring Terminated					

DEPTH DRILLED: 61.5 ft — DEPTH TO WATER: 19.5 ft — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/19/2010 — DATE MEASURED: 5/19/2010 — FIGURE: 7d

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 10A2S-TEMF-8

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger — LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT2 (PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT)	PLASTICITY INDEX	% -200
			CLAY, Silty, Firm, Brown to Dark Brown, Damp, with organics and ferric staining					
			SAND, Clayey, Silty, Soft to Firm, Tan, Damp, with ferric staining	6				
			– possible fill to 8 ft	3				
			CLAY, Silty, Soft to Firm, Tan, Damp, with ferric staining					
			CLAY, Silty, Stiff, Reddish Brown, Damp with ferric staining	8				
			Boring Terminated	12				

DEPTH DRILLED: 11.5 ft — DEPTH TO WATER: N/A — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/21/2010 — DATE MEASURED: 5/21/2010 — FIGURE: 8

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 10A2S-TEMF-9

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger — LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT2 (PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT)	PLASTICITY INDEX	% -200
			CLAY, Sandy, Silty, Soft, Brown, Damp with ferric staining and traces of gravel					
			CLAY, Silty, Reddish Brown, Damp with ferric staining and traces of gravel – possible fill from 0 to 11.5 ft.	3				
			CLAY, Sandy, Silty, Soft, Grayish Brown, Damp, with ferric staining	4				
			Boring Terminated	2				

DEPTH DRILLED: 11.5 ft — DEPTH TO WATER: N/A — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/21/2010 — DATE MEASURED: 5/21/2010 — FIGURE: 9

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 10A2S-TEMF-10

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger — LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT2 (PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT)	PLASTICITY INDEX	% -200
			ASPHALT (0.5 inches)					
			SAND, Silty, Clayey, Loose, Reddish Brown, Loose, with ferric staining and traces of gravel					
			CLAY, Sandy, Stiff, Reddish Brown, Damp, with ferric staining	6				
			CLAY, Sandy, Silty, Stiff, Reddish Brown, Damp, with ferric staining	9				
				12				
			– possible fill to 11.5 ft Boring Terminated	11				

DEPTH DRILLED: 11.5 ft — DEPTH TO WATER: N/A — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/21/2010 — DATE MEASURED: 5/21/2010 — FIGURE: 10

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-21

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary — LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT2 (PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT)	PLASTICITY INDEX	% -200
			CLAY, Sandy, Silty, Stiff, Reddish Brown, Damp, with ferric staining					
			SAND, Silty, Clayey, Loose to Medium Dense, Pinkish Brown, Damp to Wet with ferric staining	13				
			– possible fill from 0 to 9 ft					
				11				
				13				
				6				
				12				

DEPTH DRILLED: 61.5 ft — DEPTH TO WATER: 17.8 ft — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 — DATE MEASURED: 5/20/2010 — FIGURE: 21a

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-21

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary — LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT2 (PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT)	PLASTICITY INDEX	% -200
			SAND, Silty, Clayey, Loose to Medium Dense, Pinkish Brown, Damp to Wet with ferric staining (continued)	5				
				9				
				4				
				15				
				16				
				11				
			SAND, Silty, Clayey, Very Loose to Loose, Pink and Tan alternating, Wet, with ferric staining	2				
				5				

DEPTH DRILLED: 61.5 ft — DEPTH TO WATER: 17.8 ft — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 — DATE MEASURED: 5/20/2010 — FIGURE: 21b

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-21

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary — LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT2 (PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT)	PLASTICITY INDEX	% -200
			SAND, Silty, Clayey, Very Loose to Loose, Pink and Tan alternating, Wet, with ferric staining (continued)	9				
			SAND, Silty, Clayey, Loose to Medium Dense, Tan, Wet, with ferric staining	13				
				26				
				32				
			CLAY, Silty, Stiff, Gray, Wet, with tan layers and ferric staining	10				
				12				

DEPTH DRILLED: 61.5 ft — DEPTH TO WATER: 17.8 ft — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 — DATE MEASURED: 5/20/2010 — FIGURE: 21c

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. 8A2S-TEMF-21

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary — LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT2 (PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT)	PLASTICITY INDEX	% -200
			CLAY, Silty, Stiff, Gray, Wet, with tan layers and ferric staining (continued)	11				
			Boring Terminated					

DEPTH DRILLED: 61.5 ft — DEPTH TO WATER: 17.8 ft — PROJ. No.: AAA10-025-00
DATE DRILLED: 5/20/2010 — DATE MEASURED: 5/20/2010 — FIGURE: 21d

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

NOTES:
1. USE THIS SHEET FOR BORING LOGS ONLY.
2. MOISTURE CONTENT, WHERE SHOWN, IS EXPRESSED AS PERCENT DRY WEIGHT AT TIME OF LABORATORY CLASSIFICATION.
3. LEGEND SHOWS OVERBURDEN MATERIALS CLASSIFIED ACCORDING TO ASTM D 2487 AND ASTM D 2488.
4. DESCRIPTION OF OVERBURDEN MATERIALS CHANGED TO CORRESPOND WITH LABORATORY CLASSIFICATION AS NECESSARY.
5. ORIGINAL DRILLING LOGS AVAILABLE AT CORPS OF ENGINEERS OFFICES.

Revision Number	Description	Date
1	ADDED NEW SHEET	JULY 2010

Date: JULY 2010
Sol No. RFP W912HN-07-A-0717
Cont No. W912HN-08-D-0027, Task Order D101
File name:
Plot date: JULY 6, 2010
Plot scale: AS SHOWN
Designed by: J. PICKERING
Dwn by: J. PICKERING
Reviewed by: K. MCCLESKEY
Submitted by: RAMAKUJA VUNNAM, P.E., CHIEF, GEOTECHNICAL SECTION

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS

ENGINEERING/ CONSTRUCTION DIVISION DESIGN BRANCH

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PROJECT NO. 069199

LOGS OF BORING 3 OF 4

Sheet reference number: B-203

Sheet 5 of 21

DESIGN FILE:

Cont No. W912HN-08-D-0027, Task Order D101

US Army Corps of Engineers
Fort Worth District

LOG OF BORING NO. 8A2S-TEMF-22

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT2 (0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0)	PLASTIC LIMIT	WATER CONTENT (10 20 30 40 50 60 70 80)	LIQUID LIMIT	PLASTICITY INDEX	% -200
			CLAY, Sandy, Silty, Firm to Stiff, Reddish Brown, Damp, with ferric staining								
			SAND, Clayey, Silty, Stiff, Pinkish Brown, Damp, with ferric staining								
5			CLAY, Sandy, Silty, Stiff, Pinkish Brown, Damp, with ferric staining	11							
			– possible fill from 0 to 7 ft								
			SAND, Silty, Clayey, Loose to Medium Dense, Pinkish Brown, Damp to Wet, with ferric staining								
10				9							
			– no longer clayey below 12 ft								
				8							
15				9							
				9							

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

DEPTH DRILLED: 62.0 ft — DATE DRILLED: 5/19/2010
DEPTH TO WATER: 20.2 ft — DATE MEASURED: 5/19/2010
PROJ. No.: AAA10-025-00 — FIGURE: 22a

LOG OF BORING NO. 8A2S-TEMF-22

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT2 (0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0)	PLASTIC LIMIT	WATER CONTENT (10 20 30 40 50 60 70 80)	LIQUID LIMIT	PLASTICITY INDEX	% -200
			SAND, Silty, Clayey, Loose to Medium Dense, Pinkish Brown, Damp to Wet, with ferric staining (continued)	2							
				4							
25				12							
				5							
30				9							
				12							
35				16							
				14							

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

DEPTH DRILLED: 62.0 ft — DATE DRILLED: 5/19/2010
DEPTH TO WATER: 20.2 ft — DATE MEASURED: 5/19/2010
PROJ. No.: AAA10-025-00 — FIGURE: 22b

LOG OF BORING NO. 8A2S-TEMF-22

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT2 (0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0)	PLASTIC LIMIT	WATER CONTENT (10 20 30 40 50 60 70 80)	LIQUID LIMIT	PLASTICITY INDEX	% -200
			SAND, Silty, Clayey, Loose to Medium Dense, Pinkish Brown, Damp to Wet, with ferric staining (continued)	16							
				12							
45			SAND, Silty, Clayey, Loose to Medium Dense, Tan, Wet, with ferric staining	7							
				21							
50				5							
				19							
55			CLAY, Sandy, Silty, Firm, Gray, Wet, with tan layers and ferric staining	4							

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

DEPTH DRILLED: 62.0 ft — DATE DRILLED: 5/19/2010
DEPTH TO WATER: 20.2 ft — DATE MEASURED: 5/19/2010
PROJ. No.: AAA10-025-00 — FIGURE: 22c

LOG OF BORING NO. 8A2S-TEMF-22

Unit Operations Facility
Fort Polk RFP Support (KMN No. 101228.01)
Leesville, Louisiana

TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger & Mud Rotary
LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT2 (0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0)	PLASTIC LIMIT	WATER CONTENT (10 20 30 40 50 60 70 80)	LIQUID LIMIT	PLASTICITY INDEX	% -200
			CLAY, Sandy, Silty, Firm, Gray, Wet, with tan layers and ferric staining (continued)								
			Boring Terminated								
65											
70											
75											

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

DEPTH DRILLED: 62.0 ft — DATE DRILLED: 5/19/2010
DEPTH TO WATER: 20.2 ft — DATE MEASURED: 5/19/2010
PROJ. No.: AAA10-025-00 — FIGURE: 22d

FINAL RFP SUBMITTAL NOT FOR CONSTRUCTION

Rev.	Description	Date
1	ADDED NEW SHEET	JULY 2010
	AM 0002	JULY 2010

NOTES:
1. USE THIS SHEET FOR BORING LOGS ONLY.
2. MOISTURE CONTENT, WHERE SHOWN, IS EXPRESSED AS PERCENT DRY WEIGHT AT TIME OF LABORATORY CLASSIFICATION.
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4. DESCRIPTION OF OVERBURDEN MATERIALS CHANGED TO CORRESPOND WITH LABORATORY CLASSIFICATION AS NECESSARY.
5. ORIGINAL DRILLING LOGS AVAILABLE AT CORPS OF ENGINEERS OFFICES.

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS, FORT WORTH, TEXAS

ENGINEERING/ CONSTRUCTION DIVISION DESIGN BRANCH

Designed by: J. PICKERING — Date: JULY 2010
Dwn by: J. PICKERING — Sol No.: RFP W912HN-07-A-0717
Reviewed by: K. McCLESKEY — Contr No.: W912HN-08-D-0027, Task Order D101
Submitted by: RAMANUJA KANNAN, P.E., CHIEF, GEOTECHNICAL SECTION — File name: ; Plot date: JULY 6, 2010 ; Plot scale: AS SHOWN

DESIGN FILE:

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PROJECT NO. 069199

LOGS OF BORING 4 OF 4

Sheet reference number: B-204

LEGEND :

CENTER LINE	℄
POWER POLE	○
POWER POLE/TRANS.	△xxxx
LIGHT POLE	
LIGHT STANDARD	
HELIPAD LIGHT	
GUY WIRE	
ELECTRIC MANHOLE	□E
COMMUNICATION MANHOLE	□C
UTILITY BOX	(J)X
TRANSFORMER ON PAD	xxxx
TRAFFIC SIGNAL BOX	P
ELECTRIC PULLBOX	□P
TRAFFIC SIGNAL CONTROLLER	
GAS VALVE	(G)
GAS METER	(G)
SPRINKLER CONTROL VALVE	SC
GUARD POST	
BOLLARD	
WATER VALVE	(W)
WATER METER	(W)
FIRE HYDRANT	X
SPRINKLER HEADS	(O)
SAN. SEWER MANHOLE	(S)
STORM DRAIN MANHOLE	(D)
CLEAN-OUT	(CO)
TREE	
SHRUB	
SIGN	
HORIZ/VERT CONTROL POINT	
FENCE	-X-X-
WATER FAUCET	
LINE LABEL ON OVERHEAD UTILITY	OH
LINE LABEL ON UNDERGROUND UTILITY	UG
UNDERGROUND ELECTRIC CONDUIT	UE

OVERHEAD SHIELD WIRE	OHS
OVERHEAD ELECTRIC LINE	— Ex —
UNDERGROUND ELECTRIC LINE	— E_x^U —
UNDERGROUND COMMUNICATION LINE	— C_x^U —
GAS MAIN LINE	— Gx —
WATER MAIN LINE	— Wx —
SANITARY SEWER MAIN LINE	— SSx —
STORM DRAIN MAIN LINE	— SDx —
TOP OF POLE	TP
LOW WIRE ELEVATION	LW
VALVE COVER	VC
TOP OF VALVE	TV
BORE HOLE	⊗
WINDSOCK	
TRAFFIC SIGNAL ARM	
GEOGRAPHIC INFORMATION SYSTEM	(GIS)
ABANDONED IN PLACE	(AIP)

N

30' 20' 10' 0 30'

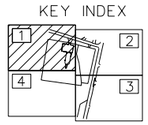
SCALE: 1" = 30' -0"

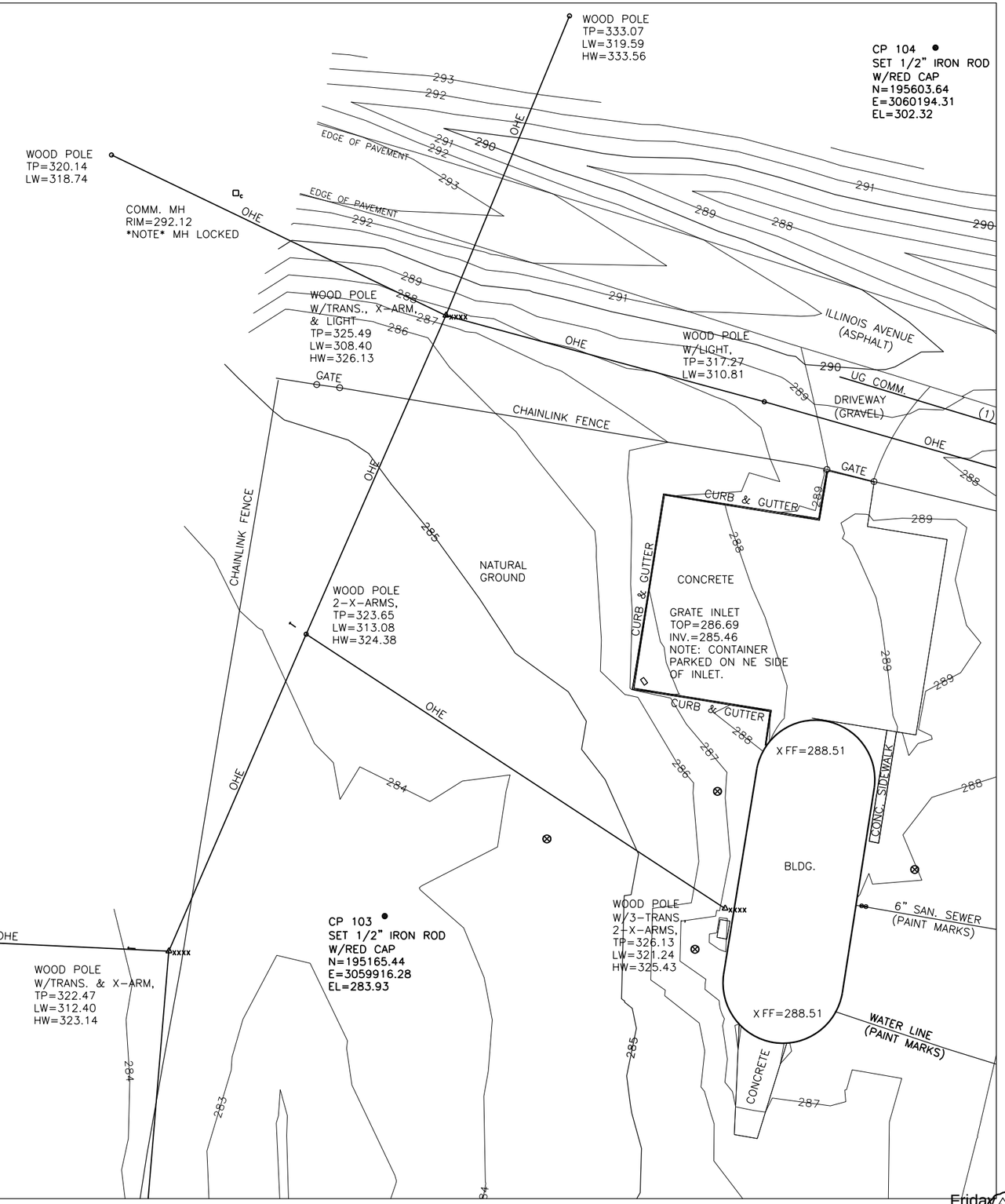
NOTE:
COORDINATES ARE SURFACE BASED ON NAD 83(93) LOUISIANA NORTH ZONE AND NAVD 88 (US FT).
SURFACE COORDINATES = GRID COORDINATES X 0.99998

COORDINATES ARE BASED ON CONTROL
CP 100
N. 195436.68
E. 3060562.17

NOTE: UTILITIES SHOWN ARE BASED ON ABOVE GROUND EVIDENCE AND EXISTING UTILITY MAPS. UNDER GROUND LOCATIONS ARE APPROXIMATE.

KEY INDEX





US Army Corps of Engineers
Fort Worth District

FINAL RFP SUBMITTAL
NOT FOR CONSTRUCTION

ALT. NO.	REVISED SHEET NO. AND OF NO.	AM 0002	JULY 2010
	Description	Author	Date

Date: JULY 2010
Sol No. RFP W912HN-07-R-0717
Contr No. W912HN-08-D-0027, Task Order DY01
Rev.
Designed by: R. RIOS
Dwn by: R. RIOS
Reviewed by: J. STANTON
Submitted by: KUNG M. NG, PE
ENGINEER
File name:
Plot date: JULY 6, 2010
Plot scale: AS SHOWN
DESIGN FILE:

U.S. ARMY ENGINEER DISTRICT,
CORPS OF ENGINEERS
FORT WORTH, TEXAS

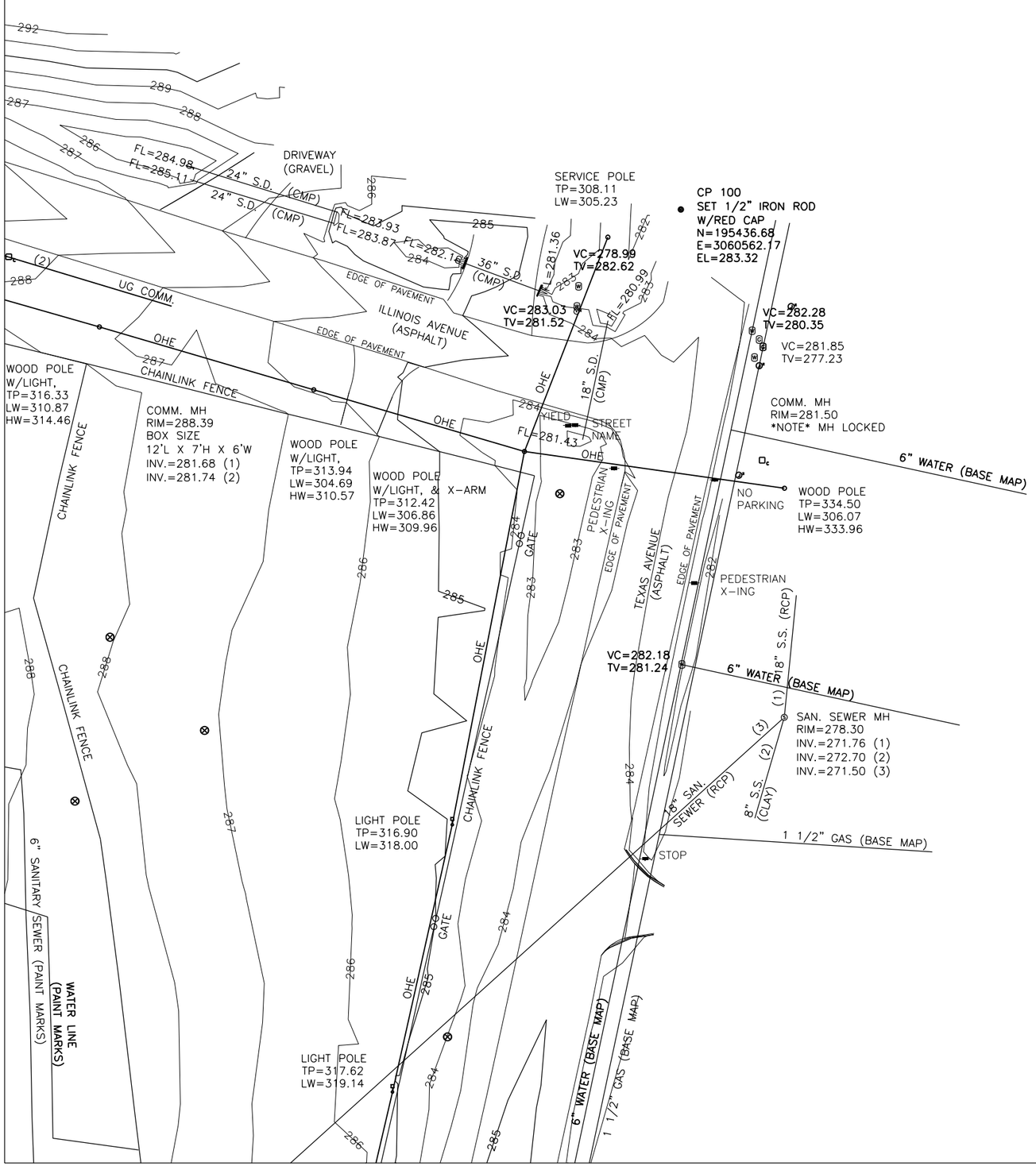
K. M. NG & ASSOCIATES, INC.
CONSULTING ENGINEERS
SAN ANTONIO, TEXAS 78230
TEXAS REGISTERED ENGINEERING FIRM F-442

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PROJECT NO. 069199

TOPOGRAPHICAL SURVEY
SHEET 1 OF 4

Sheet reference number:
V-101

CDS/MUERY SERVICES
Engineering & Surveying
3411 MAGIC DR. SAN ANTONIO, TEXAS 78229 210-581-1111



LEGEND :

CENTER LINE	℄
POWER POLE	○
POWER POLE/TRANS.	△XXXX
LIGHT POLE	
LIGHT STANDARD	
HELIPAD LIGHT	(HP)
GUY WIRE	→
ELECTRIC MANHOLE	□E
COMMUNICATION MANHOLE	□C
UTILITY BOX	(J)X
TRANSFORMER ON PAD	△XXXX
TRAFFIC SIGNAL BOX	□P
ELECTRIC PULLBOX	□P
TRAFFIC SIGNAL CONTROLLER	⊠
GAS VALVE	(G)
GAS METER	(G)
SPRINKLER CONTROL VALVE	SC
GUARD POST	
BOLLARD	
WATER VALVE	(W)
WATER METER	(W)
FIRE HYDRANT	X
SPRINKLER HEADS	(o)
SAN. SEWER MANHOLE	(S)
STORM DRAIN MANHOLE	(D)
CLEAN-OUT	(CO)
TREE	
SHRUB	
SIGN	
HORIZ/VERT CONTROL POINT	△
FENCE	–X–X–
WATER FAUCET	
LINE LABEL ON OVERHEAD UTILITY	OH
LINE LABEL ON UNDERGROUND UTILITY	UG
UNDERGROUND ELECTRIC CONDUIT	UE
OVERHEAD SHIELD WIRE	OHS
OVERHEAD ELECTRIC LINE	— E_x —
UNDERGROUND ELECTRIC LINE	— E^U_x —
UNDERGROUND COMMUNICATION LINE	— C^U_x —
GAS MAIN LINE	— G_x —
WATER MAIN LINE	— W_x —
SANITARY SEWER MAIN LINE	— SS_x —
STORM DRAIN MAIN LINE	— SD_x —
TOP OF POLE	TP
LOW WIRE ELEVATION	LW
VALVE COVER	VC
TOP OF VALVE	TV
BORE HOLE	⊗
WINDSOCK	
TRAFFIC SIGNAL ARM	
GEOGRAPHIC INFORMATION SYSTEM	(GIS)
ABANDONED IN PLACE	(AIP)

N

30' 20' 10' 0 30'

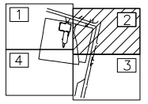
SCALE: 1" = 30' -0"

NOTE:
COORDINATES ARE SURFACE BASED ON NAD 83(93) LOUISIANA NORTH ZONE AND NAVD 88 (US FT).
SURFACE COORDINATES = GRID COORDINATES X 0.99998

COORDINATES ARE BASED ON CONTROL
CP 100
N. 195436.68
E. 3060562.17

NOTE: UTILITIES SHOWN ARE BASED ON ABOVE GROUND EVIDENCE AND EXISTING UTILITY MAPS. UNDER GROUND LOCATIONS ARE APPROXIMATE.

KEY INDEX



CDS/MUERY SERVICES
Engineering & Surveying
3411 MAGIC DR. SAN ANTONIO, TEXAS 78229 210-581-1111

US Army Corps of Engineers
Fort Worth District

FINAL RFP SUBMITTAL NOT FOR CONSTRUCTION

Symbol	Description	Date	Approved
1	REVISED SHEET NO. AND OF NO.	03.10.01	AM 0002

Date: JULY 2010
Sol No. RFP W912HN-07-R-0717
Contr No. W912HN-08-D-0027, Task Order DY01
File name:
Plot date: JULY 6, 2010
Plot scale: AS SHOWN
Designed by: R. RIOS
Dwn by: R. RIOS
Reviewed by: J. STANTON
Submitted by: KUNG M. NG, PE
ENGINEER

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS

K. M. NG & ASSOCIATES, INC.
CONSULTING ENGINEERS
2500 WEST WILLIAM CANNON, STE. 211
TEXAS REGISTERED ENGINEERING FIRM F-442

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PROJECT NO. 069199

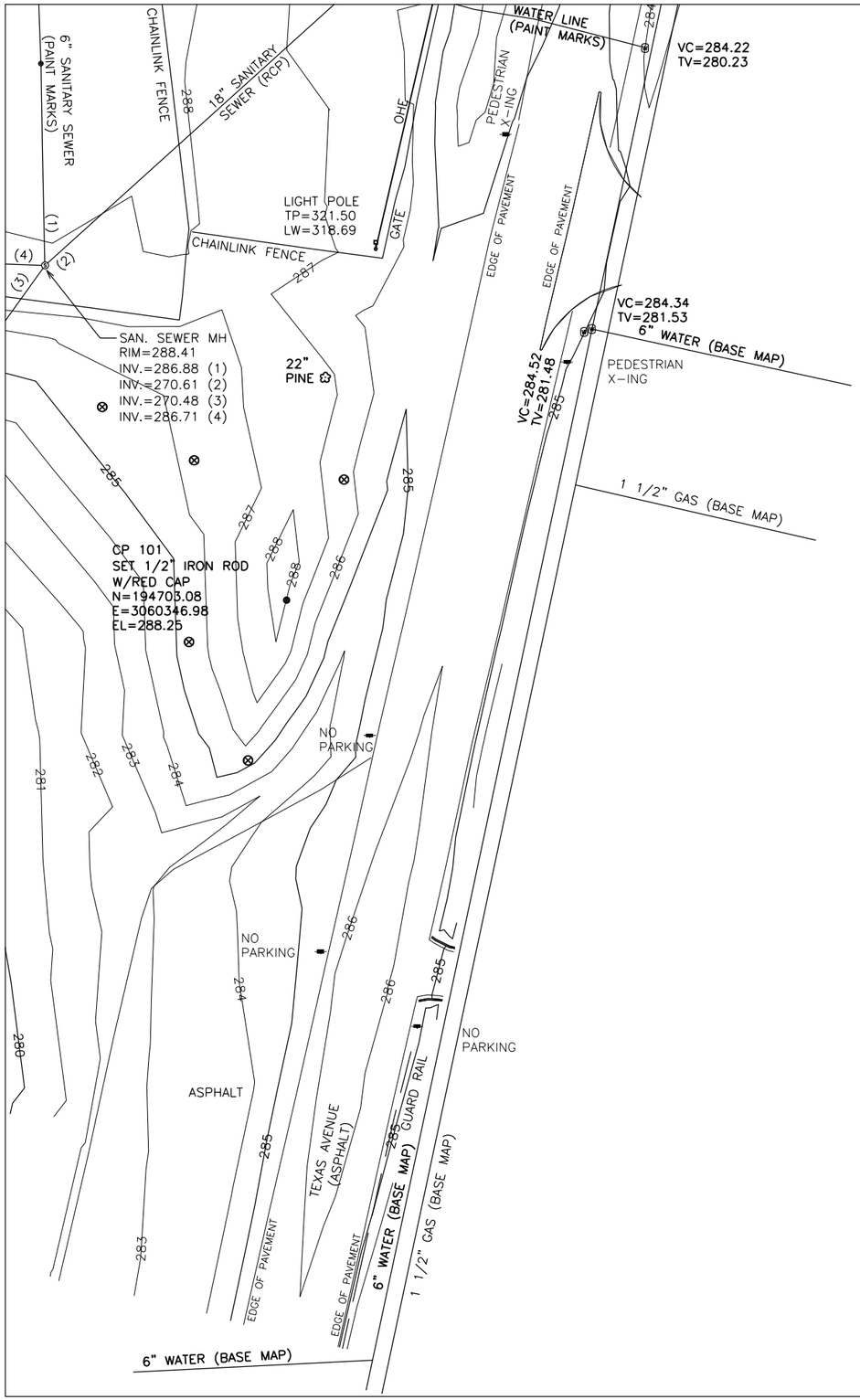
TOPOGRAPHICAL SURVEY
SHEET 2 OF 4

Sheet reference number:
V-102

DESIGN FILE:

10/6/2010 I:\Projects\Active\10_Coe\1228.01\TEMP\tpteml\v-102sh2.dgn

Contr No. W912HN-08-D-0027, Task Order DY01



LEGEND :

CENTER LINE	℄
POWER POLE	○
POWER POLE/TRANS.	△XXXX
LIGHT POLE	
LIGHT STANDARD	
HELIPAD LIGHT	(P)
GUY WIRE	→
ELECTRIC MANHOLE	□E
COMMUNICATION MANHOLE	□C
UTILITY BOX	(J)X
TRANSFORMER ON PAD	△XXXX
TRAFFIC SIGNAL BOX	P
ELECTRIC PULLBOX	□P
TRAFFIC SIGNAL CONTROLLER	⊠
GAS VALVE	(G)
GAS METER	(G)
SPRINKLER CONTROL VALVE	SC
GUARD POST	⊛
BOLLARD	●
WATER VALVE	(W)
WATER METER	(W)
FIRE HYDRANT	X
SPRINKLER HEADS	(O)
SAN. SEWER MANHOLE	(S)
STORM DRAIN MANHOLE	(D)
CLEAN-OUT	(CO)
TREE	
SHRUB	
SIGN	
HORIZ/VERT CONTROL POINT	
FENCE	—X—X—
WATER FAUCET	
LINE LABEL ON OVERHEAD UTILITY	OH
LINE LABEL ON UNDERGROUND UTILITY	UG
UNDERGROUND ELECTRIC CONDUIT	UE

OVERHEAD SHIELD WIRE	OHS
OVERHEAD ELECTRIC LINE	— E_x —
UNDERGROUND ELECTRIC LINE	— E^u_x —
UNDERGROUND COMMUNICATION LINE	— C^u_x —
GAS MAIN LINE	— G_x —
WATER MAIN LINE	— W_x —
SANITARY SEWER MAIN LINE	— SS_x —
STORM DRAIN MAIN LINE	— SD_x —
TOP OF POLE	TP
LOW WIRE ELEVATION	LW
VALVE COVER	VC
TOP OF VALVE	TV
BORE HOLE	⊗
WINDSOCK	
TRAFFIC SIGNAL ARM	
GEOGRAPHIC INFORMATION SYSTEM	(GIS)
ABANDONED IN PLACE	(AIP)

N

30' 20' 10' 0 30'

SCALE: 1" = 30' -0"

NOTE:
COORDINATES ARE SURFACE BASED ON NAD 83(93) LOUISIANA NORTH ZONE AND NAVD 88 (US FT).
SURFACE COORDINATES = GRID COORDINATES X 0.99998

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CP 100
N. 195436.68
E. 3060562.17

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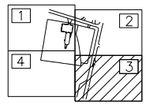
KEY INDEX



CDS/MUERY SERVICES
Engineering & Surveying
3411 MAGIC DR. SAN ANTONIO, TEXAS 78229 210-581-1111

US Army Corps of Engineers
Fort Worth District

FINAL RFP SUBMITTAL NOT FOR CONSTRUCTION

Symbol	Description	Date	Approved
1	REVISED SHEET NO. AND OF NO.	02/3/10	AM 0002

JULY 2010

Date: JULY 2010
Rev.
Sol No. RFP W912HN-07-A-0717
Cont No. W912HN-08-D-0027, Task Order D101
File name:
Plot date: JULY 6, 2010
Plot scale: AS SHOWN
Designed by: R. RIOS
Dwn by: R. RIOS
Reviewed by: J. STANTON
Submitted by: KUNG M. NG, PE ENGINEER

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS

K. M. NG & ASSOCIATES, INC.
CONSULTING ENGINEERS
SAN ANTONIO, TEXAS 78229
TEXAS REGISTERED ENGINEERING FIRM F-442

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PROJECT NO. 069199

TOPOGRAPHICAL SURVEY
SHEET 3 OF 4

Sheet reference number:
V-103

DESIGN FILE:

10/6/2010 I:\Projects\Active\10_Coe\1228.01\TEMP\fptemlv-103sn3.dgn

Cont No. W912HN-08-D-0027, Task Order D101

LEGEND :

CENTER LINE	℄
POWER POLE	○
POWER POLE/TRANS.	△xxxx
LIGHT POLE	
LIGHT STANDARD	
HELIPAD LIGHT	
GUY WIRE	
ELECTRIC MANHOLE	□E
COMMUNICATION MANHOLE	□C
UTILITY BOX	Jx
TRANSFORMER ON PAD	xxxx
TRAFFIC SIGNAL BOX	P
ELECTRIC PULLBOX	□P
TRAFFIC SIGNAL CONTROLLER	
GAS VALVE	G
GAS METER	G
SPRINKLER CONTROL VALVE	SC
GUARD POST	
BOLLARD	
WATER VALVE	W
WATER METER	W
FIRE HYDRANT	x
SPRINKLER HEADS	(O)
SAN. SEWER MANHOLE	S
STORM DRAIN MANHOLE	D
CLEAN-OUT	CO
TREE	
SHRUB	
SIGN	
HORIZ/VERT CONTROL POINT	
FENCE	–X–X–
WATER FAUCET	
LINE LABEL ON OVERHEAD UTILITY	OH
LINE LABEL ON UNDERGROUND UTILITY	UG
UNDERGROUND ELECTRIC CONDUIT	UE

OVERHEAD SHIELD WIRE	OHS
OVERHEAD ELECTRIC LINE	— E_x —
UNDERGROUND ELECTRIC LINE	— E_x^U —
UNDERGROUND COMMUNICATION LINE	— C_x^U —
GAS MAIN LINE	— G_x —
WATER MAIN LINE	— W_x —
SANITARY SEWER MAIN LINE	— SS_x —
STORM DRAIN MAIN LINE	— SD_x —
TOP OF POLE	TP
LOW WIRE ELEVATION	LW
VALVE COVER	VC
TOP OF VALVE	TV
BORE HOLE	⊗
WINDSOCK	
TRAFFIC SIGNAL ARM	
GEOGRAPHIC INFORMATION SYSTEM	(GIS)
ABANDONED IN PLACE	(AIP)

N

30' 20' 10' 0 30'

SCALE: 1" = 30' -0"

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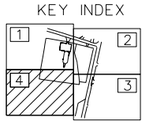
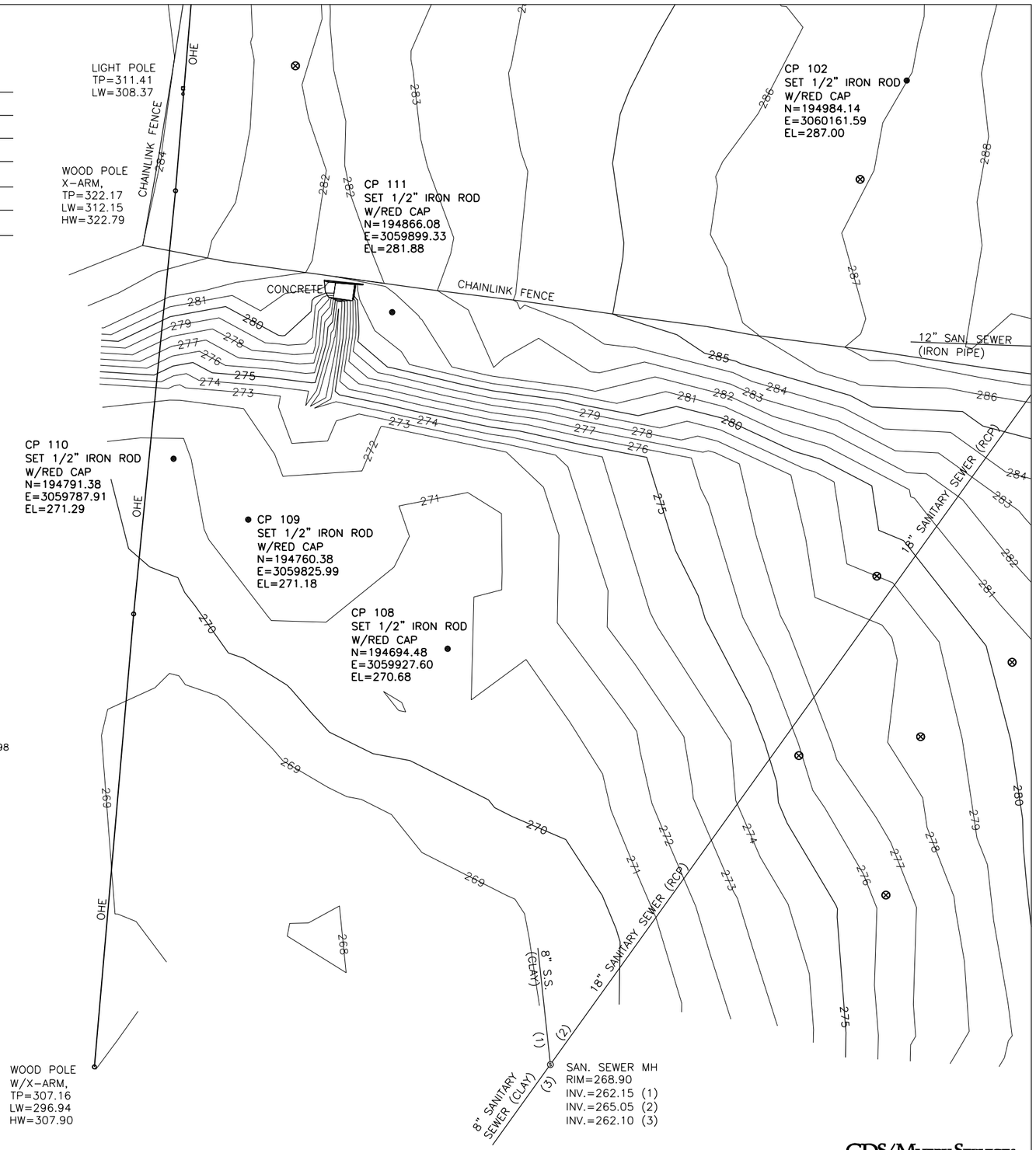
COORDINATES ARE BASED ON CONTROL
CP 100
N. 195436.68
E. 3060562.17

NOTE: UTILITIES SHOWN ARE BASED ON ABOVE GROUND EVIDENCE AND EXISTING UTILITY MAPS. UNDER GROUND LOCATIONS ARE APPROXIMATE.

KEY INDEX





CDS/MUERY SERVICES
Engineering & Surveying
3411 MAGIC DR. SAN ANTONIO, TEXAS 78229 210-581-1111

US Army Corps of Engineers
Fort Worth District

FINAL RFP SUBMITTAL
NOT FOR CONSTRUCTION

Symbol	Description	Date	Approved
1	REVISED SHEET NO. AND OF NO.	03.10.01	AM 0002

Date: JULY 2010
Sol No. RFP W912HN-07-A-0717
Contr No. W912HN-08-D-0027, Task Order DY01
File name:
Plot date: JULY 6, 2010
Plot scale: AS SHOWN
Designed by: R. RIOS
Dwn by: R. RIOS
Reviewed by: J. STANTON
Submitted by: KUNG M. NG, PE
ENGINEER
DESIGN FILE:

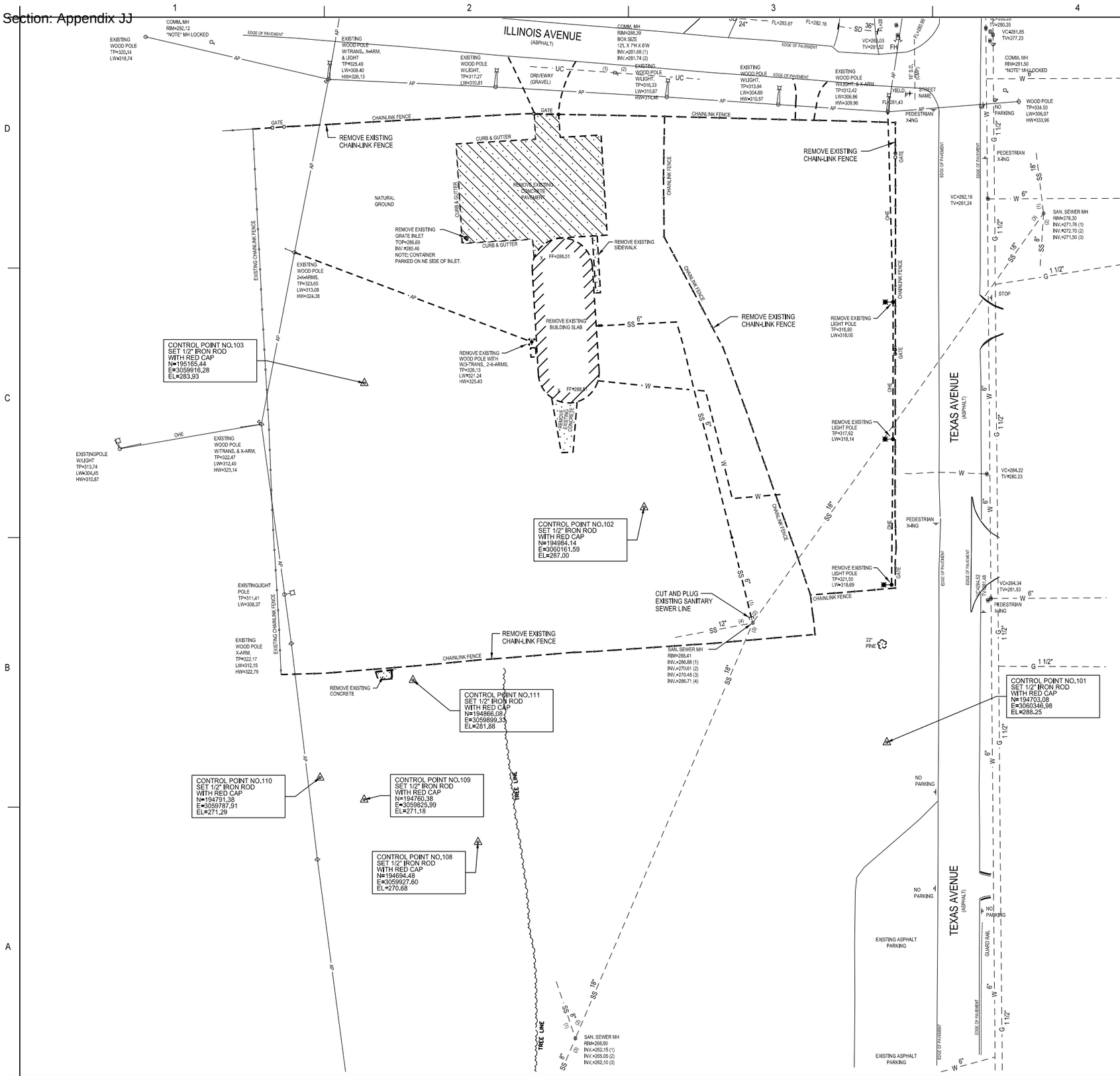
U.S. ARMY ENGINEER DISTRICT,
CORPS OF ENGINEERS
FORT WORTH, TEXAS

K. M. NG & ASSOCIATES, INC.
CONSULTING ENGINEERS
SAN ANTONIO, TEXAS 78213
TEXAS REGISTERED ENGINEERING FIRM F-442

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PROJECT NO. 069199

TOPOGRAPHICAL SURVEY
SHEET 4 OF 4

Sheet reference number:
V-104



EXISTING TO REMAIN	DESCRIPTION	EXISTING TO BE REMOVED
NONE	BUILDING SLAB	
NONE	CONCRETE PAVEMENT	
NONE	CONCRETE SIDEWALK	
	CONCRETE CURB AND GUTTER	
	CHAIN-LINK FENCE	
— — SD — —	STORM DRAIN LINE	NONE
NONE	STORM DRAIN INLET	
— — SS — —	SANITARY SEWER LINE	— — SS — —
— — G — —	GAS LINE	NONE
— — W — —	WATER LINE	— — W — —
— FH	FIRE HYDRANT	NONE
— — UC — —	COMMUNICATIONS LINE	NONE
— — AP — —	AERIAL PRIMARY	— — AP — —
	POWER POLE	

US Army Corps of Engineers
Fort Worth District

FINAL RFP SUBMITTAL
NOT FOR CONSTRUCTION

Symbol	Description	Date	Approved
1	REVISED SHEET NO. AND OF NO.	0.0. NO.	AM 0002 JULY 2010

Date: JULY 2010
Sol No. RFP W912HN-07-A-0717
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File name:
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Plot scale: AS SHOWN
Designed by: K.M. CHAN
Dwn by: E. CHAVEZ
Reviewed by: K.M. NG
Submitted by: KUNG M. NG, PE
ENGINEER
DESIGN FILE:

U.S. ARMY ENGINEER DISTRICT,
CORPS OF ENGINEERS
FORT WORTH, TEXAS

K. M. NG & ASSOCIATES, INC.
CONSULTING ENGINEERS
1000 HWY 80 EAST, SUITE 101
TEXAS REGISTERED ENGINEERING FIRM F-442

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PROJECT NO. 069199

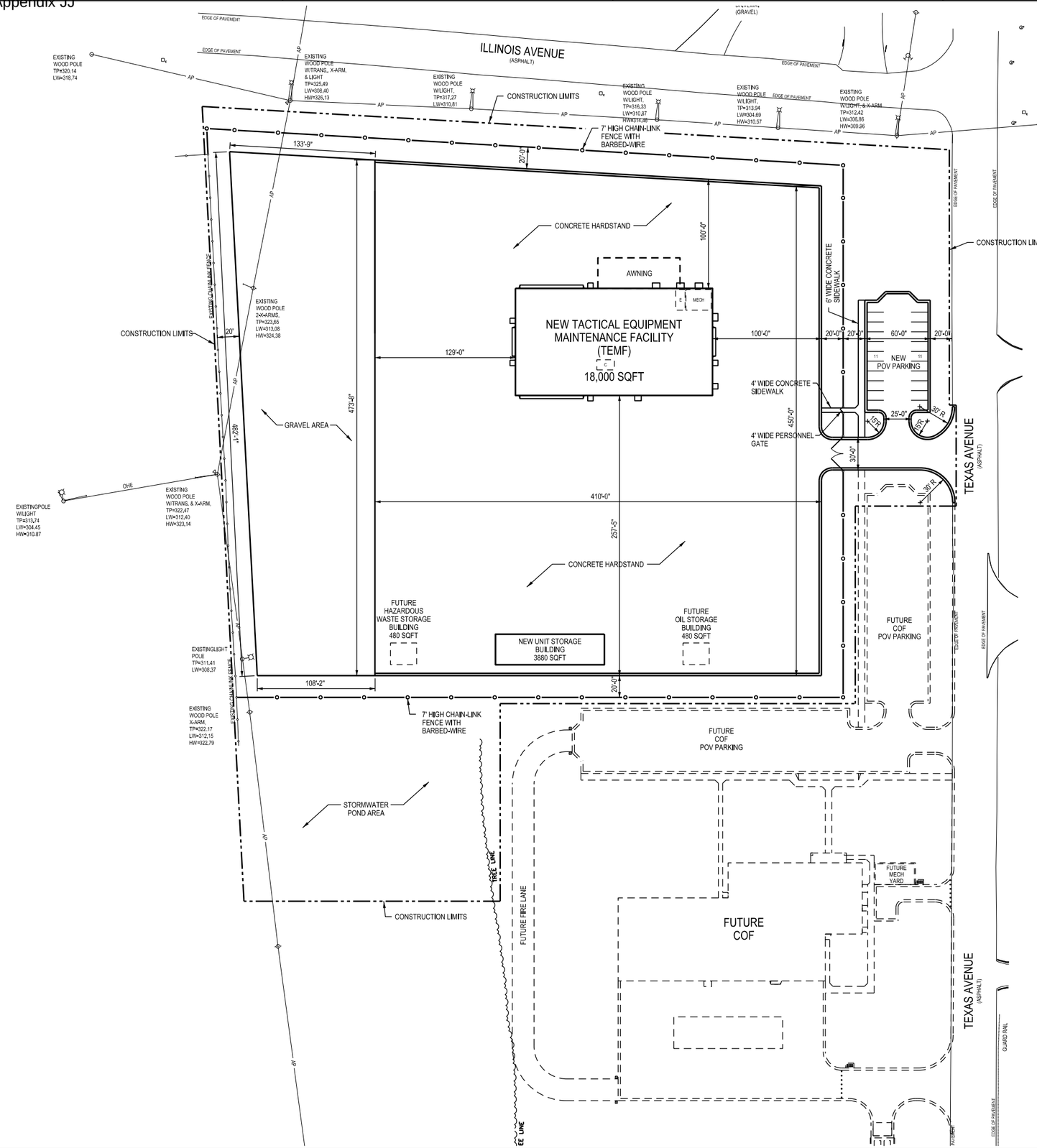
DEMOLITION SITE PLAN

1 C-101 | C-101 DEMOLITION SITE PLAN SCALE: 1" = 50'

Sheet reference number:
C-101

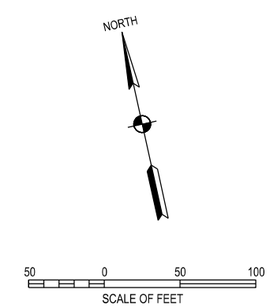
US Army Corps of Engineers
Fort Worth District

FINAL RFP SUBMITTAL
NOT FOR CONSTRUCTION



LEGEND

- NEW BUILDING
- NEW CONCRETE SIDEWALK
- NEW CONCRETE CURB AND GUTTER
- CONSTRUCTION LIMITS



1 SITE LAYOUT PLAN

C-102 C-102

SCALE: 1" = 50'

Symbol	Description	Date
1	REVISED SHEET NO. AND OF NO.	JULY 2010

Date: JULY 2010
Rev.
Sol No. RFP W912HN-07-A-3717
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Designed by: K.M. CHAN
Dwn by: E. CHAVEZ
Reviewed by: K.M. NG
Submitted by: KUNG M. NG, PE ENGINEER

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS

K. M. NG & ASSOCIATES, INC.
CONSULTING ENGINEERS
SAN ANTONIO, TEXAS 78217
TEXAS REGISTERED ENGINEERING FIRM F-442

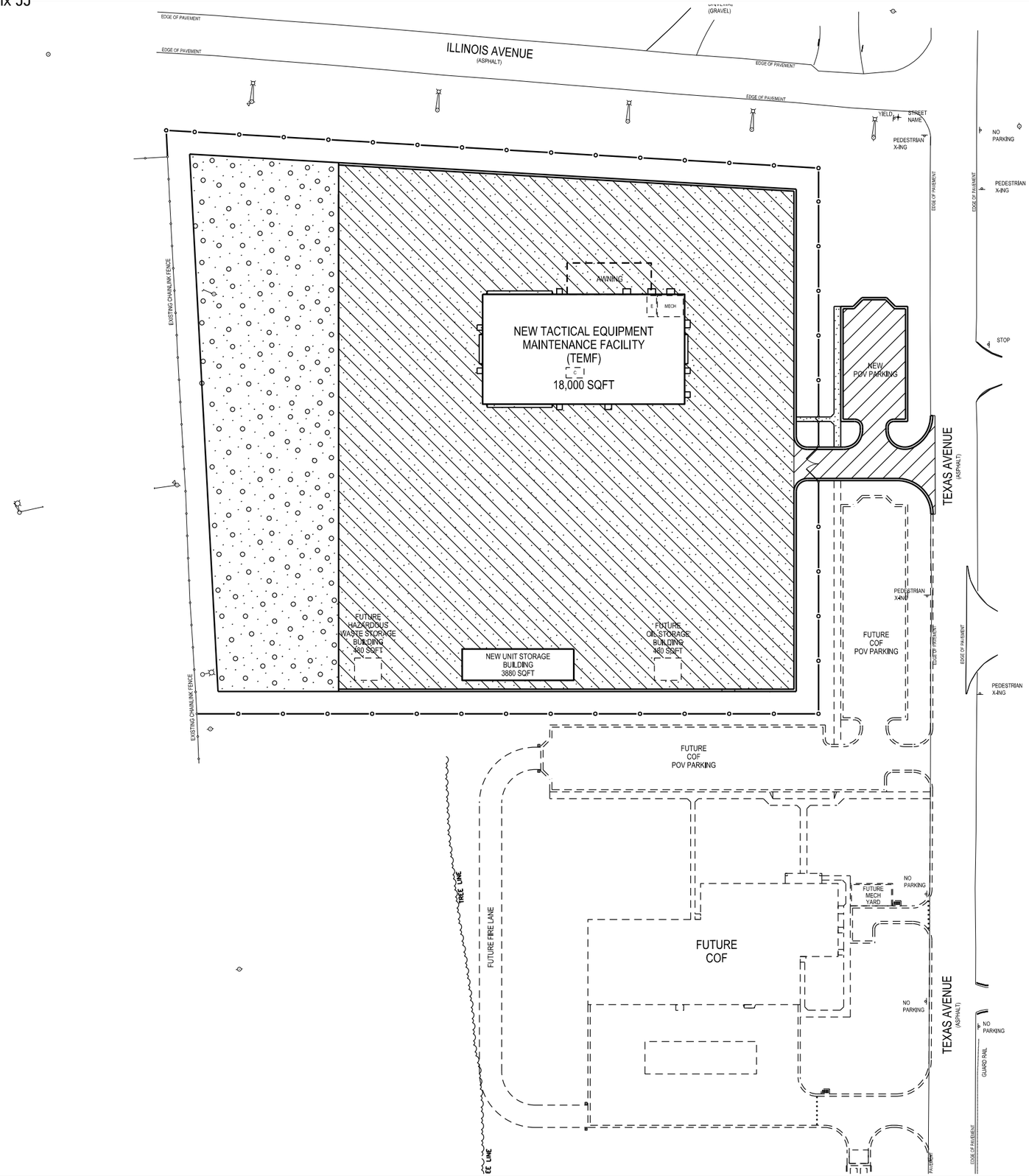
FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PROJECT NO. 069199

SITE LAYOUT PLAN

Sheet reference number: C-102

Sheet 12 of 21

10/6/2010 I:\Projects\Active\10_Coe\1228.01\TEMF\1plemfc-102loy.dgn



LEGEND

- NEW ASPHALT PAVEMENT
- NEW CONCRETE PAVEMENT
- NEW GRAVEL PAVEMENT
- NEW CONCRETE SIDEWALK
- NEW CONCRETE CURB AND GUTTER

NORTH

50 0 50 100
SCALE OF FEET

1 C-103 C-103 PAVING PLAN SCALE: 1" = 50'

US Army Corps of Engineers
Fort Worth District

FINAL RFP SUBMITTAL
NOT FOR CONSTRUCTION

Symbol	Description	Date
1	REVISED SHEET NO. AND OF NO.	JULY 2010
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Date: JULY 2010
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File name:
Plot date: JULY 6, 2010
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Designed by: K.W. CHAN
Dwn by: E. CHAVEZ
Reviewed by: K.M. NG
Submitted by: KUNG M. NG, PE ENGINEER

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS

K. M. NG & ASSOCIATES, INC.
CONSULTING ENGINEERS
SAN ANTONIO, TEXAS 78230
TEXAS REGISTERED ENGINEERING FIRM F-442

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PROJECT NO. 069199

PAVING PLAN

Sheet reference number:
C-103

Sheet 13 of 21

Cont No. W912HN-08-D-0027, Task Order D101

10/6/2010 I:\Projects\Active\10_Coe\1228.01\TEMF\tptemfc-103pav.dgn

US Army Corps of Engineers
Fort Worth District

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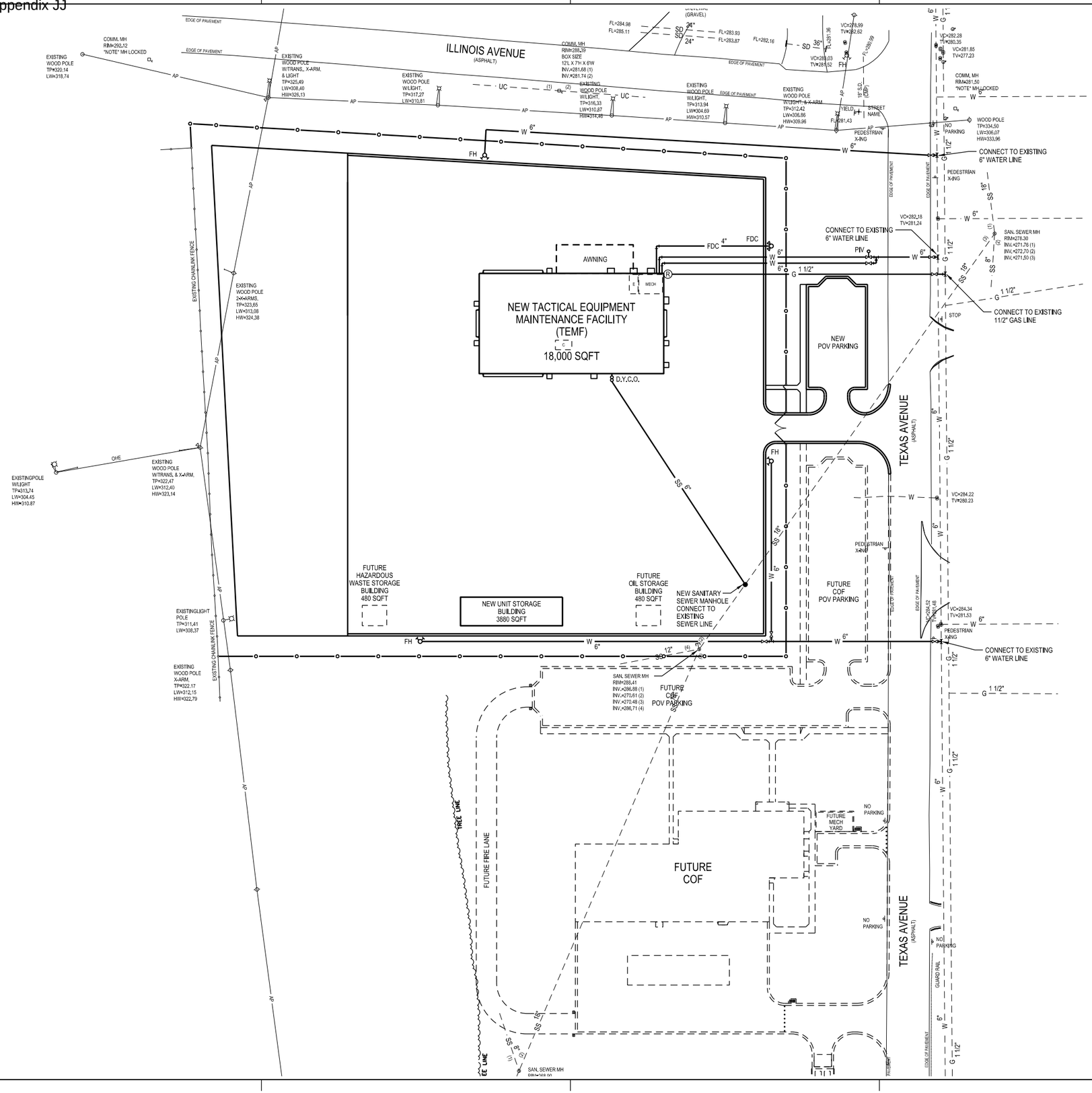

LEGEND

EXISTING	DESCRIPTION	NEW
G	GAS LINE	G
SS	SANITARY SEWER LINE	SS
SD	STORM DRAIN LINE	SD
W	WATER LINE	W
FH	FIRE HYDRANT	FH
NONE	FIRE DEPARTMENT CONNECTION	FDC
	VALVE AND BOX	
NONE	POST INDICATOR VALVE	PIV
	MANHOLE	
NONE	DOUBLE YARD CLEANOUT	D.Y.C.O.
	CHAIN - LINK FENCE	

NORTH

50 0 50 100
SCALE OF FEET

1 C-104 | C-104 UTILITY SITE PLAN SCALE: 1" = 50'

No.	Description	Date
1	REVISED SHEET NO. AND OF NO.	AM 0002 JULY 2010

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Dwn by: E. CHAVEZ
Reviewed by: K.M. NG
Submitted by: KUNG M. NG, PE ENGINEER

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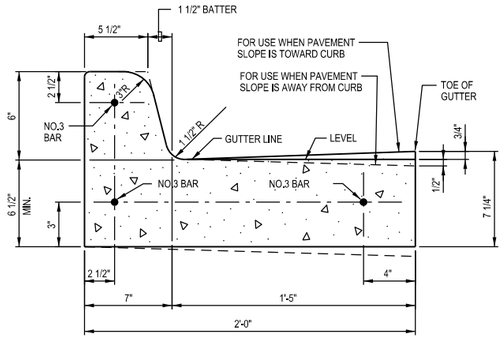
K. M. NG & ASSOCIATES, INC.
CONSULTING ENGINEERS
FIRM REGISTRATION NO. F-3673
TEXAS REGISTERED ENGINEERING FIRM F-442

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PROJECT NO. 069199

UTILITY SITE PLAN

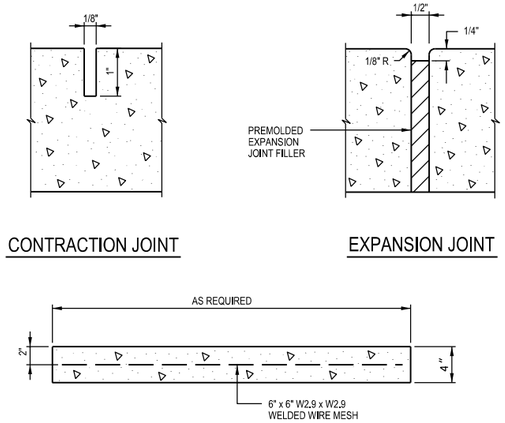
Sheet reference number: C-104



1 CONCRETE CURB AND GUTTER

C-501 | C-501

NO SCALE



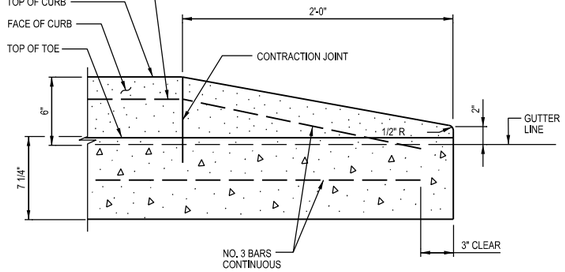
NOTES:

1. PROVIDE TRANSVERSE CONTRACTION JOINTS AT INTERVALS NOT EXCEEDING 5'-0" ON CENTER. PROVIDE CENTERLINE CONTRACTION JOINTS IN SIDEWALKS WIDER THAN 8'-0".
2. PROVIDE CONTRACTION JOINTS AT INTERVALS NOT EXCEEDING 40'-0" ON CENTER WHERE WALK DOES NOT ABUT CURB.

3 SIDEWALK DETAILS

C-501 | C-501

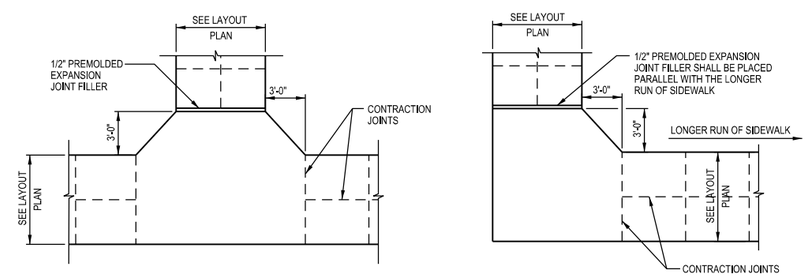
NO SCALE



2 CURB TERMINAL DETAIL (ELEVATION)

C-501 | C-501

NO SCALE



4 CONCRETE SIDEWALK INTERSECTION DETAILS

C-501 | C-501

NO SCALE

US Army Corps of Engineers
Fort Worth District

FINAL RFP SUBMITTAL NOT FOR CONSTRUCTION

Symbol	Description	Date
1	REVISED SHEET NO. AND OF NO.	JULY 2010
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Designed by: K.W. CHAN
Dwn by: E. CHAVEZ
Reviewed by: K.M. NG
Submitted by: KUNG M. NG, PE ENGINEER

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS

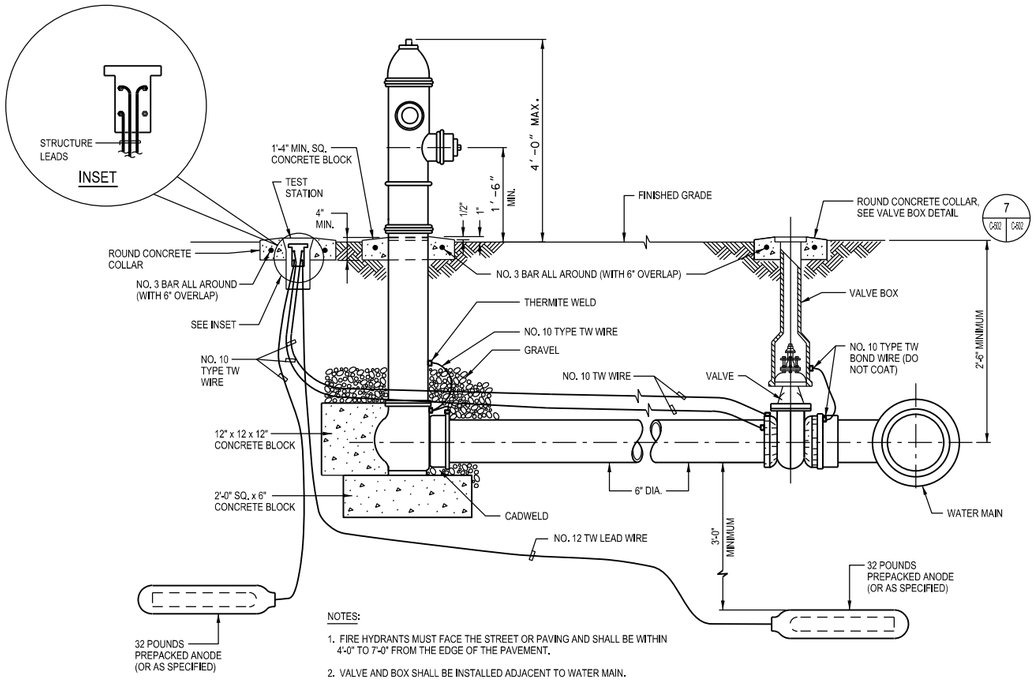
K. M. NG & ASSOCIATES, INC.
CONSULTING ENGINEERS
SAN ANTONIO, TEXAS 78213
TEXAS REGISTERED ENGINEERING FIRM F-442

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PROJECT NO. 069199

PAVING DETAILS

Sheet reference number:
C-501

10/6/2010 I:\Projects\Active\10_Coe\1228.01\TEMF\Iptemfc-501pdx.dgn
Cont No. W912HN-08-D-0027, Task Order D101

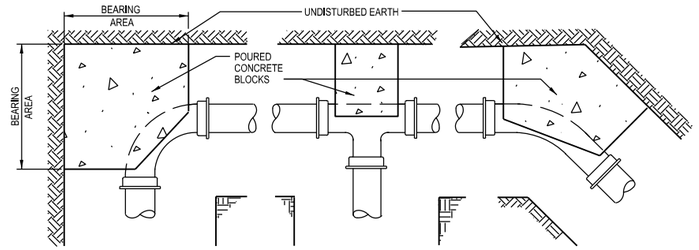


NOTES:

1. FIRE HYDRANTS MUST FACE THE STREET OR PAVING AND SHALL BE WITHIN 4'-0" TO 7'-0" FROM THE EDGE OF THE PAVEMENT.
2. VALVE AND BOX SHALL BE INSTALLED ADJACENT TO WATER MAIN.
3. ENSURE THAT THE WEEP HOLES FOR THE FIRE HYDRANT ARE NOT COVERED UP BY THE CONCRETE THRUST BLOCKS.
4. SOIL RESISTIVITY IS APPROXIMATELY 2000 OHMS/CM (FIELD VERIFY).

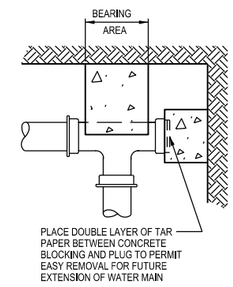
1 TYPICAL FIRE HYDRANT SETTING

C-502 C-502 — NO SCALE



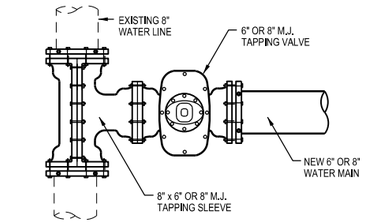
BEARING AREA OF BLOCK IN SQUARE FEET					
FITTING SIZES	TEE AND END	90° BEND	45° BEND	22 1/2° BEND	11 1/4° BEND
6"	3,6	5,4	2,5	1,5	0,8
8"	6,3	8,9	4,8	2,5	1,3

SOIL BEARING PRESSURE	MULTIPLIER
1000	2.0
1500	1.33
2000	1.0
3000	0.67



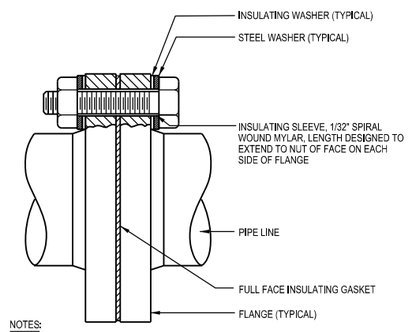
3 THRUST BLOCK DETAILS

C-502 C-502 — NO SCALE



5 WATER LINE CONNECTION TO MAIN

C-502 C-502 — NO SCALE



NOTES:

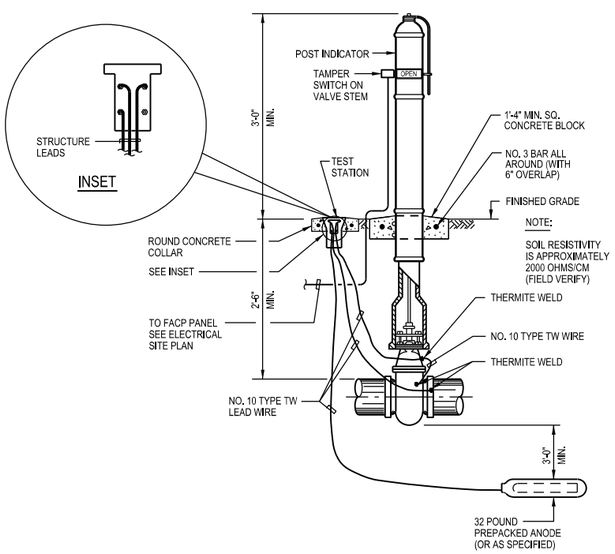
1. ABOVE GRADE INSULATING FLANGE INSTALLATION SHOWN.
2. FOR BURIED OR SUBMERGED INSULATING FLANGE INSTALLATION, DO NOT INSTALL INSULATING WASHER ON PROTECTED OR NEW SIDE OF FLANGE.
3. COAT BURIED OR SUBMERGED INSULATED FLANGES WITH COLD APPLIED COAL TAR MASTIC AFTER ASSEMBLING JOINT AND WRAP WITH A BUTYL RUBBER ADHESIVE, POLYETHYLENE BACKED TAPE.

6 TYPICAL INSULATING FLANGE DETAIL

C-502 C-502 — NO SCALE

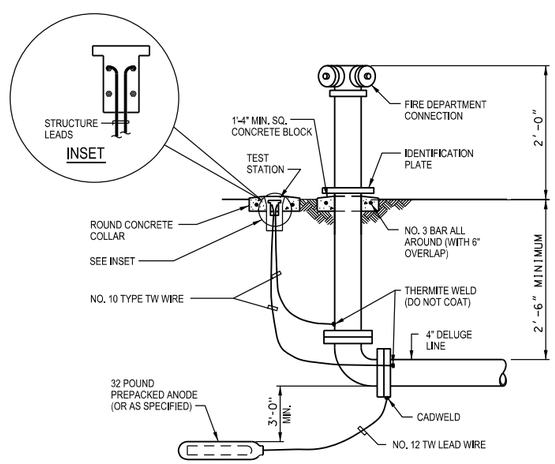
NOTES:

1. ALL BURIED METALLIC, WATER, FIRE PROTECTION SYSTEMS, SANITARY SEWER FORCE MAINS, VALVES, FITTINGS, BUILDING RISERS, AND BUILDING STUB-OUTS SHALL HAVE CATHODIC PROTECTION AND A BONDED COATING.
2. THERMITE WELD SHALL HAVE A EXOTHERMIC WELD CAP AND COATING INSTALLED.
3. A NO. 10 TRACER WIRE SHALL BE INSTALLED OVER WATER LINES, FIRE PROTECTION SYSTEMS, AND SANITARY SEWER FORCE MAINS. WIRE SHALL BE TAPED TO LINES EVERY 30 FEET AND SHALL BE CONTINUOUS AND ACCESSIBLE ABOVEGROUND AT VALVE AND BUILDING RISERS.
4. WATER MAINS SHALL BE C-900 PIPE.



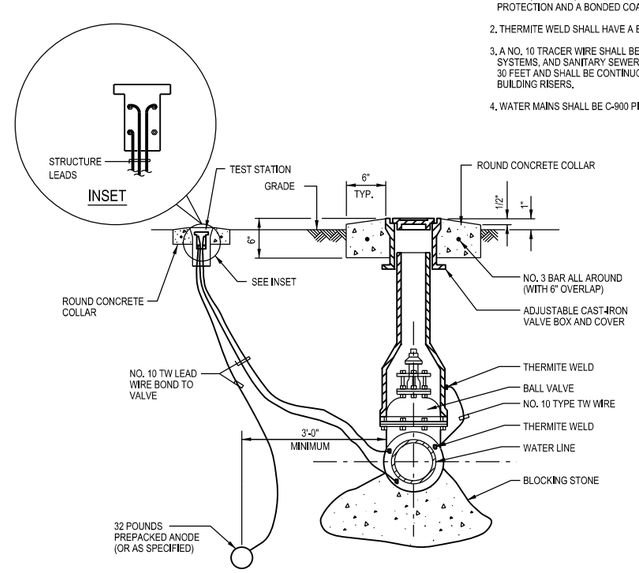
2 POST INDICATOR VALVE

C-502 C-502 — NO SCALE



4 FIRE DEPARTMENT CONNECTION

C-110 C-502 — NO SCALE



7 VALVE AND BOX DETAIL

C-502 C-502 — NO SCALE

US Army Corps of Engineers
Fort Worth District

FINAL RFP SUBMITTAL NOT FOR CONSTRUCTION

SYMBOL	DESCRIPTION	CODE IDENT NO.	AND OF NO.	REVISED SHEET NO.	DATE
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Designed by: K.M. CHAN
Dwn by: E. CHAVEZ
Reviewed by: K.M. NG
Submitted by: KING M. NG, PE ENGINEER

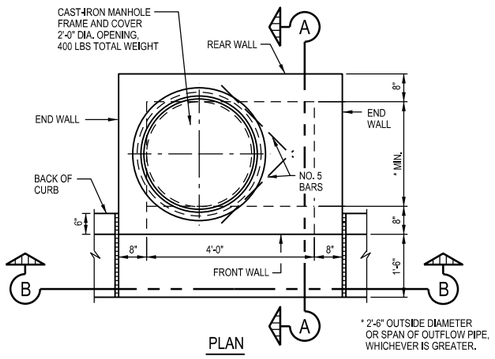
U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS

K. M. NG & ASSOCIATES, INC.
CONSULTING ENGINEERS
SAN ANTONIO, TEXAS 78231
TEXAS REGISTERED ENGINEERING FIRM F-442

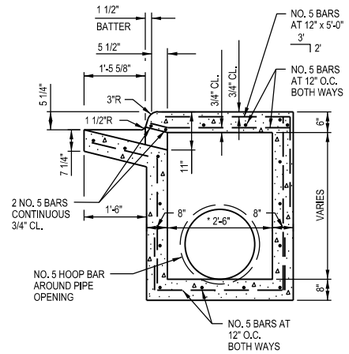
FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PROJECT NO. 06199

UTILITY DETAILS

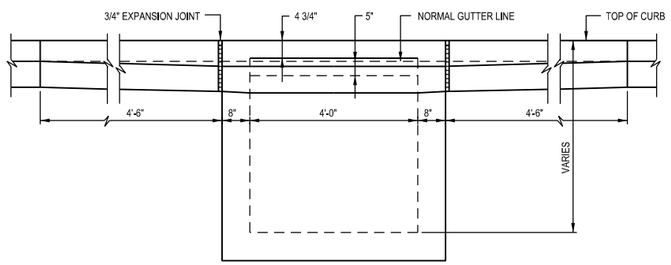
Sheet reference number: C-502



PLAN



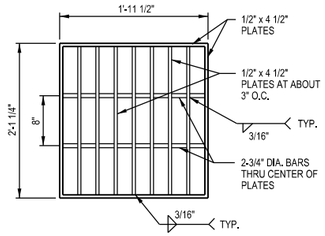
SECTION A-A



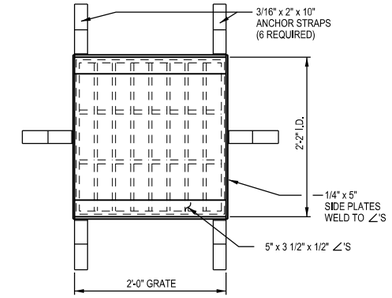
SECTION B-B

1 CURB INLET DETAILS

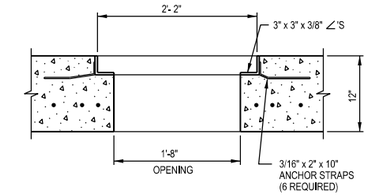
NO SCALE



GRATE PLAN



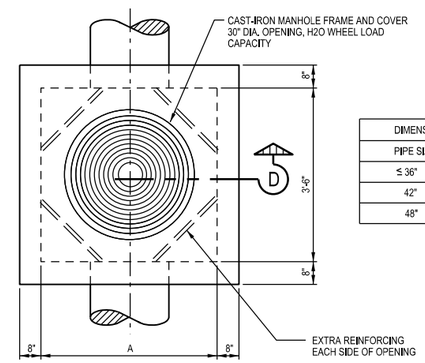
FRAME PLAN



SECTION THRU INSTALLED FRAME

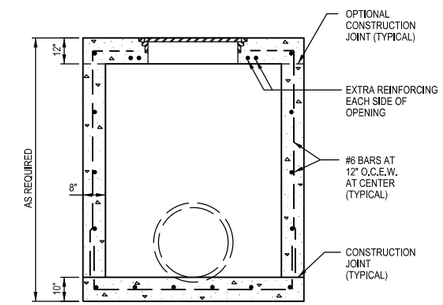
3 SURFACE INLET GRATE AND FRAME DETAILS

NO SCALE



PLAN

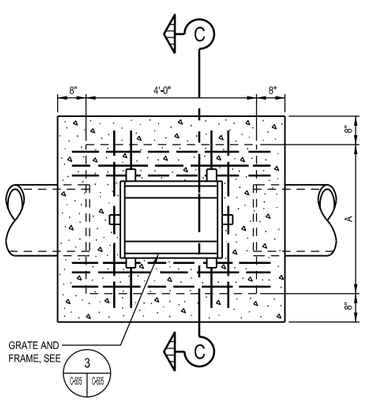
DIMENSION SCHEDULE	
PIPE SIZE	A
≤ 36"	4'-0"
42"	4'-6"
48"	5'-0"



SECTION D

4 STORM DRAIN MANHOLE DETAILS

NO SCALE



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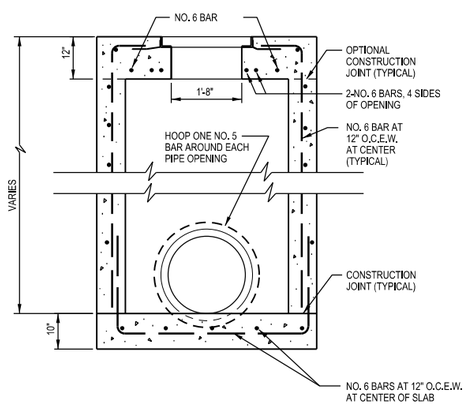
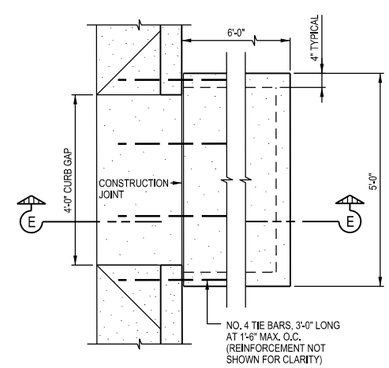


SECTION C-C

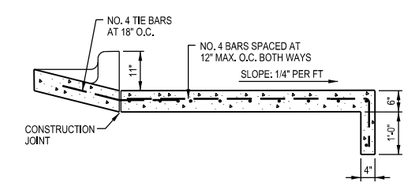
DIMENSION SCHEDULE	
PIPE SIZE	A
≤ 36"	4'-0"
42"	4'-6"
48"	5'-0"

2 STANDARD SURFACE INLET

NO SCALE



PLAN



SECTION E-E

5 CURB GAP WITH PAD DETAILS

NO SCALE

NOTES:

1. CONCRETE SHALL HAVE A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS.
2. HOOP ONE BAR AROUND ALL PIPE OPENINGS.
3. ALL LAPS AND EXTENSION OF REINFORCING BARS SHALL BE 30 DIAMETERS MINIMUM.
4. THE MENTION OF A MANUFACTURER'S PRODUCT BY NAME AND PART NUMBER IS NOT INTENDED TO CLOSE THAT SPECIFICATION, BUT RATHER IT IS INTENDED TO ESTABLISH A MINIMUM LEVEL OF PRODUCT QUALITY AND OPERATION.

US Army Corps of Engineers
Fort Worth District

FINAL RFP SUBMITTAL NOT FOR CONSTRUCTION

No.	Description	Date
1	REVISED SHEET NO. AND OF NO.	JULY 2010

Date: JULY 2010
Sol No. RFP W912HN-07-R-0717
Contr No. W912HN-08-D-0027, Task Order 0101
Rev.
File name:
Plot date: JULY 6, 2010
Plot scale: AS SHOWN
Designed by: KJN, CMAN
Dwn by: E. CHAVEZ
Reviewed by: KJM, NG
Submitted by: KJNG M. NG, PE
ENGINEER
DESIGN FILE:

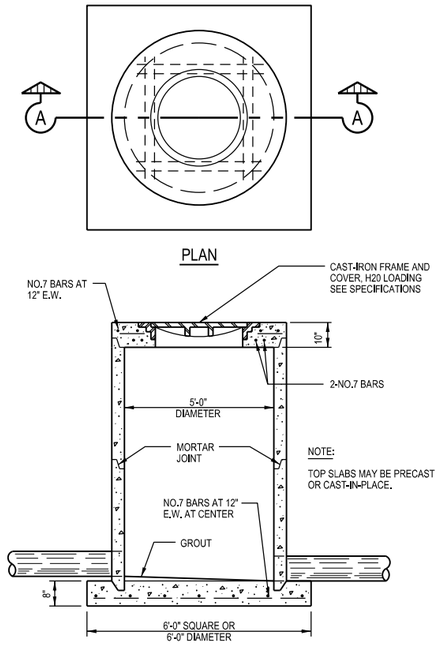
U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS

K. M. NG & ASSOCIATES, INC.
CONSULTING ENGINEERS
SAN ANTONIO, TEXAS 78217
TEXAS REGISTERED ENGINEERING FIRM F-442

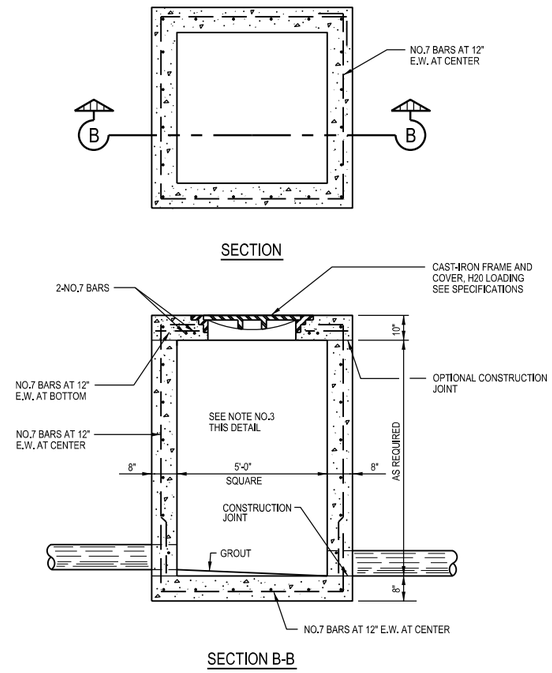
FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PROJECT NO. 069199

DRAINAGE DETAILS

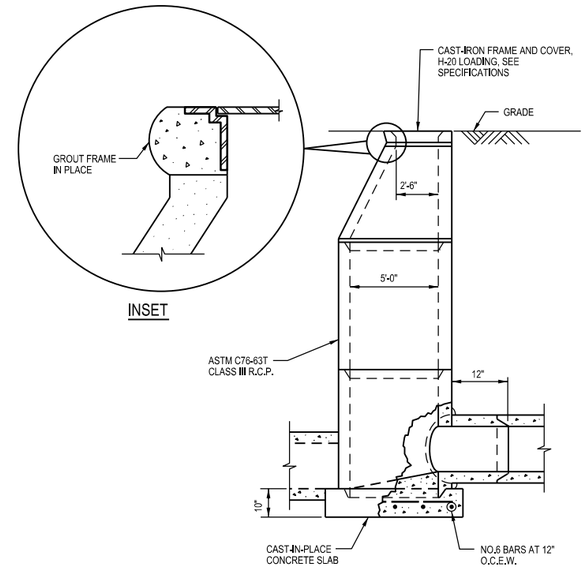
Sheet reference number: C-503



PRECAST CONCRETE OPTION



CAST-IN-PLACE REINFORCED CONCRETE OPTION



ALTERNATE PRECAST MANHOLE OPTION
(NON-TRAFFIC AREAS)

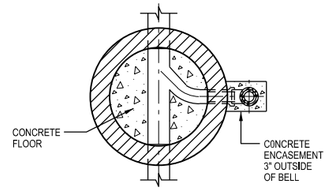
NOTES FOR MANHOLE DETAILS:

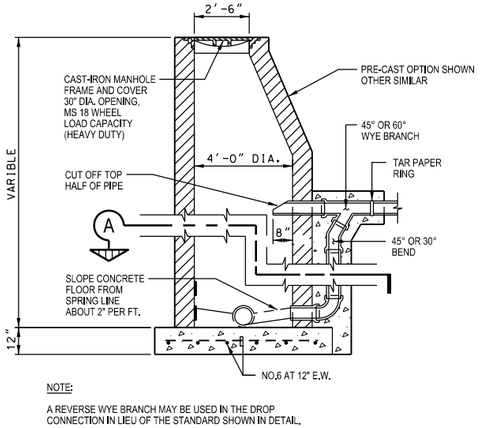
1. CAST-IN-PLACE CONCRETE SHALL HAVE MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS.
2. ALL LAPS AND EXTENSION OF REINFORCING BARS SHALL BE 30 DIAMETER MINIMUM EXCEPT AS OTHERWISE NOTED.
3. GROUT SHALL BE PLACED IN MANHOLES AS INDICATED ON THIS DRAWING.

1 SANITARY SEWER MANHOLE DETAILS

C-504 C-504

NO SCALE





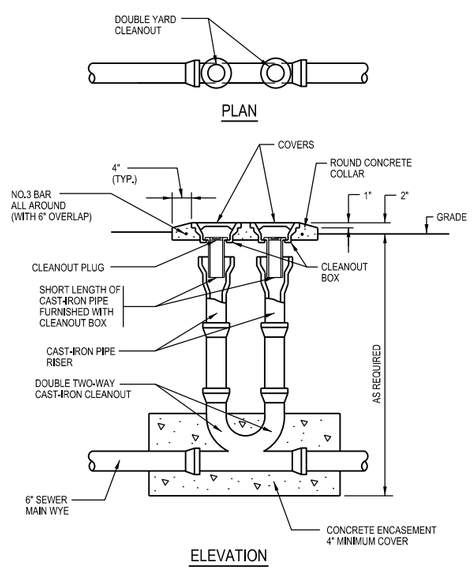
NOTE:

A REVERSE WYE BRANCH MAY BE USED IN THE DROP CONNECTION IN LIEU OF THE STANDARD SHOWN IN DETAIL.

2 DROP TYPE SEWER MANHOLE

C-504 C-504

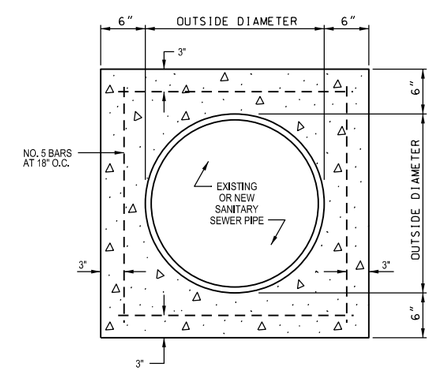
NO SCALE



3 TYPICAL DOUBLE YARD CLEANOUT DETAIL

C-504 C-504

NO SCALE



4 CONCRETE ENCASEMENT DETAIL

C-504 C-504

NO SCALE

FINAL RFP SUBMITTAL NOT FOR CONSTRUCTION

US Army Corps of Engineers
Fort Worth District

Symbol	Description	Date	Approved
1	REVISED SHEET NO. AND OF NO.	JULY 2010	AM 0002

Date: JULY 2010 | Rev.
Sol No. RFP W912HN-07-A-0717
Contr No. W912HN-08-D-0027, Task Order D101
File name:
Plot date: JULY 6, 2010
Plot scale: AS SHOWN
Designed by: KJW, CHAN
Dwn by: E. CHAVEZ
Reviewed by: KJM, NG
Submitted by: KUNG M. NG, PE ENGINEER

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS

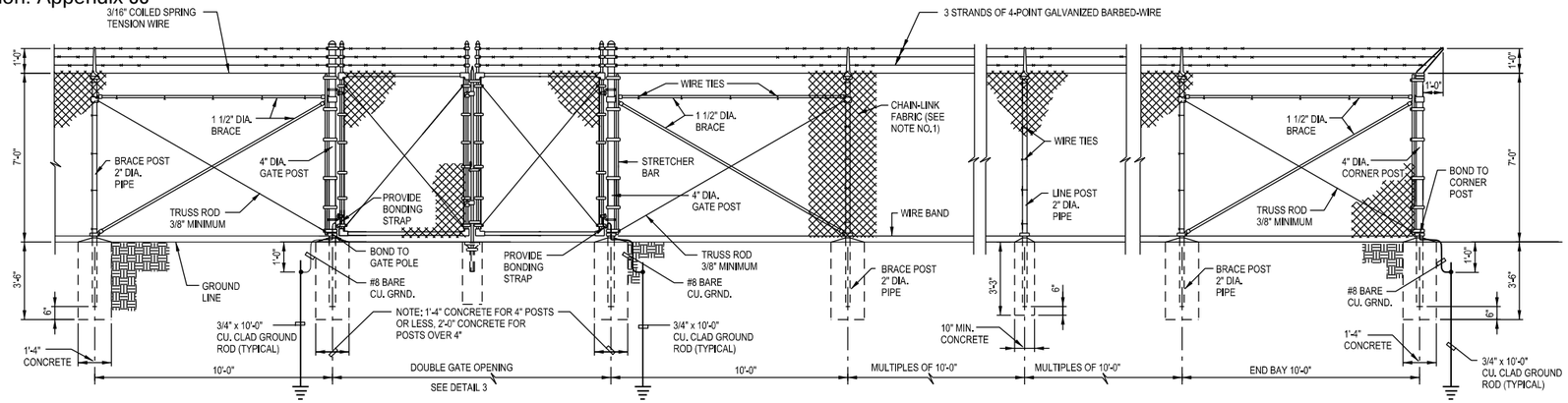
K. M. NG & ASSOCIATES, INC.
CONSULTING ENGINEERS
SAN ANTONIO, TEXAS 78231
TEXAS REGISTERED ENGINEERING FIRM F-442

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PROJECT NO. 069199

SANITARY SEWER DETAILS

Sheet reference number: C-504

DESIGN FILE:

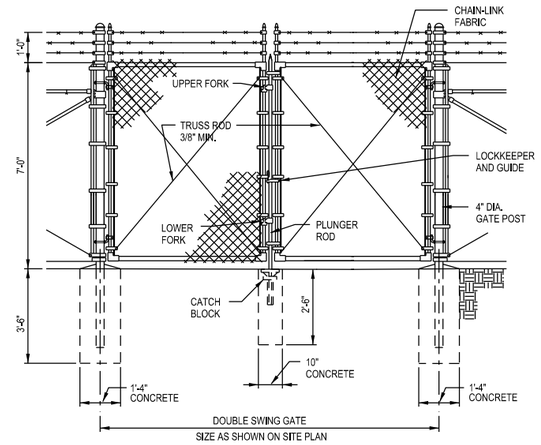


NOTES:

1. ALL FABRIC SHALL BE #9 GAUGE WIRE WOVEN IN A 2" MESH. TOP AND BOTTOM EDGES SHALL BE TWISTED AND BARBED.
2. ALL MATERIAL/METALS SHALL BE GALVANIZED.

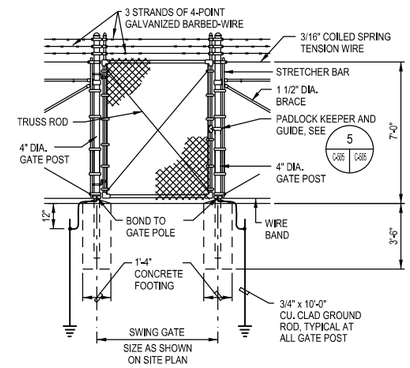
1 CHAIN-LINK FABRIC FENCE

C-408 C-505 — NO SCALE



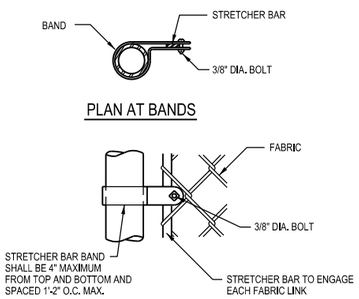
3 DOUBLE SWING GATE

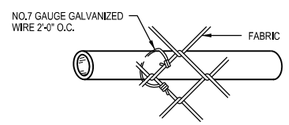
C-409 C-505 — NO SCALE

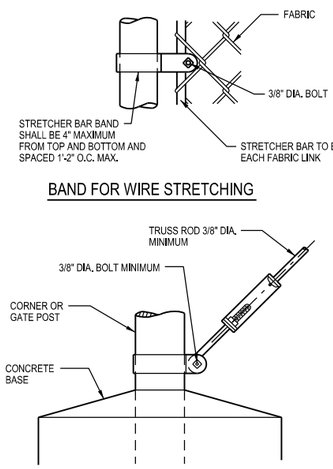


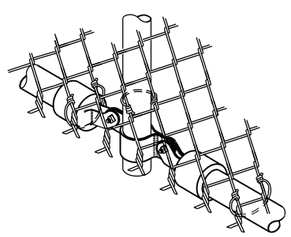
4 PEDESTRIAN SWING GATE

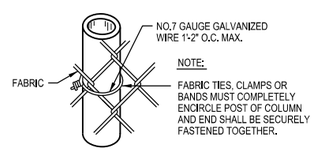
C-102 C-505 — NO SCALE

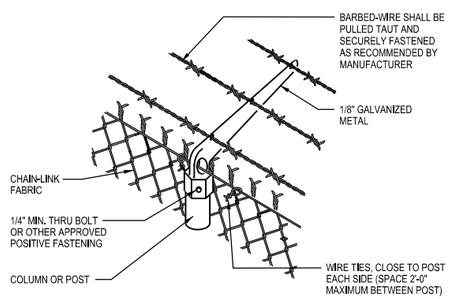


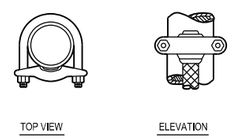


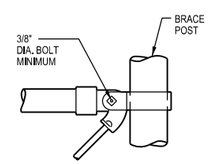


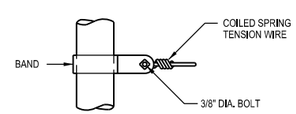






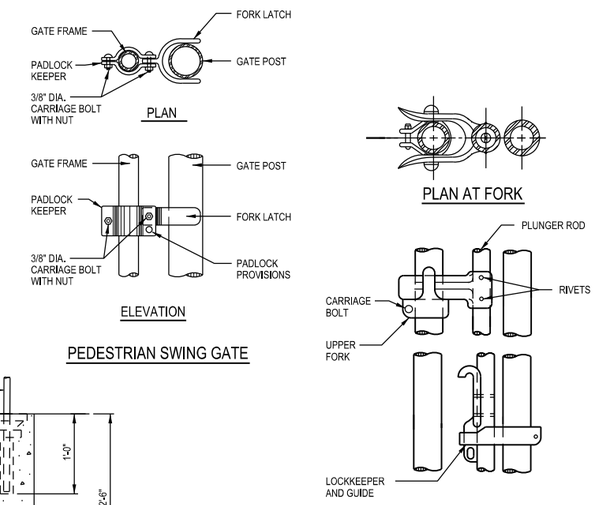


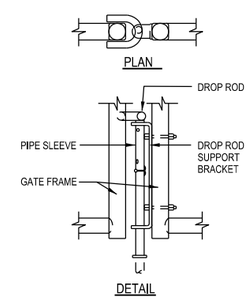


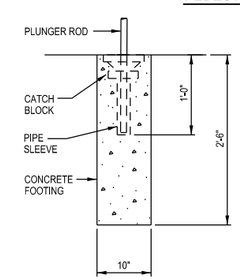


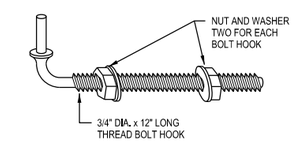
2 FASTENING DETAILS - SIMILAR FOR TUBULAR POST

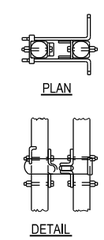
C-505 C-505 — NO SCALE

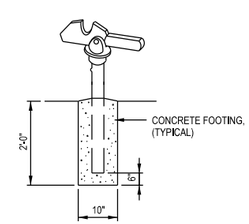


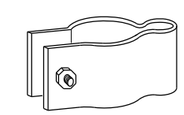












5 DOUBLE SWING GATE DETAILS

C-505 C-505 — NO SCALE

US Army Corps of Engineers
Fort Worth District

FINAL RFP SUBMITTAL NOT FOR CONSTRUCTION

Symbol	REVISED SHEET NO. AND OF NO. Description	D.O. NO.	AM 0002 Author	JULY 2010 Date
1				

Date: JULY 2010
Sol No. RFP W912HN-07-R-0717
Cont No. W912HN-08-D-0027, Task Order D101
File name:
Plot date: JULY 6, 2010
Plot scale: AS SHOWN
Rev.
Designed by: KJN, CHAN
Dwn by: E. CHAVEZ
Reviewed by: KJN, NG
Submitted by: KUNG M. NG, PE ENGINEER
DESIGN FILE:

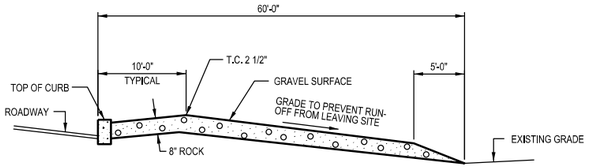
U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS

K. M. NG & ASSOCIATES, INC. CONSULTING ENGINEERS 6440 SOUTHWEST FWY. 77074 TEXAS REGISTERED ENGINEERING FIRM F-442

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PROJECT NO. 069199

CHAIN-LINK FENCE DETAILS

Sheet reference number: C-505



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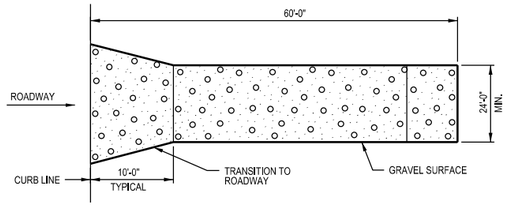


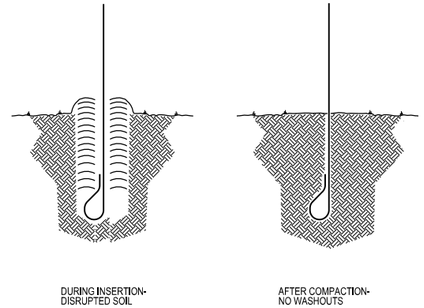
PLAN VIEW

GENERAL NOTES:

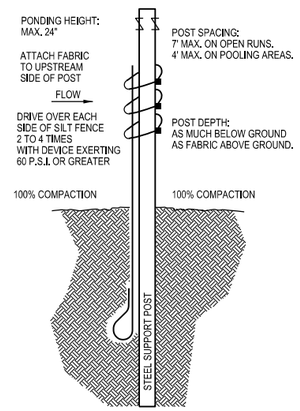
1. STONE SIZE: 3" TO 5" OPEN GRADED ROCK.
2. LENGTH: AS EFFECTIVE, BUT NOT LESS THAN 60'-0".
3. THICKNESS: NOT LESS THAN 8 INCHES.
4. WIDTH: NOT LESS THAN FULL WIDTH OF ALL POINTS OF INGRESS OR EGRESS.
5. WASHING: WHEN NECESSARY, WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO ROADWAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE WHICH DRAINS INTO AN APPROVED TRAP OR SEDIMENT BASIN. ALL SEDIMENTS SHALL BE PREVENTED FROM ENTERING ANY STORM DRAIN, DITCH, OR WATER COURSE USING APPROVED METHODS.
6. MAINTENANCE: THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH SHALL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO ROADWAYS, THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO ROADWAY SHALL BE REMOVED IMMEDIATELY.
7. DRAINAGE: ENTRANCE SHALL BE PROPERLY GRADED OR A DRAINAGE SWALE SHALL BE INCORPORATED TO PREVENT RUNOFF FROM LEAVING THE CONSTRUCTION SITE.

1 STABILIZED ENTRANCE

C-506 | C-506 — NO SCALE



STATIC SLICING



NOTE:

NO MORE THAN 24" OF A 36" FABRIC IS ALLOWED ABOVE GROUND.

SUPPORT POST DETAIL

NOTE:

SILT FENCE SHALL BE INSTALLED USING A NARROW CUSTOM-SHAPED BLADE AT LEAST 10 INCHES PENETRATED INTO THE GROUND AND SIMULTANEOUSLY PULLING SILT FENCE FABRIC INTO THE OPENING CREATED AS THE BLADE IS PULLED THROUGH THE GROUND. AFTER INSTALLING THE FABRIC, THE DISRUPTED SOIL SHALL BE COMPACTED ON BOTH SIDES OF FABRIC.

SILT CONTROL NOTES:

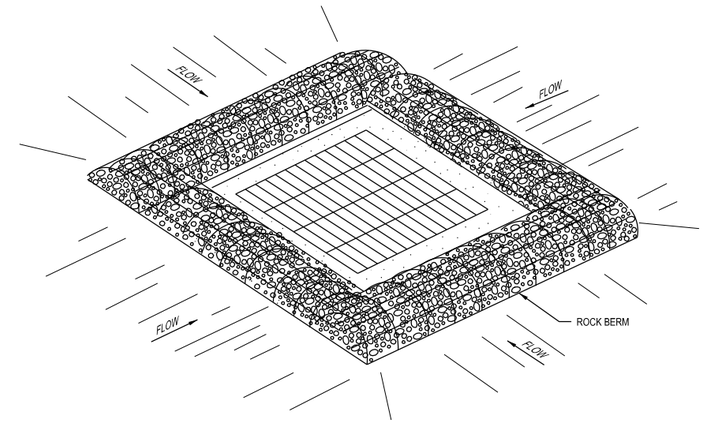
1. INSTALL SILT FENCE ACROSS EXISTING DRAINAGE AT LOCATIONS SHOWN. MAINTAIN THE SILT FENCE FOR THE DURATION OF THE PROJECT.
2. INSTALL A MINIMUM OF 50'-0" OF SILT FENCE PARALLEL TO THE OPEN SEWER MAIN TRENCH AND MAINTAIN THE SILT FENCE AS LONG AS THE TRENCH IS OPEN.

GENERAL NOTES:

1. STEEL POSTS WHICH SUPPORT THE SILT FENCE SHALL BE INSTALLED AT A SLIGHT ANGLE TOWARD THE ANTICIPATED RUNOFF SOURCE. POST SHALL BE EMBEDDED A MINIMUM OF 12 INCHES.
2. THE TOE OF THE SILT FENCE SHALL BE TRENCHED IN WITH A SPADE OR MECHANICAL TRENCHER, SO THAT THE DOWNSLOPE FACE OF THE TRENCH IS FLAT AND PERPENDICULAR TO THE LINE OF FLOW. WHERE FENCE CANNOT BE TREATED (E.G.IN PAVEMENT), WEIGHT FABRIC FLAP WITH WASHED GRAVEL ON UPHILL SIDE TO PREVENT FLOW UNDER FENCE.
3. THE TRENCH SHALL BE A MINIMUM OF 6 INCHES DEEP AND A MINIMUM OF 6 INCHES WIDE TO ALLOW FOR THE SILT FABRIC TO BE LAID IN THE GROUND AND BACKFILLED WITH COMPACTED MATERIAL.
4. SILT FENCE SHALL BE SECURELY FASTENED TO EACH STEEL SUPPORT POSTS OR TO WOVEN WIRE, WHICH IS IN TURN ATTACHED TO THE STEEL FENCE POST.
5. INSPECTION SHALL BE MADE WEEKLY OR AFTER EACH RAINFALL EVENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
6. SILT FENCE SHALL BE REMOVED WHEN THE SITE IS COMPLETELY STABILIZED SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
7. ACCUMULATED SILT SHALL BE REMOVED WHEN IT REACHES A DEPTH OF 6" INCHES. THE SILT SHALL BE DISPOSED OF AT AN APPROVED SITE AND IN SUCH A MANNER SO AS NOT TO CONTRIBUTE TO ADDITIONAL SILTATION.

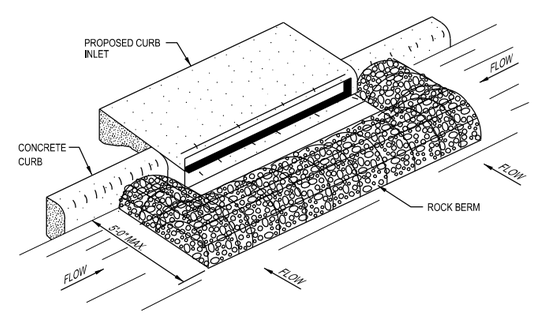
3 SILT FENCE

C-506 | C-506 — NO SCALE



5 INLET ROCK BERM

C-506 | C-506 — NO SCALE

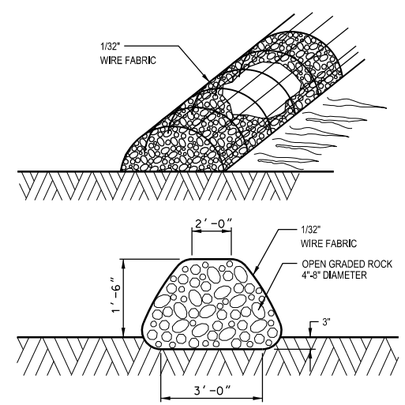


GENERAL NOTES:

1. ROCK BERM BARRIERS SHALL BE INSTALLED IN FRONT OF INLETS AT THE END OF WORK EACH DAY AND REMOVED THE NEXT MORNING TO CONTINUE WORK UNTIL THE PAVING AREA HAS BEEN STABILIZED.
2. ROCK BERM USED AS INLET PROTECTION SHALL BE INSTALLED IN SUCH A MANNER THAT SURFACE RUNOFF WILL PERCOLATE THROUGH THE SYSTEM IN SHEET-FLOW FASHION, ALLOWING SEDIMENT TO BE RETAINED AND ACCUMULATED AND RUNOFF TO ENTER INLET.

2 CURB INLET ROCK BERM

C-506 | C-506 — NO SCALE

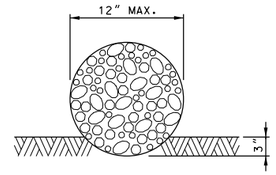


GENERAL NOTES:

1. USE ONLY OPEN GRADED ROCK 4-8 INCHES DIAMETER FOR STREAM FLOW CONDITION; USE OPEN GRADED ROCK 3-5 INCHES DIAMETER FOR OTHER CONDITIONS.
2. THE ROCK BERM SHALL BE SECURED WITH A WOVEN WIRE SHEATHING HAVING MAXIMUM 1 INCH OPENING AND MINIMUM WIRE DIAMETER OF 1/32 INCH.
3. THE ROCK BERM SHALL BE INSPECTED WEEKLY OR AFTER EACH RAIN, AND THE STONE AND/OR FABRIC CORE-WOVEN WIRE SHEATHING SHALL BE REPLACED WHEN THE STRUCTURE CEASES TO FUNCTION AS INTENDED, DUE TO SILT ACCUMULATION AMONG THE ROCKS, WASHOUT, CONSTRUCTION TRAFFIC DAMAGE, ETC.
4. WHEN SILT REACHES A DEPTH EQUAL TO ONE-THIRD THE HEIGHT OF THE BERM OR 12 INCHES, WHICHEVER IS LESS, THE SILT SHALL BE REMOVED AND DISPOSED OF AT AN APPROVED SITE AND IN A MANNER AS TO NOT CREATE A SILTATION PROBLEM.
5. DAILY INSPECTION SHALL BE MADE ON SERVE SERVICE ROCK BERMS; SILT SHALL BE REMOVED WHEN ACCUMULATION REACHES 6 INCHES.
6. WHEN THE SITE IS COMPLETELY STABILIZED, THE BERM AND ACCUMULATED SILT SHALL BE REMOVED AND DISPOSED OF IN AN APPROVED MANNER.

4 ROCK BERM DETAIL

C-506 | C-506 — NO SCALE



GENERAL NOTES:

1. SEDIMENT LOG SHALL BE BIODEGRADABLE OR NON-BIODEGRADABLE MATERIAL.
2. SEDIMENT LOG SHALL BE WEED SEED FREE.
3. SEDIMENT LOG SHALL BE 12-INCH DIAMETER OR LESS.
4. SEDIMENT LOG SHALL BE PLACED IN DITCH BOTTOMS, SWALES, WATERWAYS, OVER BARE SOILS TURF REINFORCEMENT BLANKETS, AND AROUND CATCH BASIN.
5. SEDIMENT LOG SHALL BE SECURED AS RECOMMENDED BY MANUFACTURER.

6 SEDIMENT LOG

C-506 | C-506 — NO SCALE

STORM WATER MANAGEMENT ACTIVITIES:

1. CONSTRUCT STABILIZED CONSTRUCTION ENTRANCES AS SHOWN ON THE PLANS.
2. INSTALL SILT FENCES AS SHOWN ON THE PLANS AND WHEREVER STORM WATER COLLECTS OR EXITS THE PROJECT. INSTALL ROCK BERM DIKES AT ALL CURB INLETS AS SHOWN ON THE PLANS.
3. BACKFILL THE UTILITY TRENCHES IN A TIMELY MANNER TO MINIMIZE EROSION.
4. SOIL STOCKPILES LEFT OVER A PERIOD OF SEVEN DAYS SHALL BE COVERED WITH SOIL RETENTION BLANKETS AND SILT FENCE SHALL BE ERECTED AROUND THE PERIMETER OF STOCKPILE MATERIAL.
5. WHEN THE PROJECT AREA HAS STABILIZED AND ALL CONSTRUCTION IS COMPLETED AND ACCEPTED, REMOVE ALL CONTROLS.
6. REFERENCE SPECIFICATION SECTION 01356-BASIC STORM WATER POLLUTION PREVENTION PLAN FOR REQUIREMENTS.
7. FINAL STABILIZATION IS ACCOMPLISHED WHEN VEGETATION AT THE DISTURBED AREAS HAS ACHIEVED 70% OF THE BACKGROUND NATIVE VEGETATION.
8. PROVIDE STRUCTURAL DETAILS NO. 2 OR NO. 5 AT EXISTING STORM GRATES IN PROXIMITY OF THE DEMOLITION SITES.

US Army Corps of Engineers
Fort Worth District

FINAL RFP SUBMITTAL NOT FOR CONSTRUCTION

SYMBOL	DESCRIPTION	CODE IDENT. NO.	DATE
1	REVISED SHEET NO. AND OF NO.	AM 0002	JULY 2010

Date: JULY 2010
Sol No. RFP W912HN-07-R-0717
Contr No. W912HN-08-D-0027, Task Order DY01
Rev.
File name:
Plot date: JULY 6, 2010
Plot scale: AS SHOWN
DESIGN FILE:

Designed by: K.W. CHAN
Dwn by: E. CHAVEZ
Reviewed by: K.M. NG
Submitted by: KUNG M. NG, PE ENGINEER

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS

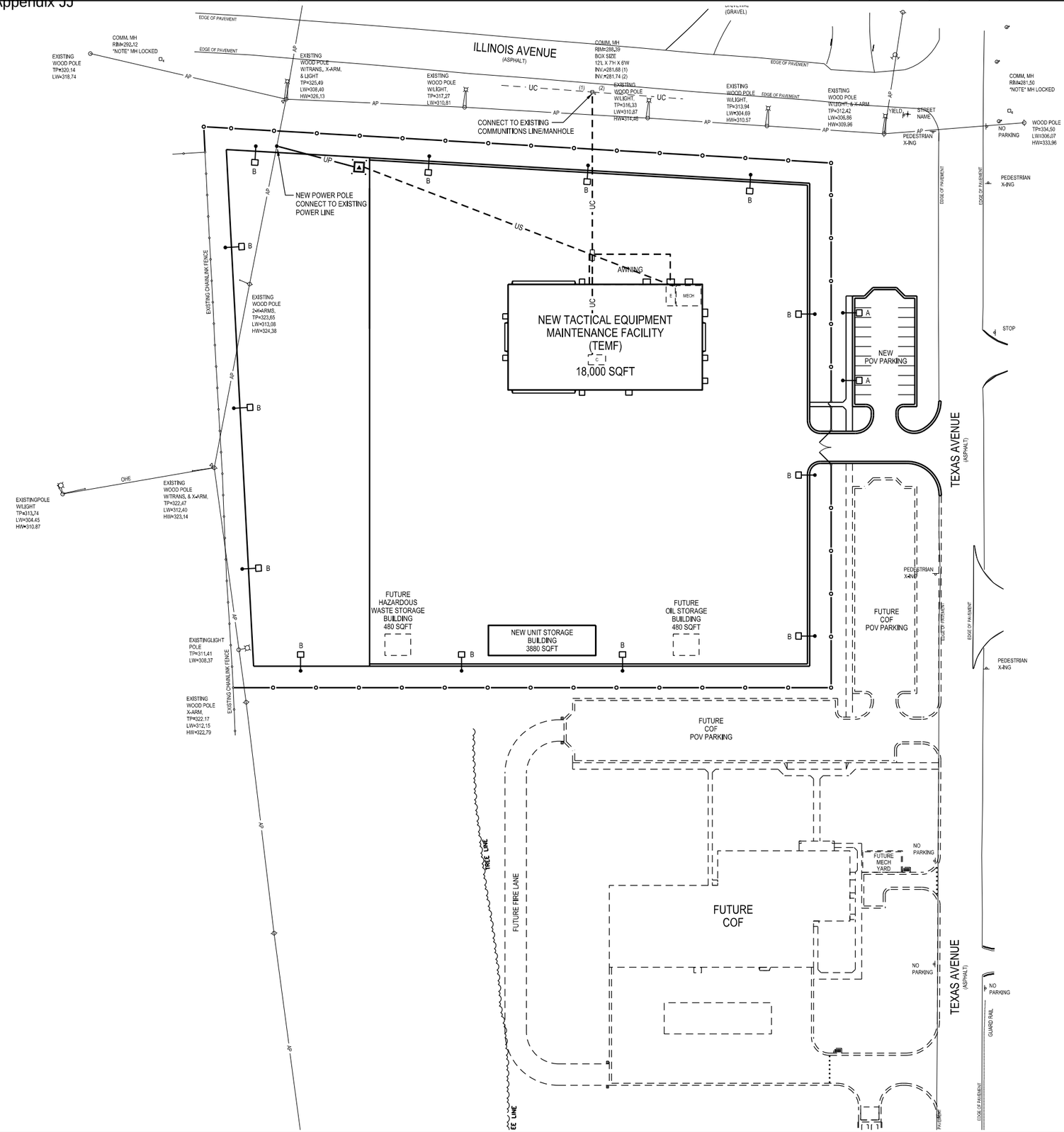
K. M. NG & ASSOCIATES, INC.
CONSULTING ENGINEERS
SAN ANTONIO, TEXAS 78217
TEXAS REGISTERED ENGINEERING FIRM F-542

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PROJECT NO. 069199

TEMPORARY EROSION SEDIMENT AND WATER POLLUTION CONTROL MEASURES

Sheet reference number: C-506

10/6/2010 I:\Projects\Active\10_Coe\1228.01\TEMP\tptemfc-506ecd.dgn
Contr No. W912HN-08-D-0027, Task Order DY01



LEGEND

EXISTING	DESCRIPTION	NEW
—— AP ——	AERIAL PRIMARY	N/A
N/A	UNDERGROUND PRIMARY	—— UP ——
N/A	UNDERGROUND SECONDARY	—— US ——
— — UC — —	UNDERGROUND COMMUNICATIONS	—— UC ——
	POLE	●
N/A	AREA LIGHTS TYPE A 150W HPS	—□ A
N/A	AREA LIGHTS TYPE B 400W HPS	□— B
N/A	225 KVA PAD MOUNTED TRANSFORMER	▲

NORTH

50 0 50 100
SCALE OF FEET

1 ES-101 | ES-101
ELECTRICAL/COMMUNICATIONS SITE PLAN
SCALE: 1" = 50'

US Army Corps of Engineers
Fort Worth District

FINAL RFP SUBMITTAL
NOT FOR CONSTRUCTION

Symbol	Description	Date
1	REVISED SHEET NO. AND OF NO.	JULY 2010
	AM 0002	

Date: JULY 2010
Sol No. RFP W912HN-07-X-0717
Contr No. W912HN-08-D-0027, Task Order D101
Rev.
File name:
Plot date: JULY 6, 2010
Plot scale: AS SHOWN
Designed by: R. WILSON
Dwn by: E. CHAVEZ
Reviewed by: J. MAGEE
Submitted by: KUNG M. NG, PE ENGINEER
DESIGN FILE:

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS

K. M. NG & ASSOCIATES, INC.
CONSULTING ENGINEERS
SAN ANTONIO, TEXAS 78213
TEXAS REGISTERED ENGINEERING FIRM F-442

FORT POLK, LOUISIANA
UNIT OPERATIONS FACILITIES
PROJECT NO. 069199
ELECTRICAL/COMMUNICATIONS SITE PLAN

Sheet reference number: ES-101

APPENDIX LL

Storm Water Pollution Prevention Plan

Unit Operations Facility

SECTION 01 57 24.03 44

STORM WATER POLLUTION PREVENTION PLAN (Louisiana)
01/2010

PART 1 GENERAL

NOTES FOR DESIGNER OF DESIGN-BID BUILD CONTRACTOR: ***Edit this section to provide guideline for Storm Water Pollution Prevention requirements for design-bid-build project that has total disturbed area of one (1) or more acre. The edited section will direct construction contractor to submit a pre-construction and operation specific SWPPP.***

NOTES FOR DESIGNER OF DESIGN-BUILD CONTRACTOR: ***Prepare pre-construction operation specific SWPPP to be implemented at the job site by a designated and qualified representative.***

1.1 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. When providing a resubmittal to address USACE review comments, the Contractor shall include annotated comment responses along with the resubmitted SWPPP (in its entirety). The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Storm Water Pollution Prevention Plan (SWPPP or SWP3);G

The construction Contractor site specific SWPPP shall prevent erosion, sediment loss from the construction site, and erosion down gradient of the developed property. To the maximum extent possible, the SWPPP shall (a) limit the area of disturbance to minimize soil loss and prevent the discharge of water quality impaired water from the construction site and (b) incorporate staged stabilization measures as work progresses throughout the duration of the project. The Contractor shall use the current forms (e.g., NOI, NOT, NOC, etc.) required by the LPDES General Permit for Stormwater Discharges From Construction Activities. Additionally, the Contractor shall maintain compliance with the Construction General Permit at all times (even when the Construction General Permit is revised by the issuing agency).

The following summarizes some of the requirements that need to be implemented into the SWPPP as required by the LPDES General Permit.

(1) The SWPPP shall comprise of three (3) major parts:
(a) narrative,
(b) drawings depicting structural and non-structural best management practices (BMPs), and
(c) permit required documentation (attachments and worksheets) for record-keeping.

(2) The Contractor site specific SWPPP shall consider the phasing of project tasks with the timing of BMPs and construction activities. Additionally, the Contractor site specific SWPPP shall consider the diversion of storm water run-on onto the disturbed portions of the project site, including limiting the area of exposed soil, and retention of sediments from escaping the exposed portion of the site.

(3) The contract drawings depict recommended or suggested BMP types and locations. Any additional BMPs or modifications to the BMPs throughout the project need to be depicted on the drawings included in the SWPPP as well as the text within the SWPPP.

(4) During construction (after USACE approval of construction operation SWPPP), SWPPP or BMP revision is required when site conditions change and when situations arise that may cause potential permit non-compliance. The SWPPP or BMP revision shall be initiated when requested by the Area Office Contracting Officer (AOCO)or as deemed necessary following an inspection conducted by the Contractor designated inspector.

(5) The NOI (when required by the applicable LPDES general permit) shall be separately submitted to all required parties by the construction Contractor and the USACE as co-operators of the construction site.

(6) The Contractor shall sign the Certification of SWPPP, the delegation letter of signatory authorization, the NOI, and the Notice of Termination (NOT) as required by the LPDES General Permit.

(7) The SWPPP must contain a list of regulated materials and construction materials and products, their location, and methods of containment for each product.

(8) The SWPPP must contain a list of wastes, their location, and method of containment.

(9) The SWPPP shall implement procedures that prevent post construction erosion from occurring. Some examples include the use

of Scour Stop or equal as velocity dissipators or the placement of composite fiber turf reinforcement mats at down gradient channels.

(10) The following shall be depicted in the SWPPP drawings.

(a) Location of batch plant (if applicable) and drainage features

The following summarizes some of what is needed to be implemented into the SWPPP as required by the USACE.

(1) The SWPPP drawings shall be prepared on site grading plans. The drawings shall include four phases or stages of Best Management Practices (BMP) structures layout:
(a) initial BMP layout at site prior to clearing and grubbing,
(b) interim BMP layout during grading activities,
(c) temporary stabilization method and locations, and
(d) final stabilization method and locations of application.

Notes on timing controls and activities shall be described on the SWPPP drawings.

(2) The SWPPP shall be prepared by a registered professional engineer, a Certified Professional in Erosion and Sediment Control (CPESC), or a licensed landscape architect who has experience with the applicable construction storm water permit as well as the use of sediment and erosion control best management practices (BMPs).

(3) The Contractor designated inspector and any person responsible for maintaining SWPPP compliance with the applicable storm water permit and permit required activities shall attend training on storm water erosion and sediment control compliance/inspections provided by the EPA, state, or vendors (e.g., www.ieca.org, www.teex.org, www.stormwatercenter.org, etc.). The inspector shall provide training certificates from accredited vendors confirming course completion. Documented experience that deals with maintaining compliance with the applicable Construction Storm Water Permit may be substituted for the above mentioned training. Documented experience must be attached to the SWPPP.

(4) The person responsible for maintaining the SWPPP shall provide briefing on the approved Construction Operation SWPPP to all on-site workers.

(5) The SWPPP shall not be submitted to the USACE unless it has been verified to meet the requirements of the applicable state Construction Storm Water Permit. Prior to submitting the Notice of Intent (NOI) (if required per the applicable state Construction Storm Water permit)to all required parties, the construction operation SWPPP shall be approved by the USACE.

(6) The SWPPP must contain the Material Safety Data Sheets (MSDS)

for each material on-site or provide a reference in the SWPPP on where the sheets can be found at the project site.

(7) The SWPPP must contain a list and identify the location and method of containment for each type of waste that is to be recycled during the project.

(8) The following shall be depicted on the SWPPP drawings.

(a) A statement that verifies an emergency spill clean-up kit and spill containment device is at fuel transfer points at all times.

(b) A statement that verifies fuel tanks or fueling trucks have overfill protection devices.

(c) Construction details for all BMPs used on the construction site (e.g., BMPs for the fuel storage areas, concrete wash-out pit, borrow area, batch plant, stabilized construction access, etc.)

(9) Include a copy of this SECTION.

SD-11 Closeout Submittal

Notice of Termination; G; PER-EE

If a NOI has been submitted, a copy of the original Notice of Termination (NOT) shall be submitted to the regulatory agency and to all required parties. Prior to submittal of the NOT, Contractor shall inspect the finished site with the Area Office Contracting Officer (AOCO)and obtain photographs to prove establishment of final soil stabilization and removal of BMP controls. A copy of NOT and photographs shall be provided to PER-EE through the AOCO. The construction Contractor shall retain all documents pertaining to Construction Storm Water Permit for at least three (3) years after NOT submittal.

1.2 SUMMARY

The Contractor shall verify that the most current forms (e.g., NOI, NOC, NOT, etc.) are submitted with the SWPPP.

The Contractor shall not commence soil disturbance until approval of the site specific SWPPP is obtained from the USACE along with the USACE SWPPP certification, and USACE NOI (if applicable). Additionally, all required waiting periods as described in the LPDES General Permit must also be met before soil disturbing activities may begin.

There is no separate payment for work required in this section.

Unit Operations Facility

1.2.1 Site Operators, Responsibilities, and Shared SWPPP

Both the U.S. Army Corps of Engineers (USACE) and the construction Contractor meet the definitions as operators for the construction activities and operate under a shared SWPPP that addresses the requirements of the LPDES General Permit.

1.3 PROJECT IDENTIFICATION

PROJECT TITLE:[_____]

LOCATION:[ ], Louisiana

1.4 PROJECT DESCRIPTION

NOTES: Provide a brief description of project site and associated construction activities (i.e. clearing and grubbing; grading; concrete and asphalt pavement; fencing; landscaping; describe project location; necessary site work and utility service lines; and demolition, recycling and disposal of regulated substances, etc.). Reference Civil Design Analysis and drawings for site info. Identify the total project area (acres) for the proposed construction and the existing demolition sites (reference NPDES General Permit for definition on total disturbed site). The total disturbed area includes number of acres where construction activities will occur, construction right-of-way, off-site material storage area, overburden and stockpiles of dirt, borrow area, spoil area, and laydown area. Construction support facilities are to be determined by the construction Contractor.

The scope of this project includes construction of new [_____], [storm sewer,] [sanitary sewer,] [[_____],] [parking lots,] [access drives,] [sidewalks,] [lighting,] [security fence,] [communication system,] and[[_____],]. [In addition, this project shall include demolition of [_____] at [_____].] The total project area of the new construction site includes [off-site material storage,] [overburden and stockpiled material,] [borrow areas,] is roughly [____] acres. [The total project area of the remote demolition site is roughly [____] acres]. The total disturbed area [including the new construction and remote demolition sites] in this contract is roughly [_____].

1.5 BID OPTIONS AND PROJECT PHASING

There are [no] Bid Options for this project. [They are:

[_____]

Unit Operations Facility

[_____]]

[Project Phasing Activities include:

[_____]

[_____]]

1.6 STANDARD INDUSTRIAL CLASSIFICATION (SIC)

NOTES: ***SIC codes are obtained from the Standard Industrial Classification Manual published by Office of Management and Budget (OMB). For construction activity permit, the primary and sometimes the secondary codes will be for the construction activity. The second through the fourth codes will generally relate to the ultimate use of the project. Use one (1) to maximum of four (4) codes as needed to adequately describe the project.***

[1521 General Contractors - Single Family Houses]

[1522 - General Contractors - Residential Buildings, other than Single Family (i.e., barracks)]

[1541 - General Contractors -Industrial Buildings and Warehouses]

[1542 - General Contractors - Non-Residential Building, other than Industrial Buildings and Warehouses (i.e., administrative buildings)]

[1611 - Highways and Street Construction, Except Elevated Highways]

[1623 - Water, Sewer, Pipeline, and Communications and Power Line Construction]

[1629 - Heavy Construction, Not Elsewhere Classified (i.e., athletic fields, cofferdams, dikes, boat docks, railroads, reservoirs, water or sewage treatment plant)]

[1771 - Concrete Work (includes asphalt; i.e., access drives and parking lots, culvert construction)]

[1794 - Excavation Work (include trenching and earth moving]

[4581 - Airports, Flying Fields, and Airport Terminal Services]

[7033 - Recreational Vehicle Parks and Campsites]

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[7538 - General Automotive Repair Shops]

[7699 - Repair Shops and Related Services, Not Elsewhere Classified (i.e., military equipment repair, machinery cleaning]

[7999 - Amusement and Recreation Services, Not Elsewhere Classified (i.e., beaches, fishing piers, picnic grounds)]

[8062- General Medical and Surgical Hospitals]

[9711 - National Security (a general category for military facilities]

1.7 LOCATION

NOTES: ***Provide a narrative of the project location, including street names or easily recognized landmarks. As a minimum, include the following: (1) project site street name and boundary streets, (2) latitude and longitude of the project center to the nearest 15 seconds, or (3) quarter, section, township, and range in which the project is located. Describe all disturbed areas, and off-site support functions and locations for proposed facilities and remote demolition sites.***

The new facility project site is within the city boundary of [City name] and is in [COUNTY name]. The project site is bounded by [name all adjacent streets]. The new facility project center is located approximately at [__] degrees [__] minutes [__] seconds latitude, [__] degrees [__] minutes [__] seconds longitude]. The physical address for the new facility is [__]. The demolition site is bounded by [__]. [The demolition site project center is approximately at [__] latitude and [__] longitude. The physical address of the demolition site is [____].] [The project borrow and material disposal area is within the project boundary.] [The project borrow area is off-site at LAT [___] and LONG [___]. The project disposal area is off-site at LAT [___] and [___] LONG.]

1.8 RECEIVING WATERS

NOTES: ***Identify the body of water that receives site runoff. If it is a tributary to a major river, identify both the tributary and the river. If runoff is collected by a storm drainage system, identify the operator of the system (i.e., the name of the military installation or municipality, the creek adjacent or on site, MS4, the ultimate receiving water body, etc.)***

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The storm runoff from the new facility site flows [direction] [into new storm drain] [by sheet flow], then flows [direction] to [name of Creek] ultimately to [name of River] [name of Basin]. [The storm runoff from the demolition site flows [direction] [to storm drain] [by sheet flow], then flows [direction] to [_____.]]

PART 2 SITE DESCRIPTION

2.1 EXISTING CONDITIONS

NOTES: ***Describe current site conditions. Include information on drainage patterns and runoff coefficients. Also discuss the design storm frequencies used for runoff volume calculations. If the site is located adjacent to an existing industrial facility or in a community greater than 100,000 people, records of storm water quality near your site may be available. Include storm water quality records for the site (if it is available).***

The site generally slopes from [north] [northwest] [northeast] [west] [east][southwest][southeast] [___] to [north] [northwest] [northeast] [west] [east][southwest][southeast] [___] with an average slope of [__] percent. There are currently [no] [an existing] underground storm drainage facilities near the new facility site. Estimated existing runoff coefficients vary from [___] to [___]. Ten-year storm frequency and [__] minutes duration with [____] inches per hour intensity was used for the design of the storm drainage system. [There are currently [no] [an existing] underground storm drainage facilities at the demolition site. The demolition site generally slopes from [east] [south] to [north] [west] with an average slope of [ ] percent.]

2.2 FINAL CONDITIONS

NOTES: ***Describe site conditions and drainage upon completion of construction activities. Include estimates of future runoff coefficients. Describe features of the storm water system and storm water management (i.e., erosion control and velocity dissipation devices).***

Grades at the new facility site will not change significantly and is roughly about [_____] percent from [north] [northwest] [northeast] [____] to [____]. Completed facility site drainage will flow [into a new underground drainage system] [by sheet flow]. The grades surrounding the building is approximately [____] percent grade. The new project site will have a [building,] [access roads,] [service drives,] [_____], [landscaping] [and turfing]. Estimated future runoff coefficients vary from [___] to [___].

2.3 CONSTRUCTION ACTIVITIES

The Contractor shall establish storm water BMP control structures prior to conducting site disturbing activities. The Contractor shall maintain temporary and permanent site stabilization at each portion of site.

The Contractor shall maintain a record of the START date of major construction site activities (i.e., clearing and grubbing, grading, trenching and excavation, dirt moving, etc.), the STOP date when construction activities cease on a portion of the site, and the START date of stabilization measures (such as sod, seeding with native seed, vegetative buffer strips, erosion control compost, turf reinforcement mat, SCOUR STOP, etc.). See
SECTION 01 57 24.02 44 SWPP PLAN INSPECTION AND MAINTENANCE REPORT FORM for an example of a grading and stabilization log sheet.

2.4 SOILS DATA

The SWPPP narrative shall provide soils information of the proposed construction site. Possible sources of information are project soil reports, USDA soil survey data, and other published sources. Information can be found at http://websoilsurvey.nrcs.usda.gov/.

2.5 STORM WATER POLLUTION PREVENTION DRAWINGS

Each SWPPP drawing shall have a specific sheet number and title.

The following describes the items that need to be identified in the drawings of the SWPPP as required by the LPDES General Permit.

(a) Direction(s) of stormwater flow and approximate slopes anticipated after grading activities;

(b) Areas of soil disturbance and areas that will not be disturbed (or a statement that all areas of the site will be disturbed unless otherwise noted);

(c) Locations of major structural and nonstructural BMPs identified in the SWPPP;

(d) Locations where stabilization practices are expected to occur;

(e) Locations of off-site material, waste, borrow or equipment storage areas;

(f) Locations of all waters of the United States (including wetlands);

(g) Locations where stormwater discharges to a surface water; and

(h) Areas where final stabilization has been accomplished and no further construction-phase permit requirements apply.

(i) A general location map.

The following describes the items that need to be identified in the drawings of the SWPPP as required by the USACE.

(a) Existing site features and BMPs -- name of receiving waters (e.g., lake, stream, creek, river, unnamed tributary of named receiving stream, etc.), project site storm water discharge locations, existing storm grates, outfall protection devices, and BMPs.

(b) Interim grading site drainage features and BMPs -- slopes with rough grading, limit of soil disturbance area, outline of areas not to be disturbed (e.g., vegetative buffer zones, cultural resources, wetlands, and areas of environmental concern), new storm grates, new drainage outfalls, and BMPs.

(c) Areas to receive temporary stabilization. Methods of stabilization shall be identified along with the applicable specification for the stabilization (e.g., native seed mix at a certain application rate in lbs/sq-ft, etc.).

(d) Areas to receive final stabilization. Methods of stabilization shall be identified along with the applicable specification for the stabilization (e.g., native seed mix at a certain application rate in lbs/sq-ft).

(e) On-site and off-site material borrow areas, clean dirt disposal areas, and BMPs. Stabilized access roads, construction support activities and laydown areas (equipment, staging, parking, and storage areas) along with the BMPs.

(f) Concrete or asphalt batch plant and BMP (if applicable).

(g) BMP construction details for all erosion control and stabilization and sediment control BMPs(e.g., BMPs for the fuel storage areas, concrete wash-out pit, borrow area, batch plant, stabilized construction access, seeding type, silt fence, etc.)

(h) EROSION AND SEDIMENT CONTROL PLAN I (demolition site)

(i) EROSION AND SEDIMENT CONTROL PLAN II(existing site conditions depicting run-on flow diversion BMPs and run-off BMPs)

(j) EROSION AND SEDIMENT CONTROL PLAN III(interim site grading conditions depicting run-off BMP, swales BMP, storm grates BMP, and

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temporary stabilization areas & method specification)

(k) EROSION AND SEDIMENT CONTROL PLAN IV(complete site grading conditions depicting run-off BMPs, swales BMPs, storm grates BMPs, and final stabilization areas and method specification)

(l) Notes on timing of controls of activities

PART 3 BEST MANAGEMENT PRACTICES (BMPs)-EROSION AND SEDIMENT CONTROLS

3.1 TEMPORARY STABILIZATION

Stabilization measures shall be in conformance with LPDES General Permit Part IV.D.2.a(2) and Part III.D.2.a(2) for large and small construction activities, respectively.

The Contractor shall provide all necessary labor, services, equipment, materials (e.g., fertilizer) to obtain, transport, apply, and maintain the temporary stabilized area until final stabilization is performed.

Some examples of acceptable methods for temporary stabilization include water sprinkling with environmental sustainable soil binders (e.g., products produced by Soilworks, LLC, DirtGlue Enterprises, SoilLok, or similar) or anchored straw mulching (typically applied at 2 tons per acre). The construction SWPPP may specify other forms of temporary stabilization methods that are industry accepted and are applicable for the project site conditions.

3.2 PERMANENT STABILIZATION

Stabilization measures shall be in conformance with LPDES General Permit Part IV.D.2.a(2) and Part III.D.2.a(2) for large and small construction activities, respectively.

The Contractor designated inspector shall inspect the site with the USACE AOCO to ensure final stabilization is established. Final stabilization is defined as described in the LPDES General Permit. If final stabilization is unsatisfactory, additional measures shall be required by the USACE AOCO. If applicable, additional seeding shall be performed after temporary removal of the erosion control blankets and subsequent replacement of blankets after such activities are completed. If applicable, the Contractor's SWPPP shall specify the native seed mix species and application rate (lbs/sq-ft). Some examples of acceptable methods for permanent stabilization includes sodding, pavement, and rock blankets.

3.3 SEDIMENT BASIN

NOTE: See LPDES General Permit Part IV.D.2.a(3) and Part III.D.2.a(3) for large and small construction activities, respectively.

The [NPDES Storm Water Discharge General Permit requires a temporary sediment basin for sites where 10 acres or more are disturbed at one time. [If the disturbed site drains to a common location, a sediment pond or trap shall be constructed as initial grading activity. The pond shall be prepared by the site designer and it shall include layout and construction details. [The runoff from the site does not drain to a common collection point; therefore, a temporary sediment basin is not required.] [A series of smaller sediment basins are constructed to provide for temporary sediment control is depicted on the grading plan.] [A series of smaller sediment basins are not attainable, therefore effective sediment controls (i.e. vegetative strips and silt fences) are established on all the down slope areas of the disturbed site perimeter to control sediment in runoff]. [A construction sediment basin in not attainable because_][Temporary sediment pond receives final grade as a permanent sediment pond to manage storm runoff at the finished site.] [A temporary sediment basin is not required because construction activities at each portion of the disturbed site is less than 10 acres.]. The following elements are required if a sediment pond is constructed as an initial site activity: The slopes of sediment pond shall be stabilized with an effective form of temporary/permanent stabilization (as applicable). The storm water shall be allowed to settle after each rainfall event before dewatering in accordance with the applicable Construction General Permit.

3.4 STRUCTURAL CONTROLS

See SECTION 01 57 23 TEMPORARY STORM WATER POLLUTION CONTROL.

3.5 NON-STRUCTURAL CONTROLS

The Contractor (and the subcontractors) shall be responsible for eliminating pollutants in storm runoff from the project site. The Contractor (and subcontractors) shall be responsible for utilizing non-structural BMPs to minimize storm water pollution. Some examples of non-structural BMP include:

- Construction Practices
- Material Management
- Waste Management
- Vehicle and Equipment Management
- Employee and Subcontractor Training
- Storm Water Pollution Prevention Plan Maintenance

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3.5.1 Construction Practices

Dewatering Operations: The Contractor (and subcontractor)shall prevent discharge of sediment by methods of sediment control, containment, and disposal. In project areas suspected of potential toxic or petroleum products contamination, the water shall be tested to determine method of disposal.

Paving Operations: The Contractor (and subcontractor) shall avoid discharge of pollutants to storm drains by avoiding asphalt and concrete paving in wet weather or anticipation of such event, storing material in covered containers, covering and berming storage areas, establish control structures, cover on-site storm grates, and worker and subcontractor training.

Structure Construction and Painting: The Contractor (and subcontractor) shall prevent pollutants in storm runoff by covering, or berming material storage areas, keeping job site clean and orderly, using safer alternate products, stabilizing adjacent disturbed areas, storing material in secondary containment, protecting on-site storm drains, establish control structures, and perform worker amd subcontractor training.

USACE Requirements

Stockpiles: Material shall have a storm water perimeter control devices established at a minimum distance of 10 feet from the toe of the stockpile. Materials excavated from utility trenching shall be protected from up gradient storm run-on.

3.5.2 Material Management

Material Delivery and Storage Practice: The Contractor (and subcontractor) shall prevent or reduce discharge of pollutants to storm water by minimizing the on-site storage of hazardous and toxic (HT) materials, storing HT in clearly labeled, corrosion-resistant containers with secondary containment at designated areas approved by the COR, conducting frequent inspection, keeping current inventory of construction materials on site and training of workers and subcontractor.

Material Use and Inventory: Common on-site materials are pesticides and herbicides, fertilizers, detergents, concrete material, petroleum-based products, fertilizers, tar, asphalt, steel reinforcing bars, other hazardous chemicals such as acid, lime, solvents, curing compounds, sealants, paints, glues, fertilizers, etc. The Contractor (and subcontractor) shall use less hazardous, alternate or environmental friendly material, if available. The Contractor shall have

(1) a list of construction materials used on site,
(2) a list of materials and associated potential pollutants, and
(3) method of storage and containment in the Contractor operation specific SWPPP.

Spill Prevention and Control: The Contractor (and subcontractor) shall store HT material in covered containers and inside a fenced area, have the temporary fuel storage tank bermed or contained to meet applicable Fire

Code, place readily accessible spill clean-up materials, have protocol for immediate work stoppage, notification, clean-up, labeling, storage and packaging, transportation, disposal, record-keeping, closure activities, and provide training to workers and subcontractor for response to spills.

3.5.3 Waste Management

Non-Construction Wastes: The Contractor must minimize pollutant discharges from areas other than construction (including stormwater discharges from dedicated asphalt plants and dedicated concrete plants).

Construction and Waste Materials: The Contractor must: 1. Prevent the discharge of solid materials, including building materials, to waters of the United States, except as authorized by a permit issued under section 404 of the CWA; 2. Minimize exposure of construction and waste materials to stormwater, and the occurrence of spills, through the use of storage practices, prevention and response practices, and other controls; 3. Prevent litter, construction debris, and construction chemicals (e.g., diesel fuel, hydraulic fluids, and other petroleum products) that could be exposed to stormwater from becoming a pollutant source in stormwater discharges.

Solid Waste Materials: Trash and uncontaminated construction debris shall be placed in appropriate covered waste containers. Waste containers shall be emptied regularly and shall not be allowed to overflow. The disposal area of excavated material from project construction shall not be utilized for waste disposal. Routine janitorial service shall be provided for all construction buildings and surrounding grounds. No construction waste materials, including concrete, shall be buried or otherwise disposed of on-site. The Contractor shall brief all on site personnel on good house-keeping and waste minimization.

Solid Waste: Solid waste materials (e.g., grout, mortar or uncontaminated debris) shall be placed in covered containers. Trees and shrubs from site clearing shall be shredded and used as mulching material after site stabilization. Packaging materials such as wood, plastic, and paper shall be recycled to the maximum extent possible and not disposed of in a landfill. It is a requirement to perform recycling (see SECTION 01 74 19). The Contractor shall designate waste containers for segregating waste (municipal, metal, aluminum, plastic, wood pallet, packaging, glass, etc.) Dry paint cans shall be recycled. The Contractor shall designate waste disposal area, have a routine janitorial service for all structures and surrounding grounds, and have a routine schedule to service waste containers. The disposal area of excavated material from project construction shall not be utilized for solid or refuse waste disposal. Personnel on the job site shall be briefed on minimizing disposal to landfill by waste segregation and recycling.

Hazardous and Toxic Waste: All excess on-site material such as paints, solvents, petroleum products (e.g., fuel, oil, and grease, etc.), herbicides, pesticides, acids for cleaning masonry, concrete curing compounds, sealants, paint strippers, wastes from oil-based paint, and glues can become HT waste. Containers of excess material shall be labeled and managed according to the labels and as recommended by the product manufacturers. If there are no instruction provided, the Contractor shall turn in contained waste to the installation DRMO, the local household

hazardous waste drop-off, or recycling program.

NOTE: ***DELETE IF REGULATED MATERIAL ABATEMENT IS NOT APPLICABLE TO THE PROJECT.***

Demolition: [Buildings to be demolished under this Contract shall require removal of the following regulated materials:] [mercury fluorescent lights], [PCB or TCB/DEPH ballasts], [items containing ozone depleting chemicals], [mercury bulb thermostats], [items containing lead-based paint or pipe joints],

and

[asbestos-containing building material] [items containing CFC] [_____]. [Asbestos-containing materials shall be handled and disposed of in accordance with Section 02 82 14.00 10 ASBESTOS HAZARD CONTROL ACTIVITIES prior to building demolition.] [Lead hazard control activities shall be performed in accordance with Section [02 83 19.00 10 LEAD BASED PAINT HAZARD ABATEMENT, TARGET HOUSING & CHILD OCCUPIED FACILITIES] [02 82 16.00 20 ENGINEERING CONTROL OF ASBESTOS CONTAINING MATERIALS] [02 83 13.00 20 LEAD IN CONSTRUCTION]. [Other regulated materials shall be removed and managed in accordance with Section 02 84 00.00 44 REMOVAL, RECYCLING, AND DISPOSAL OF REGULATED MATERIAL.]

Contaminated Soil: If suspicious of soil contamination during soil moving activities, the Contractor (and subcontractor) shall stop work, notify COR, and establish containment to prevent soil transport or runoff from that location. For removal of contaminated soil, a WORK PLAN shall be prepared for COR approval prior to handling and management of the material. The WORK PLAN shall at least include the following: containment, sampling & analyses, notification to regulatory agencies, transportation, worker safety, training & environmental monitoring, disposal, and documentation and record-keeping.

Construction and Concrete Waste: Construction waste or surplus materials, demolition building debris, scrap metal, rubber, plastic, glass, concrete, and masonry products shall be segregated and recycled to minimize landfill disposal. No construction waste shall be buried or disposed of on-site. Concrete waste shall be controlled and minimized by appropriate storage methods for dry and wet materials, and control the amount of concrete and cement mixed on site. Sweepings from exposed aggregate concrete shall be collected and returned to aggregate stockpile and they shall not be washed into streets or storm drains. Concrete wastewater from wash pit is not permitted to discharge as storm runoff. See
SECTION 01 57 23 TEMPORARY STORM WATER POLLUTION CONTROL for additional concrete wash-out requirements. After project completion, the Contractor shall contain wastewater, clean the basin, test and dispose of wastewater and sediment in accordance with applicable regulations and to the satisfaction of the USACE AOCO. The Contractor is responsible for all fees, levies, and disposal cost and shall provide a treatment facility signed delivery ticket.

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Sanitary/Septic Waste: On-site sanitary facilities shall be established at a convenient location. Facility location, design, maintenance, and waste collection practices shall be approved by COR and are in accordance with local regulations. The Contractor (and subcontractor) shall have a routine schedule for waste pump out by a licensed hauler. Septic waste treatment system shall have a pre-construction permit from the local health regulating agency and have contract service with a licensed company. Temporary sanitary facilities discharging to sanitary sewer system shall be approved by the operator of the system and properly connected to avoid illicit discharges. Wastewater from water-based paint shall not be discharged as sanitary waste.

Building Exterior Cleaning or High-pressure Wash: Storm drains shall be protected by approved storm water control device. Wash onto dirt area, spade in, settle solids in pit, collect (mop up) and discharge to sanitary sewer (with approval from sewer operator). If the exterior paint contains lead exceeding the levels stated in the Consumer Safety Standard, mercury or mildewcide, the wash water shall be collected and disposed of as regulated material that will require sampling data for disposal to permitted facility.

Street/Pavement Cleaning: Water used for this activity shall be minimized and sediment basin shall be used to contain wastewater. At completion of construction, the silt shall be removed and disposed of in accordance with applicable regulations, and water from the basin shall be pumped to a sanitary sewer with written approval from the COR.

Dechlorination of Wastewater from Disinfection of New Drinking Water System: Reference SECTION 3 11 00 WATER DISTRIBUTION SYSTEM.

Care of Storm Water from Excavated Areas: Storm water trapped in excavated areas shall be lifted or pumped into a temporary bermed sediment basin or equal measure(s) for sediments removal. The filtered water shall runoff as sheet flow from the sediment removal area. The sediment removal area shall have the maximum separation distance possible from the site drainage outfall.

3.5.4 Dust Control

See SECTION 01 56 00 DUST CONTROL.

3.5.5 Vehicle and Equipment Management

Off-site Vehicle Tracking: The Contractor is required to keep vehicles from tracking soils from the project, borrow, and disposal sites. Temporary parking area(s) to be used 30 calendar days or more for the Contractor's equipment or personal vehicles shall be paved with temporary asphalt. The temporary parking areas shall be removed by the Contractor upon project completion and restored to the satisfaction of the COR.

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Vehicle and Equipment Cleaning: Washing shall be performed off site at a commercial washing facility that has an oil/water separator as pre-treatment before connection to municipal sewer system. No vehicle washing is allowed on site, unless washing involves the rinsing of a concrete truck and wastewater is trapped in a washout pit with secondary containment.

Vehicle and Equipment Fueling: Fueling shall be off-site unless a written approval is obtained. If fueling on-site is approved, it shall be at least 150 feet from drainage courses.

The Contractor shall provide a construction detail to depict best management practices for fuel storage and fuel transfer/dispensing areas.

Fueling operations shall avoid topping of fuel tank, and avoid mobile fueling of mobile construction equipment. Fueling locations shall use impervious secondary containment (i.e., a liquid-tight berm and an impermeable liner). The containment capacity of the bermed area shall provide at least 110 percent (%) of the stored fluid.

It is necessary to have a clean-up kit and containment bloom (or absorbent material) available at all times for immediate clean-up during fueling. No petroleum fuel, oil or lubricants or products tanks are allowed on-site unless is pre-approved in writing. Emergency cut-off valve and or overfill protection device is required on fuel transfer equipment. The temporary fuel containers placed on-site shall meet the industrial standard, labeled and stored in accordance with applicable Federal, state, and local Fire codes.

In case of spill of hazardous, toxic, and radiological waste (HTRW), the Contractor shall stop work, contain spill, notify the AOCO and Safety Office, and execute spill control per the SPILL CONTROL PLAN as required in specification SECTION 01 57 20 ENVIRONMENTAL PROTECTION . Spill control, response, notification, clean-up, restoration, reporting, record-keeping, etc. shall be in accordance with 40 CFR 110 and 40 CFR 112 , other applicable Federal, state, and local regulations, and to the satisfaction of the AOCO.

Vehicle and Equipment Maintenance: Outdoor vehicle or equipment maintenance is a significant potential source of storm water pollution. Activities often include engine repair, changing fluids, etc. Such activities shall be prohibited at the job site. The construction Contractor shall verify proofs on routine maintenance of construction equipment and vehicles before bringing them to the job site.

Vehicle and Equipment Parking: Vehicle or equipment shall be regularly inspected for leaks and schedule routine maintenance to reduce the potential for leaks. If leaks are observed at the job site, such vehicle or equipment shall be repaired immediately or removed from the site.

3.5.6 Employee and Subcontractor Training

The Contractor is responsible for providing training for all workers

(including the subcontractor) on the job site. The objectives in training are to provide a clear concept of activities or problems that generate pollutants to storm water, identify solutions (BMPs), promote ownership of the problems and solutions, and integrate feedback into training and BMP implementation. A certificate to verify completion of training shall be signed by all trained personnel and retained in the SWPPP.

3.5.7 Storm Water Pollution Prevention Plan Maintenance

The USACE approved SWPPP shall be readily available to inspector either from the USACE or regulatory agency. The USACE approved BMPs and SWPPP shall be revised at no cost by the construction Contractor when there are changes in site conditions, sequence of construction and operation, when sediments escape from the job site, or as dictated by the results of inspections. The BMPs and SWPPP shall be updated by the construction Contractor upon request of the USACE AOCO.

PART 4 STORM WATER MANAGEMENT AND PERMANENT CONTROLS

NOTE: ***The number and headings of these subsections will vary significantly from project to project. Use as many subsections as necessary to adequately describe erosion and sediment controls for the completed project site. While designing the site layout and grading plans, the design engineer should include features that will limit erosion and control sedimentation once project construction has been completed. Permanent structures may include curbs and gutters, storm drains, drainage ditches, culverts, pavement slopes, etc. Indicate storm frequencies and durations used for design purposes. Subsections may include, but are not limited to: RUNOFF COMPUTATIONS, STORM DRAINAGE SYSTEM, VEGETATIVE BUFFER STRIPS, DRAINAGE SWALES AND DITCHES, DRAINAGE CULVERTS and all measures discussed in SECTION 01 57 23 STORM WATER POLLUTION PREVENTION MEASURES.***

All sites for new construction and demolition shall be separately addressed. Units of measure used shall **match the construction project.**

The SWPPP designer shall determine if there are concerns associated with the discharges from sources other than storm water. The SWPPP designer shall consult with the construction Contractor to determine concrete washout pit capacity at the job site to provide total containment of concrete detention and the designed storm event.

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4.1 RUNOFF COMPUTATIONS

The storm drainage design is based on a [10][__]-year storm frequency and [10][__]-minutes duration with [___] inch per hour rainfall intensity.

4.2 SURFACE DISCHARGE QUALITY

The wastewater from concrete washing activity is prohibited from discharging as surface runoff. See Part 3.6.5 of SECTION 01 57 20 ENVIRONMENTAL PROTECTION.

4.3 PERMANENT EROSION CONTROL STRUCTURES AND STORM WATER TREATMENT UNIT

Permanent drainage structures, including [concrete curbs and gutters,] [storm drainage system,] [concrete pavement,] [asphalt pavement,] [drainage swale,] [drainage ditch,] [turfing,] [vegetative strip,][concrete culvert,] [pipe culvert,] will provide erosion control at the project site.

[Storm water treatment unit shall has a stainless steel expanded screen opening of at least 4700 microns (4.7 mm or 0.185 inches) to remove sediment.]

4.4 OUTLET PROTECTION OR OUTFALL VELOCITY DISSIPATION DEVICES

NOTE: ***Identify velocity dissipation or outlet protection device to provide non-erosive flow conditions at the point of surface drainage discharge. New construction and demolition sites shall be addressed separately.***

The outlet protection or outfall dissipation device shall provide non-erosive flow conditions at the point of surface water discharge to the ditch or swale and downstream of the outfall or channel. [The proposed storm drain shall be discharged into [[flow channel] [x-inches diameter storm drain pipe] .] The outfall impact locations are protected by [e.g., SCOUR STOP or equal]. The drainage channels are protected by [e.g., seeding on prepared soil surface with ECC and overlay with composite turf reinforcement mats] [composite turf reinforcement mats overlay on solid sod].

PART 5 TIMING OF CONTROLS AND ACTIVITIES

NOTE: **Discuss the sequence of major construction activities and how the related pollution prevention measures will be implemented. Identify situations which are critical to successful construction and pollution prevention, but will not limit the Contractor's ability to determine construction phasing schedule. NOTES of Timing of Controls and Activities specific for each project shall be depicted on SWPPP drawings.**

The general Contractor shall discuss timing (sequence) of controls and construction activities to minimize soil loss from exposed areas in the construction operation SWPPP.

The following list provides a general example of the Timing of Controls and Activities.

- Minimize area of disturbance,

- Preserve existing vegetation at the downgradient portion of the site, do not disturb ground cover until it is necessary to proceed with field work,

- Install stabilized construction access,

- Install BMPs at contractor staging, stockpiles, storage, parking, borrow areas, and stockpiles (on-site and off-site locations), concrete washout pit, fuel storage/transfer area, etc.,

- Install BMP at existing storm grates (e.g., curb inlets surface inlets, manholes, catch basins, etc.),

- Install flow diversion dike and stabilize. Construct sediment trap at the downgradient end of the dike,

- Track weather and protect exposed areas with erosion control measures before anticipated storms arrive.

- Construct outfall, install BMPs at initial impact location, and stabilize flow channel prior to clearing upper watershed,

- Stage construction to the maximum extent possible by disturbing, protecting, and then stabilizing one side of river bank before disturbing the opposite side,

- Stabilize flow channel,

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- Clear site for sediment pond (if applicable)and utilize sediment pond skimmer to control overflow,

- Stabilize pond slopes,

- Develop run-on BMP devices and protect loose soil areas,

- Start grading up gradient of site and stabilize disturbed areas,

- Avoid disturbing down slope areas of site until up-gradient disturbed areas are stabilized,

- Delay construction of infiltration measures until the end of project when drainage areas are stabilized,

- Install BMP protections at new storm grates (e.g., curb inlets surface inlets, manholes, catch basins, etc.),

- Protect excavated materials by installing BMP perimeter controls to protect materials from run-on and run-off

- Stabilize stockpiles and install BMPs at least 10 feet from the toe of the material,

- Backfill utility trenches in a timely manner to minimize erosion and soil loss,

- Monitor weather reports to schedule paving (asphalt or concrete), concrete saw cutting, foundation work, dust control, seeding or any activities that will impact run-off,

- Inspect and maintain BMP control structures,

- Evaluate BMP and revise BMP when site conditions or activities change. Maintain Construction General Permit and USACE required field records and training logs,

- Monitor discharge from concrete batch plant(if applicable),

- Maintain stabilized areas until final project acceptance (i.e., watering, fertilize, mow, additional seeding, etc.),

- Verify final stabilization of disturbed areas with AOCO representative. See definition in PART 2.3,

- Remove sediment and BMP control structures once disturbed areas are permanently stabilized and accepted by AOCO. Obtain photographs of site to prove establishment of stabilization and removal of all BMP controls,

- File the Contractor NOT. Provide a copy of NOT through AOCO to PER-EE.

PART 6 COMPLIANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS

NOTE: Army Regulation 200-1 requires that all Department of Defense installations and Contractors to comply with Federal environmental protection statutes, which includes a provision to observe State, and local environmental regulations.

The SWP3 shall identify the document prepared for compliance with the National Environmental Policy Act (NEPA) of 1969, as amended. It shall discuss impact on endangered and threatened species and their (critical) habitats, archeological, cultural and historical resources and properties, wetlands, floodplains, environmental contamination and compliance issue, water resources, ecological resource, land use, noise, air quality. The installation environmental office is responsible to prepare the NEPA document at the project pre-design stage. The Contractor shall request name NEPA compliance document (Record of Environmental Consideration, Environmental Impact Statement, Environmental Assessment), date of signature for findings (Record of Decision or Findings of No Significant Impact), and include information to PART 7.

In compliance with the Clean Water Act, Section 402, a construction site of 0.4 hectare (1 acre) in size, or larger, is required to obtain a National Pollutant Discharge Elimination System (NPDES) from EPA NPDES General Permit for Storm Water Discharges from Construction Activities.

Section 404 of the Clean Water Act (CWA) stipulates discharge of dredge and fill material with jurisdictional Waters of the United States. The civil engineer and environmental planner shall evaluate the proposed site compliance with CWA Section 404. For The proposed site shall be reviewed if it crosses drainage water ways or watersheds (dry creeks and streams could be Waters of U.S.)that are contributing to the Waters of United States. The review process sometimes involved wetland delineation to identify existing national permit coverage or issuance of a Clean Water Act Section 404 Permit. The permit or a permit coverage verification memorandum could require compensatory mitigation. The compensatory mitigation shall become the initial part of construction activity. The construction Contractor shall not start soil disturbing activities until the required compensatory mitigation is implemented or the soil disturbing activities are covered under existing national permit.

The civil engineer and environmental planner shall evaluate the proposed site compliance with Clean Water Act, Section 10, the Rivers & Harbor Act of 1899.

Section 401 of the Clean Water Act stipulates the on-site sewerage discharge. If an on-site sewerage system is required, the Contractor shall prepare drawings and mark-up specifications, obtain a pre-construction permit from the state, regional Environmental Quality Office, or County Health Department. The Contractor shall contact

installation Environmental Office for application of on-site sewerage system pre-construction permit.

The Contractor shall resolve all permit compliance issues prior to disturbing soil.

In compliance with the National Environmental Policy Act of 1969, as amended, the [Environmental Assessment] [Environmental Impact Statement] entitled [_____] dated [____] has been prepared and the memorandum was signed on [_____].] [Record of Environmental Consideration (REC) dated [_____] has been prepared for this proposed action.] [The [EA] {EIS] [REC] indicates the proposed action is [_____].] [The proposed action has [_____] impact on endangered and threatened species and their critical habitats.] [The attached letter dated [_____] with US Fish and Wildlife Service has determined the following protection measures:[_____].] [The proposed action has [_____] impact on cultural and historical properties, the memorandum dated [_____] from SHPO verified this resolution.] [The proposed action has [_____] impact on noise.] [The proposed project site [_____] encroaches upon floodplains and wetlands.] [The proposed action [_____] impact air quality.] [The proposed site has [_____] environmental compliance issues and an environmental baseline study (EBS) was prepared on [_____]. The EBS indicated that [_____]]. [This facility will have an on-site sewerage treatment system and the Contractor shall obtain a pre-construction permit prior to start work.] [The Contractor shall not start field work until [the Clean Water Act Section 10] [and] [Section 404] issues are resolved and a permit is issued or the construction activity is covered under a nationwide permit and a verification memorandum, dated [_____] is completed by the the Permit Section, Regulatory Branch, US Army Corps of Engineers.] [In compliance with the Clean Water Act permit issued on [_____], the Contractor shall furnished work as required for the compensatory mitigation as stipulated by the permit.] In compliance with Clean Water Act, Section 402, the Contractor and the subcontractor shall conform with all applicable NPDES General Permit stipulations to discharge storm water during construction. [The Contractor shall furnish water well development certification in accordance with state and local regulations]. In addition, the Contractor (including the subcontractor) shall comply with the Government approved Contractor's operation specific Storm Water Pollution Prevention Plan, BMP, and contract requirements as stated in this section.

The Contractor (and the subcontractor shall comply with all applicable Federal, state, and local hazardous, toxic, radiological (HTR) waste, municipal waste, sanitary and septic waste disposal regulations.

PART 7 MAINTENANCE AND INSPECTION PROCEDURES AND QUALIFICATION OF DESIGNATED INSPECTOR

The Contractor shall designate an inspector on site to ensure Storm Water Permit compliance and perform SWPPP quality control. All BMPs and control structures shall be inspected according to the requirements of Part IV.D.4 and Part III.D.4 of the LPDES General Permit for large and small construction activities, respectively. The inspector shall inspect adjacent areas daily for direct clean-up of waste materials, debris, and fugitive

sediment that are blown or washed off-site.

All protective measures used and identified in the SWPPP must have maintenance performed in conformance with Parts IV.D.3 and III.D.3 of the L PDES General Permit for large and small construction activities, respectively.

The designated SWPPP inspector is responsible for maintaining the SWPPP throughout the term of permit coverage in accordance with the LPDES General Permit. All deficiencies shall be corrected and recorded. An example of a form to record this information can be found in SECTION 01 57 24.02 44 SWPPP PLAN INSPECTION AND MAINTENANCE REPORT FORM. A copy of each inspection report form shall also be provided to the AOCO.

PART 8 PROHIBITION ON NON-STORM WATER DISCHARGES

In accordance with the Part III.A.3 and Part II.A.3 of the LPDES General Permit for large and small construction activity, respectively, non-storm water discharges are prohibited during construction of the project, except for the non-storm water discharges listed below. The following list of non-storm water discharges from active construction sites are allowed and is developed based on the above guideline.

1. Discharges from fire-fighting activities;
2. Fire hydrant flushings;
3. Waters used to wash vehicles where detergents are not used;
4. Water used to control dust in accordance with Part IV.D.2.c(2) and III.D.2.c(2) of the large and small construction general permits, respectively;
5. Potable water including uncontaminated water line flushings;
6. Routine external building wash down that does not use detergents;
7. 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;
8. Uncontaminated air conditioning or compressor condensate;
9. Uncontaminated ground water or spring water;
10. Foundation or footing drains where flows are not contaminated with process materials such as solvents;
11. Uncontaminated excavation dewatering (large construction activity);
12. Landscape irrigation (large construction activity);
13. Landscape irrigation;
14. Uncontaminated ground water infiltration (large activity).

PART 9 CONTRACTOR COMPLIANCE AND CERTIFICATION

The construction Contractor shall use this SECTION as guidance on how to

prepare a construction SWPPP that includes narrative, drawings (see PART 2.5 in this section), and required worksheets. Prior to submitting the NOI(if required to be prepared per the applicable state Construction Storm Water General Permit)to the regulatory agency and all other required parties, the Contractor shall submit the operation and field specific SWPPP with a prepared and signed NOI attached for USACE review and approval.

The construction Contractor and sub-contractor shall each prepare a SWPPP CERTIFICATION. The SWPPP CERTIFICATION assures responsibility and compliance with the permitted discharges of storm water during construction. As such, the SWPPP submitted for USACE review and approval shall have a SWPPP CERTIFICATION prepared and signed by the appropriate approval authority. The USACE sharing the approved SWPPP shall prepare a SWPPP CERTIFICATION. All SWPPP certifications shall be included and retained in the SWPPP.

9.1 CONSTRUCTION SWPPP GUIDELINES

An adequate construction SWPPP includes a narrative, drawings, and required worksheets.

The narrative is a written statement to explain and justify the pollution prevention decisions made for a particular project. The narrative shall contain concise information about existing site conditions, construction phasing, BMP practices, construction schedule, and the performance the BMPs are expected to achieve, and actions to be taken if the performance goals are not achieved, and other pertinent items that may not be contained on the drawings.

The narrative shall identify all operators (see PART 1.3 in this section).

The site grading plans provide a baseline to assist in the preparation of the SWPPP drawings. The drawings shall layout various BMP types, locations, and methods of stabilization in accordance with Part IV.D.1 and III.D.1 of the LPDES General Permit for large and small construction activity, respectively, and Part 2.5 of this section.

The SWPPP shall also address the following.

- Describe the location, size, and characteristics of any wetlands, streams, or lakes that are adjacent or in close proximity to the site, and/or will receive discharges from disturbed areas of the project. Also delineate areas with high erosion potential including steep slopes.

- List Threatened and Endangered Species and Critical Habitats.
- List Cultural and Historical Resources.
- Clean Water Act Section 404 Memo or Permit Stipulations
- Septic System Permit
- Water well Permit
- Identify if concrete/asphalt plant is at site

(A batch plant may require coverage of an industrial operation permit)

- Spill Prevention and Control Measures per state or EPA and local

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requirements
- Spill Response

If available, submitting by electronic means is the most efficient process for filing an NOI, and therefore recommended. However, the physical address for NOI submission and payment can be found on the NOI form.

9.1.1 On-Site Construction Document, Signage, And Record-Keeping

A copy of each of the following shall be maintained in the USACE approved SWPPP in accordance with the LPDES General Permit.

- Contractor NOI,

- Contractor Certification of SWPPP,

- Contractor Signatory Delegation Letter,

- Contractor BMP Inspection and Maintenance Report,

- Qualification documents (e.g., training certificates) for Contractor personnel that maintain any part of the SWPPP,

- Contractor log for recording Major Construction Activities and Subsequent Stabilization Practices,

- Contractor log for describing construction materials stored on-site, their potential pollutants, and method of containment,

- Contractor log for describing waste materials stored on-site and method of storage,

- Contractor NOT (once the project is complete and the NOT is submitted),

- Contractor Concrete or Asphalt Batch Plant sampling records (if batch plant operation is being conducted),

- USACE Certification of SWPPP,

- USACE NOI,

- Contractor and the USACE storm water discharge permits after receipt from the regulatory agency.

A copy of each of the following shall be maintained in accordance with USACE requirements.

- Contractor NOT (append a blank form in the SWPPP to be completed once project is finished and approved by the USACE AOCO),

- Contractor's anticipated construction timeline schedule (that includes anticipated dates for soil disturbance),

- Contractor SWPPP Revision Log,

- The SWPPP shall contain label tabs or similar to clearly identify each item/section of the SWPPP,

- The SWPPP shall be retained at the project site at all times,

- A spill response action guide,

- Contractor SWPPP/BMP training log,

- Certification or Notification for a Drinking Water Well and/or Septic Sanitary Sewer System (if applicable).

The Contractor shall post the required items per the applicable LPDES General Permit near the main entrance of each construction access point.

All records pertaining to the Storm Water Permit for discharging water associated with construction site activities shall be maintained, by the construction Contractor, for a minimum of three (3) years from the date specified in Part V.A and Part IV.A of the LPDES General Permit for large and small construction activity, respectively.

9.1.2 Storm Water Discharge General Permit Fees And Fines For Non-Compliance

The Contractor shall be responsible for the initial Contractor storm water discharge permit NOI fee and any subsequent annual permit fees during construction (if required per the applicable state Construction Storm Water General Permit). In addition, if a batch plant is on-site, the Contractor is responsible to obtain samples of surface water discharged at the batch plant. A water sample for water quality analysis shall be analyzed by a state accredited laboratory and data shall be submitted to the regulatory agency for the batch plant operation as required by applicable permit regulations.

Any fines levied by regulatory agency regarding non-compliance with LPDES General Permit shall be the Contractor's responsibility.

9.1.3 Regulatory Inspector Visits

If the regulatory agency inspector visits the job site, the workers shall notify the Contractor Designated Storm Water Inspector immediately. The Contractor's Designated Inspector shall contact the USACE AOCO immediately and both of them shall accompany the regulatory agency inspector to walk the construction site. The Contractor's Designated Inspector shall brief workers daily on the BMP and the SWPPP, logistics of a regulatory agency inspector site visit, and avoid having an unattended regulatory agency inspector on the job site. The Designated Inspector shall assign a responsible person in his/her absence to oversight the logistic of regulatory agency inspector site visit.

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9.2 NOTICE OF TERMINATION (NOT)/COMPLETION REPORT

Notice of Termination (NOT) is applicable for construction activities that submit an NOI. A Small Construction Activity Completion Report (SCACR) is required for small construction activities. If applicable, the regulatory agency will automatically send the annual storm water permit payment notice if a NOT is not received in the data base before a set date each year. The Contractor is responsible to pay any annual fee on a construction storm water discharge permit.

At establishment of final stabilization, the Contractor shall have USACE AOCO approve the project's final stabilization as well as remove sediment and BMP sediment controls, obtain pictures of the permanently stabilized site and removal of BMP controls, and written approval from USACE AOCO. The Contractor shall prepare a NOT and submit his/her own NOT to the appropriate regulatory agency and any other applicable contacts (i.e., MS4s, cities identified in the SWPPP, etc.). The Contractor shall provide two (2) copies of the filed NOT and site photos to the USACE AOCO. The AOCO shall retain a copy of the NOT as project closure documentation and forward the other copy of NOT and photos to CESWF-PER-EE.

For all other construction activities (i.e., ones that do not require a filing of an NOT), the Contractor shall file the proper documentation to the regulatory agency and any other applicable contact (i.e., MS4s, cities identified in the SWPPP, etc.) as described in the LPDES General Permit. A copy of this document submittal shall be provided to the USACE AOCO. The AOCO shall retain a copy of the documents sent to the regulatory agency and other applicable contacts as project closure documentation and forward a copy of all the documents and photos to CESWF-PER-EE.

The Contractor is responsible for fines due to non-compliance with closure documentation for the construction activity storm water discharge permit.

9.3 NOTIFICATION TO MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4)

Not applicable.