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1.0 PROJECT OBJECTIVES

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

Comparison of Military Facilities to Civilian Facilities

Military Facility	Civilian Facility
Unaccompanied Enlisted Personnel Housing (UEPH)	Apartment

1.0.2 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.

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

1.1 SECTION ORGANIZATION

This Section is organized under 6 major "paragraphs".

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

2.0 SCOPE

2.1. UNACCOMPANIED ENLISTED PERSONNEL HOUSING (UEPH)

Provide Unaccompanied Enlisted Personnel Housing (UEPH) facilities. This project type is to house single soldiers and is intended to be similar both functionally and technically to similar housing in the private sector community surrounding the Installation.

Number of single personnel to be housed is 296

Maximum gross area 108,336 square feet.

2.2. SITE:

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

Approximate area available 5.37 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: Vending machines and Ice making machines.

2.4. FURNITURE REQUIREMENTS

A Furniture, Fixtures & Equip design and package is NOT required for this project. However, Structural Interior Design (SID) is required for all facility types regardless of the requirements for the FF&E design and package. The 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 is still required as part of the SID submittal.

2.5. NOT USED

3.0 UNACCOMPANIED ENLISTED PERSONNEL HOUSING (UEPH)

3.1. GENERAL REQUIREMENTS

The Army requires an apartment complex of two-bedroom, one-bath dwelling units with kitchen (1+1E module) similar in features, standards and layout to apartment complexes in the surrounding community. Maximize the space inside the individual dwelling units versus providing additional spaces not listed in the functional requirements in this section. Building circulation is required to be through the use of interior corridors/breezeways or garden style apartments, where circulation is minimized. Exterior egress balconies are prohibited; this does not preclude apartments designed with exterior entry landings. Choice of breezeways and exterior entry landings shall be predicated upon the weather criteria of the specific geographic area. Breezeways and exterior entry landings shall be designed to preclude snow and ice infiltration/accumulation. Building spaces and areas are as indicated in the text below. Coordinate the site design with the building described in this Section. Specific site requirements that affect the design and construction of the site appear in 01 10 00-6.0.

3.2. FUNCTIONAL AND AREA REQUIREMENTS

The overall building gross area is based on allocating each occupant 366 gross square feet for buildings up to three stories or 388 gross square feet for buildings over three stories. For Installations in Alaska the overall building gross area is based on allocating each occupant 388 gross square feet for all barracks building, irrespective of building height. The gross square feet per occupant includes the total area of all functional areas required in the building, including all dwelling units, common areas, canopies, and support areas, e.g. stairways, elevators, foyers, corridors, public toilets, janitor's closets, utility room spaces.

(a) Elevators: Provide elevators for buildings that exceed three stories only. Provide elevator system that complies with the most current editions of ASME A17.1 and ASME A17.2 in their entirety, and additional requirements specified herein. The first elevator shall be centrally located and shall have a minimum rated load-capacity of 3500 lb (1588 kg), with center opening doors and interior dimensions sized to accommodate a fully extended Emergency Medical Services (EMS) gurney and four average size adults. Gurney size shall be based on the "STRYKER Power-PRO XT" gurney. An additional elevator as specified above shall be provided for every additional one hundred (100) persons or fraction thereof, over the first two hundred (200) persons the building is designed to accommodate, unless a traffic analysis determines otherwise. Such traffic analysis shall be included in the Design Analysis. Elevator interior walls, ceiling, doors and fixtures shall have a satin No. 4 stainless steel finish. Floor finish shall be vinyl composition tile as specified in Paragraph 3.4.5.2. (b). All elevators shall be furnished with removable hanging protective pads and fixed hooks to facilitate conversion to use for moving freight.

Elevator Inspector: The Elevator Inspector shall be certified in accordance with the requirements of the most current editions of ASME A17.1 and ASME QEI-1 and licensed in elevator inspection by the State where project is located. The Certified Elevator Inspector shall inspect the installation of the elevator(s) to assure that the installation conforms with all contract requirements. The Elevator Inspector shall be directly employed by the Prime Contractor and shall be independent of the Elevator System Manufacturer and the Elevator System Installer. The Elevator Inspector shall witness the acceptance inspections and tests, approve all results and sign and certify the successful results. The Elevator Inspector, after completion of the acceptance inspections and tests, shall certify in writing that the installation is in accordance with the contract requirements. The Elevator Inspector shall bring any discrepancy, including any safety related deficiencies, to the attention of the Contracting Officer in writing, no later than three working days after the discrepancy is discovered.

(b) Gross building area definition: Gross building area is measured to the outside face of exterior enclosure walls. Gross area includes floor areas, penthouses, mezzanines, and other spaces as follows:

(1) Areas calculated as half space. Gross building area shall be calculated in accordance with Appendix Q, with the following exceptions in accordance with TI 800-01 Design Criteria – Appendix B, UEPH:

i. All stairs and elevator shafts count as half space for each floor they serve.

ii. Interior public corridors/breezeways will be calculated as half space.

(2) Excluded space: The following spaces are excluded from gross area calculations: Attic areas where average clear height does not exceed 7 feet; crawl spaces; exterior uncovered loading platforms; open courtyards; normal roof overhangs and soffits for weather protection; uncovered ramps and steps; utility tunnels; raceways; mechanical equipment platforms and catwalks.

(3) Gross area limitations: Maximum authorized gross building areas for each facility is included in this paragraph. Proposals that exceed authorized gross area limitations may be considered non-conforming.

(c) Net area definition: Net area is measured to the inside face of the room or finish walls.

(d) Net Area Requirements: Net area requirements for programmed spaces are included in this chapter. If net area requirements are not specified, the space shall be sized to accommodate the required function and to comply with code requirements, overall gross area limitations, and any other requirement of this RFP (for example, area requirements for corridors, stairs, and mechanical rooms will typically be left to the discretion of the offeror).

3.2.1. ACCESSIBILITY REQUIREMENTS

Able-bodied soldiers occupy and manage UEPH facilities. The Architectural Barriers Act (ABA) requirements do not apply to UEPH facilities, except as follows:

3.2.1.1. Site Plan Design and Construction:

- (a) Provide ABA compliant access from the parking lot to the building.
- (b) Provide two (2) ABA compliant vehicle parking stalls for each barracks building for visitor parking.
- (c) Provide handicapped vehicle parking signage and pavement markings.

3.2.1.2. Facility Design and Construction:

- (a) The main building entrance on the ground level and at least one emergency egress, designed per applicable code, shall be handicapped accessible. Electronic exterior door openers with push button control are required for handicapped accessibility.
- (b) Provide ABA clearances and door accesses in the building main entry/vestibule being used by visitors.
- (c) If a lobby is required by the RFP, provide a handicapped accessible drinking fountain in the lobby.
- (d) If a lobby is required by the RFP, provide handicapped accessible public toilet(s), which may be unisex, in the lobby area.

3.2.2. Dwelling Units:

3.2.2.1. Bedrooms: Each dwelling unit shall have two bedrooms, each with a minimum net area of 140 square feet and a maximum net area of 183 square feet. Bedrooms shall be equal in size and similar in configuration. Each bedroom shall have a walk-in closet directly adjacent. Each walk-in closet shall have a net area of 32 square feet, and shall be furnished with hanger rods and shelves. Closet shelf shall be capable of supporting a minimum of 30 pounds per linear foot. Closet shelf shall be 15 inches deep and top of shelf shall be set at 70 inches above closet finish floor. Closet rod and bracket system shall be capable of supporting a minimum of 30 pounds per linear foot. Provide a minimum of 78 linear inches of rod and shelf with no rod and shelf being less than 48 inches long. Each closet door shall have a Function (F75), Grade 1 closet latch, and be equipped with padlock eyes so the occupant can provide his/her own padlock. One padlock eye shall be mortised into and screw attached flush with door edge on the latch side of the door and the second padlock eye shall be mortised and welded flush into the inside face of the door frame jamb. Padlock eye shall be fabricated to accommodate padlock shackle up to 1/4" diameter. Padlock eye color shall match door frame color. Locate padlock eye at between 4'-6" and 5'-6" AFF. Location of padlock eyes shall be at the same height in all modules. Each closet door shall have a Type 304 satin finished, stainless steel, robe hook mounted on the closet side of the door. Each closet door shall have a 16 inches wide by 70 inches high by 1/4 inch thick, select float glass, full length mirror, in a one piece 1/2 inch by 1/2 inch by 1/2 inch Type 304 satin finished, stainless steel frame, with mitered corners, mounted on the bedroom side of the door. Bottom of mirror shall be located at 6 inches above finish floor. Bedroom shall be able to accommodate the following furniture with adequate circulation for one occupant:

- One twin bed with headboard and footboard 40" wide x 85 long".
- One entertainment center 36" wide x 25" deep x 76" high.
- One chest of drawers 36" wide x 20" deep.

- One nightstand 26" wide x 20" deep.
- One desk 60" wide x 26" deep with retractable keyboard tray and overhead study carrel.
- One desk chair 19 ½" wide by 18" deep.

3.2.2.2. Kitchen: Each dwelling unit shall have a full kitchen with adequate space and circulation to accommodate a GFGI full size refrigerator 28 inches wide, a GFGI electric oven/range 30 inches wide, with a CFCI built-in combination 30 inch wide vent hood and microwave oven, centered over the space provided for the electric range, with standard height base cabinet system, wall cabinet system and countertops for food storage and preparation. Provide a minimum of two 18 inches wide drawer units in the kitchen base cabinet system. Provide utility connections and casework to accommodate appliances listed above. Provide area for recyclables receptacle and kitchen waste receptacle. Furnish and install a single bowl stainless steel kitchen sink. Provide utility connections and casework to accommodate future installation of a dishwasher. Future dishwasher space shall be furnished with a removable built-in full width shelf dividing it into two equal spaces, and a pair of removable swing doors matching the rest of the kitchen cabinetry. Provided a minimum of twelve (12) linear feet of base cabinet systems with twelve (12) linear feet of standard height counter and twelve (12) linear feet of wall cabinet systems. Twelve (12) linear feet of standard height counter includes required sink. In addition to the twelve (12) linear feet of standard height counter, kitchen layout shall accommodate a minimum of 36 linear inches of counter style seating and dining for two people, or provide space for a 36 inch diameter dining table with two chairs outside of the kitchen area.

3.2.2.3. Bathroom: Each dwelling unit shall have one full bath, with an elongated floor mounted flush tank type vitreous china water closet, porcelain enameled cast-iron or enameled steel tub/shower, fixed shower head, lavatory/vanity with storage cabinets below, two minimum 16-inches wide by 24 inches high recessed mirrored medicine cabinet, with adjustable shelves, mounted on the backwall of the vanity. Medicine cabinet construction shall be heavy gauge steel, all welded, with a powder-coated finish. Mirror shall be ¼ inch thick select float glass in a one piece ½ inch by ½ inch by ½ inch Type 304 satin finished, stainless steel frame, with mitered corners. Provide one combination tumbler holder/tooth brush holder and one soap dish at each medicine cabinet. Install each set of tooth brush/tumbler holder and soap dish in a stack, with bottom of tooth brush/tumbler holder 6-inches above top of soap dish. Provide a minimum of two towel bars. Spray end of shower head shall be set at 78 inches above finish height of tub drain. Fiberglass or acrylic tub-surround units are required. Lavatory/vanity shall be separated from the tub/shower-water closet enclosure.

3.2.2.4. Not Used

3.2.3. Common Areas:

3.2.3.1. Lobby: Lobby shall meet the accessibility requirements stated in 01 10 00-3.2.1 above.

3.2.3.2. Public Toilet(s): Public toilets, which may be a single, unisex toilet, shall be located adjacent to the Lobby area and shall comply with the ABA accessibility requirements. If either a CQ station or a lobby is provided, a public toilet shall be included.

3.2.3.3. CQ Station: CQ station shall be located within the Lobby. CQ Station shall have a net area of 70 square feet and shall consist of a built-in reception ABA compliant counter for visitors with space for a chair. Provide a dual 8-pin modular jack outlet for voice and data connectivity. Provide two (2) 125 volt, duplex receptacles for CQ workstation. Receptacles shall be on a dedicated circuit. Provide additional lighting over CQ station to obtain a 30-footcandle illuminance level on desk top.

3.2.3.4. Centralized Laundry: Locate a minimum of one laundry room in a centralized location, on each floor of each barracks building. Interior of laundry rooms shall be visible from the corridor through glazed picture windows. Picture window glazing shall be laminated glass. Design-Build Contractor may propose an alternate solution that will provide visual monitoring of the laundry room in-lieu of using picture windows. Laundry room entry shall provide a clear opening 36 inches wide minimum. Size self-serve laundry facilities to accommodate a combined total of no fewer than one commercial washer per 12 residents on each floor and one commercial dryer per 8 residents on each floor. Washers and dryers are GFGI. Fixed heavy gauge stainless steel clothes folding/hanging tables, stainless steel utility sinks and laundry supplies vending area are required features of centralized laundry facilities. Each fixed heavy gauge stainless steel clothes folding/hanging table shall be 2'-0" deep by 5'-0" wide.

Provide one fixed heavy gauge stainless steel clothes folding/hanging table per 48 residents on each floor. Provide power receptacles for washers, dryers and laundry supplies vending machines. Provide a minimum of one convenience duplex power receptacle on each wall. Provide water and drain connections for all washers. Provide individual vent connections for all dryers. Locate laundry rooms on exterior wall so that dryer exhaust can be vented directly to the exterior.

3.2.3.5. Vending Area: Provide a minimum of one vending area centrally located on the ground floor of each barracks building. For barracks buildings higher than three stories, provide a minimum of one vending area centrally located on the ground floor of each barracks building, and a minimum of one vending area centrally located on every other floor above the ground floor of each barracks building. Provide additional ventilation/exhaust to maintain vending areas temperature at levels specified for corridors. Each Vending Area shall be sized to accommodate one ice cube machine-dispenser designed for hotel type ice bucket filling, capable of producing minimum 250 pounds of regular ice cubes in 24 hours, with 180 pound storage capacity, and one full-size vending machine per 80 – 100 residents, or space for a minimum of three full-size vending machines, whichever is greater. Provide power receptacles for vending machines and ice cube machine-dispensers. Provide water and drain connections for ice cube machine-dispensers. Provide floor drain for ice cube machine-dispensers. Locate vending areas in central locations that are easily monitored. Vending Machines and ice cube machine-dispenser shall be GFGI.

3.2.3.6. Recyclables Storage: Provide one Recyclables Storage per building. Locate the Recyclables Storage on the first floor with access to the complex trash/recyclables dumpster area. Recyclables Storage shall be fully enclosed and ventilated. Recyclables Storage shall be sized to accommodate a minimum of six (6) fifty-gallon barrel sized recyclable containers, with adequate circulation space to allow access to move each container in and out of the Recyclable Storage with a dolly, without having to move the other containers.

3.2.3.7. Janitor's Closet: Provide a minimum of one Janitor's Closet per floor. Each Janitor's Closet shall have a minimum area of 30 square feet. Each Janitor closet shall have a mop sink, mop rack, and space for buckets, vacuum and storage for janitorial supplies. Provide a minimum of six linear feet of 18 inch deep, heavy duty, stainless steel shelving for storage of janitorial supplies.

3.2.3.8. Mechanical, Electrical, and Telecommunications Rooms: Mechanical rooms shall accommodate space for equipment maintenance/repair access without having to remove other equipment. Mechanical, electrical and telecommunications rooms shall be keyed separately for access by Installation maintenance personnel. Filter changes and preventative maintenance shall be performed without requiring access to the dwelling units. First floor exterior access is required for centralized mechanical and electrical rooms. Telecommunications rooms shall comply with the requirements of ANSI/TIA/EIA-569-B. Refer to Mechanical and Electrical Sections for additional information.

3.2.3.9. Mail Access Area: A mail access area shall be designed and constructed as a part of this project. Mail access area shall include one USPS-approved combination lock type mailbox per resident, and a minimum of one USPS-approved two-key parcel locker per 40 residents. The numbering sequence shall be coordinated with the user. Mail access area shall be located on an exterior wall, protected from the elements and shall conform to the requirements of AITP UFC 4-010-01

3.2.3.10. Boot Wash:

Provide outdoor areas for soldiers to rinse mud off field gear, boots and clothing before laundering. Provide one rinsing station per 30 persons, or a minimum of one boot wash area close to each entrance, whichever is greater. Each rinsing station shall be furnished with a pedestal mounted, hosed cold water faucet or hydrant. Faucet or hydrant shall be non-freeze type.

3.2.3.11. Activity Room: Activity Room shall be sized to provide space for a 55 inch projection television, lounge seating for 25 persons and one standard size pool table with required clearances. Provide electrical and cable connections for the projection television.

3.2.3.12. Vestibule: Provide an enclosed transition space between the exterior and the lobby or building interior. Provide a minimum of 7 feet clearance between interior and exterior doors.

3.3. SITE REQUIREMENTS

3.3.1. Walks: Construct pedestrian walks within the designated construction area and connect to existing sidewalks, where applicable.

(a) Sidewalks shall be a minimum of 6 feet wide. Sidewalks designed to support emergency vehicle traffic shall be a minimum of 20 feet wide per NFPA requirements. Sidewalks designed to support service vehicle traffic shall be a minimum of 10 feet wide. Construct walks paralleling buildings beyond the eave drip line and at least 5 feet from the foundation. Restrict vehicular access to the sidewalks, as required by UFC 4-010-01.

(b) Construct non-vehicular pedestrian sidewalks of Portland Cement Concrete having a minimum nominal thickness of 4 inches. Design joint patterns uniformly, symmetrical, and in accordance with the American Association of State Highway and Transportation Officials (AASHTO) standards. For joints, do not exceed the length to width ratio of 1.25 for non-reinforced pavements.

(c) Sidewalks designed to support emergency and service vehicle traffic will be considered roadway pavements and shall be designed to meet the AASHTO standards. Construct vehicular supported walks of Portland Cement Concrete having a minimum nominal thickness of 7 inches. Design joints uniformly, symmetrical, and in accordance with AASHTO standards. Do not exceed the length to width ratio of 1.25 for non-reinforced pavements.

3.3.2. Site Structures and Amenities

Dumpster Area: The Contractor shall locate, design, and construct the dumpster enclosure area(s) and screening. Dumpster screening shall be aesthetically and architecturally compatible with the building it serves and shall be designed in accordance with the Installation's guidelines. Locate the dumpster areas in accordance with UFC 4-010-01 "DoD Minimum Antiterrorism Standards for Buildings". Position the GFGI dumpsters outside of restricted areas to allow for servicing activities.

3.3.3. Site Functional Requirements

(a) Privately Owned Vehicle (POV) Parking: The Contractor shall design and construct the POV parking, within the designated construction area. Base the location and design of the POV parking area(s) on the Installation's site constraints. The Contractor shall ensure that the location of parking complies with UFC 4-010-01. See paragraph 5.2.3, "VEHICLE PAVEMENTS", for additional information. Provide POV parking spaces for 70 percent of the personnel.

(b) Service Drives: The Contractor shall provide service drives to each building. Locate the drives in accordance with UFC 4-010-01. Restrict access to the drives, where applicable, as required by UFC 4-010-01. Design the pavements as required by paragraph 5.2.3, "VEHICLE PAVEMENTS". The minimum service drive width shall be 10 feet. The Contractor shall design and construct drives with curb and gutter when necessary for drainage purposes.

(c) Fire Access Lanes: The Contractor shall provide fire access lanes. Access must be provided to three sides, minimum. Access must be within 33 feet of a building's entrance. Design the fire access lanes in accordance with NFPA 1, UFC-3-600-01, and the installation's requirements.

3.4. ARCHITECTURAL REQUIREMENTS

3.4.1. Hardware

3.4.1.1. Not Used

3.4.1.2. Finish Hardware: All hardware shall be consistent and shall conform to ANSI/BMHA standards for Grade 1. All requirements for hardware keying shall be coordinated with the Contracting Officer. Extension of the existing Installation keying system shall be provided, the Installation keying system is Best Lock Corporation. Cores shall have not less than seven pins; cylinders shall have key-removable type cores. Disassembly of knob or lockset shall not be required to remove core from lockset. Locksets for mechanical, electrical and communications rooms only shall be keyed to the existing Installation Master Keying System. HVAC terminal units that are accessed from a central corridor shall have a deadbolt to minimize protrusion into corridor. Plastic cores are unacceptable. Provide closers for all exterior egress doors, all doors opening to corridors and as required by codes. Exit devices shall be installed on all building egress doors.

3.4.1.3. Auxiliary Hardware: Provide wall or floor stops for all exterior doors that do not have overhead holder/stops. Provide other hardware as necessary for a complete installation.

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

3.4.1.5. Key Card Access System: A Programmable Electronic Key Card Access System shall be provided on all exterior entry/egress doors, dwelling unit doors, bedroom doors and centralized laundry doors (if centralized laundries are required by RFP). Extension of the existing Installation key card access system shall be provided, the existing Installation key card access system is Onity HT-28. The minimum operability requirement is a key card access system that provides a single key card for the individual soldier, programmable to open all exterior entry/egress doors, the laundry room (if a centralized laundry is provided), the soldier's dwelling unit door, and the soldier's bedroom door. A Programmable Electronic Key Card Access System Manufacturer's Representative shall install all hardware and software necessary for the operation of the Electronic Key Card Access System and program all locksets. Provide six (6) blank key cards for each personnel each building is designed to accommodate. All blank key cards shall be serially numbered and each key card shall have its number permanently inscribed on it. The Design-Build Contractor shall furnish in three-ring binders, one full set of the system manufacturer's system training manual, system maintenance manual, and one training video (in format provided by the system manufacturer), with each system installed. The Programmable Electronic Key Card Access System Manufacturer's Representative shall provide two (2) separate 4-hour classes of training for the user on software use, programming locks, encoding cards and printing reports. Each building shall be furnished with a complete stand-alone key card system package. System shall be capable of being compartmentalized so that each building has only the capability to produce key cards for that building. Provide a two (2) year warranty on the system and all components and locksets. All special tools, software, connecting cables and proprietary equipment necessary for the maintenance, testing, and reprogramming of the system shall be furnished to the Contracting Officer Representative.

3.4.1.6. Key Card Access System Accessories: Nothing additional.

3.4.2. Special Acoustical Requirements

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

- (a) Interior partitions – STC 49
- (b) Exterior walls – STC 49
- (c) Floors separating sleeping spaces – STC 50 / IIC 55
- (d) Module entry, bedroom and bathroom doors – STC 25

3.4.2.2. Sound conditions (and levels) for interior spaces, due to the operation of mechanical and electrical systems and devices, shall not exceed levels as recommended by ASHRAE handbook criteria. Provide acoustical treatment for drain lines and other utilities to prevent noise transmission into the interior of dwelling units

3.4.3. Exterior Design Objectives

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

3.4.3.1. Exterior Walls: Where Exterior Insulation and Finish Systems (EIFS), or any other material except CMU or other Masonry material is used as exterior finish material, it shall be in conjunction with a Masonry wainscot. EIFS shall be "high-impact" type and shall be "drainable" type. Masonry units shall be tested for efflorescence.

Efflorescence testing shall conform to the provisions of ASTM C 67. CMU construction shall comply with the provisions of ASTM C 1400.

3.4.3.2. Roof System: Minimum roof slope for membrane roof systems shall be 1/4 inch per foot. Minimum roof slope for pitched roof systems shall be 3 inches per foot. Membrane roof systems shall be fully adhered. Structural standing seam metal roofs shall comply with the requirements of ASTM E 1592. Roof system shall be Underwriters Laboratory (UL 580 Class 90) rated or Factory Mutual Global (FM) I-90 rated. Roof system shall comply with applicable criteria for fire rating.

(a) Roof Mounted Equipment: For roof mounted equipment, provide permanent access walkways and platforms to protect roof. Roof mounted equipment on pitched roof systems is unacceptable. Roof mounted equipment on membrane roof systems shall be completely screened by the roof parapet.

(b) Roof access from building exterior is prohibited.

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

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

3.4.3.5. Exterior Doors and Frames:

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

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

3.4.3.6. Exterior Windows: Provide insulated, high efficiency window systems, with thermally broken frames complying with applicable codes and criteria. Each bedroom shall have at least one exterior window. Window shall meet egress requirements of NFPA 101 and International Building Code. All bedroom windows shall be sealed windows. Windows shall not open to corridor, balcony or landing. Curtain wall systems shall be capable of withstanding area wind loads, thermal and structural movement required by location and project requirements, and shall comply with applicable codes and criteria. Window sills shall be designed to discourage bird nesting.

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

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

3.4.3.9. Exterior Louvers: Exterior louvers shall have bird screens and shall be designed to exclude wind-driven rain. Exterior louvers shall be made to withstand wind loads in accordance with the applicable codes. Wall louvers shall bear the Air Movement & Control Association (AMCA) International certified ratings program seal for air performance and water penetration in accordance with AMCA 500-D and AMCA 511. Louver finish shall be factory applied.

3.4.4. Interior Design Objectives

General: Provide sustainable materials and furnishings that are easily maintained and replaced. Maximize use of daylighting. Provide interior surfaces that are easy to clean and light in color. Design barracks interior with a residential ambience.

3.4.4.1. Signage: Room signage shall conform to the Housing Automated Management System, (HOMES4). At each dwelling unit, provide two (one on each side of entry door) dwelling unit/room number and changeable two-line message strip signage. Dwelling units shall be sequentially numbered. For example, the first unit on the first floor shall be "101", first unit on the second floor shall be "201". Rooms shall be designated using the letters "A and B". The room designation is determined by standing in the corridor facing the entry door of the dwelling unit, the bedroom on the left is "A" and the one on the right is "B". The complete dwelling unit/room numbering shall be as in this example, first unit on the second floor "201A and 201B". Changeable message strip signs shall be of same construction as standard room signs to include a clear sleeve that will accept a paper or plastic insert with identifying changeable text. The insert shall be prepared typeset message photographically enlarged to size and mounted on paper card stock.

3.4.4.2. Bulletin Boards: Provide one bulletin board centrally located on all floors. Bulletin board shall be 4'-0" high and 6'-0" wide. Bulletin boards shall have a header panel and shall have lockable, glazed doors. Glazing shall be laminated glass.

3.4.4.3. Corner Guards: Provide surface mounted, high impact resistant, integral color, snap-on type resilient corner guards, extending from floor to ceiling for wall/column outside corners in high traffic areas. Factory fabricated end closure caps shall be furnished for top and bottom of surface mounted corner guards.

3.4.4.4. Chair Rail: Chair rails shall be installed in areas prone to hi-impact use, such as corridors and lobby.

3.4.4.5. Casework: Provide cabinets complying with AWI Quality Standards. Countertops shall have waterfall front edge. Bathroom, kitchen and public toilet countertops shall have integral coved backsplash. Bathroom and public toilet (if required by RFP) vanity countertop shall be minimum ½ inch thick cast 100 percent acrylic polymer solid surfacing material with waterfall front edge and integral coved backsplash.

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

3.4.4.7. Interior Doors and Frames:

(a) Wood Doors: Provide flush solid core wood doors with Grade A hardwood face veneer for transparent finish. Stile edges shall be non-finger jointed hardwood compatible with face veneer. Provide flush solid core wood doors at doors within dwelling unit. Provide flush solid core wood doors at all dwelling unit entry.

(b) Insulated Metal Doors: Comply with applicable codes and criteria. Doors shall be minimum Level 3, physical performance Level A, Model 2; factory primed. Provide insulated metal doors at utility rooms, janitor closets, module entry (if solid core insulated hollow metal door is required), and stairwell doors.

(c) Hollow Metal Frames: Comply with ANSI A250.8/SDI 100. Frames shall be minimum Level 3, 16 gauge, and shall be continuously welded, with mitered corners and seamless face joints; factory primed.

• Contractor's Option – Contractors have the option to furnish knockdown frames for closet and bathroom doors in the dwelling units. Continuously welded frames with mitered corners and seamless face joints at closets and bathroom doors in the dwelling units shall be considered betterments.

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

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

(f) Each dwelling unit entry door shall be furnished with a brass peep hole door viewer with a viewing angle of 200 degrees minimum.

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

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

3.4.4.10. Toilet Accessories: Furnish and install the items listed below and all other toilet accessories necessary for a complete and usable facility. All toilet accessories except soap dishes at tub/shower shall be Type 304 stainless steel with satin finish.

(a) Public Toilets (IF REQUIRED BY THE RFP): Toilet accessories shall conform to the requirements of the ABA and shall include, but are not limited to the following:

- (1) Glass mirrors on stainless steel frame and shelf – at each lavatory
- (2) Liquid soap dispenser – at each lavatory
- (3) Combination recessed mounted paper-towel dispenser/waste receptacle
- (4) Sanitary napkin disposal at each female/unisex toilet
- (5) Recessed mounted lockable double toilet paper holder – at each water closet.
- (6) Sanitary toilet seat cover dispenser – a minimum of one per toilet room
- (7) Grab bars – as required by ABA
- (b) Dwelling unit bathroom accessories shall at a minimum include:
 - (1) Two heavy duty towel bars – minimum 24 inches wide each
 - (2) Two recessed mounted mirrored medicine cabinets – at each lavatory. (See Section 01 10 00 Paragraph 3.2.2.3.)
 - (3) Two soap dish - at tub/shower. Soap dishes shall be molded into fiberglass or acrylic tub surround.
 - (4) One wall mounted retractable clothesline – across tub/shower
 - (5) Two combination tumbler holder/toothbrush holder – one at each medicine cabinet
 - (6) Double robe hook - on inside face of bathroom door
 - (7) Toilet paper holder – at each water closet.
 - (8) Curved shower curtain rod - extra heavy duty.
 - (9) Shower curtain – white anti-bacterial nylon/vinyl fabric shower curtain.
 - (10) Two soap dish – one at each medicine cabinet.

3.4.5. Finishes

Designers are not limited to the minimum finishes listed in this paragraph and are encouraged to offer higher quality finishes.

3.4.5.1. Minimum Paint Finish Requirements

(a) All paints used shall be listed on the "Approved product list" of the Master Painters Institute, (MPI). Application criteria shall be as recommended by Master Painters Institute (MPI) guide specifications for the substrate to be painted and the environmental conditions existing at the project site.

(b) Exterior surfaces, except factory pre-finished material or exterior surfaces receiving other finishes shall be painted a minimum of one prime coat and two finish coats. Paints having a lead content over 0.06 percent by weight of nonvolatile content are unacceptable. Paints containing zinc-chromate, strontium-chromate, mercury or mercury compounds, confirmed or suspected human carcinogens shall not be used on this project. Exterior paints and coating products shall be classified as containing low volatile organic compounds (VOCs) in accordance with

MPI criteria. Application criteria shall be as recommended by MPI guide specifications. Provide an MPI Gloss Level 5 Finish (Semi-gloss), unless otherwise specified.

(c) Interior surfaces, except factory pre-finished material or interior surfaces receiving other finishes shall be painted a minimum of one prime coat and two finish coats. Paints having a lead content over 0.06 percent by weight of nonvolatile content are unacceptable. Paints containing zinc-chromate, strontium-chromate, mercury or mercury compounds, confirmed or suspected human carcinogens shall not be used on this project. Interior paints and coating products shall contain a maximum level of 150 g/l (grams per liter) of volatile organic compounds (VOCs) for non-flat coatings and 50 g/l of VOCs for flat coatings. Provide an MPI Gloss Level 5 Finish (Semi-gloss) in wet areas and a flat finish in all other areas.

3.4.5.2. Minimum Interior Finish Requirements

(a) Wall, ceiling and floor finishes shall conform to the requirements of the IBC, NFPA and UFC 3-600-01. Where code requirements conflict, the most stringent code requirement shall apply.

(b) Carpet shall not be used as a floor finish on this project. Vinyl composition tile (VCT) shall be a minimum 1/8 inch thick, conforming to ASTM F 1066, Class 2, through-pattern tile, Composition 1, asbestos free, with color and pattern uniformly distributed throughout the thickness of the tile.

(c) Walls: All wall finish shall be minimum 5/8" painted gypsum board, except where stated otherwise. All gypsum board shall achieve a score of 10, the highest level of performance for mold resistance under the ASTM D 3273 test method. All gypsum board shall be transported, handled, stored and installed in accordance with the GYPSUM ASSOCIATION – Guidelines For Prevention Of Mold Growth On Gypsum Board (GA-238-03). Use impact resistant gypsum board in corridors, storage rooms, stairwells and activity rooms and centralized laundries (if centralized laundries are required by RFP).

(d) All ceiling finishes shall be minimum 5/8" painted gypsum board, except where stated otherwise. All gypsum board shall achieve a score of 10, the highest level of performance for mold resistance under the ASTM D 3273 test method. All gypsum board shall be transported, handled, stored and installed in accordance with the GYPSUM ASSOCIATION – Guidelines For Prevention Of Mold Growth On Gypsum Board (GA-238-03).

MINIMUM INTERIOR FINISHES														
	FLOORS					BASE			WALLS		CEILING		REMARKS	
	RESILIENT FLOORING	PORCELAIN OR QUARRY TILE	CERAMIC TILE	RECESSED ENTRY MAT	SEALED CONCRETE	RESILIENT BASE	SANITARY COVE CERAMIC BASE	PORCELAIN OR QUARRY TILE	GYPSUM BOARD PAINT	CERAMIC	GYPSUM BOARD PAINT	ACOUSTICAL CEILING TILE	MINIMUM HEIGHT	
COMMON AREAS														
LOBBY (IF REQUIRED BY RFP)		●						●	●		●	●	9'-0"	SEE NOTE 6
PUBLIC TOILET			●				●		●	●			8'-0"	SEE NOTES 2, 3 AND 5
VESTIBULES		●		●				●	●				9'-0"	
MUDROOM (IF REQUIRED BY RFP)			●				●		●	●			8'-0"	SEE NOTES 2 AND 5
BOOT WASH (IF REQUIRED BY RFP)					●								-	
ACTIVITY ROOM (IF REQUIRED BY RFP)		●						●	●		●	●	9'-0"	SEE NOTE 6

MAIL ACCESS AREA		•						•	•			•	8'-0"	IF LOCATED WITHIN BUILDING
MAIL ACCESS AREA					•								8'-0"	IF LOCATED OUTSIDE BUILDING SEE NOTE 10
STAIRS	•				•	•			•		•		8'-0"	SEE NOTE 4
CORRIDORS	•					•			•		•	•	9'-0"	SEE NOTE 6
VENDING											•		8'-0"	SEE NOTE 1
RECYCLABLES STORAGE	•					•			•		•		8'-0"	SEE NOTE 1
JANITOR CLOSETS			•				•		•	•	•		8'-0"	SEE NOTES 2 AND 5
MECHANICAL					•	•			•		•		-	SEE NOTES 5 AND 7
ELECTRICAL					•	•			•		•		-	
TELECOMMUNICATIONS					•	•			•		•			SEE NOTE 8
CENTRALIZED LAUNDRY (IF REQUIRED BY RFP)		•							•	•	•		8'-0"	SEE NOTE 5
DWELLING UNITS														
KITCHEN	•					•			•		•		8'-0"	SEE NOTE 3
BATHROOM			•				•		•	•	•		8'-0"	SEE NOTES 2 AND 3
BEDROOM	•					•			•		•		9'-0"	SEE NOTE 9
CLOSET	•					•			•		•		8'-0"	
1. FINISHES IN VENDING OR RECYCLABLES STORAGE AREA SHALL MATCH FINISHES IN ADJACENT SPACE.														
2. ALL WET WALLS SHALL HAVE A 4'-0" HIGH CERAMIC TILE WAINSCOT. BATHTUB SURROUND SHALL BE AS SPECIFIED IN PARAGRAPH 3.2.2.3.														
3. ALL KITCHEN AND BATHROOM COUNTERS SHALL HAVE A MINIMUM OF 4" HIGH BACKSPLASH.														
4. STAIR LANDING SHALL BE RESILIENT FLOORING OR SEALED CONCRETE. TREADS SHALL BE RESILIENT FLOORING OR SEALED CONCRETE, PROVIDE SLIP RESISTANT NOSING. RISERS SHALL BE PAINTED STEEL OR RESILIENT FINISH AS REQUIRED FOR STAIR CONSTRUCTION TYPE.														
5. PROVIDE FLOOR DRAIN IN CENTER OF ROOM. SLOPE FLOOR TO DRAIN IN ALL ROOMS WITH FLOOR DRAIN														
6. UP TO 50% OF CEILING AREA MAY BE ACOUSTICAL CEILING TILE. ALL ACOUSTICAL CEILING TILE SHALL BE INSTALLED WITH HOLD DOWN CLIPS TO PREVENT UPWARD MOVEMENT.														
7. PROVIDE FLOOR DRAIN IN CENTER OF ROOM. DOES NOT APPLY TO DWELLING UNIT MECHANICAL CLOSETS.														
8. COMPLY WITH THE REQUIREMENTS OF ANSI/TIA/EIA-569-B														
9. WHERE MASONRY WALLS ARE PROPOSED AS THE BEDROOM WALL FINISH SYSTEM, THE LONGEST WALL IN EACH BEDROOM SHALL BE FINISHED WITH A TACKABLE MATERIAL. TACKABLE MATERIAL SHALL BE GYPSUM BOARD AND SHALL COMPLY WITH THE REQUIREMENTS OF PARAGRAPH 3.4.5.2.(c)														
10. CEILING SHALL BE PAINTED EXPOSED STRUCTURE														

3.5. STRUCTURAL REQUIREMENTS

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

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

(Note that the minimum live loads indicated do not include partition loads. Partition live loads of 15 pounds per square foot (psf) shall be added to all areas with a live load of 80 psf or less)

- (a) Elevated floors 60 pounds per square foot (psf) minimum
- (b) Slab on grade 150 psf minimum
- (c) Centralized laundry area (if required by RFP) 150 psf, (but not less than actual equipment loads)

3.5.2. Wood frame construction is prohibited from use in all facilities 5-stories or greater

3.6. ENERGY CONSERVATION

3.6.1. Energy Compliance

The building, including the building envelope, HVAC systems, service water heating, power, and lighting systems shall be designed to achieve a non-plug load energy consumption that is at least 40% below the consumption of a baseline building meeting the minimum requirements of ANSI/ASHRAE/IESNA Standard 90.1-2007 (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.)

3.6.2. Required Energy Conservation Features

All items listed in the required 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.

3.6.3. Compliance Documentation

The required energy conservation features shown in the following tables contribute to the achievement of the above energy performance and are life cycle cost effective for a UEPH facility. Use of the required energy conservation features does not eliminate the requirement for energy analysis calculations documenting compliance. The D-B 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.

Climate Zone 3B, Energy Conservation Features Table

Item	Component	Minimum Requirements
Roof	Attic	R-40
	Surface reflectance	0.27
Walls	Light Weight Construction	R-20
Exposed Floors	Mass	R-10 c.i.
Slabs	Unheated	NR ⁽²⁾
Doors	Swinging	U-0.70
	Non-Swinging	U-1.45
Infiltration		0.25 cfm/ft ² @ 75 Pa ⁽³⁾
Vertical Glazing	Window to Wall Ratio (WWR)	10% - 20%
	Thermal transmittance	U-0.45
	Solar heat gain coefficient (SHGC)	0.31
Interior Lighting	Lighting Power Density (LPD)	0.9 W/ft ²
	Ballast	Electronic ballast
HVAC	Air Conditioner	Energy Efficient Heating and Cooling System with Associated Heating and Reheat Coil DOAS with 14 SEER DX coil (3.52 COP), Hot Gas Reheat and

		Auxiliary Heat/ Reheat Coil
	Gas Furnace	none
	ERV	70% - 75% sensible effectiveness
Economizer		yes
Ventilation	Outdoor Air Damper	Motorized control
	Demand Control	NR
	Laundry Room	Decoupled ⁽⁵⁾
Ducts	Friction Rate	0.08 in. w.c./100 feet
	Sealing	Seal class B
	Location	Interior only
	Insulation level	R-6 ⁽⁶⁾
Service Water Heating	Gas storage	90% E _t

Notes for Energy Conservation Features Table:

- (1) NOT USED
- (2) NR means there is no requirement or recommendation for a component in this climate.
- (3) Increased Building Air tightness. Building air leakage (measured in cfm/ft2) is the average volume of air(measured in cubic feet per minute) that passes through a unit area of the building envelope (measured in square feet) when the building is maintained at a specified internal pressure (measured in Pascals). Testing requirements are specified in Chapter 5..
- (4) Dedicated Outdoor Air System. A central dedicated outdoor air system (DOAS) providing the following:
 - (a) Outside air for building indoor air quality and humidity control
 - (b) Make-up air for bathroom and kitchen exhausts
 - (c) Building pressurization to prevent infiltration which allows for reduction of heating/cooling and moisture loads on the system.

NOTE: The Central DOAS does not provide sensible heating or cooling. Sensible loads are provided by a complementing heating and cooling system

- (5) **Decoupling exhaust and supply systems for laundry rooms.** To reduce unneeded energy use for heating and cooling of the make-up air and for air transportation of supply and exhausted air from the dryers, laundry exhaust and supply systems are separated in the efficient building model from the rest of the building exhaust and supply systems. Laundry exhaust system and corresponding make-up systems operate only when dryers are operating.
- (6) The duct and pipe insulation values are from the ASHRAE Advanced Energy Design Guide for Small Offices.

All design features not described above will be in accordance with the minimum requirements of ANSI/ASHRAE/IESNA Standard 90.1-2007. including conformance with paragraph 5.9.2, which requires purchase of Energy Star and FEMP designated products.

3.6.4. Schedules

The following facility schedules must be used in all facility energy simulations for purposes of documenting compliance with energy performance requirement.

UEPH Common Area Internal Load Schedules

Hr	Occupancy			Lighting			Washer/Dryer Use			Washer SHW		
	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun

Hr	Occupancy			Lighting			Washer/Dryer Use			Washer SHW		
	1-6	0.00	0.00	0.00	0.30	0.30	0.30	0.00	0.00	0.00	0.00	0.00
7-10	0.20	0.20	0.20	0.30	0.30	0.30	0.00	0.00	0.00	0.00	0.00	0.00
11-18	0.00	0.00	0.00	0.30	0.30	0.30	0.00	0.00	0.00	0.00	0.00	0.00
19	0.00	0.00	0.00	0.80	0.80	0.80	0.00	0.00	0.00	0.00	0.00	0.00
20-21	0.20	0.20	0.20	0.80	0.80	0.80	0.50	0.50	0.50	0.50	0.50	0.50
22-23	0.40	0.40	0.40	0.80	0.80	0.80	1.00	1.00	1.00	1.00	1.00	1.00
24	0.20	0.20	0.20	0.80	0.80	0.80	0.50	0.50	0.50	0.50	0.50	0.50
Peak	5 occ/floor			1.0 W/ft ² (10.8 W/m ²)			8.4 kW/floor			53.3 gal/hr/flr (202 L/hr/flr)		

UEPH Apartment Unit Internal Load Schedules

Hr	Occupancy			Lighting			Plug Loads			Service Hot Water		
	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun
1-5	0.80	0.75	0.75	0.20	0.20	0.20	0.20	0.20	0.20	0.00	0.00	0.00
6	0.70	0.65	0.75	0.40	0.30	0.20	0.20	0.20	0.20	0.10	0.10	0.10
7	0.60	0.60	0.70	0.70	0.50	0.30	0.40	0.35	0.20	0.40	0.40	0.40
8	0.50	0.50	1.00	0.50	0.50	0.50	0.40	0.40	0.40	0.20	0.20	0.20
9	0.25	0.25	0.00	0.20	0.20	0.20	0.30	0.40	0.40	0.00	0.00	0.00
10-17	0.20	0.20	0.20	0.20	0.20	0.20	0.30	0.30	0.30	0.00	0.00	0.00
18	0.30	0.30	0.30	0.50	0.50	0.50	0.50	0.50	0.50	0.10	0.10	0.10
19	0.50	0.30	0.30	0.70	0.70	0.70	0.50	0.50	0.50	0.10	0.10	0.10
20	0.50	0.50	0.50	0.70	0.70	0.70	0.60	0.50	0.50	0.10	0.10	0.10
21	0.70	0.50	0.50	0.70	0.70	0.70	0.60	0.50	0.50	0.00	0.00	0.00
22	0.70	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.00	0.00	0.00
23	0.80	0.75	0.75	0.40	0.40	0.40	0.40	0.50	0.50	0.00	0.00	0.00
24	0.80	0.75	0.75	0.20	0.20	0.20	0.20	0.20	0.20	0.00	0.00	0.00
Peak	2 occ/unit			1.1 W/ft ² (10.8 W/m ²)			1.7 W/ft ² (18 W/m ²)			40 gal/hr (114 L/hr)		

UEPH Apartment Unit Internal Load Schedules

Hr	Refrigerator			Range and Oven		
	Wk	Sat	Sun	Wk	Sat	Sun
1-6	1.00	1.00	1.00	0.01	0.01	0.01
7-16	1.00	1.00	1.00	0.04	0.04	0.04
17-18	1.00	1.00	1.00	0.05	0.05	0.05
19-20	1.00	1.00	1.00	0.11	0.11	0.11
21-23	1.00	1.00	1.00	0.10	0.10	0.10
24	1.00	1.00	1.00	0.03	0.03	0.03
Peak	76.36 W/unit			68.95 W/unit		

UEPH Apartment Unit Thermostat Set-Point Schedules

Hr	Heating (°F)			Heating (°C)			Cooling (°F)			Cooling (°C)		
	Wk	Sat	Sun									
□												
1-24	68	68	68	20	20	20	75	75	75	24	24	24

UEPH Unoccupied Zones (ie stairwells, mechanical rooms) Thermostat Set-Point Schedules

Hr	Heating (°F)			Heating (°C)		
	Wk	Sat	Sun	Wk	Sat	Sun
1-24	55	55	55	12.8	12.8	12.8

3.7. MECHANICAL REQUIREMENTS**3.7.1. Plumbing**

3.7.1.1. Water Heating: Domestic water heating system shall be sized based on 20 gallons of 110 deg. F hot water consumption per occupant during morning peak period. Peak period duration shall be 30 minutes (10 minute duration for shower and lavatory use per occupant per dwelling unit plus a 10 minute transition period). Hot water storage capacity shall be based on 75% usable storage and a storage temperature of 140 deg F. For domestic hot water pipe sizing, peak hot water flow rate shall be based on all showers flowing simultaneously at a rate of 2.0 gpm per shower. Waste stacks, building waste drains, and lift stations (if required) shall be sized with consideration of increased flow rates as well. Domestic hot water distribution shall be at 120 deg F from a central system mixing valve. Domestic hot water distribution piping shall be designed to handle up to 180 deg F water temperatures.

Maximum plumbing fixture flow rates shall be as follows:

Water closets: 1.28 gallons per flush or dual flush with an equivalent average flush volume of 1.28 gallons per flush. Water closets shall conform to Maximum Performance Testing (MaP) requirements as per most current testing report by Veritec and Koeller found at <http://www.cuwcc.org/MaPTesting.aspx>. The website includes the test report, testing protocol, and a list of tested water closets of various manufacturers. Water closets shall be able to flush a minimum 800 gram test sample with a single flush.

Showers: 1.5 gpm

Bathroom sinks: 0.5 gpm

Kitchen sinks: 1.5 gpm

Janitor sinks: 1.5 gpm

3.7.1.2. Boot Wash: Provide sand interceptors in drains from Boot Wash areas.

3.7.1.3. Laundry: Centralized Laundry facilities shall be considered commercial laundries with respect to the IPC and shall be provided with solids interceptor in accordance with the IPC. IF DRYER VENTS ARE MANIFOLDED TO A COMMON EXHAUST, PROVIDE AN EASILY ACCESSIBLE MEANS OF CLEANOUT. Dryer exhaust vent exterior terminations shall be located no closer than 15 feet from dwelling unit bedroom windows.

3.7.2. Heating, Ventilating and Air-Conditioning

3.7.2.1. All room/dwelling unit HVAC units shall be located in equipment closets accessible only through a corridor access door with keyed deadbolt. Corridor HVAC access doors shall be sized for ease of service and maintenance of HVAC units. Access for maintenance shall not require entry into the dwelling unit. Air filters shall be located in the equipment closet. All dwelling unit HVAC units shall have piping and duct connections that allow quick and easy removal and replacement of individual units.

3.7.2.2. Each dwelling unit shall be positively ventilated using dedicated outdoor air units. Dedicated outdoor air units (DOAUs) shall continuously supply dehumidified, tempered air ducted directly to each bedroom from DOAU. DOAU supply air ductwork shall not connect to dwelling unit heating/cooling unit. Supply air conditions from DOAU shall be between 68 and 75 degree F dry bulb and no greater than 48 degree F dew point. Supply quantity shall be 30 cfm per bedroom for a total of 60 cfm per dwelling unit. Dwelling unit exhaust shall be 45 cfm continuous through a bathroom exhaust. (Note: This exceeds ASHRAE 62.1 but provides compliance with IMC chapter 4 and maintains slight building positive pressurization with respect to dwelling unit exhaust rate of 45 cfm). DOAU unit shall be direct expansion (DX) type and cooling/dehumidification shall be available 24/7/365. Refer to chapter 6 for site specific constraints. The number of exhaust fans and DOAUs shall be the same, and exhaust fans and DOAUs shall be arranged for and shall include exhaust air energy recovery. Exhaust and DOAU systems shall be provided with variable frequency drives (VFDs) and shall be provided with a control logic that provides reduced ventilation rates during periods of low interior humidity and still meet minimum ASHRAE 62.1 requirements.

3.7.2.3. Corridors shall be ventilated per ASHRAE 62.1 by supply from the dedicated outdoor air unit.

3.7.2.4. Dwelling unit room temperature control shall be through the direct digital control (DDC) system. Each dwelling unit shall have a heating/cooling unit with thermostat/temperature control sensor located in common area. Occupant control will include fan selection (on/off) and an occupant temperature setpoint adjustment mechanism that allows +/- 2 deg F of adjustment from the DDC programmed set points (70 deg F heating, 75 deg F cooling). Additionally, the DDC controls shall monitor each dwelling unit for sub-cooling. The DDC system shall record an alarm event if the space temperature drops below 71 degree F (adjustable) when the outside air is greater than 85 degree F (adjustable). Occupant control shall also include ability to select heating or cooling mode. HVAC system shall be able to provide for year round heating or cooling in individual dwelling units as selected by the occupants.

3.7.2.5. Kitchen range hoods shall be the U.L. listed ducted to building exterior type.

3.8. ELECTRICAL REQUIREMENTS

Select electrical characteristics of the power system to provide a safe, efficient, and economical distribution of power based upon the size and types of loads to be served. Use distribution and utilization voltages of the highest level that is practical for the load to be served. The effect of nonlinear loads such as computers, other electronic equipment and electronic ballasts shall be considered and accommodated as necessary. Voltage drop shall not exceed the maximum allowed per ASHRAE 90.1. Transient voltage surge protection shall be provided on service equipment. Bedrooms shall be considered to be living and sleeping rooms, therefore they are to be considered to be part of a dwelling unit per NFPA 70.

3.8.1. Interior Lighting

Interior lighting controls shall be provided in accordance with ASHRAE 90.1. Compact fluorescent lamps of 12 watts or less shall not be used. Electronic ballasts for linear fluorescent lamps shall be the high efficiency programmed start type. Provided lighting levels shall be within +/- 10% of required lighting levels.

3.8.1.1. Lighting level in bedrooms shall be 15 foot-candles. Lighting shall utilize compact fluorescent fixtures with manual on/off switching.

3.8.1.2. Lighting level in laundry room(s) shall be 30 foot-candles. Lighting shall have automatic occupancy sensor detection switching.

3.8.1.3. Lighting level in lobbies (if required by the RFP) shall be 10 foot-candles. Lighting in common areas such as corridors and lobbies shall have automatic occupancy sensor detection switching. Sensors in corridors shall be wired such that only the lighting fixtures within the activation range of a particular sensor shall turn on

3.8.1.4. Lighting level in kitchen areas shall be 30 foot-candles with automatic occupancy sensor detection switching. Switching shall be manual-ON/Automatic OFF. Counter top task lighting shall be installed under cabinets utilizing fixtures with 2 foot linear T8 fluorescent lamps with manual on/off switching. Task lighting switching shall be separate from general lighting switching.

3.8.1.5. Lighting level in mechanical and electrical rooms shall be 30 foot-candles. Lighting shall utilize fixtures with T8 fluorescent lamps with manual on/off switching.

3.8.1.6. Provide an illuminance level of 20-footcandles and automatic occupancy sensor detection switching to control fixture(s) in the mudroom (if mudroom is provided).

3.8.1.7. If mail is distributed from an exterior kiosk or through an exterior wall provide a minimum illuminance level of 5-footcandles.

3.8.1.8. Provide compact fluorescent light fixture with automatic occupancy sensor detection switching in each walk-in closet. Switching shall be manual-ON/Automatic OFF.

3.8.2. Interior Power

Power shall be provided for all installed equipment requiring power to include convenience receptacles and government furnished government installed equipment. Panelboards located in accessible areas, shall be lockable and keyed to one master key.

3.8.2.1. In addition to the requirements of NFPA 70 for dwelling units, a duplex receptacle shall be mounted adjacent to the CATV outlet.

3.8.2.2. Provide a minimum of one 125 volt duplex receptacle on each wall within the lobby (if lobby is provided) for housekeeping purposes.

3.8.2.3. Provide a minimum of one 125 volt duplex receptacle per corridor for housekeeping. No point along a corridor wall at 18" above finished floor shall be more than 25 feet from a receptacle.

3.8.2.4. Provide a minimum of two 125 volt duplex receptacles in mechanical rooms in addition to those required by NFPA 70. This requirement does not apply to the small mechanical rooms used for individual dwelling units. In addition, provide a minimum of one 125 volt duplex receptacle in each electrical room.

3.8.2.5. Electrical service shall be provided for electric dryers regardless of whether or not electric dryers are to be used.

3.9. TELECOMMUNICATIONS REQUIREMENTS

Telecommunications outlets shall be provided per the applicable criteria based on functional purpose of the space within the building.

3.10. CABLE TV (CATV) REQUIREMENTS

All CATV outlet boxes, connectors, cabling, and cabinets shall conform to applicable criteria unless noted otherwise. All horizontal cabling shall be homerun from the CATV outlet to the nearest telecommunications room unless indicated otherwise. See paragraph 6 for possible additional requirements.

3.11. FIRE ALARM REQUIREMENTS

3.11.1.1. All software, software locks, special tools and any other proprietary equipment required to maintain, add devices to or delete devices from the system, or test the Fire Alarm system shall become property of the Government and be furnished to the Contracting Officer's Representative prior to final inspection of the system.

3.11.1.2. The fire alarm system installation shall be supervised by a National Institute for Certification of Engineering Technologies (NICET) Level 3 (minimum) technician.

3.11.1.3. Smoke detectors shall be provided in all bedrooms. Smoke detectors in bedrooms shall be monitored. Tampering with a smoke detector shall send a trouble signal. Trouble signals shall be transmitted to the fire department.

4.0 APPLICABLE CRITERIA

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

4.1. INDUSTRY CRITERIA

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

Table 1: Industry Criteria

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

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

American National Standards Institute 11 (ANSI)	
ANSI Z21.10.1	Gas Water Heaters Vol. 1, Storage water Heaters with Input Ratings of 75,000 Btu per Hour or less
ANSI Z124.3	American National Standard for Plastic Lavatories
ANSI Z124.6	Plastic Sinks
ANSI Z21.45	Flexible Connectors of Other Than All-Metal Construction for Gas Appliances
ANSI/IEEE C2-2007	National Electrical Safety Code
ANSI/AF&PA NDS-2001	National Design Specification for Wood Construction
American Society of Civil Engineers (ASCE)	
ASCE 7	Minimum Design Loads for Buildings and Other Structures
ASCE 37	Design and Construction of Sanitary and Storm Sewers, Manuals and Reports on Engineering Practice [sanitary sewer and storm drain design criteria]
ASCE/SEI 31-03	Seismic Evaluation of Existing Buildings [Existing Building Alteration/Renovation]
ASCE/SEI 41-06	Seismic Rehabilitation of Existing Buildings [Existing Building Alteration/Renovation]
American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)	
ASHRAE 90.1	ANSI/ASHRAE/IESNA 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings
ASHRAE Guideline 0	The Commissioning Process
ASHRAE Guideline 1.1	The HVAC Commissioning Process
ASHRAE Handbooks	Fundamentals, HVAC Applications, Systems and Equipment, Refrigeration (Applicable, except as otherwise specified)
ASHRAE Standard 15	Safety Standard for Refrigeration Systems
ASHRAE Standard 62.1	Ventilation for Acceptable Indoor Air Quality

ASHRAE Standard 55	Thermal Environmental Conditions for Human Occupancy (Design portion is applicable, except where precluded by other project requirements.)
American Society of Mechanical Engineers International (ASME)	
ASME BPVC SEC VII	Boiler and Pressure Vessel Code: Section VII Recommended Guidelines for the Care of Power Boilers
ASME A17.1	Safety Code for Elevators and Escalators
ASME B 31 (Series)	Piping Codes
American Water Works Association (AWWA)	
	Standards [standards for water line materials and construction]
American Welding Society	
	Welding Handbook
	Welding Codes and Specifications (as applicable to application, see International Building Code for example)
Architectural Woodwork Institute (AWI)	
Latest Version	AWI Quality Standards
Associated Air Balance Council (AABC)	
AABC MN-1	National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems
	AABC Associated Air Balance Council Testing and Balance Procedures
ASTM International	
ASTM C1060-90(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	The Various BHMA American National Standards
Building Industry Consulting Service International	
	Telecommunications Distribution Methods Manual (TDMM)
	Customer-Owned Outside Plant Design Manual (CO-OSP)
Code of Federal Regulations (CFR)	
49 CFR 192	Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards
10 CFR 430	Energy Conservation Program for Consumer Products
Consumer Electronics Association	
CEA 709.1B	Control Network Protocol Specification
CEA 709.3	Free-Topology Twisted-Pair Channel Specification
CEA 852	Tunneling Component Network Protocols Over Internet Protocol Channels
Electronic Industries Association (EIA)	
ANSI/EIA/TIA 568	Structured Cabling Series
ANSI/EIA/TIA 569	Commercial Building Standard for Telecommunications Pathways and Spaces (includes ADDENDA)
ANSI/TIA/EIA-606	Administrative Standard for the Telecommunications Infrastructure of Commercial Buildings
J-STD EIA/TIA 607	Commercial Building Grounding and Bonding Requirements for Telecommunications
Federal Highway Administration (FHWA)	
	Manual on Uniform Traffic Control Devices for Streets and Highways [signage and pavement markings for streets and highways]
FHWA-NHI-01-021	Hydraulic Engineering Circular No. 22, Second Edition, URBAN DRAINAGE DESIGN MANUAL

Illuminating Engineering Society of North America (IESNA)	
IESNA RP-1	Office Lighting
IESNA RP-8	Roadway Lighting
IESNA Lighting Handbook	Reference and Application
Institute of Electrical and Electronics Engineers Inc. (IEEE)	
	Standard for Use of the International System of Units (SI): the Modern Metric System
Standard 1100	Recommended Practice for Powering and Grounding Sensitive Electronic Equipment
International Code Council (ICC)	
IBC	<p>International Building Code</p> <p>Note: All references in the International Building Code to the International Electrical Code shall be considered to be references to NFPA 70.</p> <p>All references in the International Building Code to the International Fuel Gas Code shall be considered to be references to NFPA 54 and NFPA 58.</p> <p>All references in the International Building Code to the International Fire Code and Chapter 9 shall be considered to be references to Unified Facilities Criteria (UFC) 3-600-01.</p>
IMC	<p>International Mechanical Code –</p> <p>Note: For all references to “HEATING AND COOLING LOAD CALCULATIONS”, follow ASHRAE 90.1</p> <p>Note: For all references to “VENTILATION”, follow ASHRAE 62.1</p>
IRC	International Residential Code
IPC	International Plumbing Code
IEC	Energy Conservation Code (IEC) –Applicable only to the extent specifically referenced herein. Refer to Paragraph 5, ENERGY CONSERVATION requirements.
IGC	International Gas Code - not applicable. Follow NFPA 54, National Fuel Gas Code and NFPA 58, Liquefied Petroleum Gas Code.

International Organization for Standardization (ISO)	
ISO 6781:1983	Qualitative detection of thermal irregularities in building envelopes – infrared method
LonMark International (LonMark)	
LonMark Interoperability Guidelines	(available at www.lonmark.org), including: Application Layer Guidelines, Layer 1-6 Guidelines, and External Interface File (XIF) Reference Guide
LonMark Resource Files	(available at www.lonmark.org), including Standard Network Variable Type (SNVT) definitions
Metal Building Manufacturers Association (MBMA)	
	Metal Building Systems Manual
Midwest Insulation Contractors Association (MICA)	
	National Commercial and Industrial Insulation Standards Manual
National Association of Corrosion Engineers International (NACE)	
NACE RP0169	Control of External Corrosion on Underground or Submerged Metallic Piping Systems
NACE RP0185	Extruded, Polyolefin Resin Coating Systems with Adhesives for Underground or Submerged Pipe
NACE RP0285	Corrosion Control of Underground Storage Tank Systems by Cathodic Protection
NACE RP0286	Electrical Isolation of Cathodically Protected Pipelines
National Electrical Manufacturers Association (NEMA)	
National Environmental Balancing Bureau (NEBB)	
	Procedural Standards Procedural Standards for Testing Adjusting Balancing of Environmental Systems
National Fire Protection Association (NFPA)	
NFPA 10	Standard for Portable Fire Extinguishers
NFPA 13	Installation of Sprinkler Systems

NFPA 13R	Residential Occupancies up to and Including Four Stories in Height Sprinkler Systems
NFPA 14	Standard for the Installation of Standpipes and Hose Systems
NFPA 20	Installation of Centrifugal Fire Pumps
NFPA 24 NFPA 25	Standard for the Installation of Private Fire Service Mains and Their Appurtenances [underground fire protection system design] Inspection, Testing And Maintenance Of Water-Based Fire Protection Systems
NFPA 30	Flammable and Combustible Liquids Code
NFPA 30A	Motor Fuel Dispensing Facilities and Repair Garages
NFPA 31	Installation of Oil Burning Equipment
NFPA 54	National Fuel Gas Code
NFPA 58	Liquefied Petroleum Gas Code
NFPA 70	National Electrical Code
NFPA 72	National Fire Alarm Code
NFPA 76	Fire Protection of Telecommunications Facilities
NFPA 80	Standard for Fire Doors and Fire Windows
NFPA 90a	Installation of Air Conditioning and Ventilating Systems
NFPA 96	Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations
NFPA 101	Life Safety Code
NFPA 780	Standard for the Installation of Lightning Protection Systems
National Roofing Contractor's Association (NRCA)	
	Roofing and Waterproofing Manual
National Sanitation Foundation, International	

NSF/ANSI Std. 2, 3, 4, 5, 6, 7, 8, 12, 13, 18, 20, 21, 25, 29, 35, 36, 37, 51, 52, 59, 169	Food Equipment Standards
ANSI/UL Std. 73, 197, 471, 621, 763	Food Equipment Standards
CSA Std. C22.2 No. 109, 120, 195	Food Equipment Standards
Occupational Safety and Health Administration (OSHA)	
Title 29, Part 1926	OSHA Construction Industry Standards, Title 29, Code of Federal Regulations, Part 1926, Safety and Health Regulations for Construction
Plumbing and Drainage Institute (PDI)	
PDI G 101	Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data
PDI WH201	Water Hammer Arrestors
Precast Concrete Institute	
PCI Design Handbook	Precast and Prestressed Concrete
Sheet Metal and Air Conditioning Contractor's National Association (SMACNA)	
SMACNA HVAC Duct Construction Standards	HVAC Duct Construction Standards - Metal and Flexible
SMACNA Architectural Manual	Architectural Sheet Metal Manual
SMACNA HVAC TAB	HVAC Systems - Testing, Adjusting and Balancing
State/Local Regulations	
	State Department of Transportation Standard Specifications for Highway and Bridge Construction
	Sedimentation and Erosion Control Design Requirements
	Environmental Control Requirements
	Storm Water Management Requirements

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

Projects

4.2. MILITARY CRITERIA

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

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

4.2.11.1. Draft Guide Specification for Section 27 05 28 PROTECTIVE DISTRIBUTION SYSTEM (PDS) FOR SIPRNET COMMUNICATIONS SYSTEMS, found at https://rfpwizard.cecer.army.mil/HTML/docs/Refs/SECTION_270528-v3.pdf

5.0 GENERAL TECHNICAL REQUIREMENTS

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

5.1. SITE PLANNING AND DESIGN

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

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

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

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

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

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

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

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

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

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

5.2. SITE ENGINEERING

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

5.2.2. SOILS:

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

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

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

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

5.2.3.2. Parking Requirements.

(a) All handicap POV parking lots (where applicable in the facility specific requirements) shall meet the ADA and ABA Accessibility Guidelines for accessible parking spaces.

(b) Design POV parking spaces for the type of vehicles anticipated, but shall be a minimum of 9 ft by 18 ft for POVs, except for two wheel vehicles.

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

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

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

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

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

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

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

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

5.3. ARCHITECTURE AND INTERIOR DESIGN:

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

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

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

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

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

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

5.3.5. BUILDING INTERIOR

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

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

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

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

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

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

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

5.3.6. COMPREHENSIVE INTERIOR DESIGN

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

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

5.4. STRUCTURAL DESIGN

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

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

5.4.3. LOADS: See paragraph 3 for facility specific (if applicable) and paragraph 6 for site and project specific structural loading criteria. Unless otherwise specified in paragraph 6, use Exposure Category C for wind. If not specified, use Category C unless the Designer of Record can satisfactorily justify another Exposure Category in its design analysis based on the facility Master Plan. Submit such exceptions for approval as early as possible and prior to the Interim Design Submittal in Section "Design After Award". Design the ancillary building items, e.g. doors, window jambs and connections, overhead architectural features, systems and equipment bracing, ducting, piping, etc. for gravity, seismic, lateral loads and for the requirements of UFC 4-010-01, DOD Minimum Antiterrorism Standards for Buildings. Ensure and document that the design of glazed items includes, but is not limited to, the following items under the design loads prescribed in UFC 4-010-01:

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

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

5.5. THERMAL PERFORMANCE

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

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

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

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

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

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

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

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

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

5.5.2.8. Provide a motorized damper in the closed position and connected to the fire alarm system to open on call and fail in the open position for any fixed open louvers at elevator shafts. Coordinate the motorized elevator hoistway vent damper(s) with the Fire Protection System design in paragraph 5.10. Ensure that the damper(s) is accessible to facilitate regular inspection and maintenance.

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

5.5.2.10. 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) Develop an Air Barrier Quality Control plan to assure that a competent air barrier inspector/specialist inspects the critical components prior to them being concealed. At a minimum, three onsite inspections are required during construction to assure the completeness of the construction and design.

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

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

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

5.6. PLUMBING

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

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

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

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

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

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

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

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

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

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

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

5.7. ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

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

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

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

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

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

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

5.7.5.1. Interior Lighting:

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

- (b) High Efficiency Fluorescent Lighting: Utilize NEMA premium electronic ballasts and energy efficient fluorescent lamps with a Correlated Color Temperature (CCT) of 4100K. Linear fluorescent and compact fluorescent fixtures shall have a Color Rendering Index of (CRI) of 87 or higher. Fluorescent lamps shall be the low mercury type qualifying as non-hazardous waste upon disposal. Do not use surface mounted fixtures on acoustical tile ceilings. Provide an un-switched fixture with emergency ballast shall be provided at each entrance to the building.
- (c) Solid State Lighting: Fixtures shall provide lighting with a minimum Correlated Color Temperature (CCT) of 4100K and shall have a Color Rendering Index of (CRI) of 75 or higher. Verify performance of the light producing solid state components by a test report in compliance with the requirements of IESNA LM 80. Verify performance of the solid state light fixtures by a test report in compliance with the requirements of IESNA LM 79. Provide lab results by a NVLAP certified laboratory. The light producing solid state components and drivers shall have a life expectancy of 50,000 operating hours while maintaining at least 70% of original illumination level. Provide a complete five year warranty for fixtures.
- (d) Metal Halide Lighting (where applicable): Metal Halide lamp fixtures in the range of 150-500 Watts shall be pulse start type and have a minimum efficiency rating of 88%.
- (e) Lighting Controls: ANSI/ASHRAE/IESNA 90.1 has specific lighting controls requirements. Provide a high level of lighting system control by individual occupants or by specific groups in multi-occupant spaces (classrooms, conference rooms) to promote the productivity, comfort and well being of the building occupants. In office spaces, the preferred lighting should be a 30 FC ambient lighting level with occupancy sensor controlled task lighting in the work spaces to provide a composite lighting level of 50 FC on the working surfaces. Consider incorporating daylighting techniques for the benefit of reducing lighting energy requirements while improving the quality of the indoor spaces. If daylight strategies are used, additional coordination is required with the architect and mechanical engineer. Additionally, incorporate electric lighting controls to take advantage of the potential energy savings.
- (f) Exterior Lighting: See paragraph 6.9 for site specific information, if any, on exterior lighting systems. Minimize light pollution and light trespass by not over lighting and use cut-off type exterior luminaries.

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

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

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

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

necessary corrective actions to ensure that the government receives a fully operational, standards based, code compliant telecommunications system.

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

5.8. HEATING, VENTILATING, AND AIR CONDITIONING

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

5.8.2. DESIGN CONDITIONS.

5.8.2.1. Outdoor and indoor design conditions shall be in accordance with UFC 3-410-01FA. Outdoor air and exhaust ventilation requirements for indoor air quality shall be in accordance with ASHRAE 62.1. All Buildings with minimum LEED Silver requirement (or better) will earn LEED Credit EQ 7.1, Thermal Comfort-Design., except where precluded by other project requirements. Where the contract specifies indoor design temperature, airflow, humidity conditions, etc., use those parameters.

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

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

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

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

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

5.8.3. BUILDING AUTOMATION SYSTEM. The Building Automation System (BAS) shall be a single complete non-proprietary Direct Digital Control (DDC) system for control of the heating, ventilating and air conditioning (HVAC) and other building systems. The BAS shall be based on an Open implementation of BACnet using ASHRAE 135-2004 exclusively as the communications protocol for communication between DDC Hardware devices to allow multi-vendor interoperability. The building BAS shall include integration to a basewide supervisory monitoring and control (M&C) system.

5.8.3.1. The 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 hardware vendor or their agents. This includes, but is not limited to the following:

- Hardware shall be installed such that individual control equipment can be replaced by similar control

equipment from other equipment manufacturers with no loss of system functionality.

- Necessary documentation (including rights to documentation and data), configuration information, configuration tools, application programs (with comments explaining program logic), application source code for programmable controllers, drivers, and other software shall be licensed to and 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:

- Be connected to a ASHRAE 135 MS/TP control network.
- Implement all required functionality of the application network interface via BACnet objects, properties, and services
- Shall conform to basewide addressing schemes, particularly with regard to Device ID.
- Minimize the use of proprietary BACnet objects and properties
- Not use any of the following BACnet services for application control functionality or communication:
 - AtomicFile or AtomicFileWrite
 - ConfirmedTextMessage or UnconfirmedTextMessage
 - ConfirmedPrivateTransfer or UnconfirmedPrivateTransfer
- Communicate over the control network via ASHRAE 135 exclusively.
- Conform to the BACnet Testing Lab's Device Implementation Guidelines.
- Be capable of responding to Who-Is/I-Am and Who-Has/I-Have service requests.
- All settings and parameters used by the application shall be fully configurable:
 - to the greatest extent possible, via properties of BACnet objects that can be written to via BACnet services.
 - via properties of BACnet objects that can be written to via BACnet services for the following
- Setpoint
- Alarm limit
- Schedule modification
- Trend modification
 - All other settings and parameters that can not be written to via BACnet services shall be fully configurable via either:
- Properties of BACnet objects that can be written to with a configuration tool, or
- Hardware settings on the controller itself to support the application.
- Provide BACnet objects, properties, and services required to support the application and supervisory monitoring and control functionality including:
 - System start/stop and overrides.
 - Scheduling
 - Alarming
 - Trending
- To the greatest extent practical, not rely on the control network to perform the application
- Be BTL Listed

5.8.3.3. Include any device capable of communicating over IEEE 802.3 (Ethernet) in a DIACAP and Certificate of Networthiness (CoN) for this installation, regardless of whether the Ethernet connection is active at time of installation. Do not use devices with Ethernet connection capability not included in a DIACAP or without a DIACAP or without a CoN shall not be used.

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

5.8.3.5. Not Used

5.8.3.6. Perform all necessary actions needed to fully integrate the ASHRAE 135-based building control system to the UMCS. These actions include but are not limited to:

- Install BACnet MS/TP-to-IP routers and/or BACnet/IP Broadcast Management Devices (BBMD) in accordance with ASHRAE 135 Annex J as needed to connect the building control network to the UMCS IP network. Devices shall be capable of configuration via DHCP and Write-Broadcast-Distribution-Table messages but shall not

rely on these services for configuration. All communication between the UMCS and building networks shall be via BACnet/IP and in accordance with ASHRAE 135. Any IP network work including access to existing networks shall be coordinated with the installation Network Enterprise Center (NEC).

- Configure M&C Software functionality including: graphical pages for System Graphic Displays including overrides, alarm handling, scheduling, trends for critical values needing long-term or permanent monitoring via trends, and demand limiting.
- Configure M&C software to provide hierarchically arranged screens to allow operator to configure (via BACnet services to the appropriate objects) all devices on the installation BACnet internetwork. The following adjustments shall be supported:
 - Setpoints
 - Alarm limits
 - Schedules
 - Trends

This requirement is separate from and in addition to the requirement to provide all necessary programming and configuration software.

5.8.3.7. Perform all necessary actions needed to integrate legacy systems to the UMCS. Configure M&C Software functionality including: graphical pages for System Graphic Displays including overrides, alarm handling, scheduling, trends for critical values needing long-term or permanent monitoring via trends, and demand limiting. Integration may be via drivers in the M&C Software or hardware gateways may be provided. Where hardware gateways are provided, include all hardware, software, software licenses, and configuration tools required for gateway operation, modification, and maintenance. Configure software driver or a hardware gateway to support M&C software functionality as listed above.

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

- The latest version of all software including source code for application software (for programmable controllers), software licenses, 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 for each device:
 - Device ID and network address (MS/TP network and MAC address, or IP address).
 - Input and Output Objects including Name, Type, Description, and relevant supported or required Properties.
 - Hardware I/O, including Type (AI, AO, BI, BO) and Description.
 - Alarm information including alarm limits and BACnet device IDs, object IDs, and property information.
 - Supervisory control information including BACnet device IDs, object IDs, and properties for trending and overrides.
 - Objects and Properties needed for device configuration.
 - Device IDs and objects (where applicable) of remote devices and objects that communicate with the given Device (e.g. clients and servers for BACnet services used by the given device).
 - 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 BACnet Device IDs, BACnet network addresses, network names, and locations.
- A consolidated list of all Device IDs.
- Control System Schematic diagram and Sequence of Operation for each controlled 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.
- Quality Control (QC) checklist (below) completed by the Contractor's Chief Quality Control (QC) Representative

Table 5-1: QC Checklist

5.8.3.9. 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.

5.8.3.10. 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.

5.8.3.11. 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.

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

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

5.9. ENERGY CONSERVATION

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

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

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

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

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

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

5.10. FIRE PROTECTION

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

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

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

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

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

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

5.11. SUSTAINABLE DESIGN

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

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

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

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

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

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

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

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

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

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

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

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

5.13. SECURITY (ANTI-TERRORISM STANDARDS): Unless otherwise specified in Project Specific Requirements, only the minimum protective measures as specified by the current Department of Defense Minimum

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

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

6.0 PROJECT SPECIFIC REQUIREMENTS

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.

Provide and install only gas-fired cooktops in the facility. This requirement supersedes the requirements of Section 01 10 00.3.2.2.2.

6.3. SITE PLANNING AND DESIGN

6.3.1. General:

Coordinate Site Planning and Design with the Land Development Engineer (LDE) and USACE for compliance with program intent. Perform Site Work in accordance with the "UEPH Barracks White Sands Missile Range Design Package 107" drawings and specifications, hereinafter referred to as "Site Package," included as a separate attachment. Limits of construction are as shown in the Site Package.

6.3.1.1. The DB Contractor is responsible for all site preparation required to accommodate the proposed foundation design.

6.3.1.2 The Site Exhibits in Appendix J include a plan showing an area adjacent to the building labeled "Building Envelope." The landscaping and hardscape within this Building Envelope are to be used for bidding purposes but may be revised to accommodate the final building footprint, subject to approval by the Government. The DB Contractor is responsible for any costs associated with changes to the site design resulting from deviations between the DB Contractor's final building design and the building design shown in the RFP. Appendix AA contains excerpts from the "Engineers Battalion GTF" Infrastructure Plans, included for reference only.

6.3.1.3 Do not waste excess soil within the project site limits; deposit waste material as indicated in the Site Package.

6.3.1.4. Coordination. Coordinate between the Land Development Engineer (LDE) and USACE regarding issues relating to site and facility design and functionality.

6.3.2. Site Structures and Amenities

Provide site structures and amenities as indicated in the Site Package.

6.3.3. Site Functional Requirements:

6.3.3.1. Stormwater Management (SWM) Systems.

(a) Storm Water Management – The Environmental Protection Agency (EPA) Region VI oversees the Storm Water Sediment and Erosion Control Management Plan for the installation. Comply with requirement of the EPA Region VI National Pollutant Discharge Elimination System (NPDES) Permit Program. Provide and maintain a pollution

prevention plan, which is to be coordinated with the overall Storm Water Pollution Prevention Plan (SWPPP). Provide and maintain the SWPPP over the life of the project. Construction activities (greater than 1 acre) in New Mexico are conducted under the EPA Region IV Construction General Permit (FRL-8690-8, EPA-HQ-OW-2008-0238). Construction site operators meeting the definition in the permits of primary or secondary operator must comply with the appropriate state construction general permit. D-B Contractor shall coordinate pollution prevention plan requirements with the WSMR Directorate of Public Works, US Army Corps of Engineers, the Land Development Engineer, the WMSR UEPH D/B Contractor, or other entities meeting the definition.

(b) Graded Slope and Fills: The angle for graded slopes and fills shall be no greater than the angle that can be retained by vegetative cover or other adequate erosion control devices or structures generally not to exceed 4:1 slope. In any event, slopes left exposed will, within 21 calendar days of completion of any phase of grading, be planted or otherwise provided with temporary or permanent ground cover, devices, or structures sufficient to restrain erosion. The angle for graded slopes and fills must be demonstrated to be stable. Stable is the condition where the soil remains in its original configuration, with or without mechanical constraints.

(c) Land Disturbing Activity: Whenever land-disturbing activity is undertaken on previously-undisturbed land, the person conducting the land-disturbing activity shall install plant or otherwise provide a permanent ground cover per Blue Grama, 11.25 Kg/ha of Pure Live Seed, unhulled, for erosion control. Where disturbance occurs on parking areas or other site structures, return the structures to their condition prior to the disturbance.

(d) The finished grades adjacent to the new building will be a minimum of 6" below finished floor except where grades are required on walk ways and entrances to buildings that are handicap accessible. Finish grades will slope away from the building at 5% for the first 10 feet and then will slope at a minimum of 1% to existing or new storm drainage. A preferred minimum gradient of 1.0 percent shall be used in all parking areas. The maximum gradient used parallel from front to rear of a space shall be 5 percent and from side to side (width of the space) shall be 1 ½ percent. (If parking is required.)

6.3.3.2. Erosion and Sediment Control

No additional requirements.

6.3.3.3. Vehicular Circulation.

All parking areas, roads and service and/or emergency vehicle access drives shall be designed in accordance with AASHTO: A Policy of Geometric Design of Highways and Streets.

6.4. SITE ENGINEERING

6.4.1. Existing Topographical Conditions

The existing site survey for the WSMR Engineering Battalion UEPH is included in Appendix J. The existing site survey for the Complex is included as Appendix C. Within 30 days of Notice to Proceed, conduct a site survey to establish survey control points and a coordinate system, based on UTM 13N, WGS84. Identify horizontal and vertical data used. Bring any discrepancies which are found in the existing surveys to the attention of the Contracting Officer within 30 days of Notice to Proceed.

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

6.4.2.1. Borings, a boring location map, and the raw data on the subsurface conditions as described in Section 01 10 00, Section 5.2.2 are furnished as part of the RFP. Appendix J shows the boring locations overlaid on the rough grading plan. Geotechnical data and boring logs are provided for informational purposes only.

6.4.2.2 Time and weather conditions may affect the actual condition of the building site, therefore, the Design Build Contractor shall accept the site as is and shall be solely responsible for all final building site preparation including rework of subgrade, placement of select fill (if necessary), and any testing required to accommodate the Design Build Contractor's proposed foundation as required by the Design Build Contractor's final geotechnical report.

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.

No additional requirements.

6.4.4. Pavement Engineering and Traffic Estimates:

No additional requirements.

6.4.5. Traffic Signage and Pavement Markings

Comply with the most current MUTCD (Manual on Uniform Traffic Control Devices.) MUTCD can be downloaded at HYPERLINK "<http://mutcd.fhwa.dot.gov/>"<http://mutcd.fhwa.dot.gov/> .

6.4.6. Base Utility Information

6.4.6.1. Temporary Utilities: Existing and permanent utility systems are shown in Appendix J and Appendix AA. Coordinate temporary utilities on site as needed. Hydrants may be used as water point sources for construction. Until electrical utilities are constructed to the project site, provide generators and any required permits for each generator for on-site electrical service. Once utilities are constructed on the project site, arrange for and bear the cost of temporary electrical power and water service. Make requests for temporary electrical power and water service, including installation of construction meters, through DPW.

6.4.6.2. Permanent Utilities:

6.4.6.3. General: Connect all utilities from the trunk lines to the building. Existing Site Utilities are shown in Appendix J and Appendix AA. All utility systems (with the exception of Cable TV) are owned by the Installation.

Provide final building electrical loads and voltage requirements to the Government no later than 45 days prior to beginning building construction. Primary conduits, conductors, and transformers are existing. Connect from the secondary side of the transformer(s) to the building, including providing, installing, and connecting to the electric meter.

Provide required water service demand to the Government no later than 45 days prior to beginning building construction. Pipe from the trunk line(s) to the building, including providing, installing, and connecting to the water meter. Install a backflow preventer for the domestic water system in the Mechanical Room.

Provide final building sanitary sewer design flow to the Government no later than 45 days prior to beginning building construction. Pipe from the trunk line(s) to the building.

Provide final gas load and desired service size to the Government no later than 45 days prior to beginning building construction. Pipe from the trunk line to the building, including providing, installing, and connecting to the gas meter. Meter specifications and details are provided in Appendix BB – Meter Specs and Details.

Privatized Utility will design and provide Cable TV service to the Telecommunications Room(s) under separate contract. Others will design the Telephone system distribution. See Paragraph SITE ELECTRICAL SYSTEMS for more information. Telephone system conduit routing will be included in the site communication duct bank. White Sands Missile Range Data Services will provide Communications Service Plans and Capacities and Local Telephone Service Plans. No later than 45 days prior to beginning building construction, determine requirements and capacity for the facility and verify with WSMR Data Services that infrastructure being provided supports the requirements and capacity of the facility.

6.4.7. Cut and Fill

Not used.

6.4.8. Borrow Material

Location of borrow pit is shown in Appendix J.

6.4.9. Haul Routes and Staging Areas

6.4.9.1. A Map with haul routes, construction entrance gate, staging areas, landfill, and borrow areas is included in Appendix J. Disposal areas are off site and are the Contractor's responsibility.

6.4.9.2. Construction Trailers: The Contractor has been allotted a Lay Down Area as shown in the Site Package for the placement of a construction trailer complex and storage for the Contractor and all Sub-Contractors. Provide the site preparation, fencing, access drives, and ongoing maintenance of the Lay Down Area. Additional trailer space will not be allocated for Sub-Contractors and therefore must be contained within the Lay Down Area. Permanent Trailers are not permitted within the site limits. Provide an access path for emergency response vehicles at the construction job site and keep it clear in the event of fire or medical emergency, per NFPA 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations.

6.4.10. Clearing and Grubbing:

Not used.

6.4.11. Landscaping:

Construct landscaping as shown in the Site Package. DB Contractor is to be the designer of record for the final landscape design, but the plant selections, locations, and arrangements of landscape, hardscape, and site furniture are to be designed and installed in accordance with those shown in the Site Package. Install landscaping perimeters required for AFTP.

6.4.12. Turf:

Not used.

6.5. ARCHITECTURE

6.5.1. General: To the maximum extent possible within the contract cost limitation, the buildings shall conform to the look and feel of the architectural style and shall use the same colors as adjacent facilities as expressed herein. The Government will evaluate the extent to which the proposal is compatible with the architectural theme expressed in the RFP during the contract or task order competition. The first priority in order of importance is that the design provides comparable building mass, size, height, and configuration compared to the architectural theme expressed herein. The second priority is that design is providing compatible exterior skin 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 White Sands Missile Range'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 White Sands Missile Range'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 identified in this Solicitation
- (d) Best Life-Cycle Cost Design
- (e) Meets the Specified Sustainable Design and LEED requirements
- (f) Complies with Energy Conservation Requirements Specified in this RFP.

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

compliance with the White Sands Missile Range EUPH Concept Renderings and the White Sands Missile Range Engineers Battalion Unit Operations Facility Area Development Guide, included in Appendix F.

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 White Sands Missile Range. 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) Roof: Minimum roof design wind speed is 100 mph.
- (c) Exterior Walls: If EIFS is used, install a heavy duty reinforcing mesh around all doors and window openings, and extend a minimum 8'0" above finished floor and to finish grade below on all exterior walls. Install a heavy duty reinforcing mesh with a minimum combined weight of 20 ounces per square yard. This requirement may be met by using multiple layers of mesh. Use high impact mesh on all other surfaces.
- (d) Install exterior doors and frames with a minimum 16 gage steel sheet or that required by the applicable SDI designation, whichever is thicker.
- (e) Boot Wash Drains: Connect boot wash drains to underground drainage.
- (f) Exterior Door Hardware:
 - 1. Key locksets for mechanical rooms, electrical closets, and TR's to the existing Post Engineer Key System without key removable cores.
 - 2. Install cipher locksets, Simplex Series 8100 or approved equal, at all TR's.
- (g) Exterior Signage: See Appendix H for Exterior Signage requirements.

6.5.3. Not Used

6.5.4. INTERIOR DESIGN

(a) Metal Doors and Frames: Install interior doors and frames with a minimum 16 gage steel sheet or that required by the applicable SDI designation, whichever is thicker.

(b) Wood Doors and Frames: Install solid core doors only. Install solid core wood doors with the proper construction designation to ensure that the construction fabrication is "5 plies" rather than "7 plies."

(c) Door Hardware: TR's are to receive a cipher lockset, Simplex Series 8100 or approved equal.

(e) At Interim and Final design, submit floor plan(s) with lockset information for each door in the facility.

(f) Interior Finishes: Install floor finishes that comply with ANSI/ADA Standards of Static Coefficient of Friction (SCOF) and non-slip standards established per ASTM C-1028 and OSHA. Install floor finishes with a minimum Coefficient of Friction of .7 and a minimum Coefficient of Friction of .8 at sloped ramp conditions.

Interior building signage requirements:

No additional requirements.

6.6. STRUCTURAL DESIGN

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

6.6.1.2 Use ground snow load of 5psf.

6.6.1.3 Use frost penetration of four inches.

6.6.1.4 Use the following seismic acceleration parameters for mapped Maximum Considered Earthquake spectral response at short periods and at 1-second period, respectively: Ss: 41 (%g) and S1: 13 (%g).

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

6.7. THERMAL PERFORMANCE

No additional requirements

6.8. PLUMBING

6.8.1 Piping Materials: Use Type K copper for water supply under slab. Use CPVC and Type L (or above) copper for water supply above slabs. Use plastic pipe (schedule 40 PVC) for drainage and venting including under concrete slabs or inside buildings. Do not use exposed PVC for exposed vent piping above roof. Type M copper is not allowed.

6.8.2. Provide cast iron valve boxes and covers. Vaults containing water meters shall have covers weighing 20 lbs or less or shall have a closeable opening in the cover directly above the meter to allow reading of the meter. Distance from top of cover to top of water meter consumption reading (dial) shall be less than 18 inches.

6.8.3. Clothes dryers (provided by others) will be gas-fired. Provide gas plumbing accordingly.

6.8.4. Do not use electric water heaters, except that small on-demand applications may be used.

6.8.5. Natural Gas Supply: Furnish standard gas pressures from building regulator of 8-15 ounces, 2 psi or 5 psi.

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

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

6.8.8 Fixture Faucet Mixing Valves: Provide single handle type mixing faucet valves with seals and seats combined into one replaceable cartridge; the cartridge shall be designed to be interchangeable between lavatories, bathtubs, kitchen and bar sinks, etc. or provide replaceable seals and seats that are removable either as a seat insert or as a part of a replaceable valve unit.

6.8.9 All water distribution piping, valves, and other materials and devices shall comply with NSF61.

6.9. SITE ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

6.9.1 Exterior Electrical: Extend the electrical service underground from the secondary of the pad mounted transformer to building service equipment/main electrical switchgear. See paragraph SITE ENGINEERING above.

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

6.9.3 Exterior Communications: Install communications infrastructure as required by the drawings in Appendix J. Cable TV is to be included in the Site Communication duct bank. Coordinate with WSMR DOIM / NEC Plans Office.

6.10. FACILITY ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

6.10.1 Exterior Lighting: Exterior site and area lighting, including lighting for ball courts shall be pulse start Metal Halide, except compact fluorescent lighting shall be acceptable for walkway lighting and above exit doors. Photo control devices for exterior lighting shall conform to ANSI C136.10 and shall have an adjustable operation range of approximately 1.0 to 5.0 footcandles. Provide building-mounted lighting suitable for illuminating the site around the building to a level of 0.5 to 5.0 fc

6.10.2 Utility Metering: Provide Watt Node Plus LON Electric Power meter or equal. Provide pulse meter for gas and water. Water meter is to read in gallons. Provide a legibly and indelibly printed multiplier on the face of the meter. Wiring for UMCS system shall be compatible with WSMR system. Install communications wiring in a 1" conduit from the Mechanical Room to the Pulse Kit on the Gas Meter for use by the UMCS system. Install communications wiring in a 1" conduit from the Mechanical Room to the Electric Meter for use by the UMCS system. Install communications wiring in a 1" conduit from the Mechanical Room to the Pulse Kit on the Water Meter for use by the UMCS system.

6.10.3 Facility Telecommunications systems:

6.10.4 Telephone and Local Area Network (LAN):

(a) All equipment racks shall have both vertical and horizontal cable management.

(b) Line all walls in the telecommunications rooms with 4' X 8' X 3/4" plywood, painted flat white. All plywood shall be fire-rated and the fire-retardant stamp are shall remain unpainted and open to view. Provide a ladder type cable tray around the perimeter of the telecommunications room and from the perimeter ladder tray to the 19"

communications rack. Mount the ladder cable tray 7-1/2 feet above finished floor. Install all horizontal cabling into the TR in this cable tray routing them around the room and into the 19" rack..

(c) Terminate the incoming fiber optic cable on a 19" twelve port single mode fiber optic patch panel with SC type connectors.

(d) No construction deviations in the communications system from the accepted design will be permitted without prior review and concurrence by USACE and WSMR Data Sciences.

(e) Submit a detailed test plan for all the cable plant installation for government review and concurrence. Include information on the test equipment and its calibration documentation.

(f) Feed all electrical circuits within a TR from an electrical panel installed within that room.

(g) Provide a 1" conduit from the electrical panel in the TR to outside of the building for future commercial cable television power. Provide a 2" conduit (adjacent to the 1" conduit) from the TR to outside of the building for future commercial cable television service entrance.

(h) Terminate Single-Mode and Multi-Mode Fiber Optic cables on separate patch panels.

(i) Terminate voice and data cables on separate patch panels located in the same equipment rack. Install voice patch panels in the copper equipment rack or cabinet.

(j) All raised flooring shall have a cable tray management system in compliance with UFC 3-580-01 under the floor for communications cabling. Submit a cable management plan showing cable routing and cable management system installation for review and concurrence prior to commencement of work.

(k) Install the horizontal cabling conduit from the outlet box, extending to the cable tray. The use of J-hooks is not permitted without prior written approval from WSMR DSD.

(l) Terminate exterior communications drops for testing purposes and cover with a blank weatherproof faceplate.

(m) All bonding jumpers, regardless of size, shall have green insulation.

(n) Floor mount communications and power drops to be used by modular furniture including those for modular furniture near a wall. Submit a communications and power plan showing locations of communications and power drops superimposed over modular furniture plan with the interim and final design packages.

(o) Manholes shall be splayed type communications MH's with preinstalled terminators and internal grounding.

(p) Provide lockable, waterproof CMH covers. Submit for approval prior to use in accordance with WSMR Force Protection Standards.

(q) Provide a minimum of two dedicated 110 volt, 20-ampere quadraplex receptacles in each TR. Each receptacle shall be on a separate 20-ampere branch circuit serving only that receptacle. Additional convenience receptacles shall be provided at 6 feet (1800 mm) intervals around the perimeter walls.

(r) Provide a dedicated 20-ampere circuit and a quadraplex receptacle for each 19 inch (480 mm) rack or cabinet in TR's. These receptacles shall be installed on the bottom or immediately adjacent to racks or cabinets to avoid equipment power cords from being placed across the TR floor.

(s) The designer shall consult with the electrical designer or facilities engineer if the TR is to house blade servers, PoE switches, PoE mid-span hubs, UPS, or large numbers of network switches. Large PoE switches may require multiple 110V or multiple 220 V circuits. The electrical designer may have to compensate for the considerable current draw amount of these devices.

6.10.5 Cable TV (CATV): Provide and install a pre-wired CATV system throughout the designated spaces. CATV system shall include but not be limited to cables, conduits, pull boxes, and CATV jacks. Route all CATV signals, conduits, and cables back to the telecommunication room.

6.10.6 Closed Circuit TV (CCTV): Provide and install a conduit system to support CCTV throughout the designated spaces. Conduit system shall include but not limit to conduits, pull boxes, and pull wires. Route all conduits for CCTV signals back to telecommunication room, or the designated monitoring room. As part of the Interim Design Review, present the proposed Floor Plan to representatives of WSMR and Security personnel to identify specific locations of security cameras, location of monitoring room, conduit routing, and system details.

6.10.7 Intrusion Detection (IDS): Provide and install conduit for IDS in the designated areas. The devices (motion sensors, contact switches, duress buttons, keypads and security panels) are provided by others. Provide conduit and a junction box for each device. Route all device conduits to a j-box in a designated wall space (for a security panel) near the entrance of the room. Provide and install a 1" conduit with a Category 6 cable routed from the j-box to the nearest telecommunications room. Terminate and certify the cable inside the j-box on an RJ-45 Female Jack and inside the telecommunications room on a patch panel. Provide a dedicated 120V single-phase circuit for IDS.

6.10.8 General: Ground and bond all inside plant cable pathways (e.g. cable trays, cable ladders, and conduits) to the Main Telecommunication Room (TR) ground bar (TMGB). Bond Individual sections of all metallic cable tray and ladder systems to each other and to the raceway (e.g. EMT) in which they support.

6.10.9 Landscape/Irrigation Controls – Provide power and outlet to accommodate the irrigation controller for each building. Make space available for the irrigation controller in the mechanical room or where designated by the contracting officer.

6.10.10 Outside electrical panels: all electrical panels located in exterior areas shall be dustproof.

6.10.11 Control exterior security lighting by a switch and photocell.

6.10.12 Use the following Telecommunications wiring color scheme:

NIPRNET – Blue

SIPRNET – Red

TACNET – Yellow

Voice – White

6.11. HEATING, VENTILATING, AND AIR CONDITIONING

6.11.1 System Selection: Current local utility rates for gas, electric, water and sewer are contained in Appendix K. These are rates paid by WSMR to the local utility providers and are for use in LEED energy cost calculations. Provide CO2 sensors in return air stream to minimize the amount of outside air required to satisfy ASHRAE 62.1 requirements for building Indoor Air Quality. Provide one CO2 sensor per HVAC zone.

6.11.2 Installation infrastructure has insufficient capacity to support use of electric heat. Provide gas-fired and/or renewable energy sources for heating.

6.11.3 Communication Rooms: Air condition telecommunications equipment rooms to control temperature and humidity per applicable criteria by separate year round direct expansion cooling systems.

6.11.4 Mechanical Room Ventilation: Automatically ventilate mechanical, fire protection, electrical, and storage spaces to limit space temperatures to 10 degrees F above design outdoor air temperature.

6.11.5 Equipment Coordination: For Variable Air Volume (VAV) systems, limit size of any individual VAV box to approximately 2500 cfm to promote better zoning and fit of equipment to space available. Coordinate all mechanical systems and equipment with space available to prevent conflict with other building systems.

6.11.6 UMCS Base-wide System and Building Control Interface: A base-wide UMCS/EMCS system has been installed as part of a separate contract. Provide a 3/4" conduit with CAT VI cable from the EMCS router to the nearest comm room for connection to the building LAN. Integration to the base-wide system shall be done under separate contract and is not part of this scope of work. The building shall be capable of running stand alone until

such time it is integrated into the base-wide system. Energy saving controls are desired such as schedule start/stop, optimized start/stop, occupancy sensors, etc. Locate AC control panels and routers in the Mechanical Room.

6.11.7 Existing IP Network: Existing IP network consist of Gig-backbone: 10/100MB to the user, 1GB between the end user building and ADN, and a 10GB core backbone.

6.11.8 Network Media: Existing network media consist of single-mode fiber optic.

6.11.9 Coordinate location of head-end UMCS hardware/software with WSMR DPW.

6.11.10 Water Quality Analysis and Treatment: Water quality for WSMR and surrounding area is 'hard'. Treatment will be required for use as make-up water in HVAC equipment. Coordinate with WSMR Environmental to obtain the required quantity and types of chemicals to be initially introduced into the closed loop heating and chilled water systems.

6.11.11 Coordinate locations of HVAC emergency shut-off switches, central control area, and switch features with WSMR DPW during design.

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

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

6.11.13 HVAC system requirements are:

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

(b) For Communications (Comm) and Information Infrastructure (IT) Equipment Spaces: provide a separate electrical DX cooling and electric heating fan coil type system or a small wall mounted heat pump for very small rooms. Obtain the internal equipment space (Comm/IT) heat loading and use that information for HVAC system design.

(c) Mechanical and Fire Protection Room Heating and Ventilation; provide gas-fired heaters at mechanical and fire protection spaces.

6.11.14 Piping Materials: Do not use Type M copper.

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

multiple equipment pieces (coordinate with Architectural designer). Enclose mechanical and electrical equipment (transformers, chillers, boilers, etc.) installed at grade with screen walls. Screen wall finishes and appearance are subject to Government review and approval.

Integrate the control system to the installation's existing UMCS. The existing UMCS is BACNET

6.12. ENERGY CONSERVATION

6.12.1. General

No additional requirements.

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

No additional requirements.

6.13. FIRE PROTECTION

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

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

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

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

6.13.5 Provide and install a Fire Department Connection near the street curb, PIV, and fire hydrant. Coordinate exact location of Fire Department Connection with LDE and WSMR Fire Department.

6.13.6 Fire Sprinkler Backflow Prevention: Backflow prevention shall be in accordance with the WSMR Cross-Connection Control Manual. This requirement may be more stringent than the requirement in UFC 3-600-01.

6.13.7 Program the following eight pre-recorded messages into the system:

(1) MESSAGE #1 – "FIRE" (Siren X 5 Seconds) (Female Voice) "ATTENTION, ATTENTION, A FIRE EMERGENCY HAS BEEN REPORTED. PLEASE LEAVE THE BUILDING USING THE NEAREST EXIT OR EXIT STAIRWAY. DO NOT USE THE ELEVATORS IF INSTALLED WITHIN THIS FACILITY".

(2) MESSAGE #2 – "SEVERE WEATHER" (100 KHZ Steady tone X 5 Seconds) (Female Voice) THIS IS THE WHITE SANDS MISSILE RANGE INSTALLATION OPERATIONS CENTER. THE NATIONAL WEATHER SERVICE HAS ISSUED A SEVERE WEATHER ALERT FOR THIS AREA. TURN ON YOUR RADIOS OR TELEVISIONS FOR THE LATEST UPDATE AND TAKE REQUIRED ACTION. AGAIN, THIS IS THE WHITE SANDS MISSILE RANGE INSTALLATION OPERATIONS CENTER. THE NATIONAL WEATHER SERVICE HAS ISSUED A SEVERE WEATHER ALERT FOR THIS AREA. TURN ON YOUR RADIOS OR TELEVISIONS FOR THE LATEST UPDATE AND TAKE REQUIRED ACTION.

(3) MESSAGE #3 – “BOMB” (Horn sound X 5 Seconds) (Female Voice) “ATTENTION, ATTENTION. THIS BUILDING HAS RECEIVED A BOMB THREAT. ALL PERSONNEL ARE TO EVACUATE IMMEDIATELY USING THE NEAREST EXIT AND TO REPORT TO OUR DESIGNATED ASSEMBLY AREA FOR ACCOUNTABILITY AND ADDITIONAL INSTRUCTION. AGAIN, THIS BUILDING HAS RECEIVED A BOMB THREAT. ALL PERSONNEL ARE TO EVACUATE IMMEDIATELY USING THE NEAREST EXIT AND TO REPORT TO OUR DESIGNATED ASSEMBLY AREA FOR ACCOUNTABILITY AND FOR ADDITIONAL INSTRUCTION.

(4) MESSAGE #4 – “SHELTER IN PLACE” (Three 1kHz tones X 1 Second each) (Female Voice) “ATTENTION, ATTENTION. A TOXIC CHEMICAL HAZARD HAS BEEN REPORTED, PLEASE REMAIN CALM. ALL PERSONNEL ARE DIRECTED TO “SHELTER IN PLACE”. TURN OFF FANS, HEATING, VENTILATION AND AIR CONDITION SYSTEMS. CLOSE ALL DOORS AND WINDOWS AND REMAIN INDOORS UNTIL THE “ALL CLEAR” ANNOUNCEMENT IS GIVEN.”

(5) MESSAGE #5 – “FPCON C” (HI/LOW Tones X 3 Seconds) (Female Voice) “ATTENTION, ATTENTION. WHITE SANDS MISSILE RANGE IS NOW AT FPCON CHARLIE. IMPLEMENT FPCON ALPHA, BRAVO AND CHARLIE SECURITY PLANS IMMEDIATELY. AGAIN, WHITE SANDS MISSILE RANGE IS NOW AT FPCON CHARLIE. IMPLEMENT FPCON ALPHA, BRAVO AND CHARLIE SECURITY PLANS IMMEDIATELY AND STAND BY FOR ADDITIONAL INFORMATION FROM THE WHITE SANDS MISSILE RANGE INSTALLATION OPERATION CENTER.”

(6) MESSAGE #6 – “FPCON D” (HI/LOW Tones X 3 Seconds) (Female Voice) “ATTENTION, ATTENTION. WHITE SANDS MISSILE RANGE IS NOW AT FPCON DELTA. IMPLEMENT ALL FPCON SECURITY PLANS, ALPHA THROUGH DELTA IMMEDIATELY. AGAIN, WHITE SANDS MISSILE RANGE IS NOW AT FPCON DELTA. IMPLEMENT ALL FPCON SECURITY PLANS, ALPHA THROUGH DELTA IMMEDIATELY AND STAND BY FOR ADDITIONAL INFORMATION FROM THE WHITE SANDS MISSILE RANGE INSTALLATION OPERATION CENTER.

(7) MESSAGE #7 – “ALL CLEAR”. (Chime sound X 5 Seconds) (Female Voice) “THE EMERGENCY HAS NOW ENDED. PLEASE RESUME NORMAL OPERATIONS. THANK YOU FOR YOUR COOPERATION.”

(8) MESSAGE #8 – “TEST” (1kHz tone X 2 Seconds) (Female Voice) “MAY I HAVE YOUR ATTENTION, PLEASE? THIS IS THE WHITE SANDS MISSILE RANGE INSTALLATION OPERATIONS CENTER CONDUCTING A TEST OF THE MASS NOTIFICATION SYSTEM. REPEAT, THIS IS ONLY A TEST.”

6.13.8 Install UL 2034 listed Carbon Monoxide detectors per manufacturer's recommendations and in accordance with the requirements of NFPA 720 in structures serviced by natural gas, petroleum, or other combustible fuel sources.

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: No 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 Government. 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 meet the criteria for this credit.

SS Credit 3 Brownfield Redevelopment.

Project site DOES NOT meet the criteria for this credit.

SS Credit 4.1 Public Transportation Access.

Project site DOES NOT meet the criteria for this credit.

EA Credit 6 Green Power.

35% of the project's electricity WILL NOT 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

6.14.8.1 Coordinate with the Government to input Government-achieved Credits into the project's online template. Submit documentation of LEED Credits to the Government in PDF format on three (3) CD's with formatting and directory structure designed for easy access to documentation. Submit LEED Design Credit documentation to the Government no later than 60 days after issuance of Design Complete documents. Submit LEED Construction Credit documentation to the Government no later than 60 days after Construction Complete as awarded.

6.14.8.2 Appendix M contains a modified LEED v2.2 Registered Project Checklist. This checklist identifies:

(a) those specific Credits/Prerequisites that the DB Contractor must provide, listed in the "Yes DB" column,

(b) those Credits/Prerequisites that the Government will provide, listed in the "Yes GOV" column,

(c) those specific credits that the DB Contractor may provide above and beyond those required (applies only to Energy and Atmosphere Credit 1, where 2 credits are required as a Prerequisite, but an additional 8 credits may be achievable at the DB Contractor's option) listed in the "? D/B" column,

(d) those Credits that the Government may provide, but should not be considered by the DB Contractor, listed in the "? GOV" column, and

(e) those Credits that the DB Contractor is prohibited from pursuing, listed in the "NO" column.

6.14.8.3 In addition to the 11 specific points that the DB Contractor is required to provide by the Checklist in Appendix M, achieve an additional 19 points to be selected by the DB Contractor .

6.15. ENVIRONMENTAL

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

6.15.2. The environmental documents that apply to this task order are [] as well as the following documents included in Appendix E: Potable Regulatory Policy (Policy Letter #16, and Cross Connection Control Manual for WSMR. Comply with all Federal, State, and Local environmental requirements.

6.16. PERMITS

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

6.17. DEMOLITION

No additional requirements.

6.18. ADDITIONAL FACILITIES

No additional requirements.

End of Section 01 10 00.001

**SECTION 01 33 00.001
SUBMITTAL PROCEDURES
(DESIGN-BUILD TASK ORDERS)**

1.0 GENERAL

1.13. GOVERNMENT APPROVED OR CONCURRED WITH SUBMITTALS

1.14. INFORMATION ONLY SUBMITTALS

1.0 GENERAL

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

1.13. GOVERNMENT APPROVED OR CONCURRED WITH SUBMITTALS

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

1.14. INFORMATION ONLY SUBMITTALS

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

End of Section 01 33 00.001

**SECTION 01 33 16
DESIGN AFTER AWARD**

1.0 GENERAL INFORMATION

1.1. INTRODUCTION

1.2. DESIGNER OF RECORD

2.0 PRODUCTS (Not Applicable)

3.0 EXECUTION

3.1. PRE-WORK ACTIVITIES & CONFERENCES

3.1.1. Design Quality Control Plan

3.1.2. Post Award Conference

3.1.3. Partnering & Project Progress Processes

3.1.4. Initial Design Conference

3.1.5. Pre-Construction Conference

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

3.2.1. Site/Utilities

3.2.2. Interim Design Submittals

3.2.3. Over-the-Shoulder Progress Reviews

3.2.4. Final Design Submissions

3.2.5. Design Complete Submittals

3.2.6. Holiday Periods for Government Review or Actions

3.2.7. Late Submittals and Reviews

3.3. DESIGN CONFIGURATION MANAGEMENT

3.3.1. Procedures

3.3.2. Tracking Design Review Comments

3.3.3. Design and Code Checklists

3.4. INTERIM DESIGN REVIEWS AND CONFERENCES

3.4.1. General

3.4.2. Procedures

3.4.3. Conference Documentation

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

ATTACHMENT A STRUCTURAL INTERIOR DESIGN (SID) REQUIREMENTS

ATTACHMENT B NOT USED

ATTACHMENT C TRACKING COMMENTS IN DRCHECKS

ATTACHMENT D SAMPLE FIRE PROTECTION AND LIFE SAFETY CODE REVIEW

ATTACHMENT E LEED SUBMITTALS

ATTACHMENT F BUILDING INFORMATION MODELING REQUIREMENTS

ATTACHMENT G DESIGN SUBMITTAL DIRECTORY AND SUBDIRECTORY FILE ARRANGEMENT

1.0 GENERAL INFORMATION

1.1. INTRODUCTION

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

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

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

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

1.2. DESIGNER OF RECORD

Identify, for approval, the Designer of Record ("DOR") that will be responsible for each area of design. One DOR may be responsible for more than one area. Listed, Professional Registered, DOR(s) shall account for all areas of design disciplines 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.

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

3.5.3. Geotechnical Investigations and Reports:

3.5.3.1. The contractor's licensed geotechnical engineer shall prepare a final geotechnical evaluation report, to be submitted along with the first foundation design submittal. Make this information available as early as possible during the over-the-shoulder progress review process. Summarize the subsurface conditions and provide recommendations for the design of appropriate utilities, foundations, floor slabs, retaining walls, embankments, and pavements. Include compaction requirements for fill and backfill under buildings, sidewalks, other structures and open areas. Recommend foundation systems to be used, allowable bearing pressures for footings, lateral load

resistance capacities for foundation systems, elevations for footings, grade beams, slabs, etc. Provide an assessment of post-construction settlement potential including total and differential. Provide recommendations regarding lateral earth pressures (active, at-rest, passive) to be used in the design of retaining walls. Include the recommended spectral accelerations and Site Class for seismic design along with an evaluation of any seismic hazards and recommendations for mitigation, if required. Include calculations to support the recommendations for bearing capacity, settlement, and pavement sections. Include supporting documentation for all recommended design parameters such as Site Class, shear strength, earth pressure coefficients, friction factors, subgrade modulus, California Bearing Ratio (CBR), etc. Provide earthwork recommendations, expected frost penetration, expected groundwater levels, recommendations for dewatering and groundwater control and the possible presence of any surface or subsurface features that may affect the construction of the project such as sinkholes, boulders, shallow rock, old fill, old structures, soft areas, or unusual soil conditions. Include pH tests, salinity tests, resistivity measurements, etc., required to design corrosion control and grounding systems. Include the raw field data. Arrange a meeting with the Government subsequent to completion and evaluation of the site specific geotechnical exploration to outline any differences encountered that are inconsistent with the Government provided preliminary soils information. Clearly outline differences which require changes in the foundation type, or pavement and earthwork requirements from that possible and contemplated using the Government furnished preliminary soils investigation, which result in a change to the design or construction. Any equitable adjustment is subject to the provisions of the contract's Differing Site Conditions Clause.

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

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

3.5.4. LEED Documentation:

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

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

3.5.5. Energy Conservation:

3.5.5.1. Refer to Section 01 10 00, Paragraph 5. Interim and Final Design submittals shall demonstrate that each building including the building envelope, HVAC systems, service water heating, power, and lighting systems meet the Mandatory Provisions and the Prescriptive Path requirements of ASHRAE 90.1. Use Compliance Documentation forms available from ASHRAE and included in the ASHRAE 90.1 User's Manual for this purpose. The Architectural Section of the Design Analysis shall include completed forms titled "Building Envelope Compliance Documentation Parts I and II". The Heating Ventilating and Air Conditioning (HVAC) Section of the Design Analysis shall include a completed form titled "HVAC Simplified Approach Option - Part I" if this approach is allowed by the Standard. Otherwise, the HVAC Section of the Design Analysis shall include completed forms titled "HVAC Mandatory Provisions - Part II" and "HVAC Prescriptive Requirements - Part III". The Plumbing Section of the Design Analysis shall include a completed form titled "Service Water Heating Compliance Documentation". The Electrical Section of the Design Analysis shall include an explanatory statement on how the requirements of ASHRAE 90.1-2007 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
- (k) Air Barrier Design: Details of all Air Barrier components, (i.e. window flashing details, penetrations in air barrier details, door flashing details, roofing/ceiling barrier interface details and etc.)

3.5.8.4. Structural Systems. Include:

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

3.5.8.5. Plumbing Systems

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

3.5.8.6. HVAC Systems

- (a) Mechanical Floor Plans: The floor plans shall show all principle architectural features of the building which will affect the mechanical design. The floor plans shall also show the following:
 - (1) Room designations.
 - (2) Mechanical legend and applicable notes.
 - (3) Location and size of all ductwork and piping.
 - (4) Location and capacity of all terminal units (i.e., registers, diffusers, grilles, hydronic baseboards).
 - (5) Pre-Fabricated Paint Spray Booth (where applicable to project scope)
 - (6) Paint Preparation Area (where applicable to project scope)

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

3.5.8.7. Fire Protection and Life Safety.

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

3.5.8.8. Elevators. Provide:

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

3.5.8.9. Electrical Systems.

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

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

3.5.8.10. Electronic Systems including the following responsibilities:

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

- (f) Intrusion Detection, Card Access System
- (g) Central Control and Monitoring System
- (h) Mass Notification System
- (i) Electrical Power Distribution Systems

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

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

3.6. FINAL DESIGN REVIEWS AND CONFERENCES

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

3.7. FINAL DESIGN REQUIREMENTS

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

3.7.1. Drawings

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

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

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

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

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

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

All CAD files shall be fully compatible with MicroStation V8 or higher. Save all design CAD files as MicroStation V8 or higher files. All submitted BIM Models and associated Facility Data shall be fully compatible with Bentley BIM file format and the USACE Bentley BIM v8 Workspace.

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

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

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

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

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

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

3.7.2. Design Analyses

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

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

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

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

3.7.3. Specifications

Specifications shall be 100% complete and in final form.

3.7.4. Submittal Register

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

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

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

3.7.6. Acceptance and Release for Construction

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

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

3.8. DESIGN COMPLETE CONSTRUCTION DOCUMENT REQUIREMENTS

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

3.9. SUBMITTAL DISTRIBUTION, MEDIA AND QUANTITIES

3.9.1. Submittal Distribution and Quantities

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

Activity and Address	Drawing Size (Full Size) Full size Full Sets/ *Partial Sets	Design Analyses & Specs Full Sets/ *Partial Sets	Drawing Size (Half Size) Half size Full Sets/ *Partial Sets	Non-BIM Data CD-ROM or DVD as Necessary (PDF & .dgn)	Furniture Submittal (Per Attachment B)	Structural Interior Design Submittal	BIM Data DVD (Per Attach F)
Commander, U.S.Army Engineer District Fort Worth District	1/0	1/0	1/0	1	1	1	1
Commander, U.S.Army Engineer District, Center of Standardization Fort Worth, TX	1/0	1/0	2/0	6	N/A	1	2
Installation	0/0	5/0	5/0	5	2	5	5
U.S.Army Corps of Engineers Construction Area Office	3/0	8/0	5/0	8	1	1	1
Information Systems Engineering Command (ISEC)	0/0	0/1	0/0	1	N/A	N/A	1
Other Offices	1/0	1/0	2/0	4	N/A	1	3

***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 nine (9) different addresses. Assemble drawing sheets, specs, design analyses, etc. into individual sets; do not combine duplicate pages from individual sets so that the government has to assemble a set.

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

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

3.10. AS-BUILT DOCUMENTS

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

ATTACHMENT A STRUCTURAL INTERIOR DESIGN (SID) REQUIREMENTS

1.0 GENERAL INFORMATION

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

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

2.1. FORMAT AND SCHEDULE

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

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

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

Design submittal requirements include, but are not limited to:

2.1.1. Narrative of the Structural Interior Design Objectives

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

2.1.2. Interior Color Boards

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

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

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

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

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

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

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

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

2.1.3. Exterior Color Boards

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

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

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

2.2. STRUCTURAL INTERIOR DESIGN DOCUMENTS

2.2.1. General

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

2.2.2. Finish Color Schedule

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

2.2.3. Interior Finish Plans

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

2.2.4. Furniture Footprint Plans

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

2.2.5. Interior Signage

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

2.2.6. Interior Elevations, Sections and Details

Indicate material, color and finish placement.

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

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

1.1. NOT USED

1.2. NOT USED

1.3. FURNITURE SELECTION

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

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

1.4. CONSTRUCTION

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

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

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

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

1.5. FINISHES AND UPHOLSTERY

1.5.1. Specify neutral colors for casegoods, furniture systems, storage and tables. Specify desk worksurfaces and table tops that are not too light or too dark in color and have a pattern to help hide soiling. Accent colors are allowed in break and lounge areas. Keep placement of furniture systems panel fabric accent colors to a minimum. All finishes shall be cleanable with ordinary household cleaning solutions.

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

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

1.6. ACCESSORIES

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

1.6.2. Not Used.

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

1.7. MISSION UNIQUE EQUIPMENT

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

1.8. SUSTAINABILITY

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

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

1.9. FURNITURE SYSTEMS

1.9.1. General.

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

1.9.2. Connector Systems.

Specify a connector system that allows removal of a single panel or spine wall within a typical workstation configuration without requiring disassembly of the workstation or removal of adjacent panels. Specify connector system with tight connections and continuous visual seals. When Acoustical panels are used, provide connector system with continuous acoustical seals. Specify concealed clips, screws, and other construction elements, where possible.

1.9.3. Panels and Spine Walls

Specify panels and spine walls with hinged or removable covers that permit easy access to the raceway when required but are securely mounted and cannot be accidentally dislodged under normal conditions. Panels shall be

capable of structurally supporting more than 1 fully loaded component per panel per side. Raceways are to be an integral part of the panel and must be able to support lay-in cabling and have a large capacity for electrical and IT. Do not thread cables through the frame.

1.9.4. Electrical And Information/Technology (IT)

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

1.9.5. Pedestals

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

1.10. EXECUTIVE FURNITURE

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

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

1.11. SEATING

1.11.1. General

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

1.11.2. Desk and Guest Seating

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

1.11.3. Conference Room Seating

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

1.11.4. Lounge, Waiting and Reception Area Seating

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

1.11.5. Break Room Seating

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

1.11.6. Lounge, Waiting and Reception Furniture.

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

1.12. FILING AND STORAGE.

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

1.13. TRAINING TABLES.

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

1.14. FURNITURE WARRANTIES.

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

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

ATTACHMENT C TRACKING COMMENTS IN DRCHECKS

1.0 General

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

2.0 DrChecks Review Comments

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

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

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

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

3.0 DrChecks Initial Account Set-Up

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

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

4.0 DrChecks Reviewer Role

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

4.1. Log into DrChecks.

4.2. Click on the appropriate project.

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

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

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

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

5.0 DrChecks Comment Evaluation

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

5.1. Log into DrChecks.

5.2. Click on the appropriate project.

5.3. Under "Evaluate" click on the number under "Pending".

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

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

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

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

6.0 DrChecks Back-check

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

6.1. Log into DrChecks.

6.2. Click on the appropriate project.

6.3. Under "My Backcheck" click on the number under "Pending".

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

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

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

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

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

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

1.0 SAMPLE FIRE PROTECTION AND LIFE SAFETY CODE REVIEW

- 1.1. Project Name (insert name and location)
- 1.2. Applicable Codes and Standards
 - 1.2.1. Unified Facilities Criteria (UFC): 3-600-01, Design: Fire Protection Engineering For Facilities
 - 1.2.2. International Building Code (IBC) for fire resistance requirements, allowable floor area, building height limitations and building separation distance requirements, except as modified by UFC 3-600-01.
 - 1.2.3. National Fire Protection Association (NFPA) 101 Life Safety Code (latest edition), for building egress and life safety and applicable criteria in UFC 3-600-01.
 - 1.2.4. ADA and ABA 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 Section 712, 715 and Table 715.3. Mechanical rooms, exit stairways, storage rooms, janitor [] hour rating. IBC Table 302.1.1
 - 1.15.2. Fire Blocks, Draft Stops, Through Penetrations and Opening Protectives
- 1.16. Fire Dampers. Describe where fire dampers and smoke dampers are to be used (IBC Section 716 and NFPA 90A). State whether isolation smoke dampers are required at the air handler.
- 1.17. Detection Alarm and Communication. UFC 3-600-01, (Chapter 5); NFPA 101 para. 3.4 (chapters 12-42); NFPA 72
- 1.18. Mass Notification. Describe building/facility mass notification system (UFC 4-021-01) type and type of base-wide mass notification/communication system. State whether the visible notification appliances will be combined with the fire alarm system or kept separate. (Note: Navy has taken position to combine visible notification appliances with fire alarm).
- 1.19. Interior Finishes (classification). NFPA 101.10.2.3 and NFPA 101.7.1.4
- 1.20. Means of Egress

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

Fire Protection Engineer of Record:

Signature and Stamp

Date

OR

Architect of Record:

Signature and Stamp

Date

Mechanical Engineer of Record:

Signature and Stamp

Date

Electrical Engineer of Record:

Signature/Date

**ATTACHMENT E
LEED SUBMITTALS**

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	LEED-NC v2.2 Submittals (OCT09REV)	Provide for Credit Audit Only	REQUIRED DOCUMENTATION	Date Submitted (to be filled in by Contractor)	Government Reviewer's Use (OCT09REV)
PAR	FEATURE	DUE AT			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 building, 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

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	LEED-NC v2.2 Submittals (OCT09REV)	Provide for Credit Audit Only	REQUIRED DOCUMENTATION	DATE	REV
				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
				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
				Option 2: Low-emission & fuel-efficient vehicle parking calculation.		CIV
				Option 2: List of drawings and specification references that show location and number of preferred parking spaces and signage.		CIV
				Option 3: Low-emission & fuel-efficient vehicle refueling station calculation.		CIV
				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
			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

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	LEED-NC v2.2 Submittals (OCT09REV)	Provide for Credit Audit Only	REQUIRED DOCUMENTATION	DATE	REV
				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
				Option 1: List of installed roof materials indicating, for each, manufacturer, product name and identification, SRI value and roof slope.		PE
			X	Option 1: Manufacturer published product data or certification confirming SRI		PE
				Option 2: Percentage calculation indicating percentage of vegetated roof area.		ARC
				Option 3: Combined reflective and green roof calculation.		ARC
				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		
				Option 3: List of installed roof materials indicating, for each, manufacturer, product name and identification, SRI value and roof slope.		PE
			X	Option 3: Manufacturer published product data or certification confirming SRI		PE
SS8		Light Pollution Reduction	Final Design	Interior Lighting: List of drawings and specification references that convey interior lighting requirements (location and type of all installed interior lighting, location of non-opaque exterior envelope surfaces, allowing confirmation that maximum candela value from interior fixtures does not intersect non-opaque building envelope surfaces). - OR - List of drawings and specification references that show automatic lighting controls 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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PAR		FEATURE	DUE AT		DATE	REV
			Final Design	Statement confirming which occupancy breakdown applies (default or special). For special occupancy breakdown, indicate source and explanation for ratio.		MEC
			Final Design	Occupancy calculation including male/female numbers for FTEs, visitors, students, customers, residential and other type occupants/users		MEC
			Final Design	Statement indicating percent of male restrooms with urinals. Statement indicating annual days of operation.		MEC
			Final Design	Baseline flush fixture calculation spreadsheet indicating, for each fixture type, gender, flush rate, daily uses per person for each occupant type identified in occupancy calculation and annual baseline flush fixture water usage.		MEC
			Final Design	Design case flush fixture calculation spreadsheet indicating, for each fixture type, gender, fixture manufacturer, fixture model number, flush rate, percent of occupants using this fixture type, daily uses per person for each occupant type identified in occupancy calculation and annual design case flush fixture water usage.		MEC
			Final Design	Option 1: If onsite non-potable water is used, identify source(s), indicate annual quantity from each source and indicate total annual quantity from all onsite non-potable water sources.		MEC
			Final Design	Option 1: Summary calculation indicating baseline annual water consumption, design case annual water consumption, non-potable annual water consumption and total percentage annual water savings.		MEC
			Final Design	Option 2: Statement confirming on-site treatment of all generated wastewater to tertiary standards and all treated wastewater is either infiltrated or used on-site.		MEC
			Final Design	Option 2: List of drawing and specification references that convey design of on-site wastewater treatment features.		CIV
			Final Design	Option 2: On-site water treatment quantity calculation indicating all on-site wastewater source(s), annual quantity treated, annual quantity infiltrated and annual quantity re-used on site from each source and totals for annual quantity treated, annual quantity infiltrated and annual quantity re-used on site from all sources.		CIV
			Final Design	Option 2: Wastewater summary calculation indicating design case annual flush fixture water usage, annual on-site water treatment and percentage sewage conveyance reduction.		MEC
			Final Design	Narrative describing project strategy for reduction of potable water use for sewage conveyance, including specific information on reclaimed water usage and treated wastewater usage.		MEC
WE3.1		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
WE3.2		Water Use Reduction: 30% Reduction	Closeout	X Manufacturer published product data or certification confirming fixture water usage.		PE MEC
CATEGORY 3 – ENERGY AND ATMOSPHERE						
EAPR1		Fundamental Commissioning of the Building Energy Systems (PREREQUISITE)	**Final Design	**Owner's Project Requirements document		ALL MEC, ELEC
			**Final Design	**Basis of Design document for commissioned systems		MEC, ELEC
			**Final Design	**Commissioning Plan		

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				Statement confirming all commissioning requirements have been incorporated into construction documents.		PE
				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
EA1		Optimize Energy Performance	Final Design	Option 2: Narrative describing phase out plan, including specific information on phase out dates and refrigerant quantities.		MEC
			Final Design	Statement indicating which compliance path option applies.		MEC
			Final Design	Option 1: Statement confirming simulation software capabilities and confirming assumptions and methodology.		MEC
			Final Design	Option 1: General information including simulation program, principal heating source, percent new construction and renovation, weather file, climate zone and Energy Star Target Finder score.		MEC
			Final Design	Option 1: Space summary listing, for each building use, the conditioned area, unconditioned area and total area and include total area for each category		MEC
			Final Design	Option 1: List of all simulation output advisory message data and show difference between baseline and proposed design		MEC
			Final Design	Option 1: Comparison summary for energy model inputs including description of baseline and design case energy model inputs, showing both by element type		MEC
			Final Design	Option 1: Energy type summary listing, for each energy type, utility rate description, units of energy and units of demand		MEC
			Final Design	Option 1: Statement indicating whether project uses on-site renewable energy. If yes, list all sources and indicate, for each source, backup energy type, annual energy generated, rated capacity and renewable energy cost		MEC
			Final Design	Option 1: If analysis includes exceptional calculation methods, statement describing how exceptional calculation measure cost savings is determined		MEC
			Final Design	Option 1: If analysis includes exceptional calculation methods, for each exceptional calculation method indicate energy types and, for each energy type, annual energy savings, annual cost savings, and brief descriptive narrative		MEC
			Final Design	Option 1: Baseline performance rating compliance report table indicating, for each energy end use, whether it is a process load, energy type, annual and peak energy demand for all four orientations. For each orientation indicate total annual energy use for each orientation and total annual process energy use.		MEC
			Final Design	Option 1: Baseline energy cost table indicating, for each energy type, annual cost for all four orientations and building total energy cost.		MEC
			Final Design	Option 1: Proposed Design performance rating compliance report table indicating, for each energy end use, whether it is a process load, energy type, annual and peak energy demand, baseline annual and peak energy demand and percent savings. Indicate total annual energy use and total annual process energy use for both proposed design and baseline and percent savings.		MEC
			Final Design	Option 1: Proposed Design energy cost table indicating, for each energy type, annual cost for all four orientations and building total energy cost.		MEC
			Final Design	Option 1: Energy cost and consumption by energy type report indicating, for each energy type, proposed design and baseline annual use and annual cost, percent savings annual use and annual cost. Indicate for renewable energy annual energy generated and annual cost. Indicate exceptional calculations annual energy savings and annual cost savings. Indicate building total annual energy use, annual energy cost for proposed design and baseline and indicate percent savings annual energy use and annual energy cost.		MEC

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			Final Design	Option 1: Compliance summaries from energy simulation software. If software does not produce compliance summaries provide output summaries and example input summaries for baseline and proposed design supporting data in the tables. Output summaries must include simulated energy consumption by end use and total energy use and cost by energy type. Example input summaries should represent most common systems and must include occupancy, use pattern, assumed envelope component sizes and descriptive features and assumed mechanical equipment types and descriptive features		MEC
			Final Design	Option 1: Energy rate tariff from project energy providers (only if not using LEED Reference Guide default rates)		MEC
EA2.1		On-Site Renewable Energy	Final Design	Statement indicating which compliance path option applies.		ELEC
			Final Design	List all on-site renewable energy sources and indicate, for each source, backup energy type, annual energy generated, rated capacity and renewable energy cost. Indicate total annual energy use (all sources), total annual energy cost (all sources) and percent renewable energy cost.		ELEC MEC
			Final Design	Option 1: Indicate, for renewable energy, proposed design total annual energy generated and annual cost.		ELEC MEC
			Final Design	Option 2: Indicate CBECS building type and building gross area. Provide the following CBECS data: median annual electrical intensity, median annual non-electrical fuel intensity, average electric energy cost, average non-electric fuel cost, annual electric energy use and cost, annual non-electric fuel use and cost.		ELEC MEC
			Final Design	Option 2: Narrative describing renewable systems and explaining calculation method used to estimate annual energy generated, including factors influencing performance.		ELEC MEC
EA2.2		On-Site Renewable Energy	Same as EA2.1	Same as EA2.1		ELEC MEC
EA2.3		On-Site Renewable Energy	Same as EA2.1	Same as EA2.1		ELEC MEC
EA3		Enhanced Commissioning	**Final Design	**Owner's Project Requirements document (OPR)		ALL
			**Final Design	**Basis of Design document for commissioned systems (BOD)		ELEC MEC
			**Final Design	**Commissioning Plan		ELEC MEC
			Closeout	Statement confirming all commissioning requirements have been incorporated into construction documents.		PE
			Closeout	**Commissioning Report		PE
			**Final Design	Statement by CxA confirming Commissioning Design Review		
			Closeout	Statement by CxA confirming review of Contractor submittals for compliance with OPR and BOD		PE
			Closeout	**Systems Manual		PE
			Closeout	Statement by CxA confirming completion of O&M staff and occupant training		PE
			Closeout	**Scope of work for post-occupancy review of building operation, including plan for resolution of outstanding issues		PE
			**Predesign	Statement confirming CxA qualifications and contractual relationships relative to work on this project, demonstrating that CxA is an independent third party.		MEC
EA4		Enhanced Refrigerant Management	Final Design	Refrigerant impact calculation table with all building data and calculation values as shown in LEED 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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PAR		FEATURE	DUE AT		DATE	REV
			Closeout	Green power provider summary table indicating, for each purchase type, provider name, annual quantity green power purchased and contract term. Indicate total annual green power use and indicate percent green power		PE
			Closeout	Narrative describing how Green Power or Green Tags are purchased		PE
CATEGORY 4 – MATERIALS AND RESOURCES						
MRPR1		Storage & Collection of Recyclables (PREREQUISITE)	Final Design	Statement confirming that recycling area will accommodate recycling of plastic, metal, paper, cardboard and glass. Narrative indicating any other materials addressed and coordination with pickup.		ARC
MR1.1		Building Reuse: Maintain 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
			**Construction Quarterly and Closeout	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	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	Manufacturer published product data or certification confirming regional material percentages in spreadsheet		PE

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PAR		FEATURE	DUE AT		DATE	REV
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 manufacturer 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

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PAR		FEATURE	DUE AT		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	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	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	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	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

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PAR		FEATURE	DUE AT		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 describing intent, requirement for credit, project approach to the credit. List of drawings and specification references that convey implementation of credit. All other documentation that validates claimed credit.		
IDc1.2		Innovation in Design	Final Design 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 responsibilities in the project.		ARC

ATTACHMENT F
Version 07-07-2010

BUILDING INFORMATION MODELING REQUIREMENTS

1.0 Section 1 - Submittal Format

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

2.0 Section 2 – Design Requirements

2.1. BIM Model and Facility Data. Contractor shall use BIM application(s) and software(s) to develop project designs. "Facility Data" is defined as associated intelligent attribute data. The "Model" is defined as 3D graphics that includes Facility Data and output as described in the paragraph 'Output' below. Contractors will use the Model to produce accurate Construction Documents. For each Center of Standardization (CoS) facility type included in this project, all BIM Models and associated Facility Data shall be submitted in Bentley Systems BIM [Not Supplied - SubmittalReqCADDSystem : BENTLEY_VERSION] 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 Fort Worth District District, and as noted herein. Specification of a CAD file format for these Drawings does not limit which BIM application(s) or software(s) may be used for project development and execution.

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

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

2.2.3. BIM Project Execution Plan.

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

2.2.4. BIM Requirements..

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

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

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

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

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

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

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

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

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

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

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

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

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

3.0 Section 3 – Design Stage Submittal Requirements

3.1. General Submittal Requirements.

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

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

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

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

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

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

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

3.2. Initial Design Conference Submittal.

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

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

3.3. Interim Design Submittals.

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

3.4. Final Design Submissions and Design Complete Submittals.

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

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

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

4.0 Section 4 – BIM Model Minimum Requirements and Output

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

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

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

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

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

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

- 4.7.4. Communications. All existing and new communications service controls and connections, both above ground and underground with necessary intelligence to produce accurate plans, details and schedules. Cable tray routing shall be modeled without detail of cable contents.
- 4.7.5. Exterior Building Lighting. All necessary exterior lighting with necessary intelligence to produce accurate plans, elevations and schedules. The exterior building lighting Model shall include all necessary lighting, relevant existing and proposed support utility lines and equipment required with necessary intelligence to produce accurate plans, details and schedules.
- 4.7.6. Equipment Clearances. The model shall incorporate and define all electrical and communications working spaces, clearances, and required access
- 4.8. Fire Protection. The fire protection system Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Additional minimum Model requirements include:
- 4.8.1. Fire Protection System. All relevant fire protection components (i.e., branch piping, sprinkler heads, fittings, drains, pumps, tanks, sensors, control panels) with necessary intelligence to produce accurate plans, elevations, building/wall sections, riser diagrams, and schedules. All fire protection piping shall be modeled.
- 4.8.2. Fire Alarms. Fire alarm/mass notification devices and detection system shall be indicated with necessary intelligence to produce accurate plans depicting them.
- 4.9. Civil. The civil Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a one inch (1"=100') scaled drawing. Additional minimum Model requirements include:
- 4.9.1. Terrain (DTM). All relevant site conditions and proposed grading, including necessary intelligence to produce accurate Project site topographical plans and cross sections.
- 4.9.2. Drainage. All existing and new drainage piping, including upgrades thereto, including necessary intelligence to produce accurate plans and profiles for the Project site.
- 4.9.3. Storm Water and Sanitary Sewers. All existing and new sewer structures and piping, including upgrades thereto, on the Project site with necessary connections to mains or other distribution points as appropriate, including necessary intelligence to produce accurate plans and profiles for the Project site.
- 4.9.4. Utilities. All necessary new utilities connections from the Project building(s) to the existing or newly-created utilities, and all existing above ground and underground utility conduits, including necessary intelligence to produce accurate plans and site-sections.
- 4.9.5. Roads and Parking. All necessary roadways and parking lots or parking structures, including necessary intelligence to produce accurate plans, profiles and cross-sections.

5.0 Section 5 - Ownership and Rights in Data

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

6.0 Section 6 – Contractor Electives

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

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

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

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

6.3.1.1. Construction Submittals – Over-The-Shoulder Progress Reviews. Periodic quality control meetings or construction progress review meetings shall include quality control reviews on the implementation and use of the Model for project scheduling.

6.4. Cost Estimating. In the BIM Execution Plan and during the Preliminary BIM Execution Plan Review, provide an overview of the use of BIM in the development and support of cost estimating requirements, or other applications such as cost analysis and estimate validation.

6.4.1. Submittal Requirements. During the Submittal stages, the Contractor shall deliver cost estimating information derived from the Model.

6.4.2. Project completion. At project completion, the Contractor shall provide an MII (Micro Computer Aided Cost Estimating System Generation II) Cost Estimate which follows the USACE Cost Engineering Military Work Breakdown System (WBS), a modified Unifomat, to at least the sub-systems level and uses quantity information supplied directly from BIM output to the maximum extent possible, though other "Gap" quantity information will be included as necessary for a complete and accurate cost estimate.

6.4.2.1. Sub system level extracted quantities from the BIM for use within the estimate shall be provided according to how detailed line items or tasks should be installed/built so that accurate costs can be developed and/or reflected. Therefore, when developing a BIM, the designer shall be cognizant of what tasks need to be separated appropriately at the beginning stages of model development, such as tasks done on the first floor versus the same task on higher floors that will be more labor intensive and therefore need to have a separate quantity and be priced differently. Tasks and their extracted quantities from the BIM shall be broken down by their location (proximity in the structure) as well as the complexity of its installation.

6.4.2.2. At all design stages it shall be understood that BIM output as described in this document will not generate all quantities that are necessary in order to develop a complete and accurate cost estimate of the project based on the design. An example of this would be plumbing that is less than 1.5" diameter and therefore not expected to be modeled due to granularity; this information is commonly referred to as The Gap. Quantities from The Gap and their associated costs shall be included in the final project actual cost estimates as well.

6.5. Other Analyses and Reports. Structural, energy and efficiency, EPACT 2005 & EISA 2007, lighting design, daylighting, electrical power, psychrometric processing, shading, programming, LEED, fire protection, code compliance, Life Cycle Cost, acoustic, plumbing.

7.0 Section 7 – BIM Project Execution Plan Template

7.1. Contractors will utilize the latest version of the USACE BIM PROJECT EXECUTION PLAN (USACE PxP) Template to develop an acceptable Plan. The template can be downloaded from the CAD/BIM Technology Center website.

ATTACHMENT G**DESIGN SUBMITTAL DIRECTORY AND SUBDIRECTORY FILE ARRANGEMENT**

Organize electronic design submittal files in a subdirectory/file structure in accordance with the following table. The Contractor may suggest a slightly different structure, subject to the discretion of the government.

Design Submittal Directory and Subdirectory File Arrangement.

Directory	Sub-Directory	Sub-Directory or Files	Files
Submittal/Package Name	Narratives	PDF file or files with updated design narrative for each applicable design discipline	
	Drawings	PDF (subdirectory)	Single PDF file with all applicable drawing sheets - bookmarked by sheet number and name
		BIM (subdirectory) See Attachment F.	BIM project folder (with files) per the USACE Workspace. Include an Excel drawing index file with each drawing sheet listed by sheet #, name and corresponding dgn file name (Final Design & Design Complete only)
	Design Analysis & Calculations	Individual PDF files containing design analysis and calculations for each discipline applicable to the submittal	
		PDF file with Fire Protection and Life Safety Code Review checklist	
	LEED	PDF file with updated Leed Check List	
		PDF file or files with LEED Templates for each point with applicable documentation included in each file.	
		LEED SUBMITTALS	
	Energy Analysis	PDF with baseline energy consumption analysis	
		PDF with actual building energy consumption analysis	
	Specifications	Single PDF file with table of contents and all applicable specifications sections.	
		Submittal Register (Final Design & Design Complete submittal only)	
	Design Quality Control	PDF file or files with DQC checklist(s) and/or statements	
	Building Rendering(s)	PDF file of rendering for each building type included in contract (Final Design & Design Complete).	

**SECTION 01 45 04.00 10
CONTRACTOR QUALITY CONTROL**

1.0 GENERAL

1.1. REFERENCES

1.2. PAYMENT

2.0 PRODUCTS (NOT APPLICABLE)

3.0 EXECUTION

3.1. GENERAL REQUIREMENTS

3.2. QUALITY CONTROL PLAN

3.3. COORDINATION MEETING

3.4. QUALITY CONTROL ORGANIZATION

3.5. SUBMITTALS AND DELIVERABLES

3.6. CONTROL

3.7. TESTS

3.8. COMPLETION INSPECTION

3.9. DOCUMENTATION

3.10. NOTIFICATION OF NONCOMPLIANCE

1.0 GENERAL

1.1. REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Refer to the latest edition, as of the date of the contract solicitation.

- ASTM INTERNATIONAL (ASTM)
- ASTM D 3740 Minimum Requirements for Agencies
Engaged in the Testing and/or Inspection
of Soil and Rock as Used in Engineering
Design and Construction
- ASTM E 329 Agencies Engaged in the Testing
and/or Inspection of Materials Used in
Construction
- U.S. ARMY CORPS OF ENGINEERS (USACE)
ER 1110-1-12 Quality Management

1.2. PAYMENT

There will be no separate payment for providing and maintaining an effective Quality Control program. Include all costs associated therewith in the applicable unit prices or lump-sum prices contained in the Contract Line Item Schedule.

2.0 PRODUCTS (Not Applicable)

3.0 EXECUTION

3.1. GENERAL REQUIREMENTS

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause titled "Inspection of Construction." The quality control system shall consist of plans, procedures, and organization necessary to produce an end product, which complies with the contract requirements. The system shall cover all design and construction operations, both onsite and offsite, and shall be keyed to the proposed design and construction sequence. The site project superintendent is responsible for the quality of work on the job and is subject to removal by the Contracting Officer for non-compliance with the quality requirements specified in the contract. The site project superintendent in this context shall be the highest level manager at the site, responsible for the overall site activities, including but not limited to quality and production. The site project superintendent shall maintain a physical presence at the site at all times, except as otherwise acceptable to the Contracting Officer, and shall be responsible for all construction and construction related activities at the site. Different contractors have different names for the on-site overall project supervisor. For clarification, the term "site project superintendent" refers to the Contractor's senior site representative or "on-site manager", or other similar title, as those terms are used in contract Clause 52.236-7, "Superintendence by the Contractor" and in the Division 00 Section(s) of the solicitation for this contract or task order, or elsewhere in the contract. It does not refer to a construction superintendent, unless that person is also the Contractor's permanently assigned senior site representative in charge of all on-site activities.

3.2. QUALITY CONTROL PLAN

Furnish for Government review, not later than 30 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause titled "Inspection of Construction." The plan shall identify personnel, procedures, control, instructions, tests, records, and forms to be used. The Government will consider an interim plan for the first 30 days of operation. Design and construction may begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. The Government will not permit work outside of the features of work included in an accepted interim plan to begin until acceptance of a CQC Plan or another interim plan containing the additional features of

work to be started. Where the applicable Code issued by the International Code Council calls for an inspection by the Building Official, the Contractor shall include the inspections in the Quality Control Plan and shall perform the inspections. The Designer of Record shall develop a program for any special inspections required by the applicable International Codes and the Contractor shall perform these inspections, using qualified inspectors. Include the special inspection plan in the QC Plan.

3.2.1. Content of the CQC Plan

The CQC Plan shall include, as a minimum, the following to cover all design and construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agents subcontractors, designers of record, consultants, architect/engineers (AE), fabricators, suppliers, and purchasing agents:

3.2.1.1. A description of the quality control organization. Include a chart showing lines of authority and an acknowledgment that the CQC staff shall implement the three phase control system for all aspects of the work specified. A CQC System Manager shall report to the project superintendent or someone higher in the contractor's organization.

3.2.1.2. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function. Also include those responsible for performing and documenting the inspections required by the International Codes and the special inspection program developed by the designer of record.

3.2.1.3. A copy of the letter to the CQC System Manager, signed by an authorized official of the firm, which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Furnish copies of these letters.

3.2.1.4. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents subcontractors, designers of record, consultants, architect engineers (AE), offsite fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

3.2.1.5. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. Use only Government approved Laboratory facilities.

3.2.1.6. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

3.2.1.7. Procedures for tracking design and construction deficiencies from identification through acceptable corrective action. These procedures shall establish verification that identified deficiencies have been corrected.

3.2.1.8. Reporting procedures, including proposed reporting formats.

3.2.1.9. A list of the definable features of work. A definable feature of work is a task, which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable feature under a particular section. This list will be agreed upon during the coordination meeting.

3.2.1.10. A list of all inspections required by the International Codes and the special inspection program required by the code and this contract.

3.2.2. Additional Requirements for Design Quality Control (DQC) Plan

The following additional requirements apply to the Design Quality Control (DQC) plan:

3.2.2.1. The Contractor's QCP Plan shall provide and maintain a Design Quality Control (DQC) Plan as an effective quality control program which will assure that all services required by this design-build contract are performed and

provided in a manner that meets professional architectural and engineering quality standards. As a minimum, competent, independent reviewers identified in the DQC Plan shall review all documents. Use personnel who were not involved in the design effort to produce the design to perform the independent technical review (ITR). The ITR is intended as a quality control check of the design. Include, at least, but not necessarily limited to, a review of the contract requirements (the accepted contract or task order proposal and amended RFP), the basis of design, design calculations, the design configuration management documentation and check the design documents for errors, omissions, and for coordination and design integration. The ITR team is not required to examine, compare or comment concerning alternate design solutions but should concentrate on ensuring that the design meets the contract requirements. Correct errors and deficiencies in the design documents prior to submitting them to the Government.

3.2.2.2. Include in the DQC Plan the discipline-specific checklists to be used during the design and quality control of each submittal. Submit these completed checklists at each design phase as part of the project documentation.

3.2.2.3. A Design Quality Control Manager, who has the responsibility of being cognizant of and assuring that all documents on the project have been coordinated, shall implement the DQC Plan. This individual shall be a person who has verifiable engineering or architectural design experience and is a registered professional engineer or architect. Notify the Government, in writing, of the name of the individual, and the name of an alternate person assigned to the position.

3.2.3. 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 Corps of Engineers, Fort Worth District. Inquire of the District or Division sponsoring the course for fees and other expenses involved, if any, for attendance at this course.

3.4.6. Organizational Changes

When it is necessary to make changes to the CQC staff, the Contractor shall revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

3.5. SUBMITTALS AND DELIVERABLES

Make submittals as specified in Section 01 33 00 **SUBMITTAL PROCEDURES**. The CQC organization shall certify that all submittals and deliverables are in compliance with the contract requirements.

3.6. CONTROL

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. The CQC organization shall conduct at least three phases of control for each definable feature of the construction work as follows:

3.6.1. Preparatory Phase

Perform this phase prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase shall include:

3.6.1.1. A review of each paragraph of applicable specifications, reference codes, and standards. Make a copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field at the preparatory inspection. Maintain these copies in the field, available for use by Government personnel until final acceptance of the work.

3.6.1.2. A review of the contract drawings.

3.6.1.3. A check to assure that all materials and/or equipment have been tested, submitted, and approved.

3.6.1.4. Review of provisions that have been made to provide required control inspection and testing.

3.6.1.5. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.

3.6.1.6. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.

3.6.1.7. A review of the appropriate activity hazard analysis to assure safety requirements are met.

3.6.1.8. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.

3.6.1.9. A check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.

3.6.1.10. Discussion of the initial control phase.

3.6.1.11. Notify the Government at least 24 hours in advance of beginning the preparatory control phase. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. Document the results of the preparatory phase actions by separate minutes prepared by the CQC System Manager and attached to the daily CQC report. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2. Initial Phase

Accomplish this phase at the beginning of a definable feature of work. Include the following actions:

3.6.2.1. Check work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.

3.6.2.2. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.

3.6.2.3. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

3.6.2.4. Resolve all differences.

3.6.2.5. Check safety to include compliance with and upgrading of the Accident Prevention plan and activity hazard analysis. Review the activity analysis with each worker.

3.6.2.6. Notify the Government at least 24 hours in advance of beginning the initial phase. The CQC System Manager shall prepare and attach to the daily CQC report separate minutes of this phase. Indicate exact location of initial phase for future reference and comparison with follow-up phases.

3.6.2.7. Repeat the initial phase any time acceptable specified quality standards are not being met.

3.6.3. Follow-up Phase

Perform daily checks to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. The checks shall be made a matter of record in the CQC documentation. Conduct final follow-up checks and correct deficiencies prior to the start of additional features of work which may be affected by the deficient work. Do not build upon nor conceal non-conforming work.

3.6.4. Additional Preparatory and Initial Phases

Conduct additional preparatory and initial phases on the same definable features of work if: the quality of on-going work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision or work crew; if work on a definable feature is resumed after a substantial period of inactivity; or if other problems develop.

3.7. TESTS

3.7.1. Testing Procedure

Perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements and project design documents. Upon request, furnish to the Government duplicate samples of test specimens for possible testing by the Government. Testing includes operation and/or acceptance tests when specified. The Contractor shall procure the services of a Corps of Engineers approved testing laboratory, or establish an approved testing laboratory at the project site. The Contractor may elect to use a laboratory certified and accredited by the Concrete and cement Reference Laboratory (CCRL) or by AASHTO Materials Reference Laboratory (AMRL) for testing procedures that those organizations certify. The Contractor shall perform the following activities and record and provide the following data:

3.7.1.1. Verify that testing procedures comply with contract requirements and project design documents.

3.7.1.2. Verify that facilities and testing equipment are available and comply with testing standards.

3.7.1.3. Check test instrument calibration data against certified standards.

3.7.1.4. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.

3.7.1.5. Include results of all tests taken, both passing and failing tests, recorded on the CQC report for the date taken. Include specification paragraph reference, location where tests were taken, and the sequential control number identifying the test. If approved by the Contracting Officer, actual test reports may be submitted later with a reference to the test number and date taken. Provide an information copy of tests performed by an offsite or commercial test facility directly to the Contracting Officer. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

3.7.2. Testing Laboratories

3.7.2.1. Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel shall meet criteria detailed in ASTM D 3740 and ASTM E 329.

3.7.2.2. Capability Recheck

If the selected laboratory fails the capability check, the Government will assess the Contractor a charge of \$1,375 to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the contract amount due the Contractor.

3.7.3. Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests, and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.7.4. Furnishing or Transportation of Samples for Government Quality Assurance Testing

The Contractor is responsible for costs incidental to the transportation of samples or materials. Deliver samples of materials for test verification and acceptance testing by the Government to the Corps of Engineers Laboratory, f.o.b., at the following address:

- For delivery by mail:
White Sands Missile Range Resident Office
Wes Hoffman, P.E.
Bldg. 1736 Martin Luther King Drive

- White Sands, NM 88002
For other deliveries:
White Sands Missile Range Resident Office
Wes Hoffman, P.E.
Bldg. 1736 Martin Luther King Drive
White Sands, NM 88002

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 02.001
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 02.001

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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 2009) Water Permeability of Geotextiles by Permittivity
ASTM D 4533	(2004; R 2009) 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; R 2009) Identification, Storage, and Handling of Geosynthetic Rolls and Samples

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 832-R-92-005	(1992) Storm Water Management for Construction Activities Developing Pollution Preventions and Plans and Best Management Practices
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U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 122.26	Storm Water Discharges (Applicable to State NPDES Programs, see section 123.25)
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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 20.00 10 ENVIRONMENTAL PROTECTION, and the requirements of the National Pollution Discharge Elimination System (NPDES) permit or applicable state Pollution Discharge Elimination System.

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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. Except as provided in paragraphs UNSUITABLE CONDITIONS and NO ACTIVITY FOR LESS THAN 21 DAYS, initiate stabilization practices as soon as practicable, but no more than 14 days, in any portion of the site where construction activities have temporarily or permanently ceased.

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 No Activity for Less Than 21 Days

When the total time period in which construction activity is temporarily ceased on a portion of the site is 21 days minimum, stabilization practices do not have to be initiated on that portion of the site until 14 days have elapsed after construction activity temporarily ceased.

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

a. 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 State of New Mexico general permit for storm water discharges from construction sites. Submit the SWPPP along with any required Notice of Intent, Notice of Termination, and appropriate permit fees, via the Contracting Officer, to the appropriate Federal or State 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:

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- (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 State of New Mexico 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.
- (6) 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 EPA or State of New Mexico, whichever is applicable, 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 or State agency for approval, a minimum of 14 calendar days prior to the start of construction. A copy of the approved SWPPP will be kept at the construction on-site office, and continually updated 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. Obtain approval from the Contracting Officer prior to final removal of silt fence barriers.

1.3.3.2 Straw Bales

Provide bales of straw as a temporary structural practice to minimize erosion and sediment runoff. If bales are used, properly place the bales to

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effectively retain sediment immediately after completing each phase of work (e.g., clearing and grubbing, excavation, embankment, and grading) in each independent runoff area (e.g., after clearing and grubbing in a area between a ridge and drain, place the bales as work progresses, remove/replace/relocate the bales as needed for work to progress in the drainage area). Show on the drawings areas where straw bales are to be used. The Contracting Officer will approve the final removal of straw bale barriers. Provide rows of bales of straw as follows:

- a. Along the downhill perimeter edge of all areas disturbed.
- b. Along the top of the slope or top bank of drainage ditches, channels, swales, etc. that traverse disturbed areas.
- c. Along the toe of all cut slopes and fill slopes of the construction areas.
- d. Perpendicular to the flow in the bottom of existing drainage ditches, channels, swales, etc. that traverse disturbed areas or carry runoff from disturbed areas. Space the rows as shown on the task order.
- e. Perpendicular to the flow in the bottom of new drainage ditches, channels, and swales. Space the rows as shown on the task order.
- f. At the entrance to culverts that receive runoff from disturbed areas.

1.3.3.3 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 0.5 m(18 inches). The minimum base width shall be 1.8 m(6 feet) and the minimum top width shall be 0.6 m(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 Sediment Basins

Trap sediment in temporary sediment basins. Select a basin size to accommodate the runoff of a local two-year storm. Pump dry and remove the accumulated sediment, after each storm. Use a paved weir or vertical overflow pipe for overflow. Remove collected sediment from the site. Institute effluent quality monitoring programs. Install, inspect, and maintain best management practices (BMPs) as required by the general permit. Prepare BMP Inspection Reports as required by the general permit. If required by the permit, include those inspection reports.

1.3.5 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

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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.

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 resistant to deterioration due to ultraviolet and heat exposure. Provide synthetic filter fabric that contains ultraviolet ray inhibitors and stabilizers to assure a minimum of

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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	445 N min.
Elongation (percent)		30 percent max.
Trapezoid Tear	ASTM D 4533	245 N min.
Permittivity	ASTM D 4491	0.2 sec-1
AOS (U.S. Std Sieve)	ASTM D 4751	20-100

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.

2.2 COMPONENTS FOR STRAW BALES

The straw in the bales shall be stalks from oats, wheat, rye, barley, rice, or from grasses such as byhalia, bermuda, etc., furnished in air dry condition. Provide bales with a standard cross section of 14 by 18 inches. Wire-bound or string-tie all bales. Use either wooden stakes or steel posts

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to secure the straw bales to the ground. Wooden stakes utilized for this purpose, shall have a minimum dimensions of 2 by 2 inches in cross section and have a minimum length of 3 feet. Steel posts (standard "U" or "T" section) utilized for securing straw bales, shall have a minimum weight of 1.33 pounds/linear foot and a minimum length of 3 feet.

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 INSTALLATION OF STRAW BALES

Place the straw bales in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another. Install straw bales so that bindings are oriented around the sides rather than along the tops and bottoms of the bales in order to prevent deterioration of the bindings. Entrench and backfill the barrier. Excavate a trench the width of a bale and the length of the proposed barrier to a minimum depth of 4 inches. After the bales are staked and chinked (gaps filled by wedging with straw), backfill the excavated soil against the barrier. Conform the backfill soil with the ground level on the downhill side and build up to 4 inches against the uphill side of the barrier. Scatter loose straw over the area immediately uphill from a straw bale barrier to increase barrier efficiency. Securely anchor each bale by at least two stakes driven through the bale. Drive the first stake or steel post in each bale toward the previously laid bale to force the bales together. Drive stakes or steel pickets a minimum 18 inches deep into the ground to securely anchor the bales.

3.3 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.

3.3.1 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

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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 receive erosion control, except that the coverage requirements in paragraph, titled "Establishment" of this section do not apply.

3.3.2 Straw Bale Maintenance

Inspect straw bale barriers in accordance with paragraph, titled "Inspections". Pay close attention to the repair of damaged bales, end runs and undercutting beneath bales. Accomplish necessary repairs to barriers or replacement of bales in a promptly manner. Remove sediment deposits when deposits reach one-half of the height of the barrier. At the each end of each row turn bales uphill when used to retain sediment. Remove a straw bale barrier when it is no longer required. The immediate area occupied by the bales and any sediment deposits shall be shaped to an acceptable grade. Seed the areas disturbed by this shaping in accordance with Section 32 92 19 SEEDING.

3.3.3 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 Section 32 92 19 SEEDING.

3.4 INSPECTIONS

3.4.1 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.

3.4.2 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 identified in the Storm Water Pollution Prevention Plan 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.

3.4.3 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, major observations relating to the implementation of the Storm Water Pollution Prevention Plan, maintenance performed, and actions taken. Furnish the report to the Contracting Officer within 24 hours of the inspection as a part of the Contractor's daily CQC

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REPORT. A copy of the inspection report shall be maintained on the job site.

3.4.4 Storm Water Pollution Plan (SWPPP) Revisions

In compliance with EPA NPDES General Permit and SECTION 01 57 24 STORM WATER POLLUTION PREVENTION PLAN, the Contractor is responsible to revise the Storm Water Pollution Prevention Plan (SWPPP) including the erosion control drawings. The current locations of storm control structures and types shall be depicted on the drawings portion of the on-site SWPPP for regulatory inspection and SWPPP revision record.

-- End of Section --

APPENDIX A

GEOTECHNICAL INFORMATION



Engineering, Environmental & Technical Services

GEOTECHNICAL ENGINEERING STUDY

UEPH Engineer Battalion – WSMR, NM



Prepared By:
ENCON International, Inc.
Project No. 801-10

January 12, 2011

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ENCON INTERNATIONAL, INC.**Engineering, Environmental & Technical Services**

January 12, 2011

Jacobs / Huitt-Zollars JV
3131 McKinney Avenue, Suite 600
Dallas, TX 75204

Attention: Sanford Case

Subject: GEOTECHNICAL ENGINEERING STUDY
Engineer Battalion UEPH
White Sands Missile Range, NM
W9126G-09-D-0001 (PN072110)
(SE Ref. 10619018.00)
ENCON Project No.: 801-10

The ENCON Team is pleased to submit our Geotechnical Engineering Report for this project. ENCON has teamed with Schnabel Engineering Consultants, Inc. (Schnabel) to provide these services. This document includes a Geotechnical Study with attached appendices and relevant data collected for this study, which is intended to meet the Fort Worth District C.O.E.'s Geotechnical Engineering Requirements for this project.

EXECUTIVE SUMMARY

The proposed construction will consist of construction of a new three-story UEPH barracks building, a concrete paved entrance drive, and associated site grading. No detailed building information is currently available. For this report, we have assumed that the buildings will have floor slabs on-grade and no basement areas. Based on the planned finished floor grade of elevation 4172.2, we anticipate that maximum fills in the planned building pad areas to be less than about 4 feet.

The property currently is undeveloped and is relatively open with a moderate slope. The site borings indicate that the natural subsurface profile generally consists of interbedded clayey sands (SC), silty sands (SM), and poorly graded sands (SP) to a depths varying from the surface to 26.5 feet. An isolated layer of sandy lean clay (CL) was encountered in one of the borings at a depth from 18.3 to 25.6 feet below existing ground surface grades.

The non-organic on-site soils are generally suitable for building support. Floor slabs may also be supported on-grade. The on-site excavated soils are suitable for reuse as compacted structural fill. Based on our preliminary evaluation and assumed maximum column and wall loads on the order of 150 kips and 3 kips/lf, respectively, shallow foundations may be sized for allowable bearing pressures of about 3,000 to 4,000 pounds per square foot (psf).

Based on our review of the test borings and geologic data, the soils encountered at the site are representative of Site Class D, or a Stiff Soil Profile.

Based on the field investigation data and our review of the soil classifications, the on-site soils are anticipated to exhibit CBR values of at least 10 when adequately compacted. These soils also exhibit a relatively low potential for shrink-swell behavior. Preliminary pavement sections for the entrance drive are provided herein.

We are providing this executive summary solely for purposes of overview. Any party that relies on this report must read the full report. This executive summary omits several details, any one of which could be very important to the proper application of the report.

1.0 SCOPE

ENCON's and Schnabel's agreement dated May 13, 2010, defines the scope of this study. Our services consisted of a Geotechnical Engineering Study for this project.

The Geotechnical Engineering Study will include the evaluation of test boring, geological, soil test, and related structural data to develop building support recommendations as requested in ENCON's Subconsultant Agreement with Jacobs/Huitt-Zollars.

Services not described in our agreement are not included in this study. We would be happy to provide additional support services to the design team as the project demands.

2.0 SITE DESCRIPTION

The project site is located at White Sands Missile Range (WSMR) in New Mexico. The site lies south of Watertown Avenue and east of Hughes Avenue. Overall the site is about 80-acres. The area planned for the UEPH barracks is currently undeveloped.

Existing ground surface grades in the area of the planned barracks slope downward to the east, varying from about EL 4172 to EL 4163 (NAVD 88) from preliminary grading plans provided by Jacobs/Huitt-Zollars JV.

3.0 PROPOSED CONSTRUCTION

The proposed construction will consist of construction of a new three-story UEPH barracks building, a new concrete paved entrance drive, and associated site grading. Several stormwater detention ponds are also planned around the building.

No detailed building information is currently available. We have assumed that all buildings will have floor slabs on-grade. Based on the finished floor elevation 4172.2, we anticipate that maximum fills in the planned building pad areas to be less than about four (4) feet.

No structural load data is currently available to us. For the purpose of this study, we have assumed that the buildings will likely have maximum column and wall loads of 150 kips and 3 kips/LF, respectively. **Structural load data will need to be verified in the final design.**

4.0 SUBSURFACE CONDITIONS

4.1 Geology

The site is located near the east side of the Tertiary Rio Grande Rift physiographic province which begins in Colorado and extends southerly through New Mexico to El Paso and into Mexico where it dissipates. The Rio Grande Rift is a relatively narrow north-south trending zone of approximately east-west extension that nearly bisects the state of New Mexico. The rift zone contains numerous basins bordered by major uplifts and a number of north-south trending, basin-bounding normal fault systems. In general, the rift is bounded on the east by, from north to south: the Sierra Blanca Mountains; the Carrizozo Volcanic Field; the Sacramento Mountains; and the Otero Platform (United States Geologic Survey).

White Sands Missile Range is located mostly within the Tularosa Basin, which is a large valley located between the San Andres Mountains and the Organ Mountains to the west / southwest and the Sacramento Mountains and the Otero Platform to the east. The San Andres Mountains were formed by west-dipping fault blocks comprised mostly of limestone. Gypsum deposits washed from the San Andres (and Sacramento) Mountains are the main source of dunes in the White Sands National Monument area, hence the name White Sands. In contrast, the Organ Mountains were formed by igneous rock intrusions and consist primarily of Precambrian granite and rhyolite. The Tularosa Basin contains both gypsum and quartzose dunes; however, the gypsum deposits are generally found north of the project site north of U.S. Route 70 (correlating with the San Andres Mountains) while quartzose dunes are present generally due east of the project site and south of U.S. Route 70 (in line with the Organ Mountains).

The project site lies within the southern reaches of the Tularosa Basin. The Organ Mountains are located directly to the southwest of the site, with a fault located at the base of the range. Bedrock in the region is primarily Tertiary pyroclastics and intrusives although Precambrian intrusive and extrusive rock is exposed to the south and west in the Organ Mountains. The valley is comprised of thousands of feet of Tertiary valley-fill deposits eroded from block-faulted uplifts within the Rio Grande Rift overlying Permian sedimentary rock.

4.2 Data Collection Techniques

Seven (7) test borings (25A2S-1 through 25A2S-7) were drilled July 13 thru 15, 2010 in the planned building areas under observation and direction of ENCON engineering personnel. The borings were drilled to a depth of 25 feet below the existing ground surface grades. Upon completion, borings were filled with concrete for safety considerations. Groundwater level measurements were attempted at completion of each respective boring with no groundwater being encountered within the depths drilled for this study. The results of the groundwater level measurements are included on the boring logs. Test boring logs are included in Appendix B. The *Test Boring Location Plan* is included in the Drawings section of the report.

ENCON engineering personnel also performed four (4) Dynamic Cone Penetrometer (DCP) soundings in the field (25A2S-1, 25A2S-4, 25A2S-6, and 25A2S-7). The Dynamic Cone Penetrometer (DCP) Test was performed in general accordance with ASTM D 6951-03 to further

identify the soil conditions. The DCP readings, measured in blows per increment (bpi), indicate the resistance of the subsurface soils to penetration of the DCP hammer. The number of strikes required to drive the DCP approximately 50 mm (1.97 in) is termed the blows per increment.

The DCP generally is constructed as a stainless steel apparatus with a 15.8 mm (5/8 in) diameter drive rod with a replaceable point or disposable cone tip. The DCP also has a 4.6 kg (10.1-lb) or 8 kg (17.6-lb) hammer which is dropped from a fixed height of 575 mm (22.6 in), a coupler assembly and a handle. The tip has an inclined angle of 60 degrees and a diameter at the base of 20 mm (0.79 in). The DCP procedure consists of seating the point into the soils to be tested and allowing the 10.1-pound or 17.6-pound weight to freefall approximately 22.6 inches, striking the driving anvil and forcing the point into the soils. When the readings are properly analyzed they can be correlated to SPT Blow counts, thereby estimating the soil strength characteristics and parameters of the in-place soils. The DCP procedure used generally consisted of driving the rod with the 17.6 lb weight hammer down to approximately 3 feet.

In-situ percolation testing was conducted by ENCON personnel. From grading plans provided by Jacobs/Huitt-Zollars JV, bottom depths of the ponds will vary around the site. Two percolation test holes were drilled with 8 inch hollow stem augers from a drill rig about 115 feet east of boring 25A2S-2 to 50 and 48 inches. Approximately two inches of clean gravel was added to the bottom of the holes to protect the bottom from scouring when water was added. Holes were filled with 12 inches of water twice and left soaking overnight. The following day the water level was checked before starting. Water had to be added to reach a level of six inches of water above the gravel. Readings were taken every ten minutes then every thirty minutes, re-filling the hole with water to the six inch mark above the gravel after each reading, until there was less than 10 percent difference between readings. The last reading was recorded as the percolation rate as shown in the percolation data in Appendix A. The percolation test data indicates infiltration rates will vary significantly depending on the soil type encountered at the pond bottoms. The clayey sands (SC) will likely exhibit rates on the order of 0.5 inches/hr, while the poorly graded sands (SP) will likely exhibit rates on the order of 15 inches/hr.

Select samples, representative of the soils encountered in the borings performed at the site, were obtained for laboratory testing. Testing performed by ENCON consisted of natural moisture content, Atterberg Limits, gradation analyses, and corrosivity tests. Laboratory tests were performed to aid in our visual classifications, to estimate soil strength characteristics, and to provide guidance in estimating the shrink/swell potential of the on-site soils. The results of the laboratory tests are included in the Summary of Laboratory Tests of Appendix A. All lab tests were conducted according to ASTM and COE standards.

4.3 Generalized Subsurface Stratigraphy

No topsoil was noted at the test boring locations. The site borings indicate that the natural subsurface profile generally consists of interbedded clayey sands (SC), silty sands (SM), and poorly graded sands (SP) to depths varying from 0.0 feet to 26.5 feet. Standard Penetration Test "N" values varied from 5 to 60+, indicating relatively loose to very compact density soils. Isolated areas of Sandy Lean Clay underlie the sands from a depth of 18.3 to 26.5 feet. Standard Penetration Test "N" values within this lower stratum varied from 33 to 51, indicating relatively compact to very compact density

soils. Based on the SPT N-values, the soils ranged from loose to compact. Detailed subsurface conditions at each test location are included in the respective *Test Boring Logs*.

The above “N” values indicate the Standard Penetration Test resistances encountered in a particular layer as determined from the number of blows required to drive a two (2)- inch O.D., 1-3/8 inch I.D. sampling spoon one foot using a 140 pound hammer falling 30 inches. This test is conducted after seating the sampler six inches in the bottom of the hole according to ASTM D1586.

Soil samples have been classified in accordance with ASTM D2488 and D2487 where laboratory tests were performed. The ASTM D2487 and D2488 group symbols (e.g. SM), indicated above and on the boring logs, are based on visual observations and limited soil laboratory testing of recovered soil samples. Criteria for soil classification are given in Appendix B. Some variation is likely to occur between the visual and laboratory classification.

4.4 Ground Water

Water level measurements taken in the boreholes shortly after completion indicated no groundwater table within the depths drilled for this study. No longer-term water readings were obtained, as the boreholes were filled with concrete for safety considerations.

Based on the data obtained during this study, the groundwater is not expected to be encountered during construction in the planned building and graded areas. Depending upon weather conditions during construction and depth of excavations, temporary perched water conditions may be encountered at isolated locations of the site. Fluctuations in the actual groundwater levels will also vary depending upon seasonal conditions such as weather, precipitation, and general site run-off conditions.

5.0 PRELIMINARY GEOTECHNICAL RECOMMENDATIONS

The preliminary geotechnical engineering analysis was based on the information developed from the subsurface exploration and soil laboratory testing, along with the project site plans and assumed structural loading conditions. The non-organic on-site soils are generally suitable for building and pavement support. Floor slabs may also be supported on-grade. The on-site soils are suitable for reuse as compacted structural fill. Some reworking and moisture conditioning of the existing surficial soils in-cut may be necessary as detailed herein to provide suitably compacted materials. The following sections of the report provide our detailed recommendations.

5.1 Earthwork and Grading

Compacted structural fill subgrades should be stripped of topsoil, rootmat, organic material, vegetation, and any soft or otherwise unsuitable materials prior to placement of new fill. Subgrades should be proofrolled with a loaded dump truck or a minimum ten-ton smooth-drum roller under the observation of the Geotechnical Engineer. Areas that, in the opinion of the Geotechnical Engineer, exhibit excessive pumping, rutting, or excessive deflection, should be excavated and replaced with compacted structural fill. Subgrades should also be compacted to at least 95 percent of maximum dry density per ASTM D1557 prior to placing any new fill. The moisture content shall be maintained

within the limits of 2% below optimum to 2% above optimum during compaction of the raw subgrade. No fill material should be placed until subgrades have been observed and are considered suitable by the Geotechnical Engineer.

Material used as compacted structural fill should classify as SM, SC, SP, SW, GP, GW, GM and/or GC in accordance with ASTM D2487, with a maximum particle size of three inches. Compacted structural fill should also be non-expansive soil having a Plasticity Index not less than 4 nor greater than 12 when tested in accordance with ASTM D4318. The on-site excavated soils can be used as non-expansive fill if they meet the aforementioned material definition. It should be anticipated that moisture conditioning of the on-site soils will be required in order for adequate compaction to be attained.

Compacted structural fill should be placed in horizontal lifts not exceeding 8 inches in loose thickness and compacted to the following minimum compaction requirements:

Table 1: Soil Compaction

Subgrade Preparation, Fills, Embankments, and Backfills	Compaction Requirements (Percentage of Maximum Dry Density per ASTM D1557)
Structures & Building Slabs	95
Streets, Paved Areas, Bike Paths	95
Aggregate Base Course	100
Sidewalks	92
Grassed Areas	90

The moisture content shall be maintained within the limits of 2% below optimum to 2% above optimum during compaction.

Compacted structural fill should extend laterally at least five feet beyond the building and pavement limits, and then slope as needed to meet existing grades. Compacted structural fill slopes should not be designed and built steeper than 3.0H:1.0V, unless verified by further geotechnical evaluation.

Exterior grading adjacent to the new building should be sloped away from the structure a minimum of five (5) percent for the first ten (10) feet.

5.2 Spread Footings

Shallow spread footings for the new Engineering Battalion UEPH building may be supported on natural soils and new compacted structural fill. Based on our preliminary evaluation and assumed maximum column and wall loads on the order of 150 kips and 3 kips/lf, respectively, shallow foundations may be sized for allowable bearing pressures of about 3,000 to 4,000 pounds per square foot (psf) considering maximum total foundation settlements of about one inch. The actual recommended allowable bearing pressure should be determined based on actual maximum anticipated structural loads, planned bottom of footing grades, and limiting total settlements to one inch or less, and differential settlements between the new and existing building to ½ inch or less.

Note that structural load data has yet to be determined and as such, recommended allowable bearing pressures cannot be refined any further without the above data.

The recommended allowable bearing pressure should provide a factor of safety of at least three against general shear failure. The bearing value should not be increased 33% for wind and seismic unless used in combination with IBC Section 1605.3.2, *Alternative Basic Load Combinations* for use with allowable stress design or other applicable code exceptions. Bearing pressures were evaluated per the EM 1110-1-1905.

In accordance with the UFC 3-310-01 (dated 5-25-05 with 12-07 changes), “frost penetration at White Sands Missile Range is four (4) inches.” However, exterior footing grades should be set at least 24 inches below final exterior grade for protective embedment. Interior footing grades may be set at nominal structural depths. Runoff from the roofs should be adequately discharged away from the foundation edges. In no case shall water be allowed to pond adjacent to any foundation, both during and after construction.

5.3 Seismic Site Classification

Based on our review of the test boring and geologic data, the soils encountered at the site are representative of Site Class D, or a Stiff Soil Profile. Based on IBC 2006, the value of the site coefficient (F_a) as a function of the site class and mapped spectral response acceleration at short periods (S_s) is 1.47. The value of the site coefficient (F_v) as a function of the site class and mapped spectral response coefficient (S_1) is 2.26. Based on UFC 3-310-04, which references 3-310-01 (dated 5-25-05 with 12-07 changes), values of S_s and S_1 of 41 and 13, respectively, are provided for White Sands Missile Range, NM.

5.4 Floor Slabs

The non-organic on-site natural soils and new compacted structural fill are generally suitable for direct support of floor slabs on-grade. All floor slabs should be underlain by a minimum six-inch thick layer of free-draining material to prevent the capillary rise of groundwater. This material should consist of open-graded crushed stone or washed gravel corresponding to AASHTO size No. 57. Floor slabs should be underlain by 10-mil (minimum) polyethylene vapor barrier.

Floor slabs may be designed using a maximum modulus of subgrade reaction, k , of 125 pci, based on a one-foot square plate, and considering that the final eight (8) inches of fill or subgrade in-cut beneath slabs is compacted to at least 95 percent of the Modified Proctor (ASTM D1557) maximum dry density.

5.5 Proposed Cut and Fill Slopes

Both cut and fill slopes are anticipated around various areas of the site to create a more level building and pavement grade, and for detention ponds. Based on our evaluation, cut and fill slopes (assuming properly compacted soils) should be constructed no steeper than 3.0H:1.0V (horizontal to vertical) in order to provide an acceptable factor of safety of at least 1.5. Steeper slopes may be possible provided that the Design Engineer performs a more detailed analysis of the specific conditions planned (per EM 1110-2-1902).

Slopes in retention basins and drainage swales should have adequate permanent slope protection measures to resist surface erosion due to runoff and wave action. The measures selected should be based on the anticipated slope gradient, runoff erosional velocities and soil types.

5.6 Soil Resistivity and Cathodic Protection Measures

The field electrical resistivity testing indicates the on-site soils have resistivities ranging from 3,000 to 7,000 ohm-cm, which is typical for these predominantly granular soils. The need for and extent of any cathodic protection measures should be evaluated by a Corrosion Engineer and considering the current White Sands Missile Range practices/requirements.

6.0 PAVEMENT SECTION RECOMMENDATIONS

Based on the field investigation data and our review of the soil classifications, the on-site soils are anticipated to exhibit CBR values of at least 10 when adequately compacted. These soils also exhibit a relatively low potential for shrink-swell behavior.

Pavement section designs were based in accordance with the C.O.E. design criteria using the Pavement Design and Evaluation Software PCASE 2.08. Pavements were designed considering a 25-yr design life. Anticipated traffic data is detailed in the attached calculations.

6.1 Rigid Pavements

Rigid pavement designs were based on a 650 psi flexural strength, 28-day compressive strength mix. Unreinforced concrete pavement with 6x6 welded wire fabric or fibermesh (Fibermesh 300 or equal) were considered for our rigid pavement analysis. Note that the welded wire fabric/fibermesh is primarily intended to control cracking during the curing process. The following minimum pavement rigid sections are recommended considering support on the on-site soils and considering properly prepared subgrades.

Entrance Drive; with Trucks but no Firetrucks
Portland Cement Concrete (NMDOT) = 8.0 inches

Entrance Drive; with Trucks and Firetrucks
Portland Cement Concrete (NMDOT) = 9.5 inches

Longitudinal and transverse contraction jointing for these concrete sections should be in accordance with UFC 3-250-01FA, Chapter 16 (January 2004). Considering planned pavement sections will be 8.0 and 9.5 inches, longitudinal and transverse joints should be spaced at a maximum 15 feet. Construction joints should generally be spaced at 20 to 25 feet apart, but may be increased depending on the construction equipment capabilities. Dowel size and spacing for construction, contraction and expansion joints should consist of 1-inch dowel bars having a minimum length of 16 inches and spaced at a minimum of 12 inches.

6.2 General Pavement Considerations

New soil fill should be placed in layers not exceeding 8 inches in loose thickness and be compacted to at least 95 percent of maximum dry density per ASTM D1557, Modified Proctor. The Aggregate Base Course should be compacted to at least 100% of ASTM D1557. Construction joints should generally be spaced at 20 to 25 feet apart, but may be increased depending on the construction equipment capabilities.

Adequate control of surface drainage will be a very important consideration for the overall development related to pavement design. Proper grading to provide runoff from the pavement surface and beyond the limits of the paved areas should be incorporated into the final site grading.

Pavement design and construction should comply with IAW UFC-3-250-01FA and UFC-3-250-18FA. Stone base shall have a minimum CBR of 80 and select fill subbase shall have a minimum CBR of 20.

7.0 CONSTRUCTION CONSIDERATIONS

7.1 Earthwork

The depth of stripping necessary to provide a suitable base for placement and compaction of earthwork or for pavement subgrade preparation may include topsoil and other softer surficial layers with or without organic matter. The depth of required stripping should be determined by the excavation contractor prior to construction using test pits, probes, or other means that the contractor wishes to employ, and this determination should be the excavation contractor's responsibility.

Proper grading to provide positive drainage away from working areas should always be maintained to avoid unnecessary excavation due to softening of the subgrade soils by water and/or construction equipment.

Construction during wet weather may also create unnecessary delays and undercutting of subgrades due to disturbance by construction traffic. The contractor should be advised of his responsibility to prevent disturbance to otherwise stable subgrades. Final subgrade observations should be made by the Geotechnical Engineer just prior to placing of moisture barrier or base course materials to verify that excessive subgrade disturbance has not occurred.

7.2 Engineering Services during Construction

Regardless of the thoroughness of a Geotechnical Engineering Exploration, there is always a possibility that conditions between borings will be different from those at the boring locations, that conditions are not as anticipated by the designers, or that the construction process has altered the subsurface conditions. Therefore, construction observation should be performed under the supervision of a Geotechnical Engineer who is familiar with the intent of the recommendations presented herein.

7.3 General Specification Recommendations

The conclusions and recommendations of this report are based on the information revealed by this exploration. An attempt has been made to provide for normal contingencies, but the possibility remains that unexpected conditions may be encountered during construction. An allowance should be established to account for possible additional costs that may be required to construct foundations and earthwork as recommended herein. Additional costs may be incurred for various reasons including undercutting of unsuitable existing soils, inability to use on-site soils during the period earthwork proceeds, and variation of soil between test borings.

8.0 LIMITATIONS

We prepared this report to aid in the evaluation of this site and to assist in the design of the project. We intend it for use concerning this specific project. We based our recommendations on information on the site and proposed construction as described in this report. Substantial changes in loads, locations, or grades should be brought to our attention so we can modify our recommendation as needed. We would appreciate an opportunity to review the plans and specifications as they pertain to the recommendations contained in this report, and to submit our comments to you based on this review.

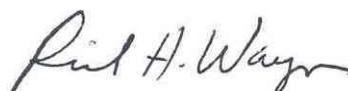
We have endeavored to complete the services identified herein in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality and under similar conditions as this project. No other representation, express or implied, is included or intended, and no warranty or guarantee is included or intended in this report, or any other instrument of service.

ENCON's Team has appreciated the opportunity to be of service for this project. Please call us if you have any questions regarding this report.

Very truly yours,



Pamela Oree, E.I.T.
Schnabel Consulting
Senior Staff Engineer



Richard H. Wargo, P.E.
Schnabel Sr. Reviewing
Principal



References:

- *Army TM 5-818-1
- *EM 1110-1-1905 – Bearing Capacity of Soils
- *EM 1110-2-1902 – Slope Stability
- *International Building Code 2006
- *Pavement Design and Evaluation Software PCASE 2.08
- *New Mexico Department of Transportation – Specifications for Highway and Bridge Construction, 2007
- *UFC 3-310-01 (dated 5-25-05 with 12-07 changes) Structural Load Data
- *UFC 3-310-04 Seismic Design for Buildings
- *UFC 3-250-01FA – Pavement Design for Roads, Streets, Walks, and Open Storage Areas
- *UFC 3-250-18 FA – General Provisions and Geometric Design for Roads, Streets, Walks, and Open Storage Areas

ATTACHMENTS:

Drawings:

Test Boring Location Plan

Appendix A: Soil Laboratory Test Data

Soil Classification Data
Thermal & Electrical Resistivity
Percolation Test Data
Unconfined Compressive Strength
Consolidation (100 min loading)
Consolidation (24 hr loading) – pending

Appendix B: Subsurface Exploration Data

Identification of Soil
Boring Logs, Nos. 25A2S-1 thru 25A2S-7
DCPs Nos. 25A2S-1, 25A2S- 4, 25A2S-6, 25A2S-7

Appendix C: Engineering Calculations

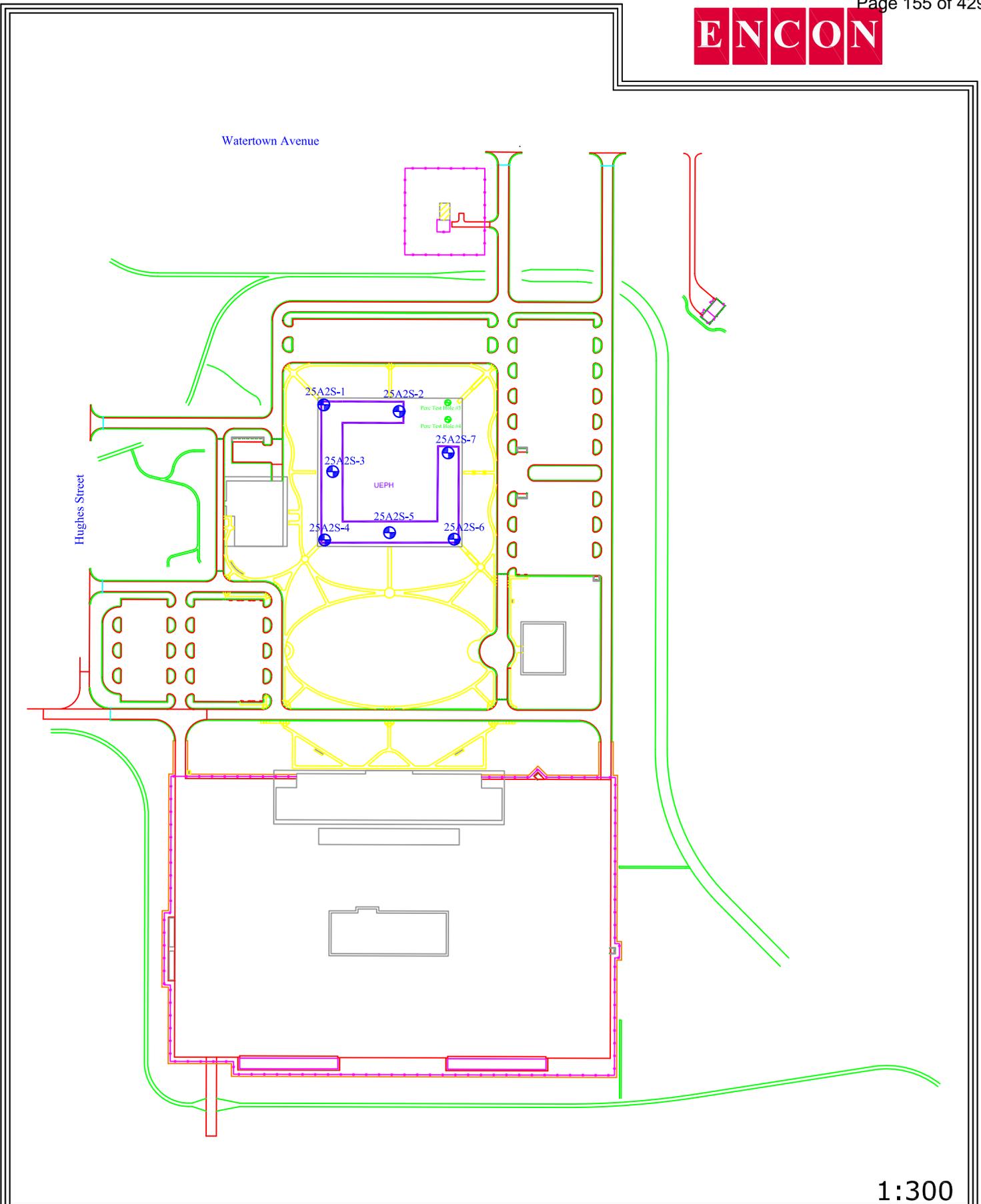
Engineering Calculations

Appendix D: Minimum Testing Requirements for Pavement Structures

2010 SWF FDA Pavement Testing

DRAWINGS

Test Boring Location Plan

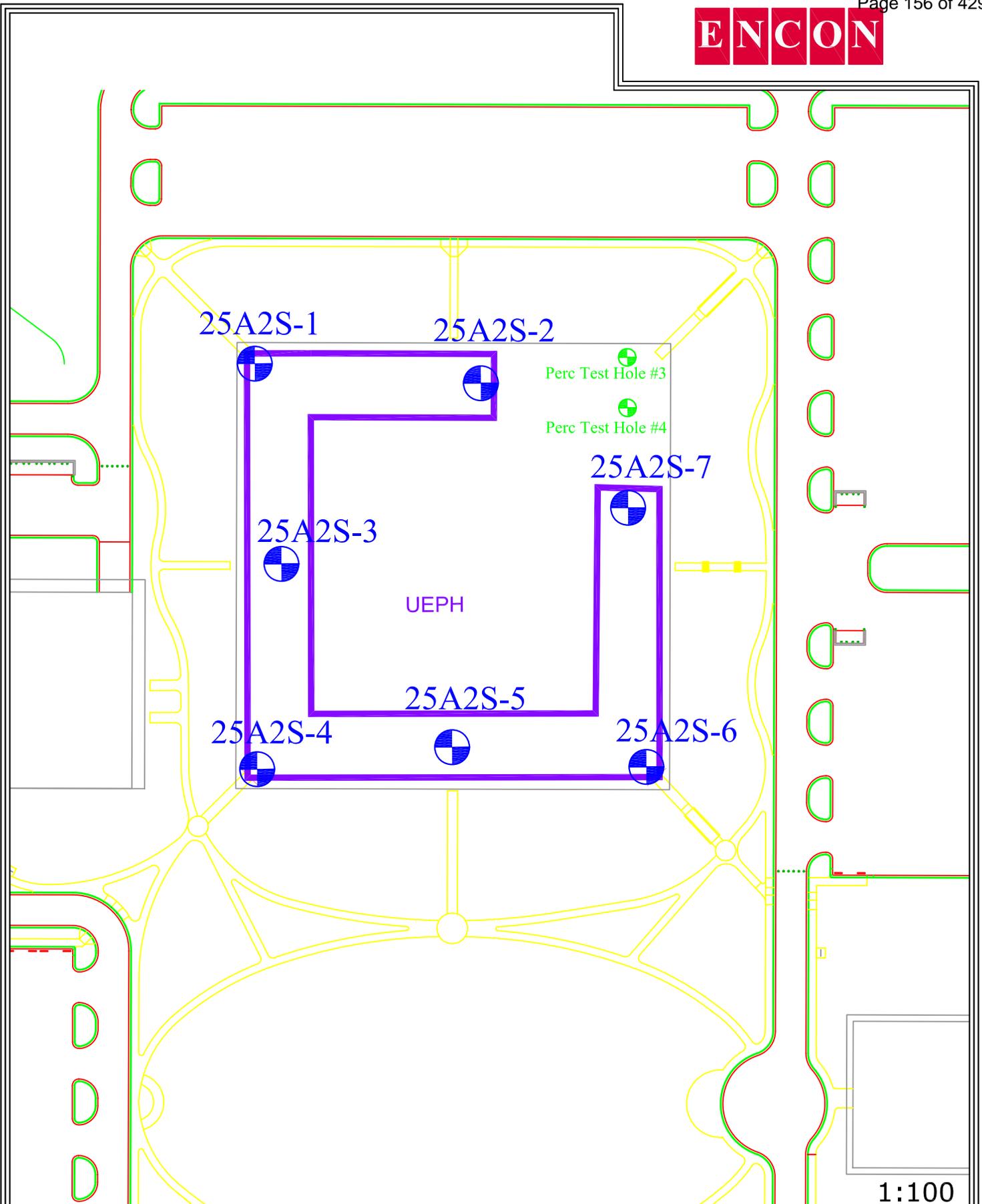


1:300

Jacobs/Huitt-Zollars JV
 Engineer Battalion UEPH - PN 072110
 White Sands Missile Range, NM
 ENCON Project #801-10

-  Borings 25' in Depth (Total 7)
-  Percolation (Total 2)

Boring Plan
 Thursday, March 03, 2011



1:100

Jacobs/Huitt-Zollars JV
 Engineer Battalion UEPH - PN 072110
 White Sands Missile Range, NM
 ENCON Project #801-10

-  Borings 25' in Depth (Total 7)
-  Percolations (Total 2)

Boring Plan
 Thursday, March 03, 2011

APPENDIX A

Soil Laboratory Test Data

Soil Classification Data
Thermal & Electrical Resistivity
Percolation Test Data
Unconfined Compressive Strength
Cosolidation (100 min loading)
Consolidation (24 hour loading)



Engineering, Environmental & Technical Services

SOIL CLASSIFICATION DATA (ASTM D 2487-00)

DATE: 7-30-10

ENCON PROJECT NO.: 801-10

PROJECT: UEPH Engineers Battalion
WSMR, NM

LAB NO.: G10-801 - (1 thru 7)

Client: Jacobs -Huitt-Zollars JV
3131 McKinney Avenue
Suite 600
Dallas, TX 75204-2489

BORING NO.	DEPTH (ft.)	UNIFIED CLASS	SIEVE ANALYSIS-ACCUM. % PASSING Finer by Weight												Moisture (%)	LL	PL	PI
			200	100	80	60	40	20	10	4	3/8	1/2	3/4	1				
25A2S-1	0' - 1.5'	SC	24.0	36	40	46	57	72	87	97	99	100			6.3	26	14	12
25A2S-1	7.5' - 9'	SM	16.6	24	27	32	42	56	76	94	97	98	100		3.8	N/V	N/V	N/P
25A2S-2	2.5' - 4'	SC	26.0	37	40	46	57	72	87	97	99	100			6.1	22	13	9
25A2S-2	5' - 6.5'	SC-SM	24.7	38	42	49	62	78	90	97	100				6.1	21	14	7
25A2S-2	10' - 11.5'	SW-SM	6.4	11	13	17	26	43	67	90	98	99	100		1.4	N/V	N/V	N/P
25A2S-3	5' - 6.5'	SC	39.8	52	56	62	71	84	94	99	100				6.2	25	11	14
25A2S-3	12.5' - 14'	SC	30.7	43	46	51	61	73	83	90	92	92	92	100	3.0	21	13	8
25A2S-4	5' - 7.5'	SC	30.3	40	43	48	57	70	85	96	99	100			6.2	33	13	20
25A2S-4	ST (7.5' - 8')	SW-SM	6.6	10	11	15	25	43	70	93	97	98	100		2.2	N/V	N/V	N/P
25A2S-4	15' - 16.5'	SM	16.1	24	26	30	38	54	76	95	100				1.6	N/V	N/V	N/P
25A2S-5	2.5' - 4'	SC	27.4	40	43	50	61	76	89	99	100				6.8	23	11	12
25A2S-5	15' - 16.5'	SM	15.2	22	25	30	40	58	81	98	100				2.0	N/V	N/V	N/P
25A2S-6	2.5' - 4'	SC	27.2	40	43	50	61	76	88	95	97	97	100		6.9	22	13	9
25A2S-6	7.5' - 9'	SC	47.1	59	62	67	75	84	92	99	100				8.9	30	11	19
25A2S-7	2.5' - 4'	SC	26.9	38	42	48	60	74	89	99	100				6.0	24	14	10
25A2S-7	ST (7.5' - 8.9')	SC	25.7	37	41	47	58	74	90	98	100				4.3	22	11	11
25A2S-7	10' - 11.5'	SC	34.4	46	50	56	67	82	93	99	100				6.1	22	11	11
25A2S-7	20' - 21.5'	SM	24.4	35	39	46	60	78	91	99	100				2.9	N/V	N/V	N/V
Perc #3	50 inches	SC	22.9	33	37	43	54	71	87	97	100				5.5	22	10	12
Perc #4	48 inches	SM	15.4	23	26	31	41	57	79	95	100				7.0	NV	NV	NP



INTERNATIONAL, INC.

Pg. 1 of 2

Engineering, Environmental & Technical Services

Site: UEPH – Engineers Battalion – WSMR, NM

ENCON Project # 801-10

Date: 7-26-10

ELECTRICAL RESISTIVITY RESULTS

Boring No.	Depth (feet)	Results (ohm-cm)	Soil Type	Direction
25A2S-7	2.5	3256	SC	North-South
	5	3639	SC	North-South
	7.5	4187	SC	North-South
	10	4788	SC	North-South
	15	5458	SC	North-South
25A2S-4	2.5	3303	SC	East-West
	5	3830	SC	East-West
	7.5	4476	SC	East-West
	10	5171	SP-SM	East-West
	15	6894	SP-SM	East-West
25A2S-1	2.5	2968	SC	South-North
	5	4022	SC	South-North
	7.5	4331	SM	South-North
	10	4596	SP	South-North
	15	5171	SC	South-North
25A2S-6	2.5	3303	SC	North-South
	5	3926	SC	North-South
	7.5	4764	SC	North-South
	10	4213	SC	North-South
	15	4883	SC	North-South

Measurements were performed with the Nilsson Soil Resistivity Meter Model 400. The four-pin method was used according to ASTM G-57.

THERMAL RESISTIVITY RESULTS

Thermal Resistivity Results (In-Situ) were obtained using a 6cm single needle (KS-1) on the KD2 Pro Thermal Analyzer. The samples were tested by placing the thermal needle in the side of the wall of the hole. ANSI/IEEE Std 442-1996

Boring No.	Depth Below Surface (in)	Thermal Resistivity (R) [(m * K)/W]	Temperature (°C)	Visual Classification
25A25-7	9	1.397	32.61	SC
25A25-6	12	1.510	30.97	SC
25A25-2	6	1.239	31.12	SC
25A2S-3	48	1.114	27.20	SC
25A25-4	96	1.206	26.72	SC

PERCOLATION TEST RECORD

Client Jacobs/Huitt-Zollars JV	Phone Number (214) 871-3311
Address - Street/P.O. Box, City, State and Zip Code 3131 McKinney Avenue, Dallas, Texas 75204	
Location of Property White Sands Missile Range, New Mexico (Engineers Battalion UEPH)	

Perc Test Hole Number # 3 (Hole Depth = 50")				Perc Test Hole Number # 4 (Hole Depth = 48")			
Time	Distance to Top of Water	Actual Water Level Drop	Rate (mpi)	Time	Distance to Top of Water	Actual Water Level Drop	Rate (mpi)
10:30	43"/43.75"	.75"	40	10:45	40"/42.5"	2.5"	4.0
11:00	43"/43.75"	.75"	40	10:55	40"/42.75"	2.75"	3.6
11:30	43"/43.5"	.5"	60	11:05	40"/42.5"	2.5"	4.0
12:00	43"/43.75"	.75"	40	11:15	40"/42.75"	2.75"	3.6
12:30	43"/43.5"	.5"	60	11:25	40"/42.5"	2.5"	4.0
1:00	43"/43.25"	.25"	120	11:35	40"/42.25"	2.25"	4.4
1:30	43"/43.5"	.5"	60	11:45	40"/42.5"	2.5"	4.0
2:00	43"/43.5"	.5"	60				
2:30	43"/43.25"	.25"	120				
Classification (SC)				Classification (SM)			

Percolation Rate

Percolation rate = Time interval used, in minutes ÷ Last water level drop, in inches

Hole # 3
Rate = $\frac{30 \text{ Minutes}}{0.25 \text{ inches}} = 120 \text{ min/in}$

Hole # 4
Rate = $\frac{10 \text{ Minutes}}{2.5 \text{ inches}} = 4 \text{ min/in}$

or

or

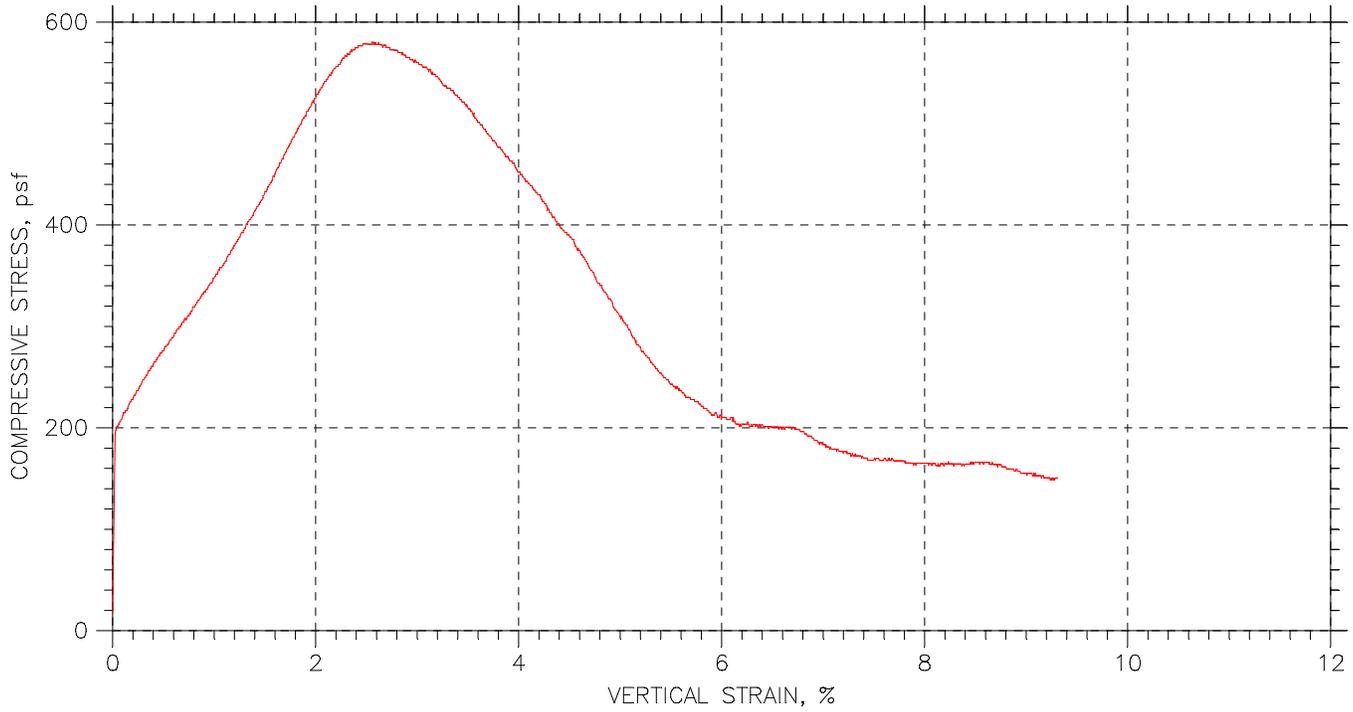
Hole # 3
Rate = $\frac{0.25 \text{ inches}}{.5 \text{ Hours}} = 0.5 \text{ in/hr}$

Hole # 4
Rate = $\frac{2.5 \text{ inches}}{0.167 \text{ hours}} = 15 \text{ in/hr}$

Tested by: Juan A. Galindo

Date: 8/5/2010

UNCONFINED COMPRESSION TEST REPORT

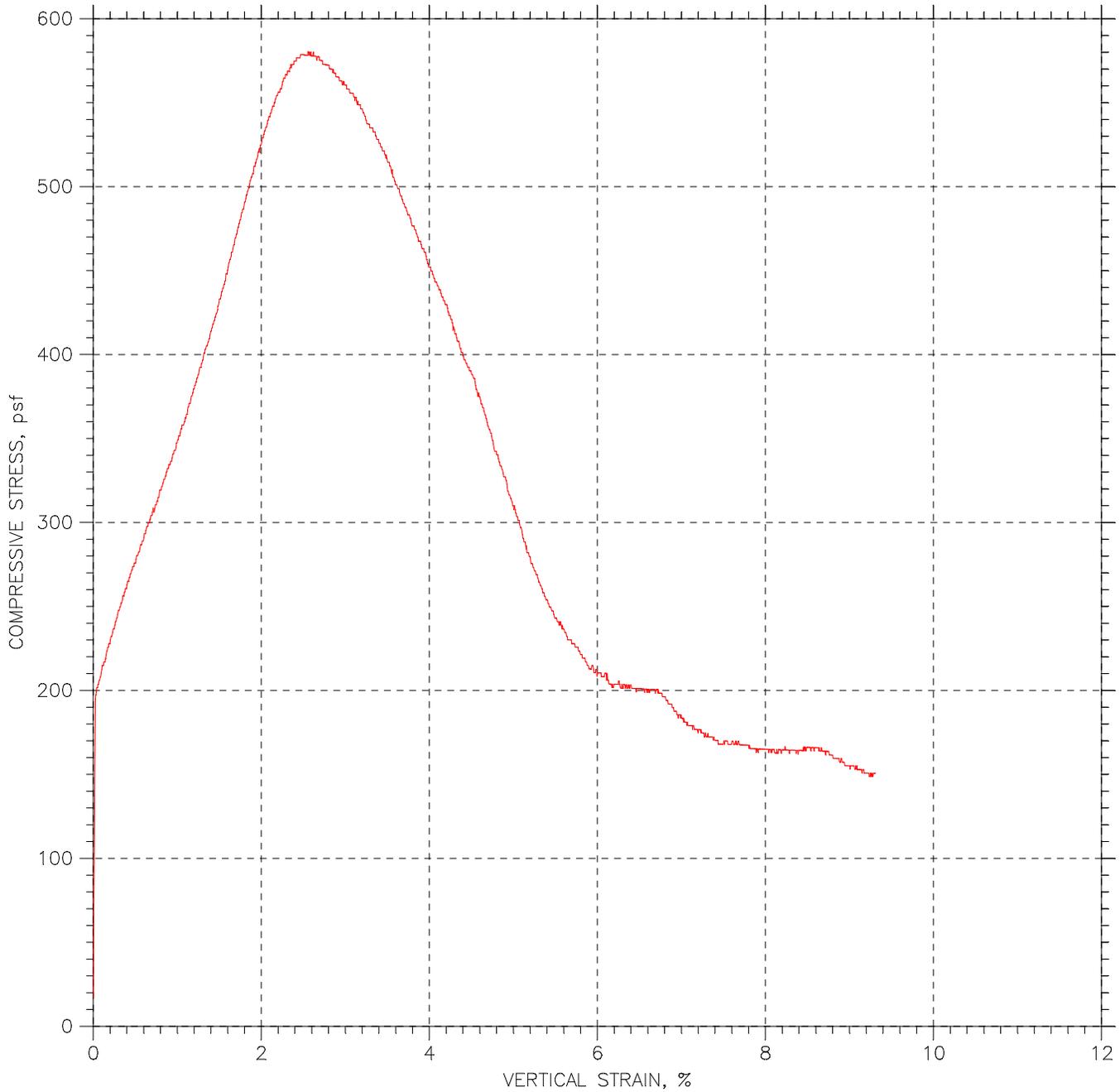


Symbol				
Test No.		1.1		
Initial	Diameter, in	2.8407		
	Height, in	5.9392		
	Water Content, %	11.48		
	Dry Density, pcf	95.98		
	Saturation, %	41.00		
	Void Ratio	0.756		
Unconfined Compressive Strength, psf		580.3		
Undrained Shear Strength, psf		290.2		
Time to Failure, min		3.9121		
Strain Rate, %/min		1		
Estimated Specific Gravity		2.70		
Liquid Limit		22		
Plastic Limit		11		
Plasticity Index		11		
Failure Sketch				

<p style="font-size: small;">a subsidiary of Geocomp Corporation</p>	Project: JEPH Engr. Battalion
	Location: WSMR, NM
	Project No.: GTX-1594
	Boring No.: 25A2S-07
	Sample Type: UD
	Description: Brown clayey sand (sc)
	Remarks: 2054

Thursday, March 03, 2011

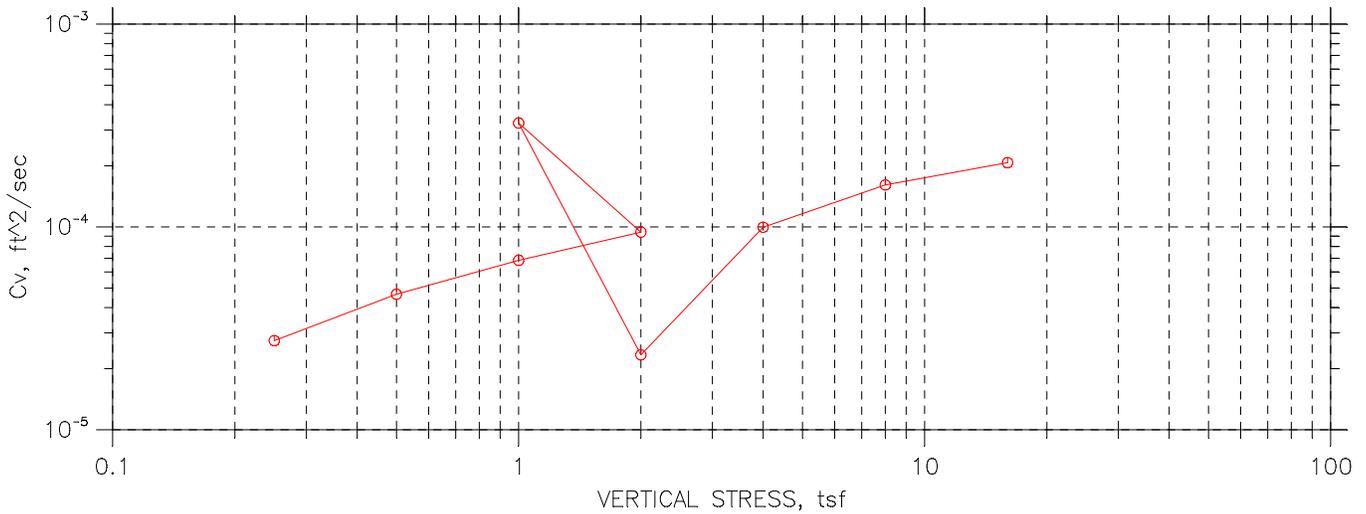
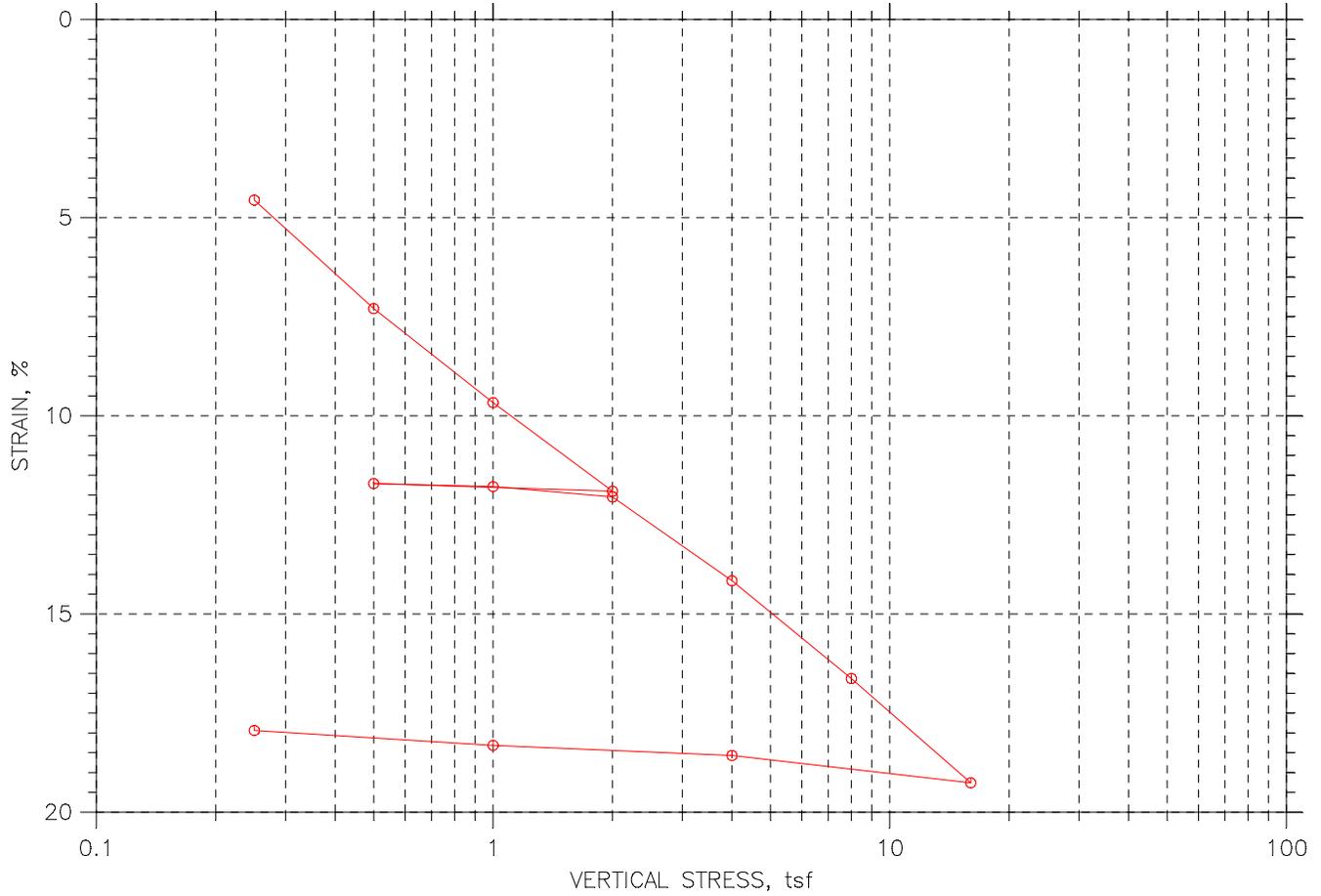
UNCONFINED COMPRESSION TEST REPORT



 <p>GeoTesting express a subsidiary of Geocomp Corporation</p>	Project: JEPH Engr. Battalion	Location: WSMR, NM	Project No.: GTX-1594
	Boring No.: 25A2S-07	Tested By: jm	Checked By: mm
	Sample No.: ---	Test Date: 8/5/10	Depth: 7.5-8.9
	Test No.: 1.1	Sample Type: UD	Elevation: ---
	Description: Brown clayey sand (sc)		
	Remarks: 2054		
			Thursday, March 03, 2011

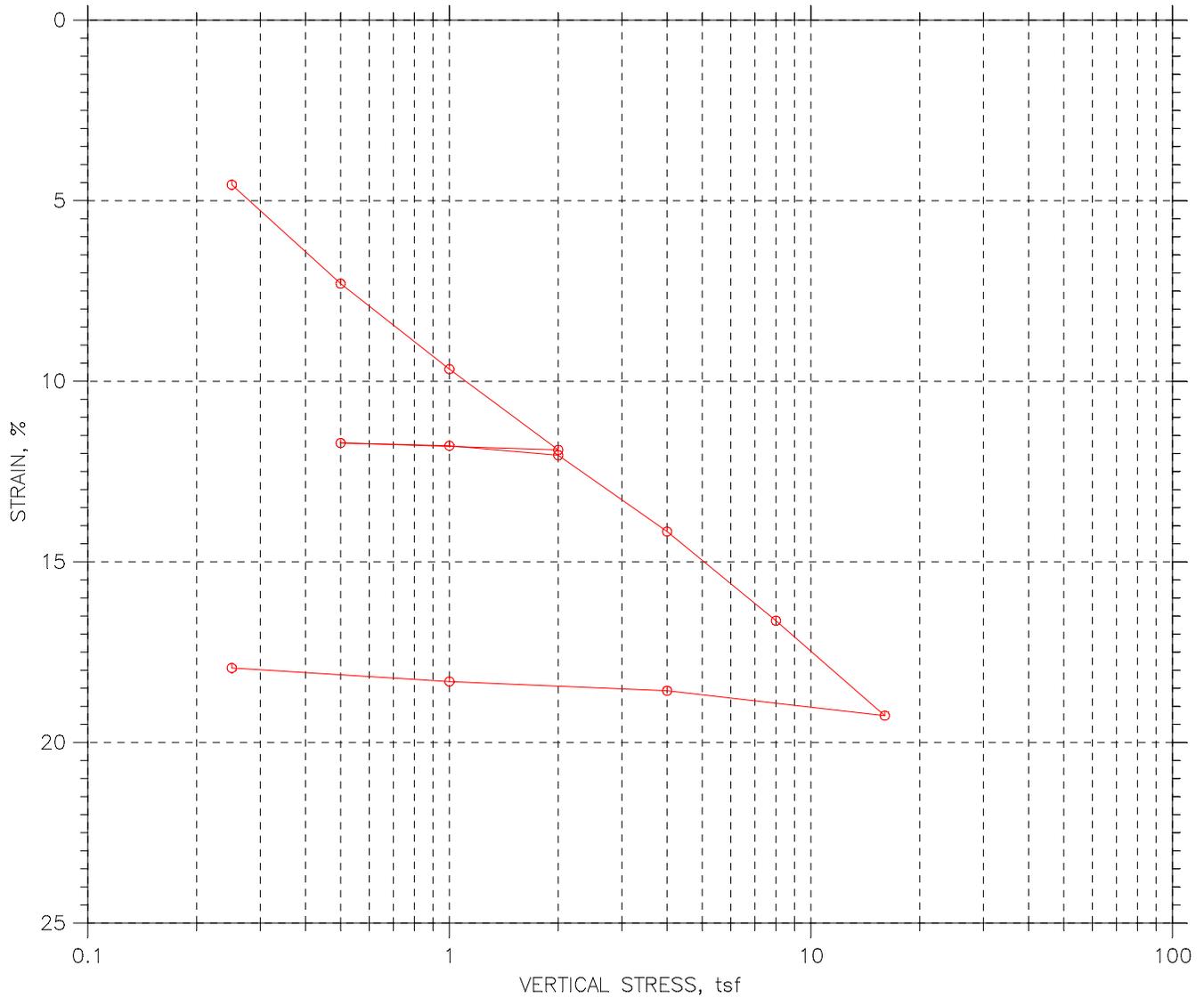
CONSOLIDATION TEST DATA

SUMMARY REPORT



Project: JEPH Engr. Battalion	Location: WRSMR, NM	Project No.: GTX-1594
Boring No.: 25A2S-07	Tested By: jm	Checked By: mm
Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

CONSOLIDATION TEST DATA SUMMARY REPORT



				Before Test	After Test
Overburden Pressure: 0.47 tsf				6.17	11.02
Preconsolidation Pressure: ---				103.4	126.
Compression Index: ---				27.28	93.48
Diameter: 2.5 in	Height: 1.046 in	Void Ratio		0.60	0.31
LL: 22	PL: 11	PI: 11	GS: 2.65		

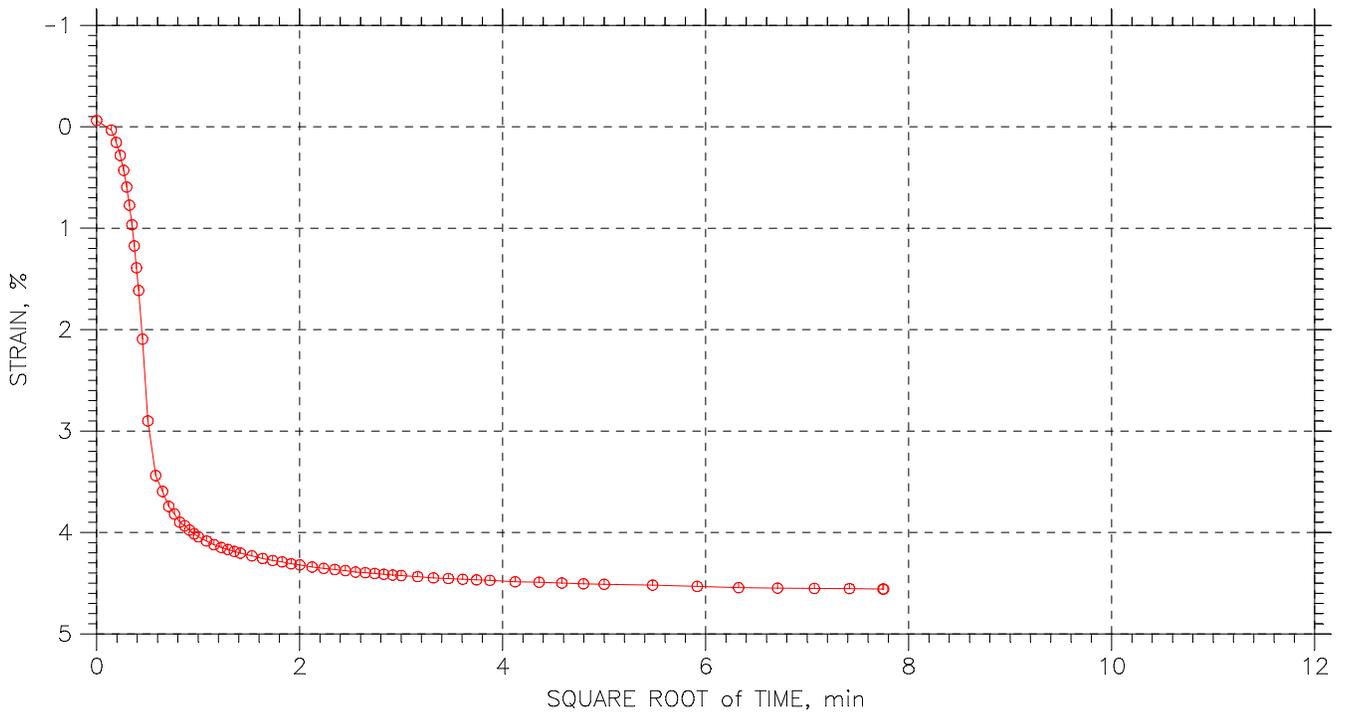
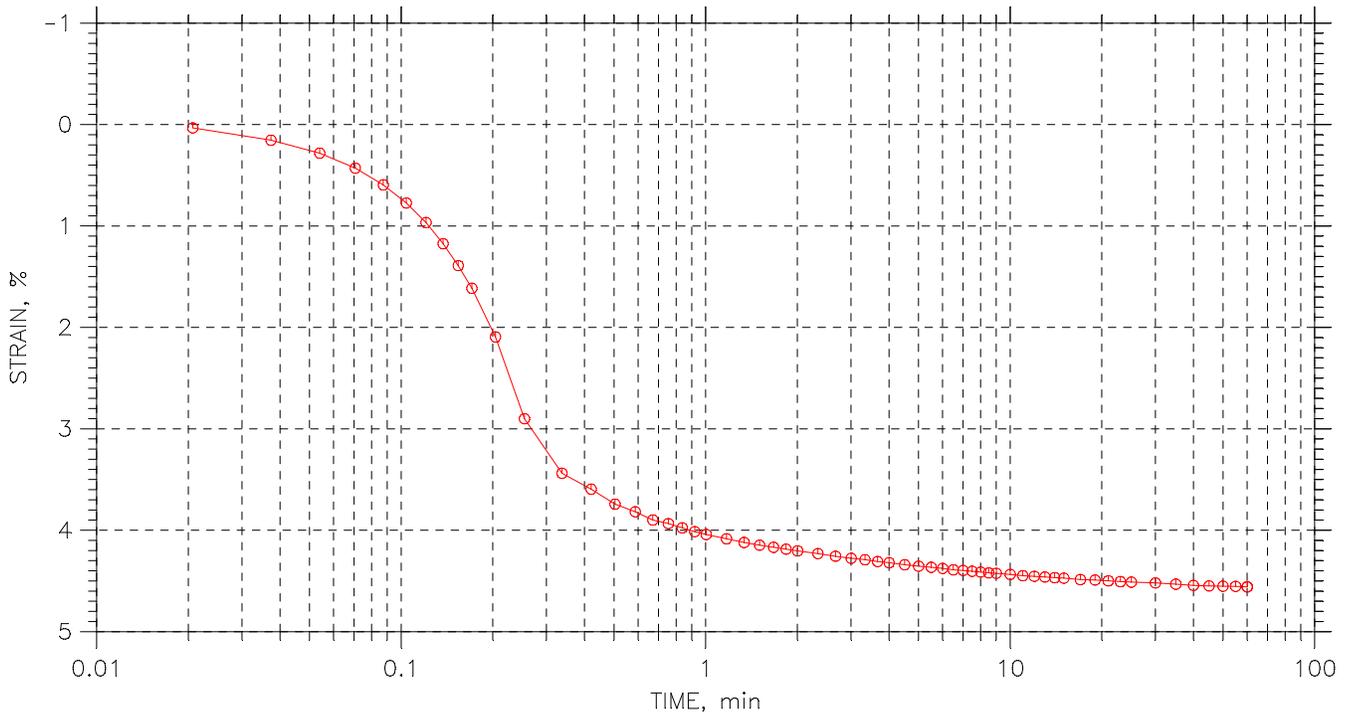
Project: JEPH Engr. Battalion		Location: WRSMR, NM		Project No.: GTX-1594	
Boring No.: 25A2S-07		Tested By: jm		Checked By: mm	
Sample No.: ---		Test Date: 8/4/10		Depth: 7.5-8.9	
Test No.: C-1.1		Sample Type: UD		Elevation: ---	
Description: Brown Clayey sand (sc)					
Remarks:					
Thursday, March 03, 2011					

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 1 of 13

Stress: 0.25 tsf



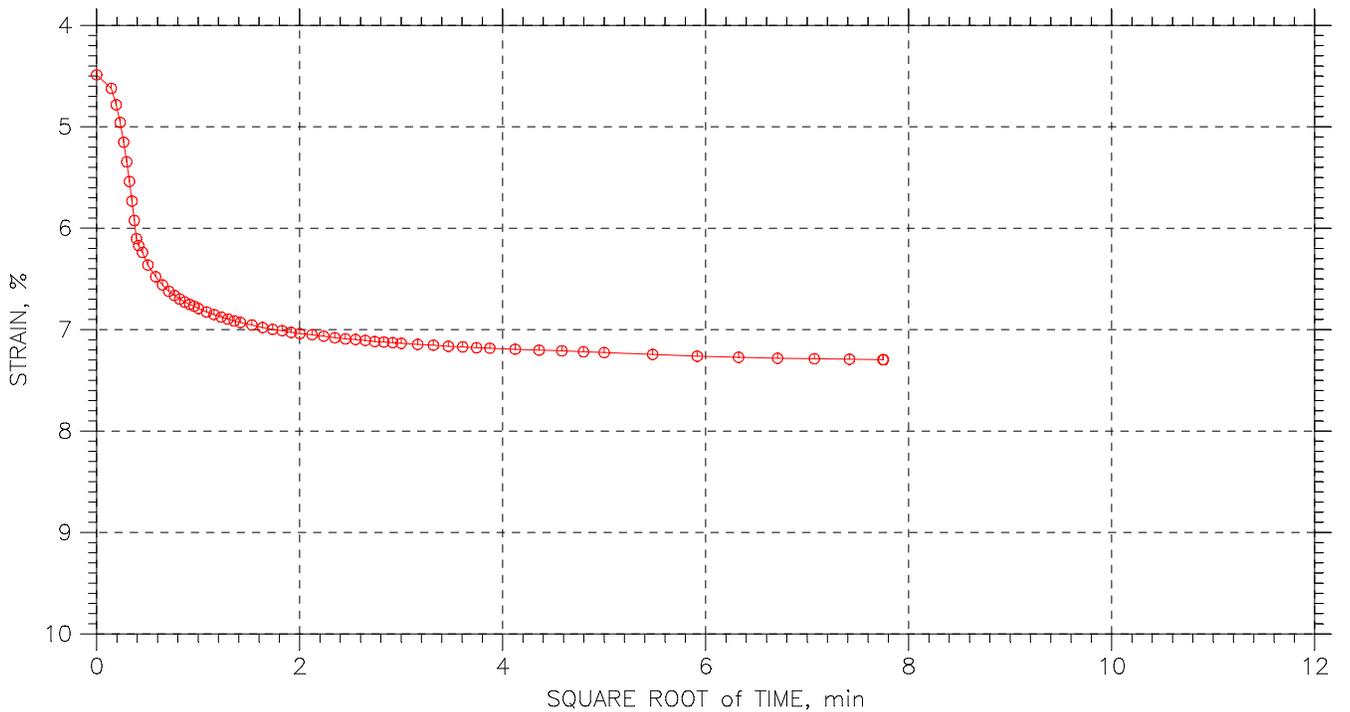
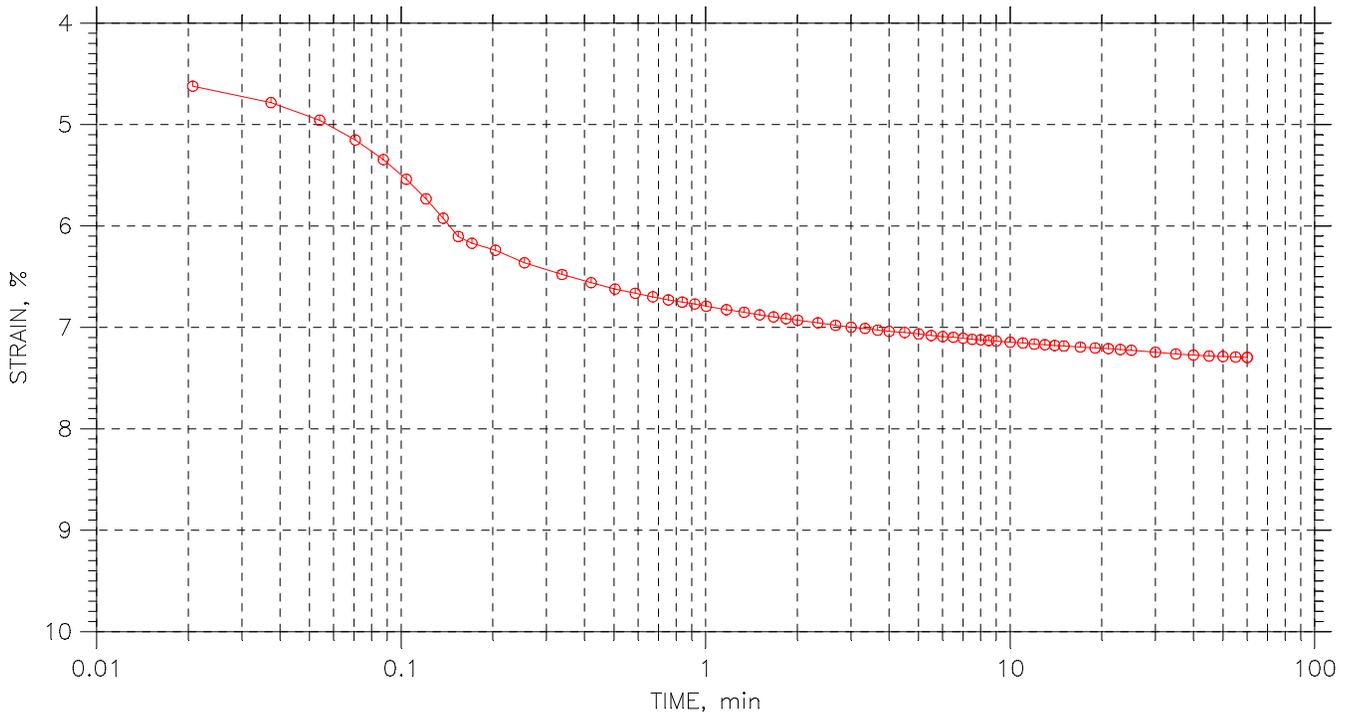
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Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 2 of 13

Stress: 0.5 tsf



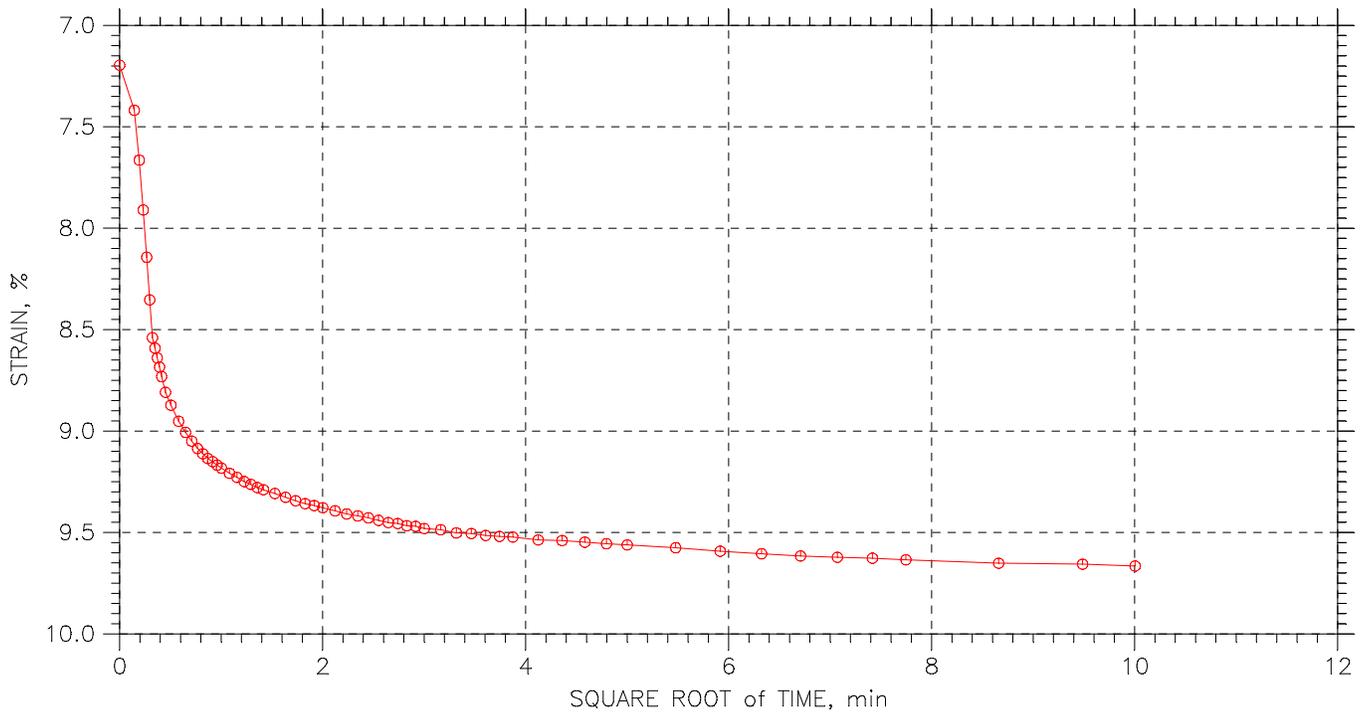
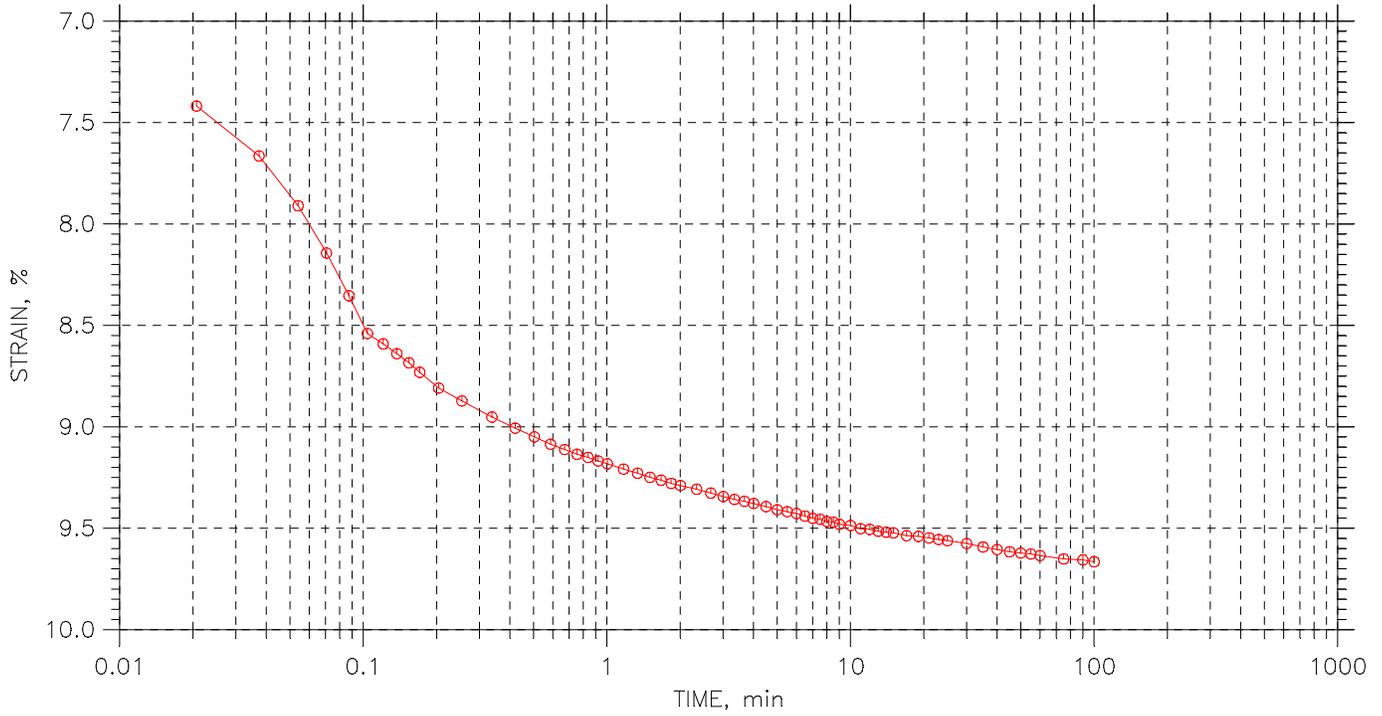
Project: JEPH Engr. Battalion	Location: WRSMR, NM	Project No.: GTX-1594
Boring No.: 25A2S-07	Tested By: jm	Checked By: mm
Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 3 of 13

Stress: 1. tsf



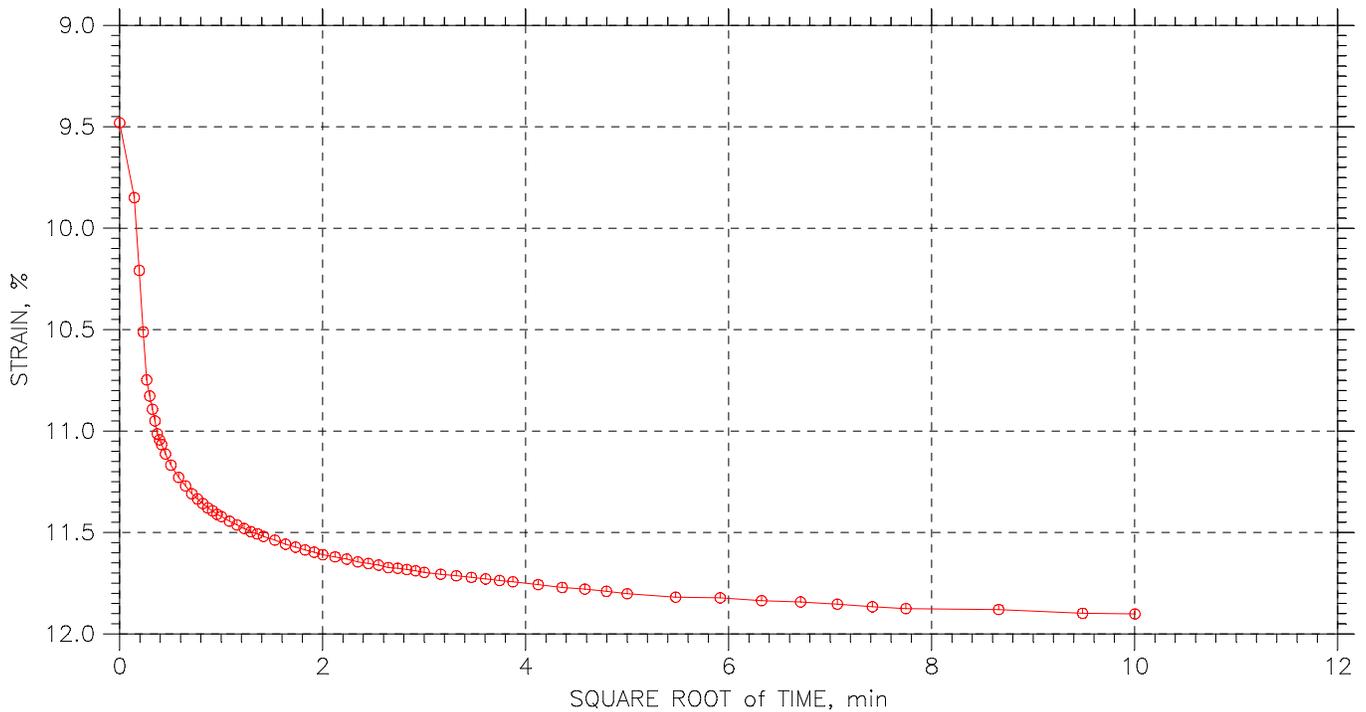
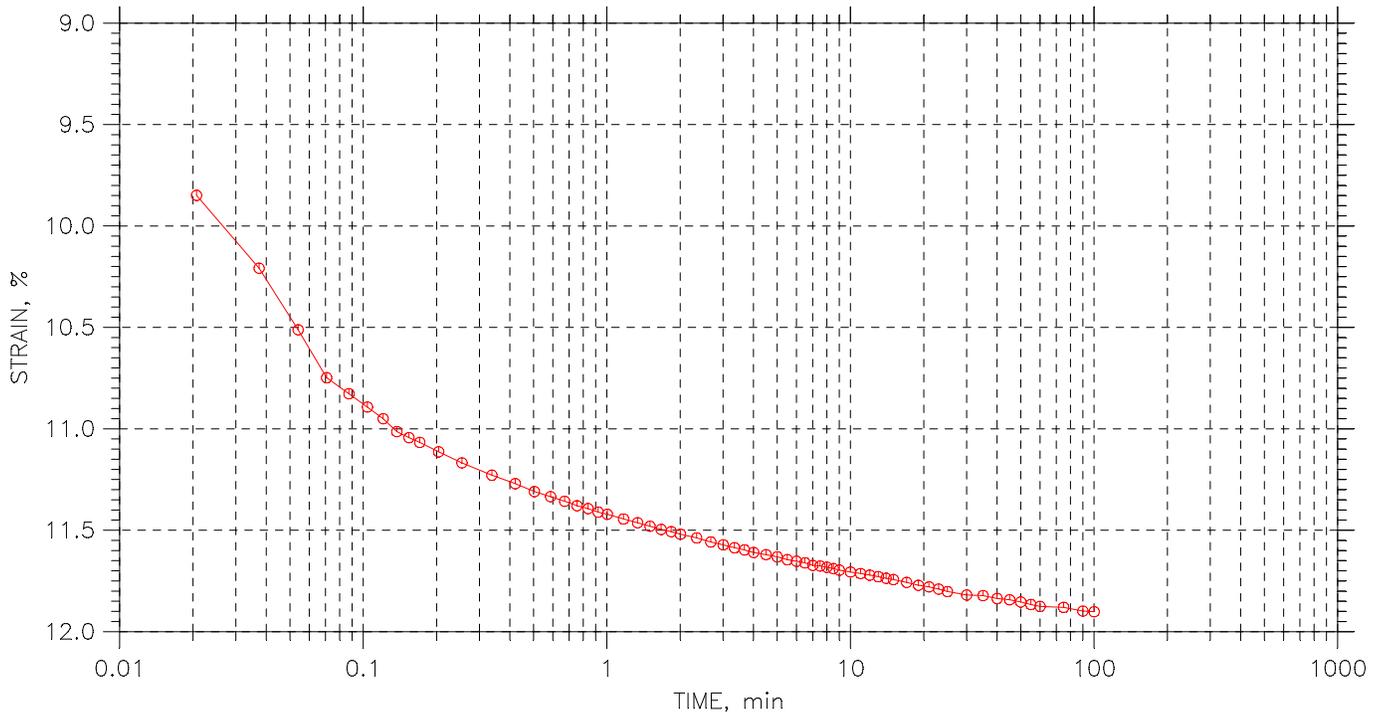
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Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 4 of 13

Stress: 2. tsf



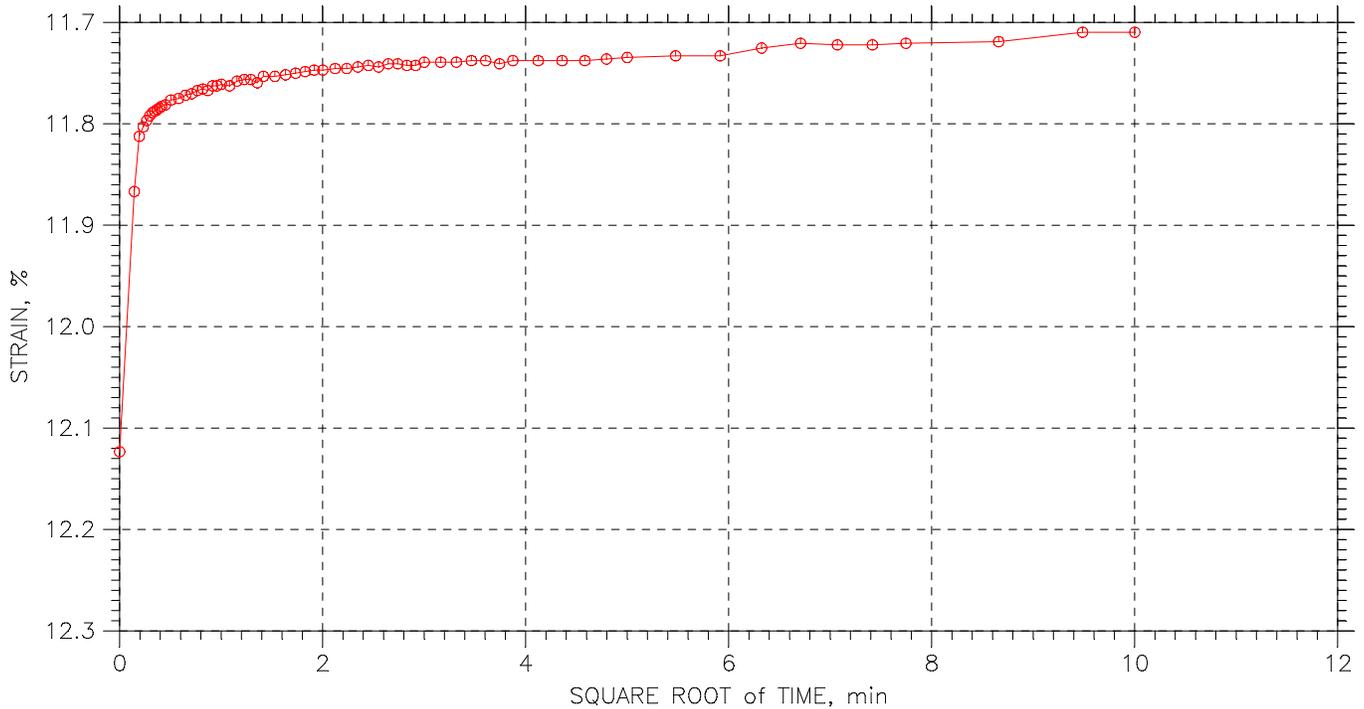
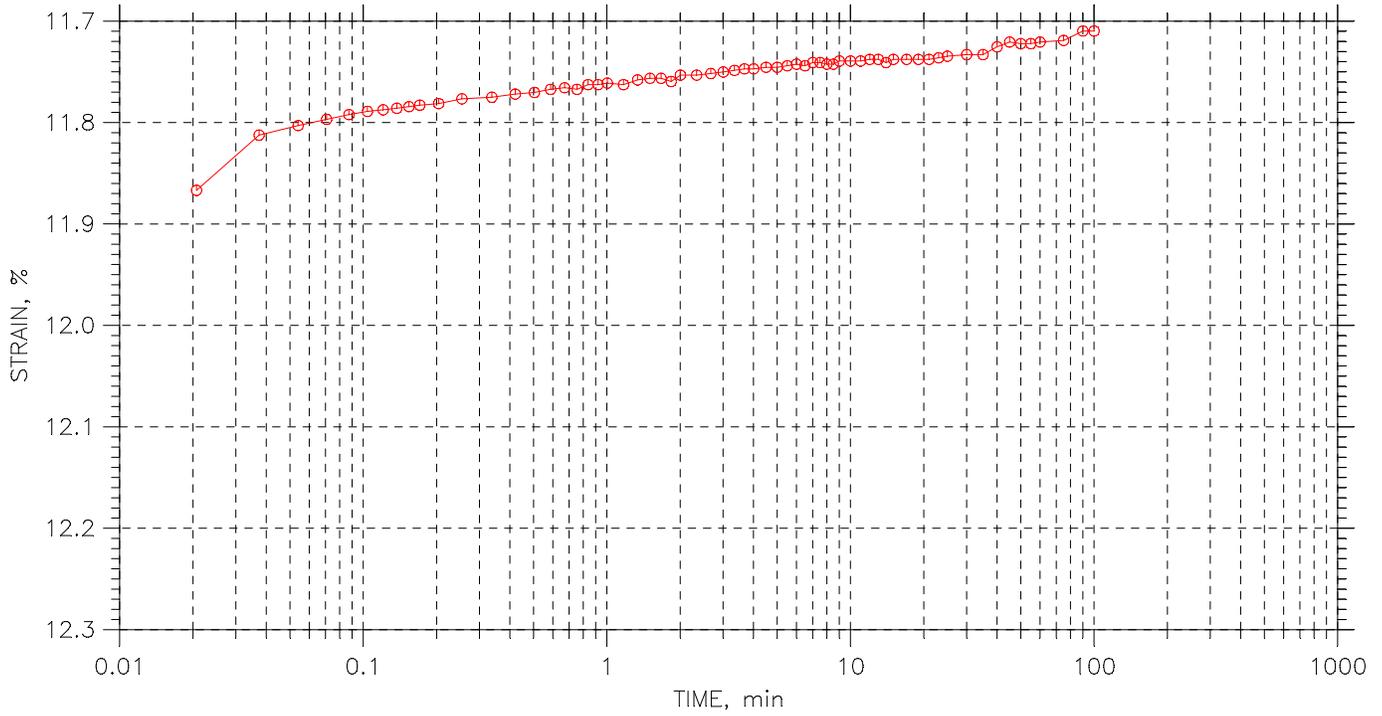
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Boring No.: 25A2S-07	Tested By: jm	Checked By: mm
Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 5 of 13

Stress: 0.5 tsf



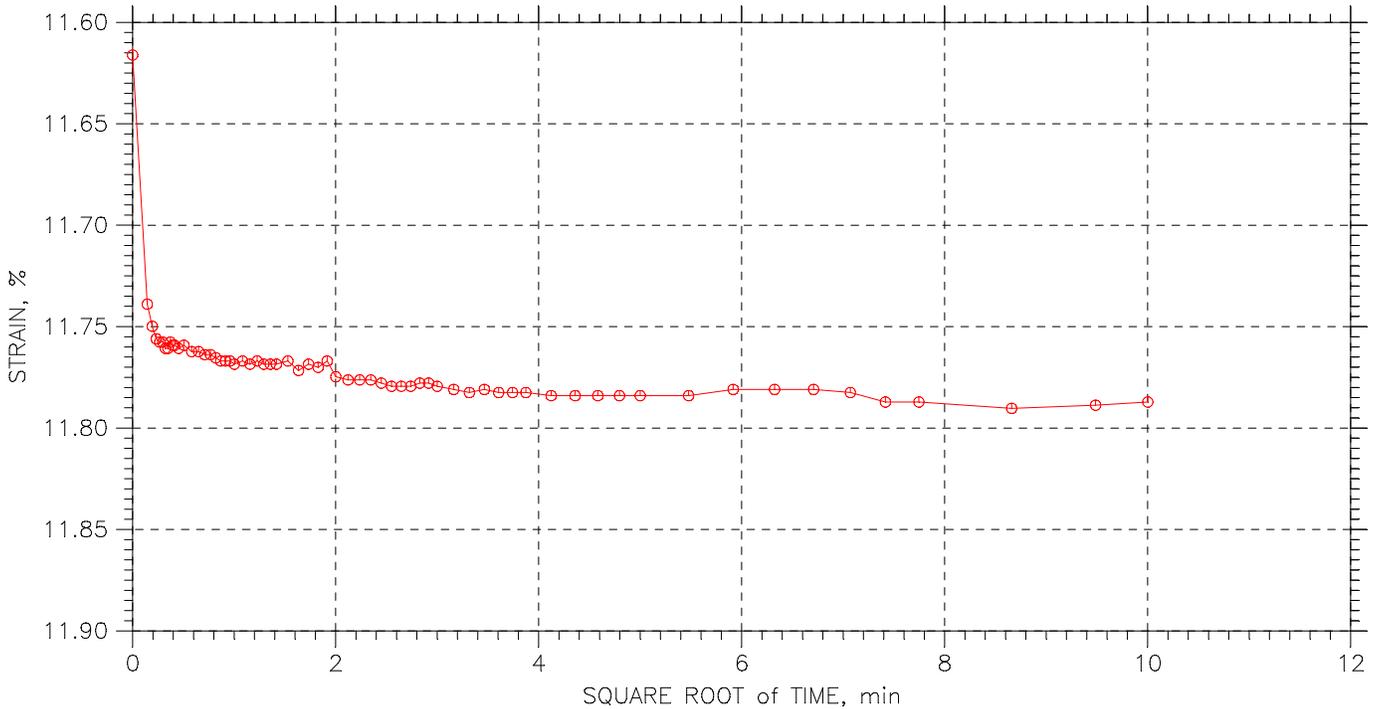
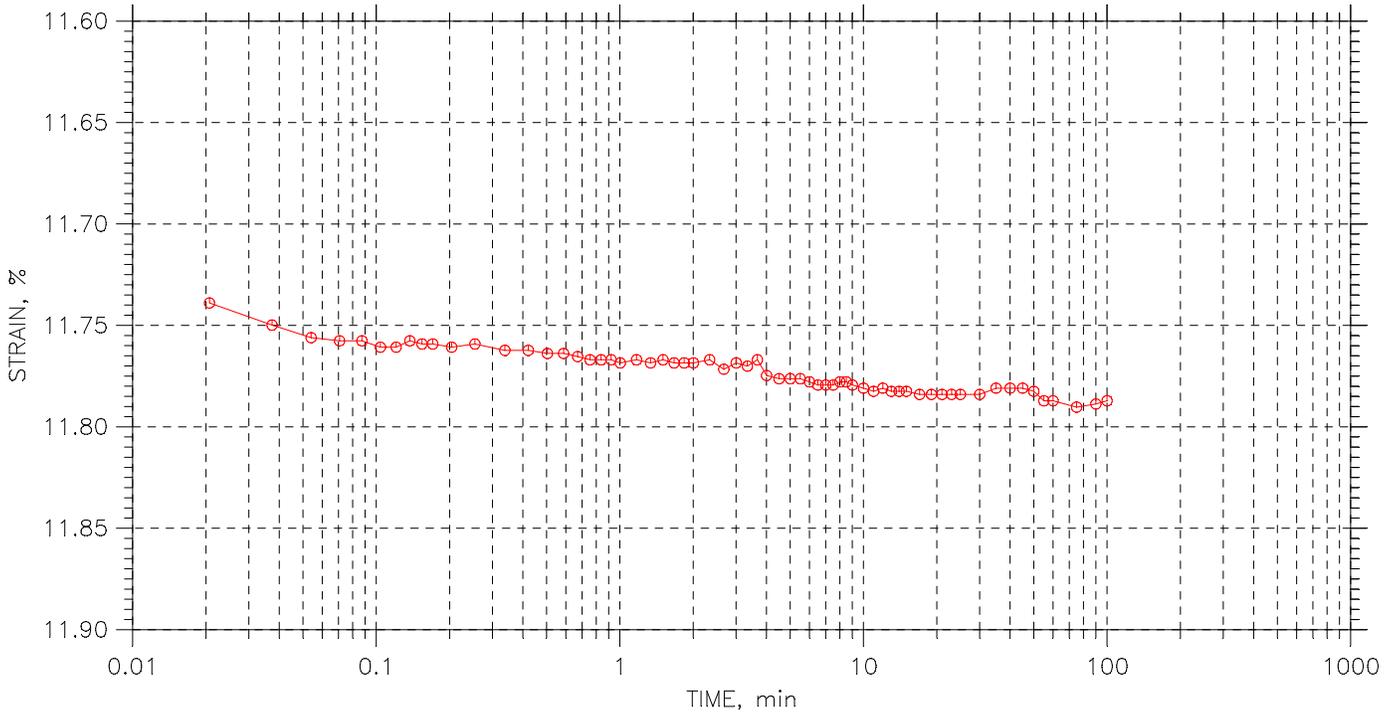
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Boring No.: 25A2S-07	Tested By: jm	Checked By: mm
Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 6 of 13

Stress: 1. tsf



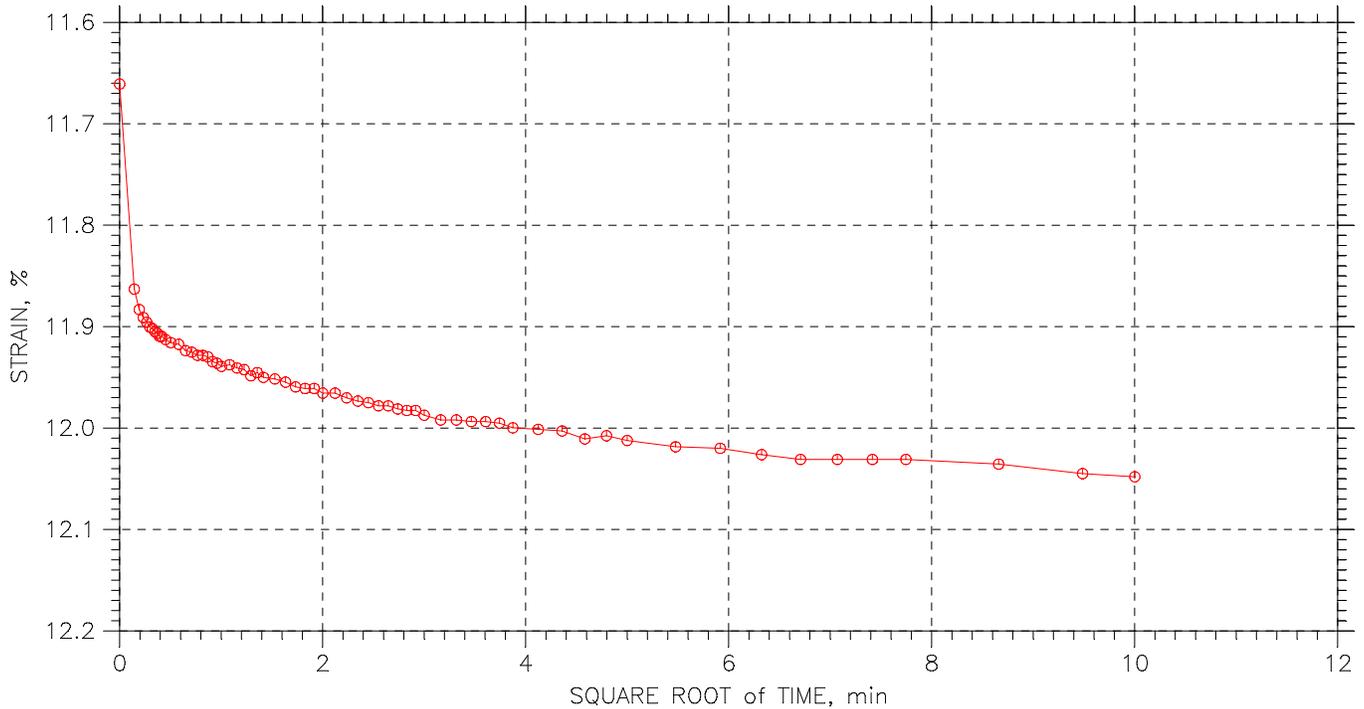
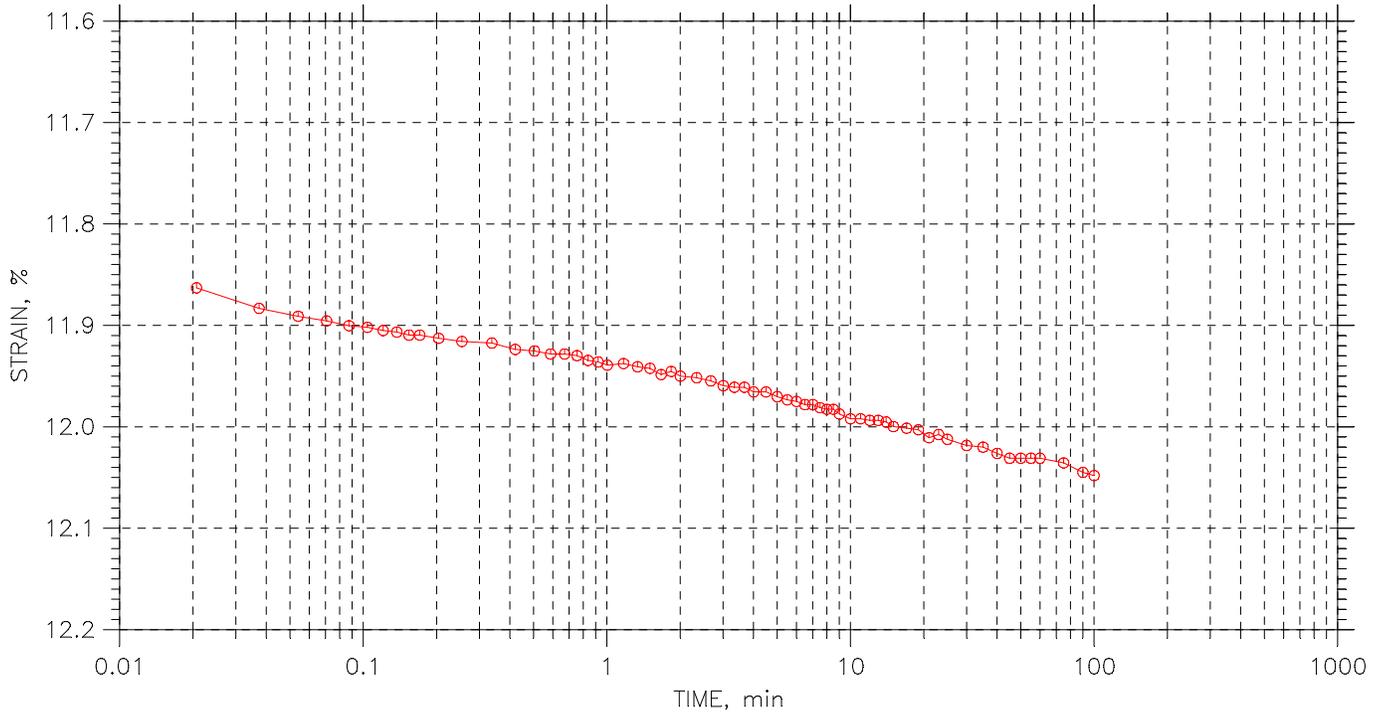
Project: JEPH Engr. Battalion	Location: WRSMR, NM	Project No.: GTX-1594
Boring No.: 25A2S-07	Tested By: jm	Checked By: mm
Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 7 of 13

Stress: 2. tsf



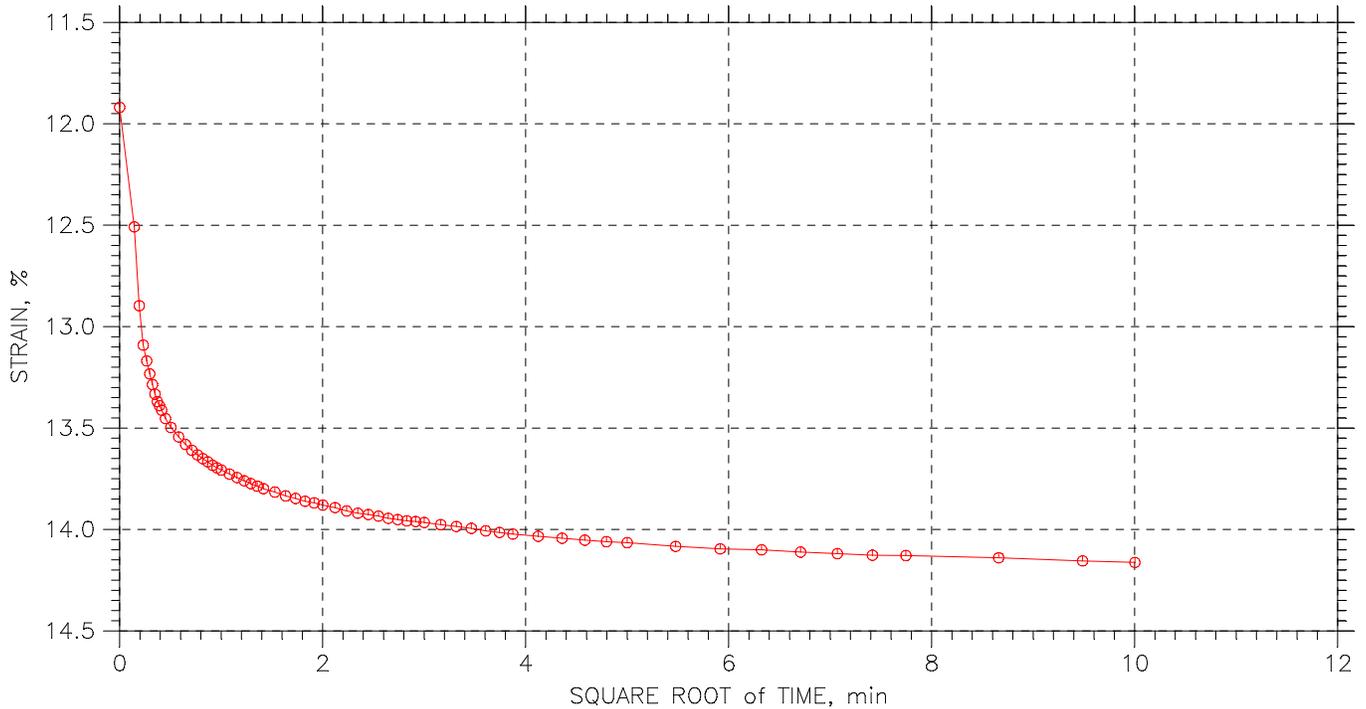
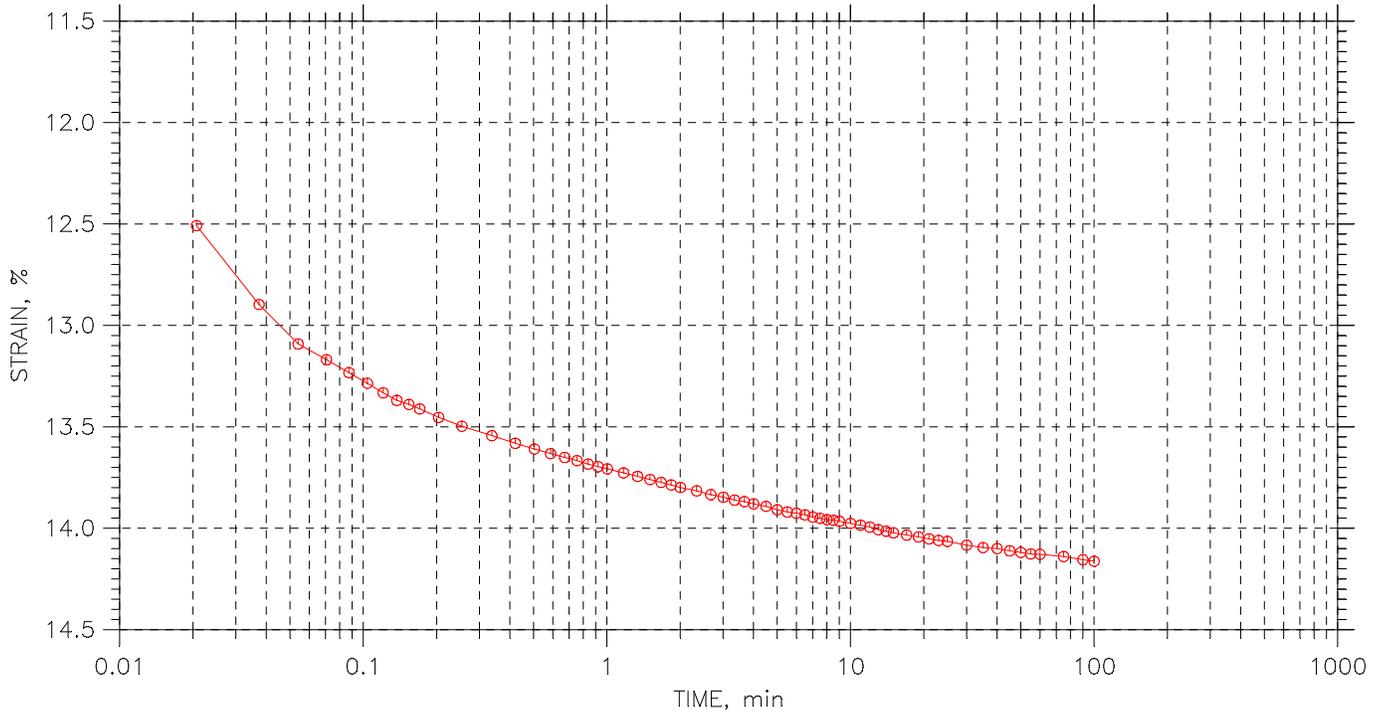
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Boring No.: 25A2S-07	Tested By: jm	Checked By: mm
Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 8 of 13

Stress: 4. tsf



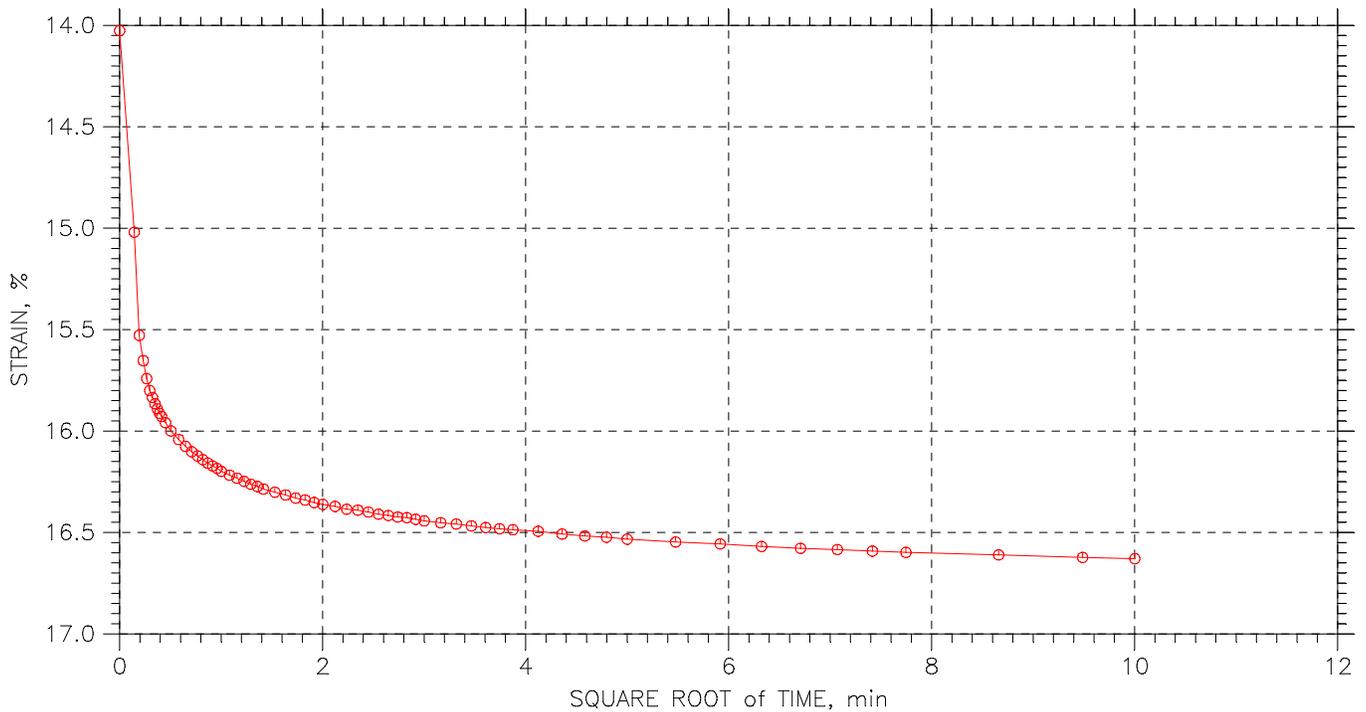
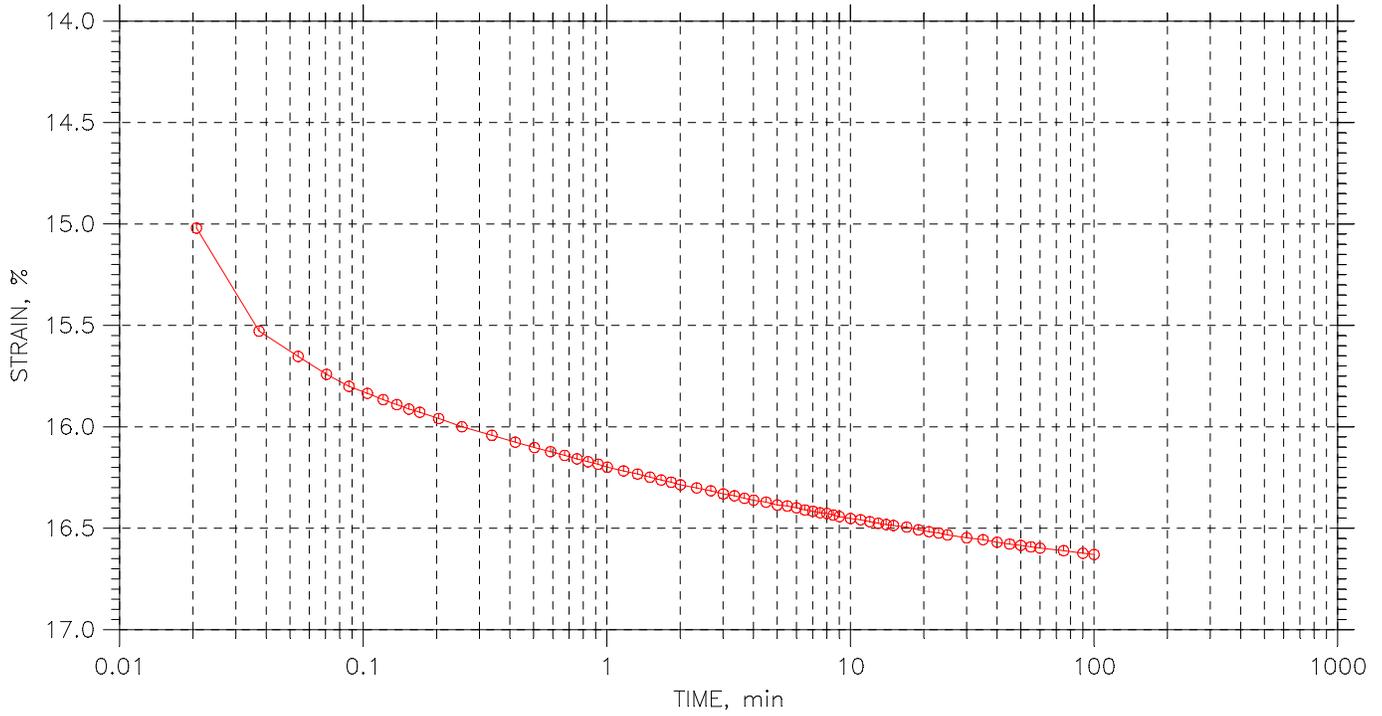
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Boring No.: 25A2S-07	Tested By: jm	Checked By: mm
Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 9 of 13

Stress: 8. tsf



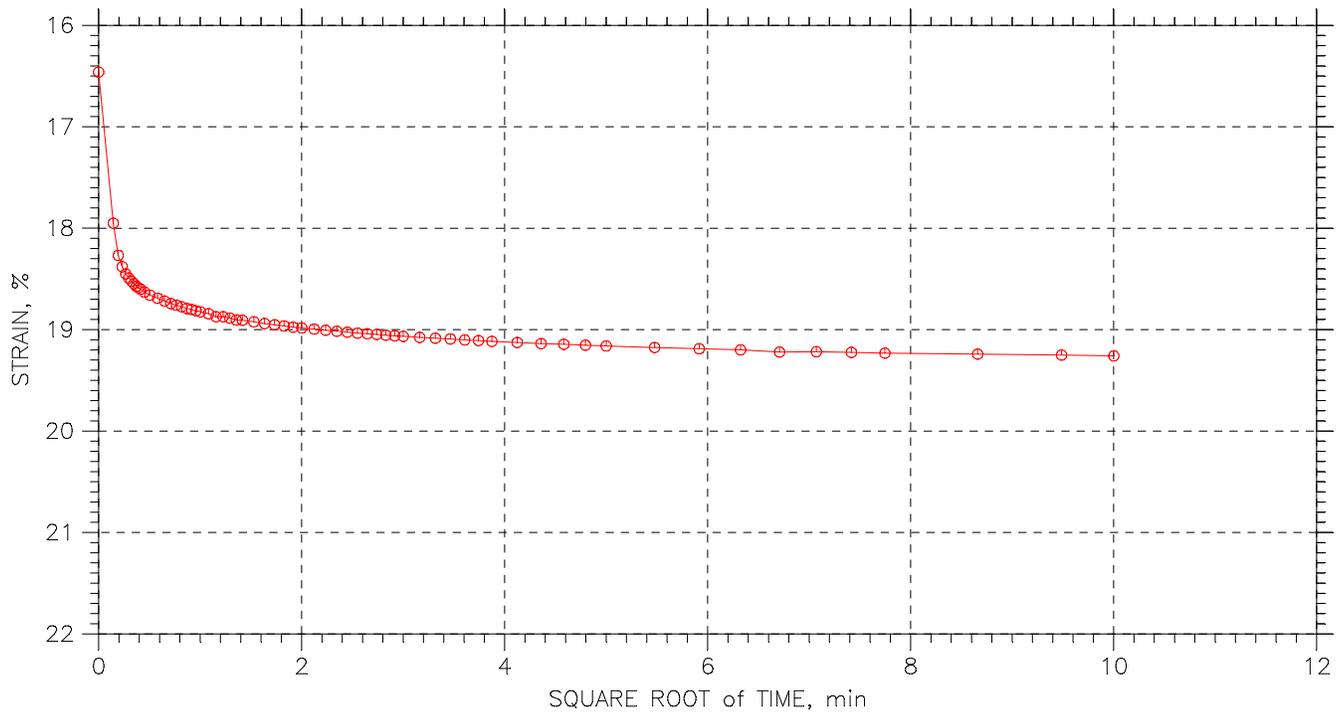
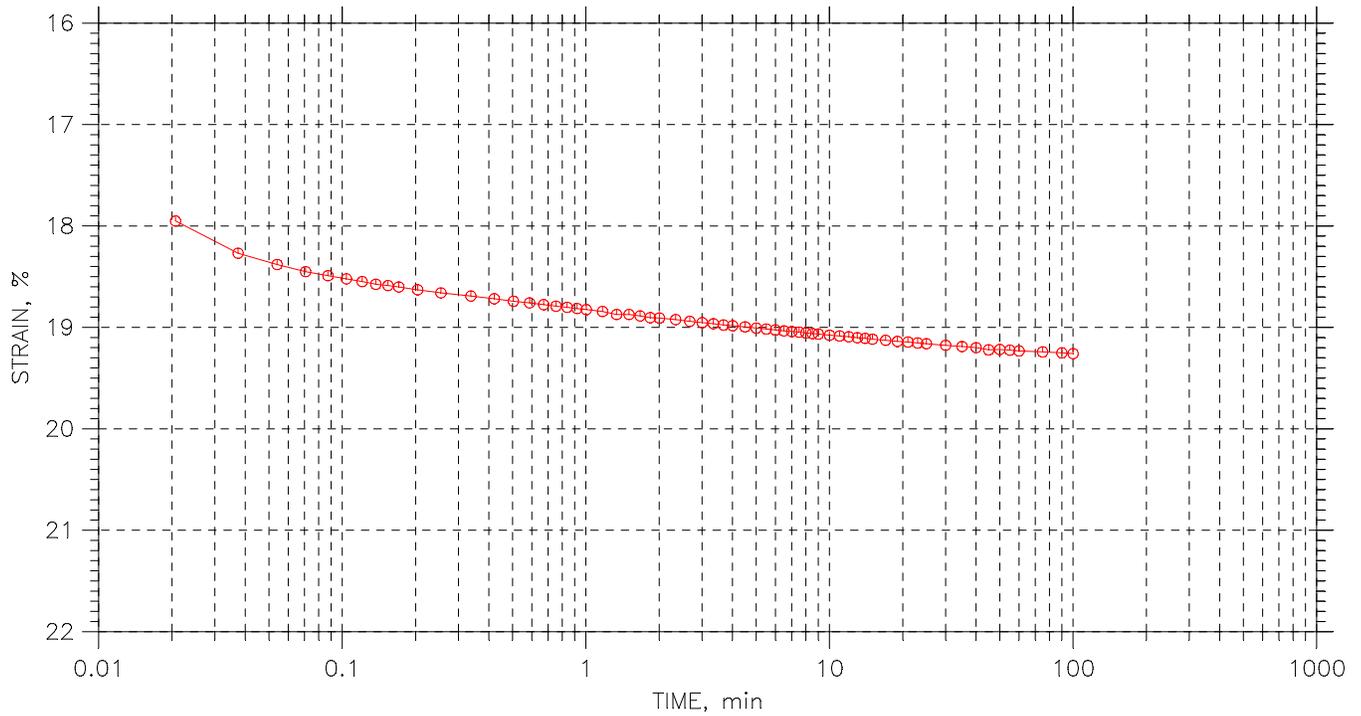
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Boring No.: 25A2S-07	Tested By: jm	Checked By: mm
Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 10 of 13

Stress: 16. tsf



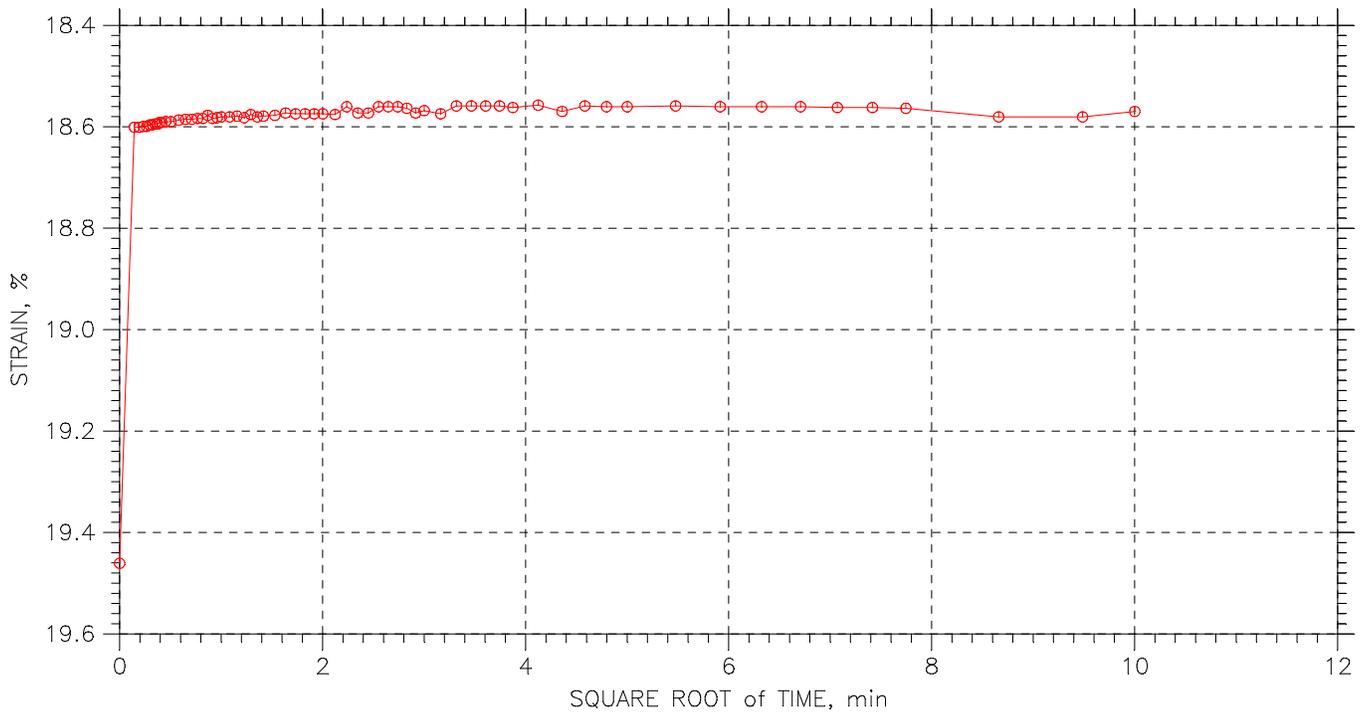
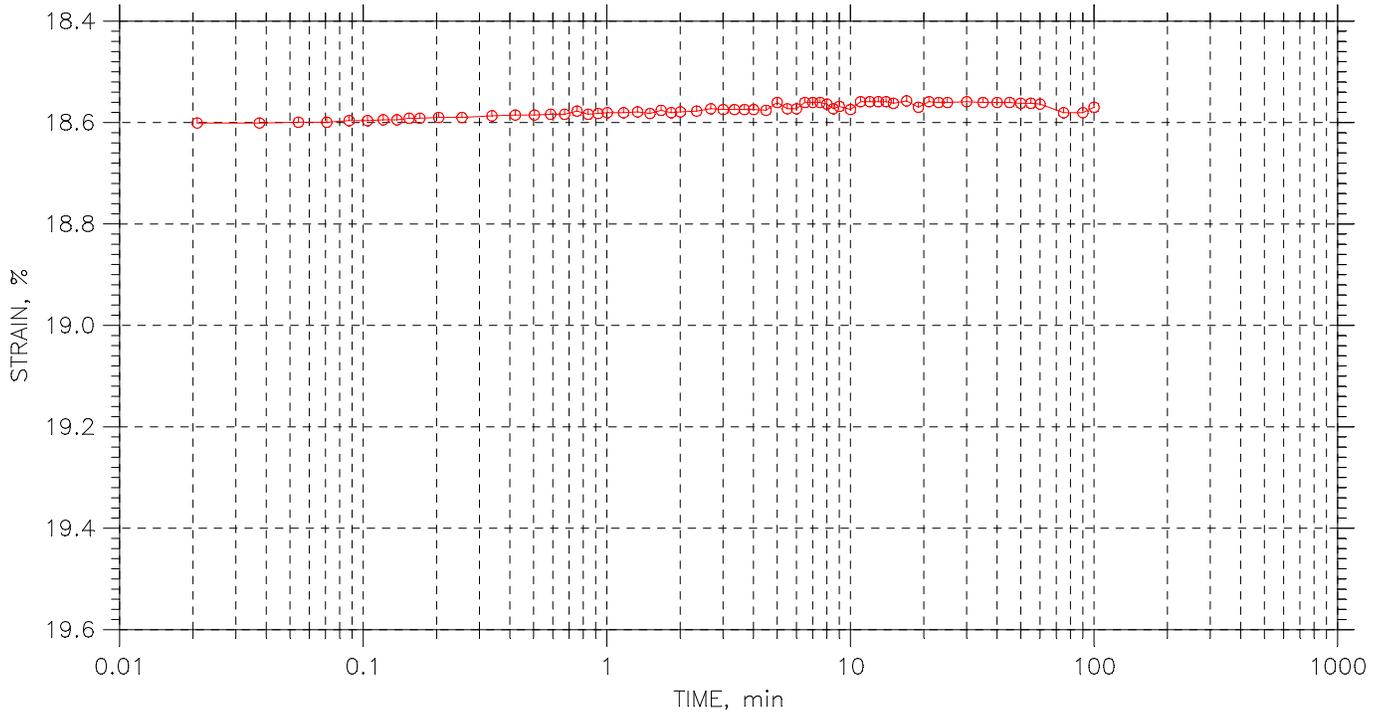
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Boring No.: 25A2S-07	Tested By: jm	Checked By: mm
Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 11 of 13

Stress: 4. tsf



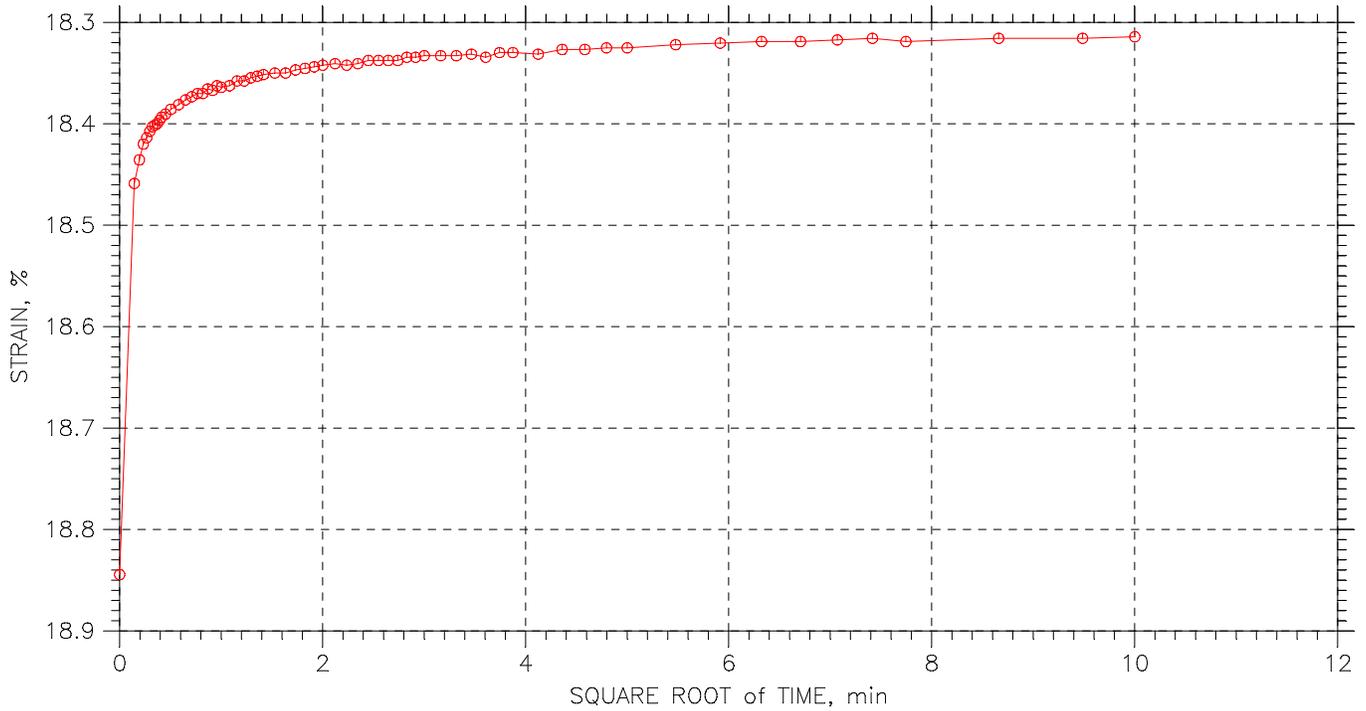
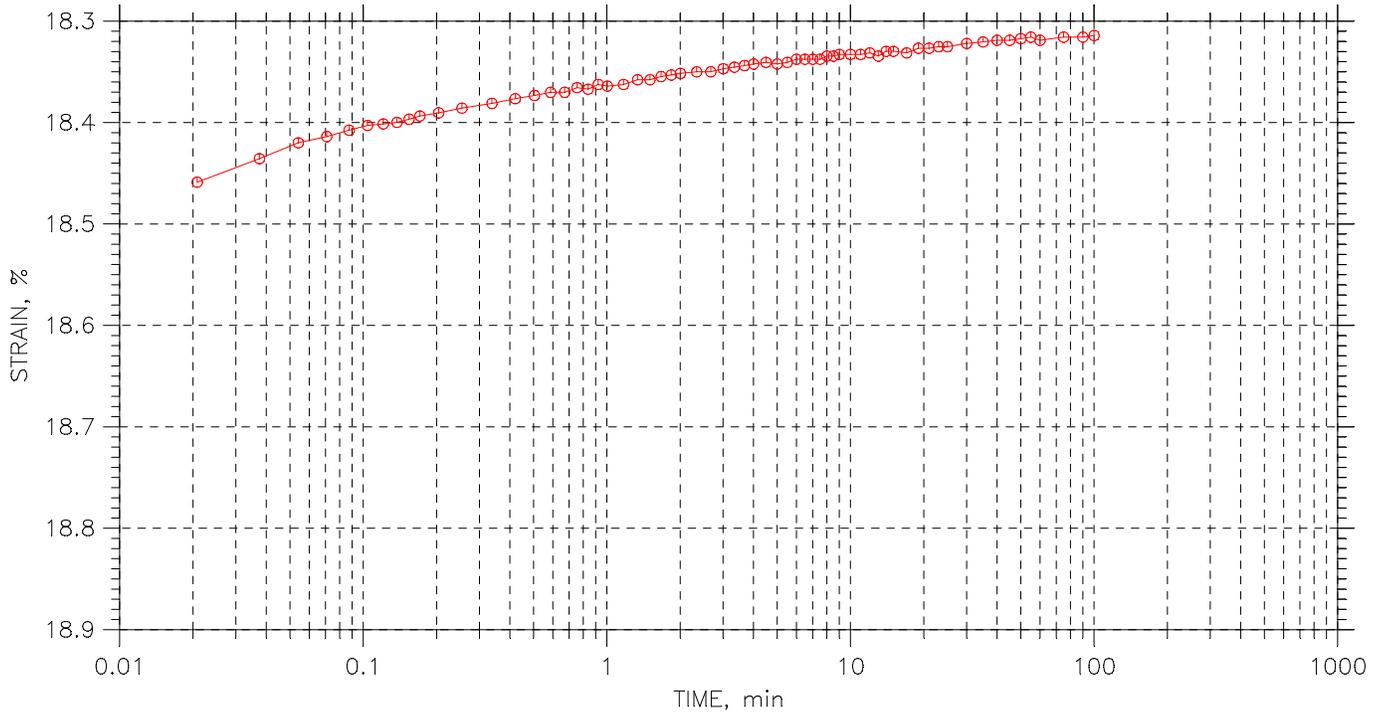
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Boring No.: 25A2S-07	Tested By: jm	Checked By: mm
Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 12 of 13

Stress: 1. tsf



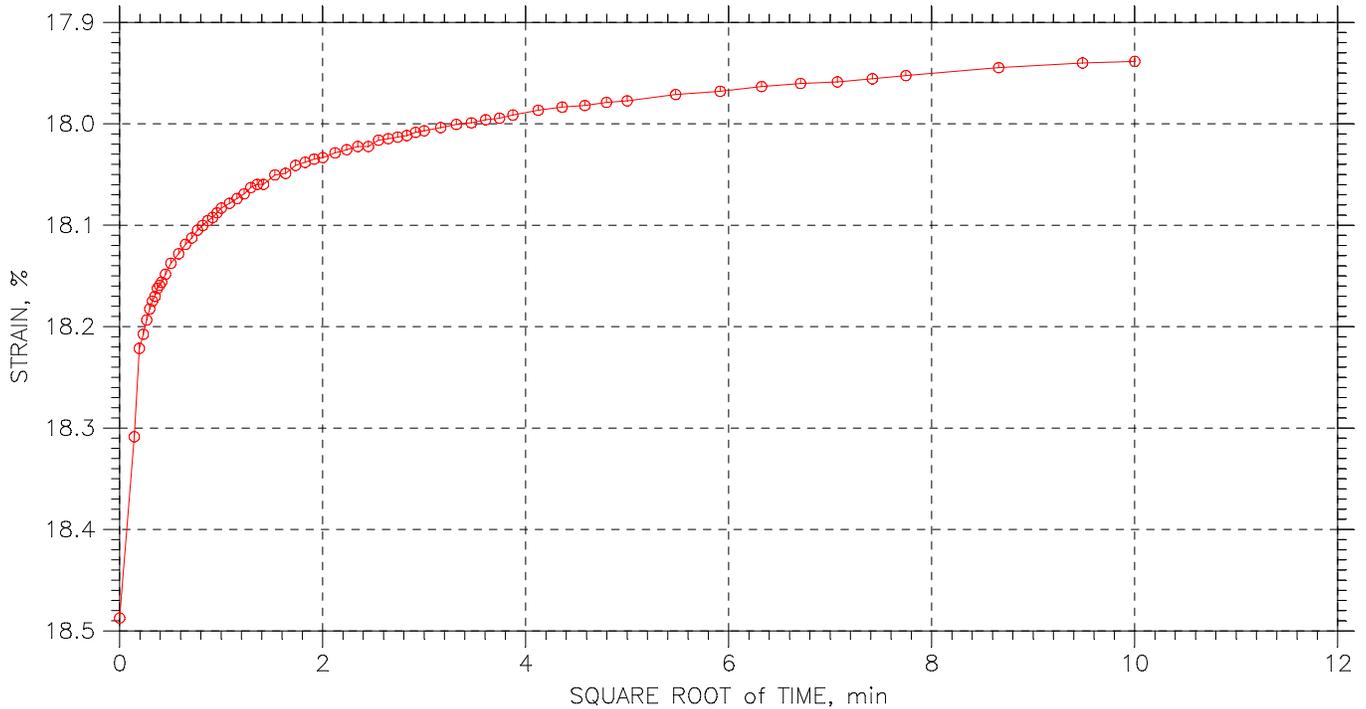
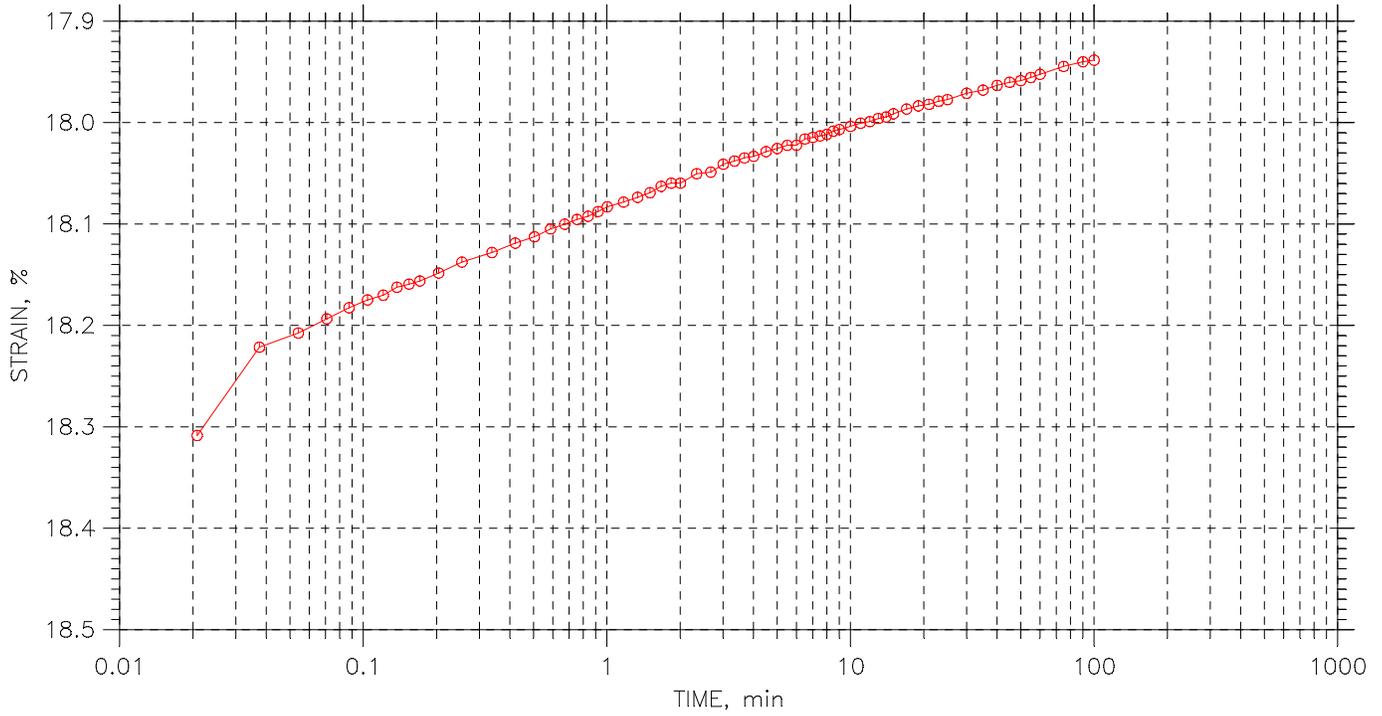
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Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 13 of 13

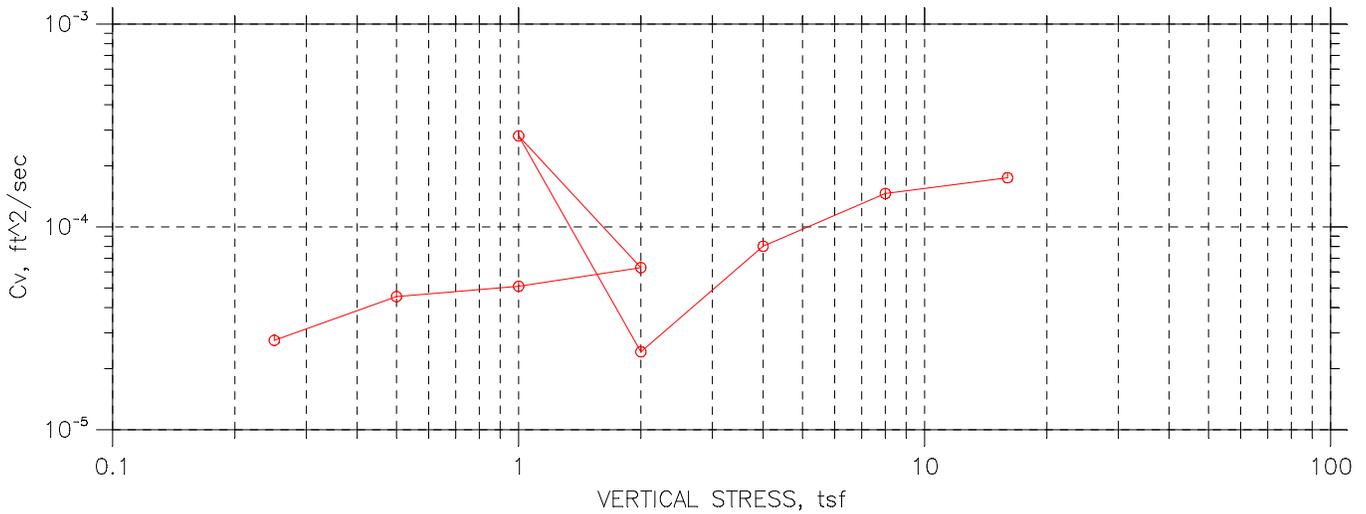
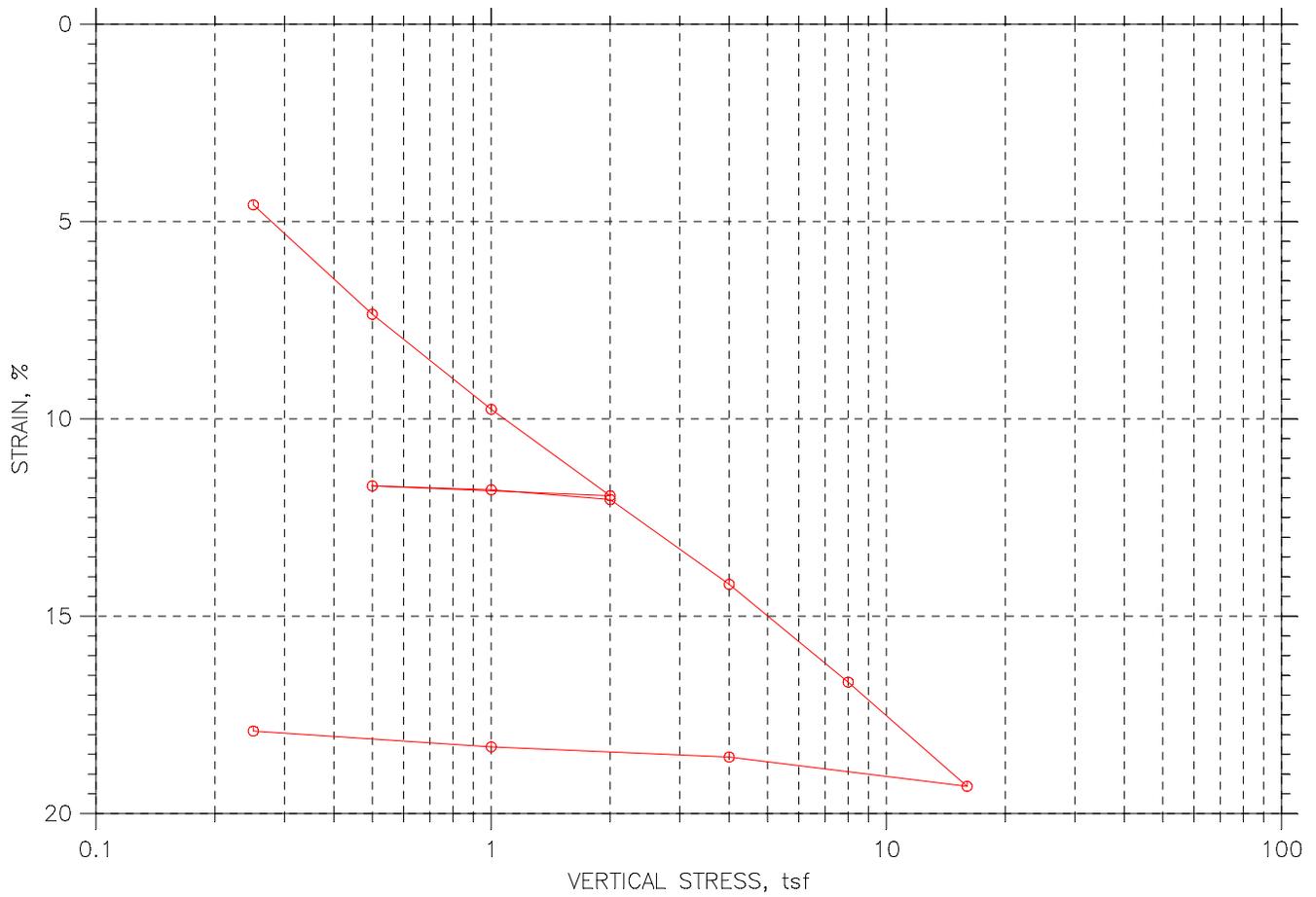
Stress: 0.25 tsf



Project: JEPH Engr. Battalion	Location: WRSMR, NM	Project No.: GTX-1594
Boring No.: 25A2S-07	Tested By: jm	Checked By: mm
Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

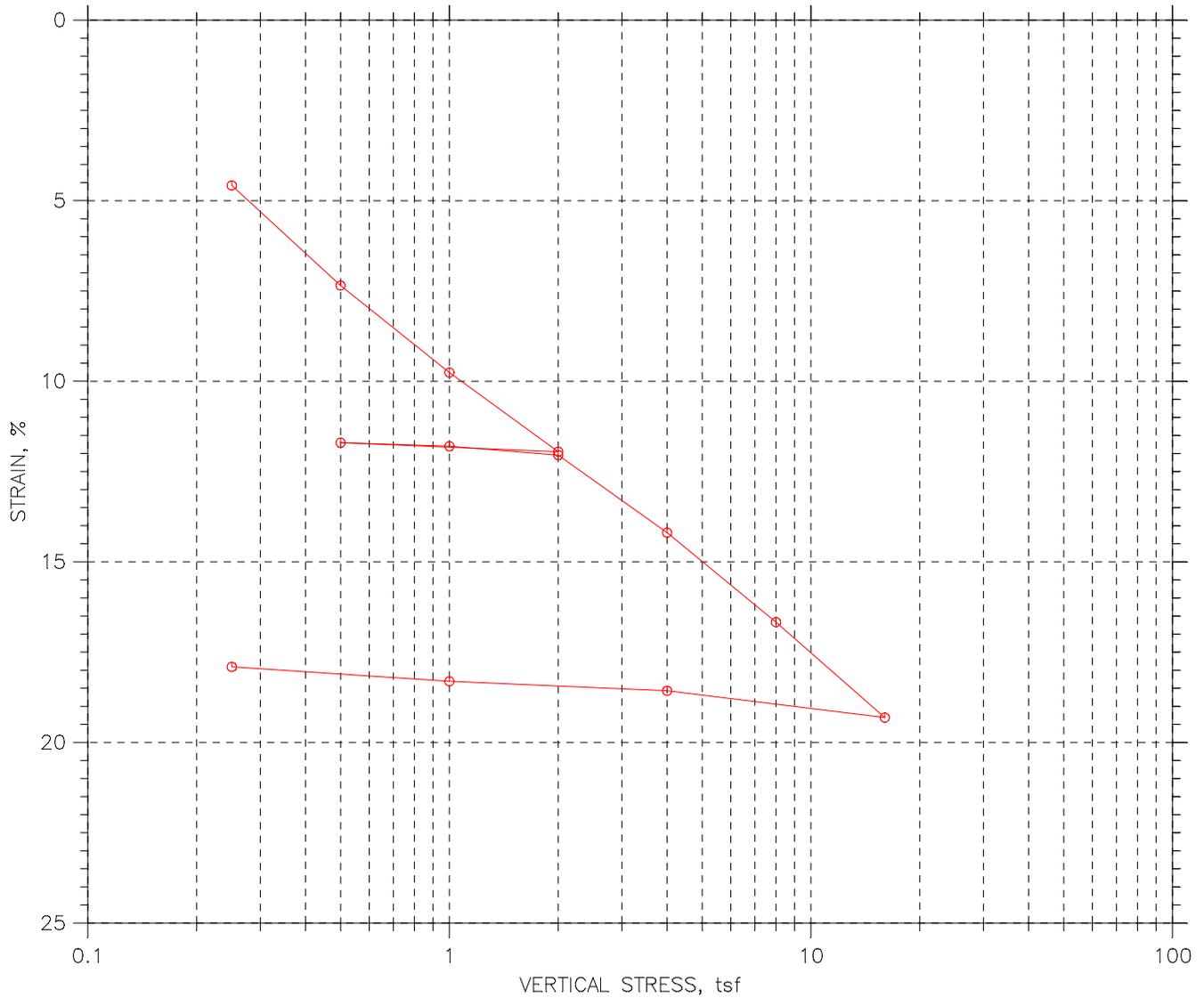
CONSOLIDATION TEST DATA

SUMMARY REPORT



Project: JEPH Engr. Battalion	Location: WRSMR, NM	Project No.: GTX-1594
Boring No.: 25A2S-07	Tested By: jm	Checked By: mm
Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

CONSOLIDATION TEST DATA SUMMARY REPORT



				Before Test	After Test
Overburden Pressure: 0.47 tsf		Water Content, %		6.17	11.02
Preconsolidation Pressure: ---		Dry Unit Weight, pcf		103.4	126.
Compression Index: ---		Saturation, %		27.28	93.34
Diameter: 2.5 in	Height: 1.046 in	Void Ratio		0.60	0.31
LL: 22	PL: 11	PI: 11	GS: 2.65		

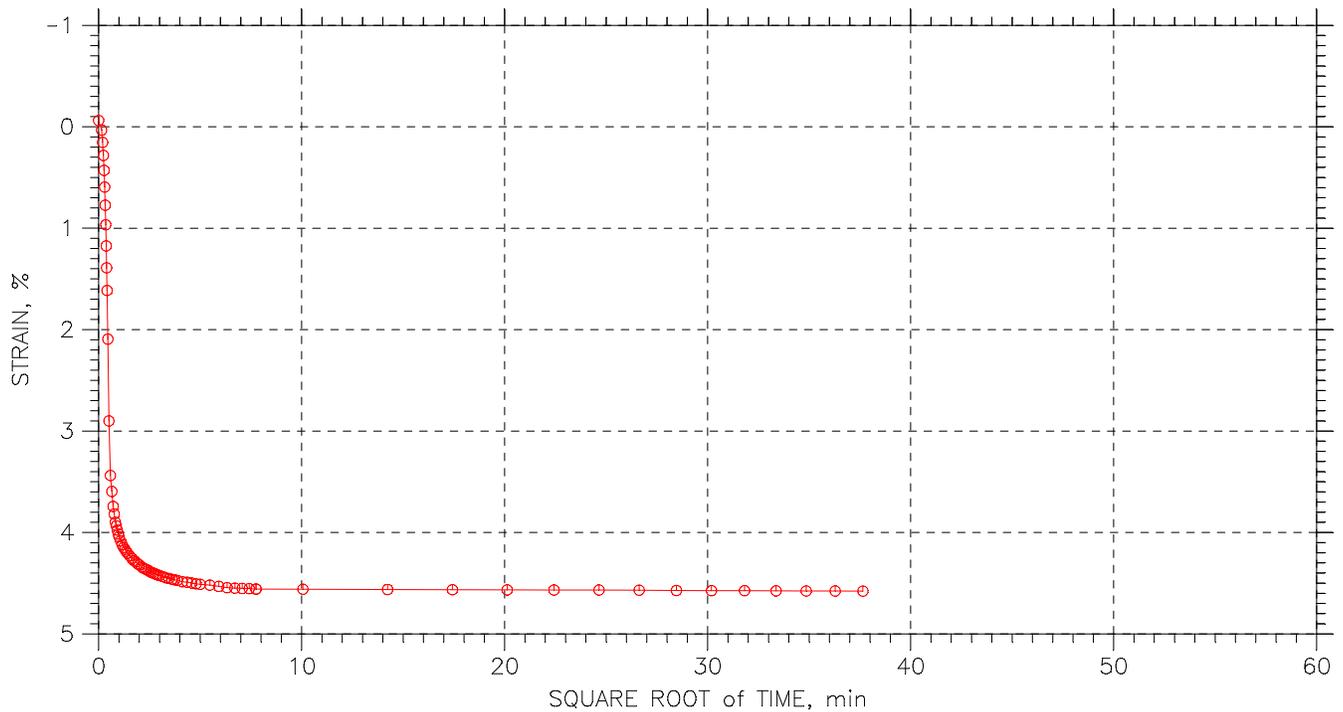
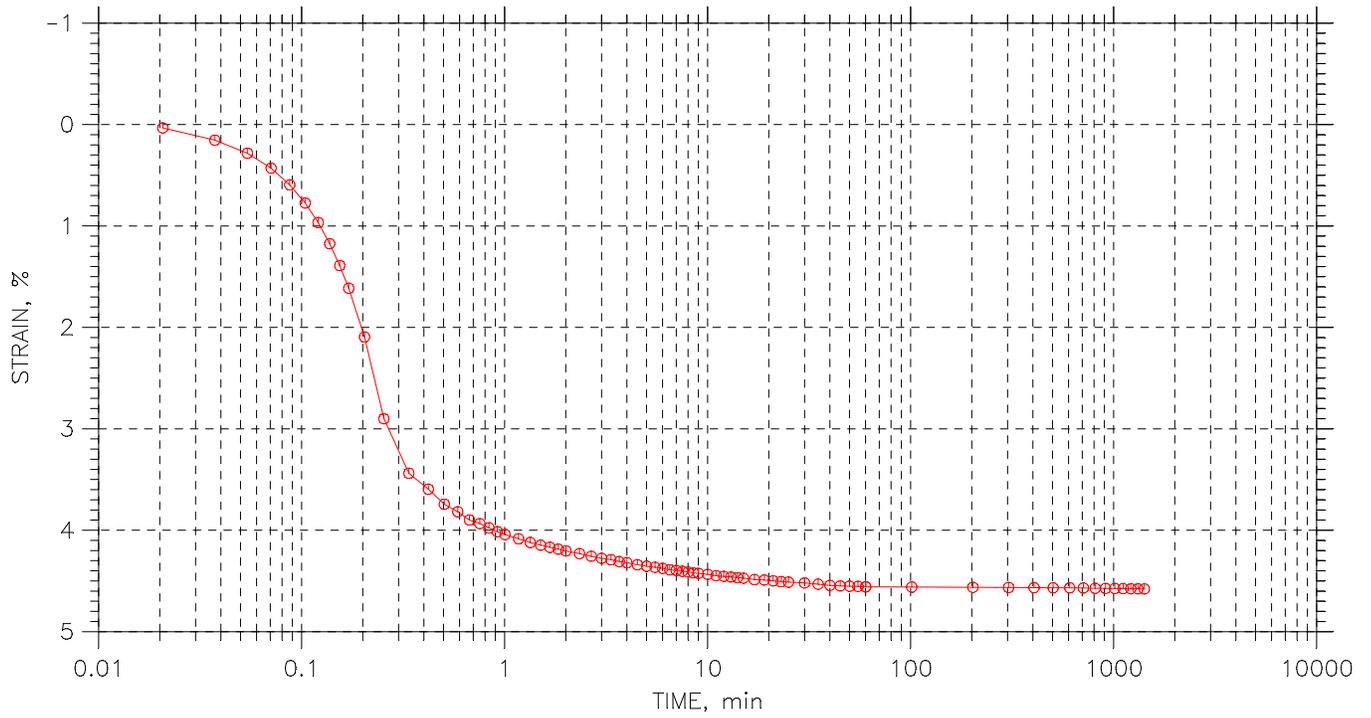
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	Boring No.: 25A2S-07	Tested By: jm	Checked By: mm
	Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
	Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)			
Remarks:			
Thursday, March 03, 2011			

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 1 of 13

Stress: 0.25 tsf



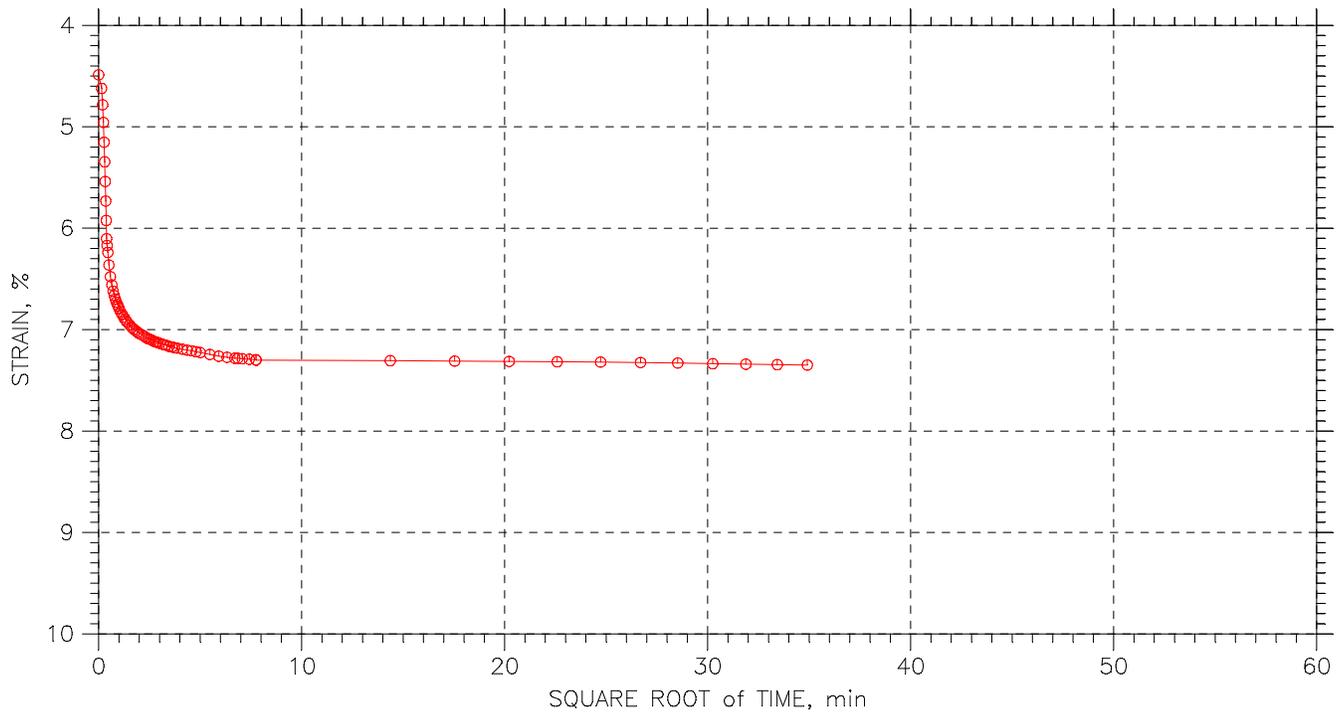
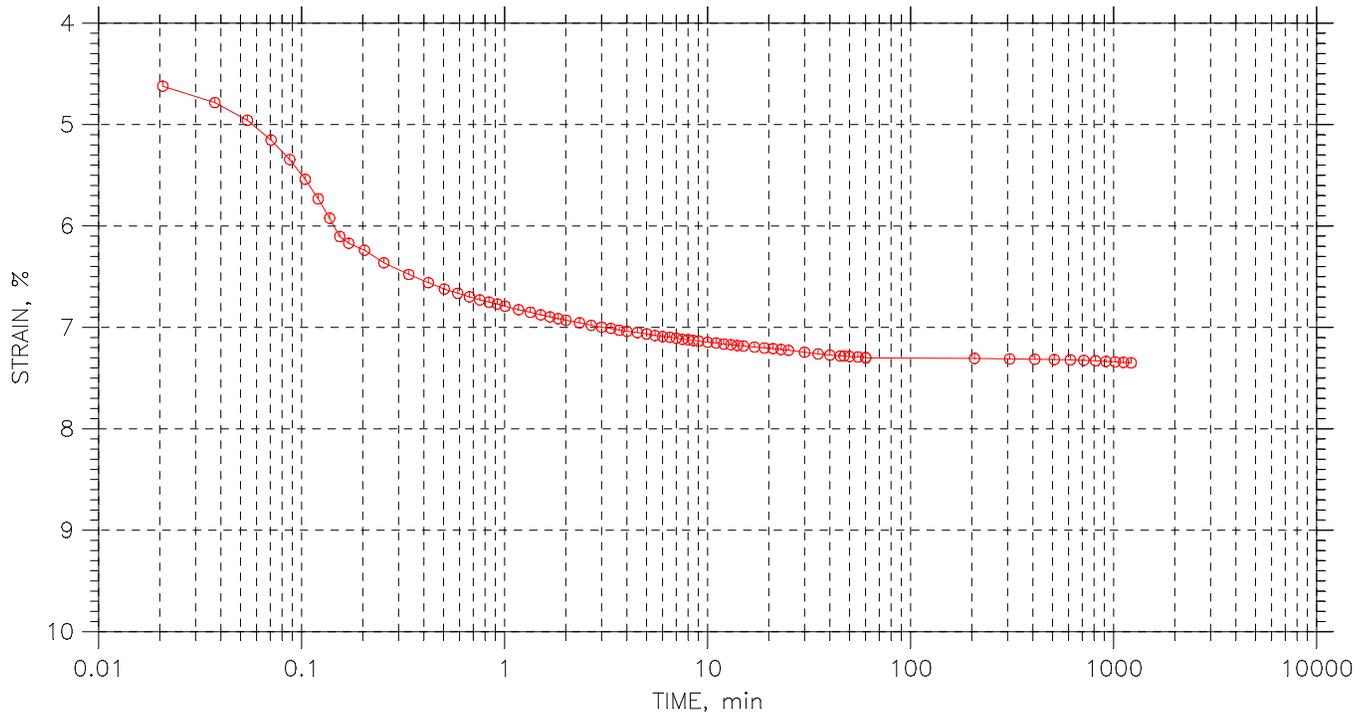
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Boring No.: 25A2S-07	Tested By: jm	Checked By: mm
Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 2 of 13

Stress: 0.5 tsf



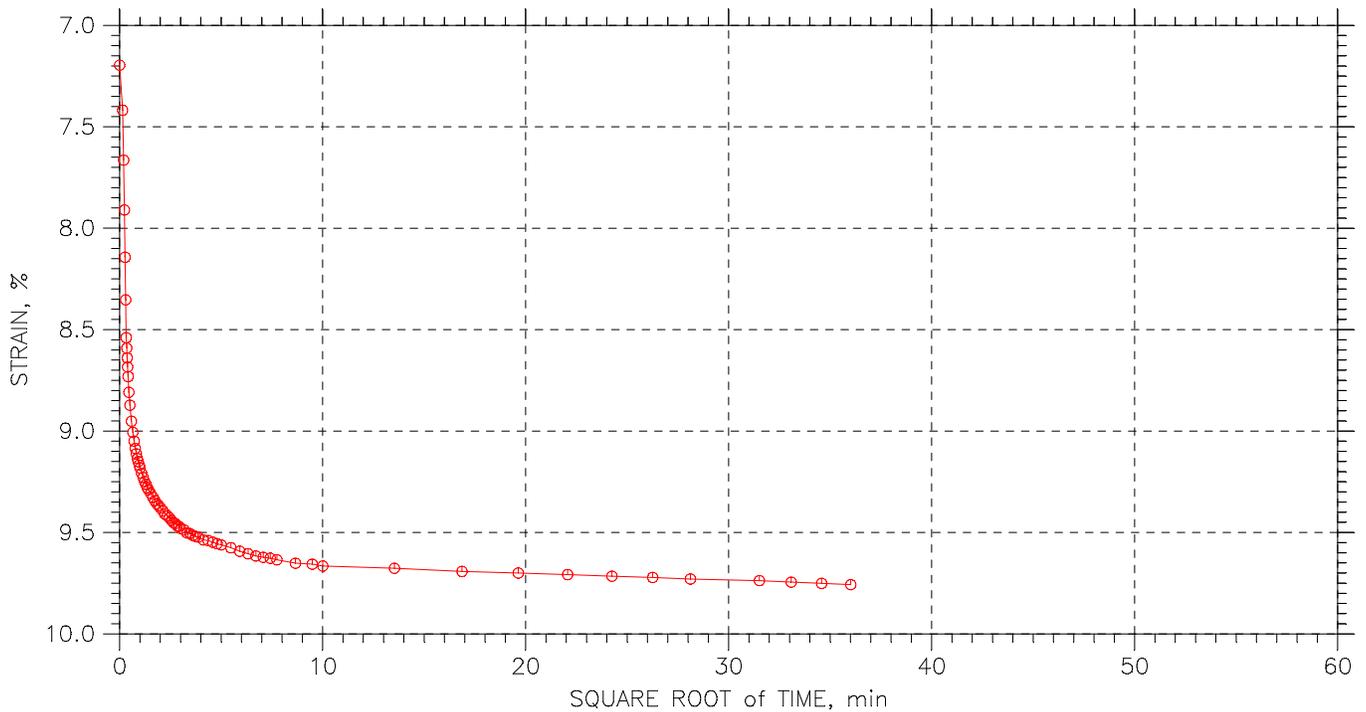
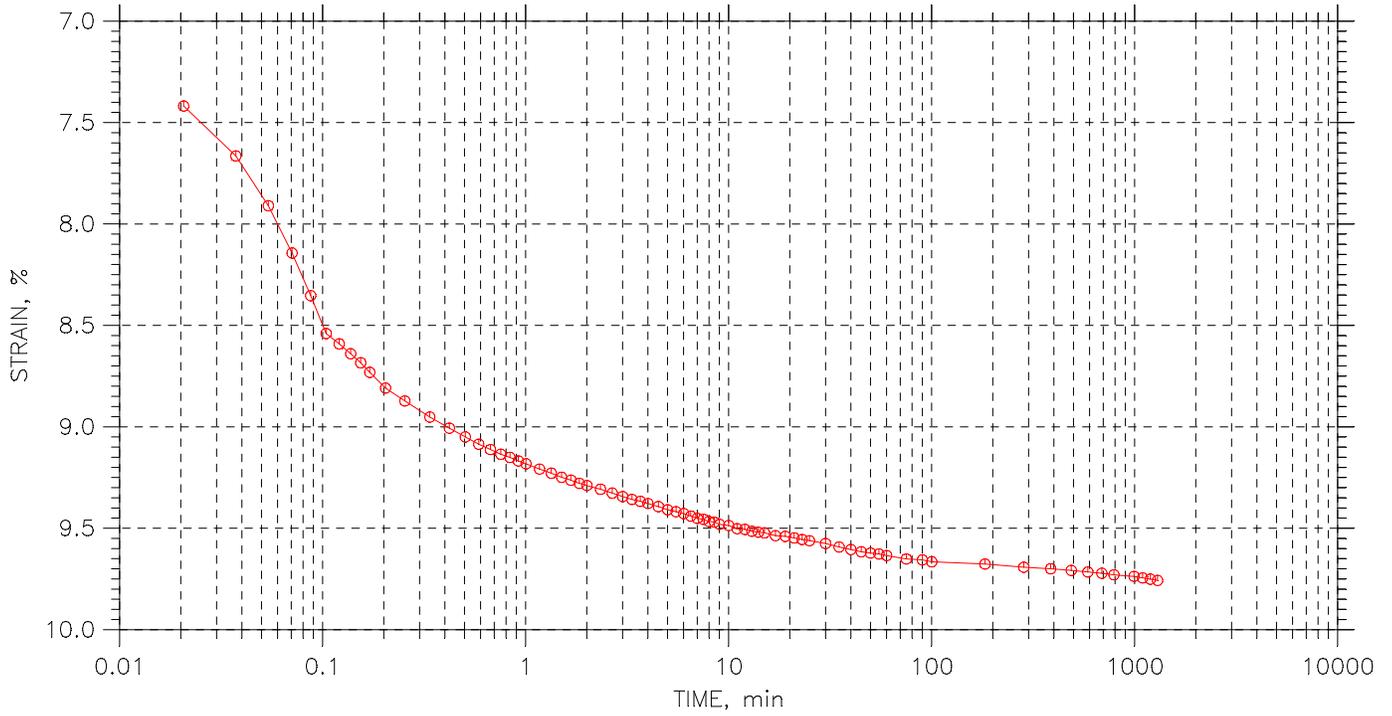
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Boring No.: 25A2S-07	Tested By: jm	Checked By: mm
Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 3 of 13

Stress: 1. tsf



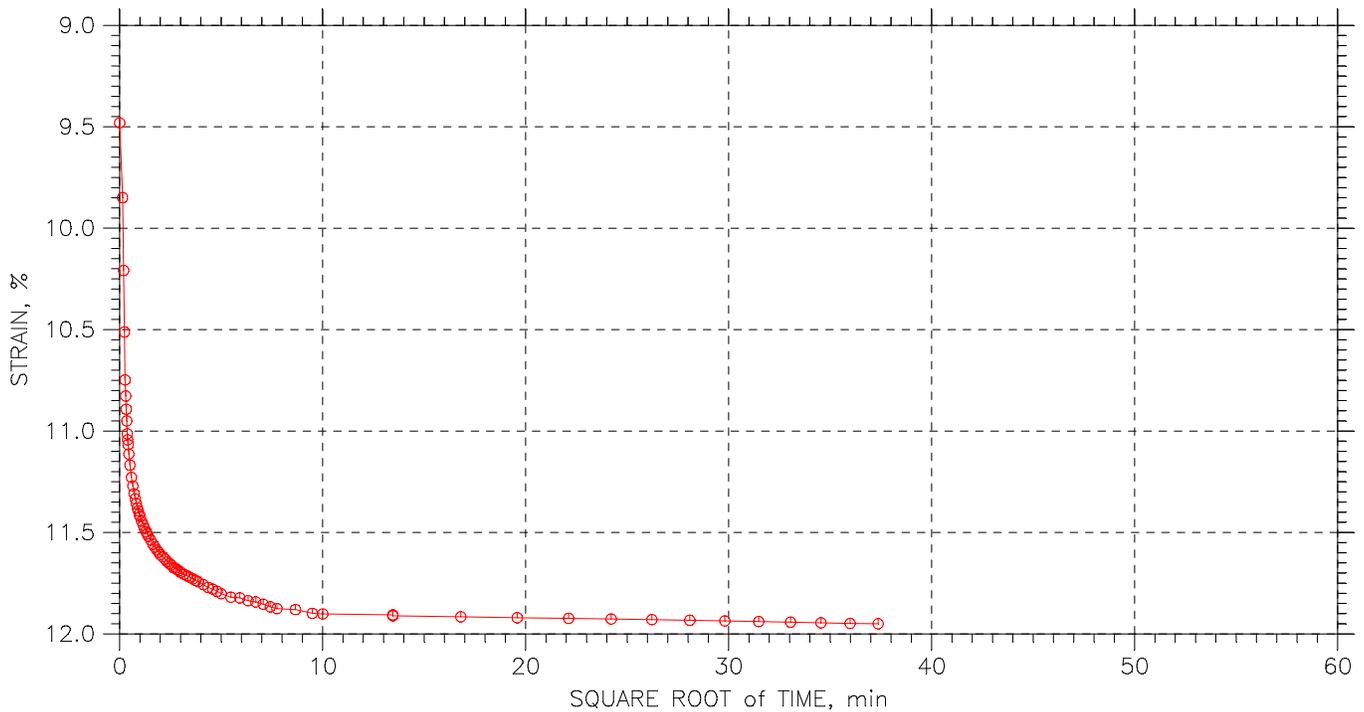
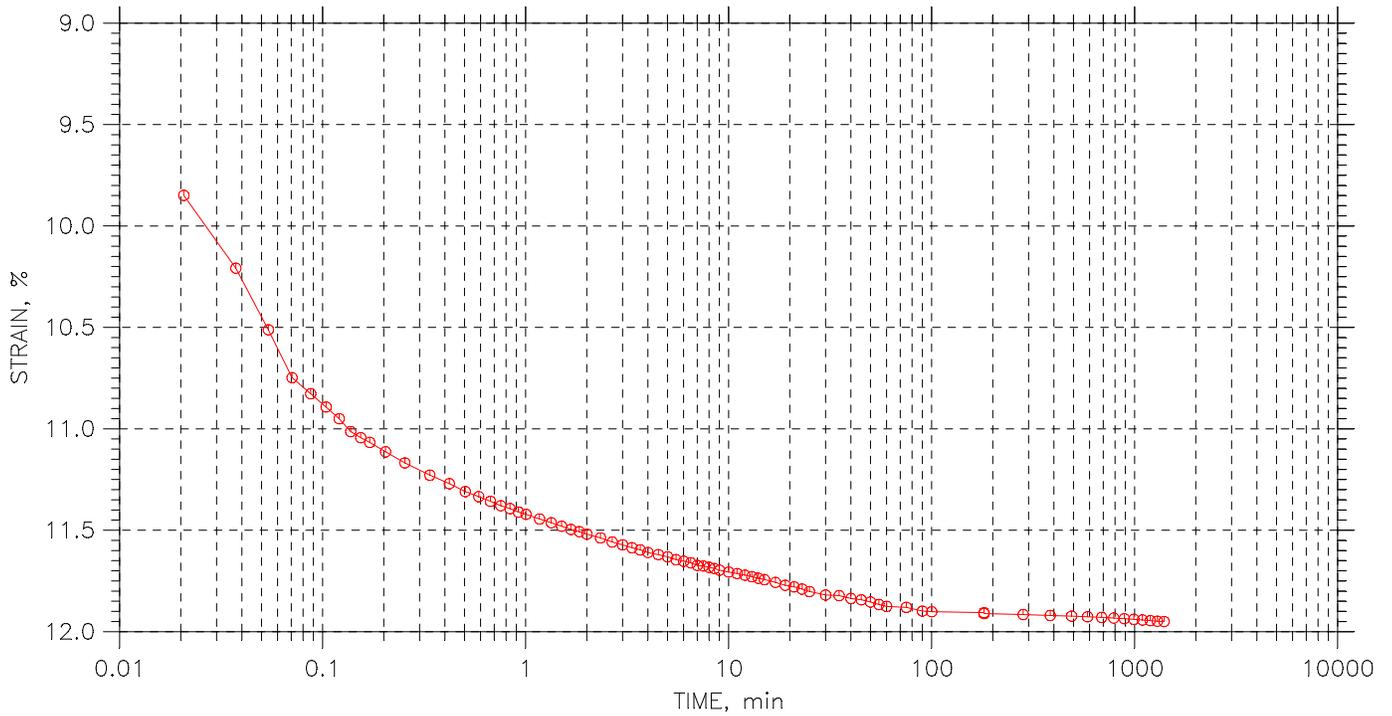
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Boring No.: 25A2S-07	Tested By: jm	Checked By: mm
Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 4 of 13

Stress: 2. tsf



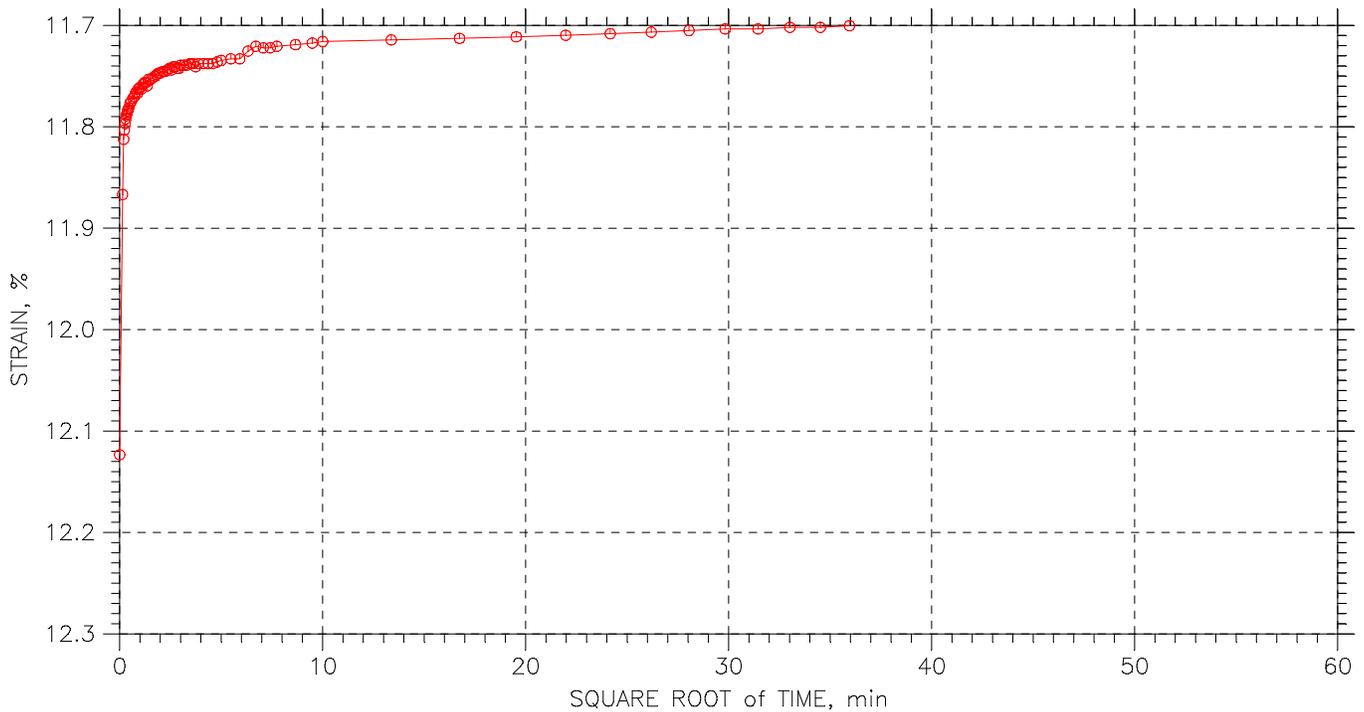
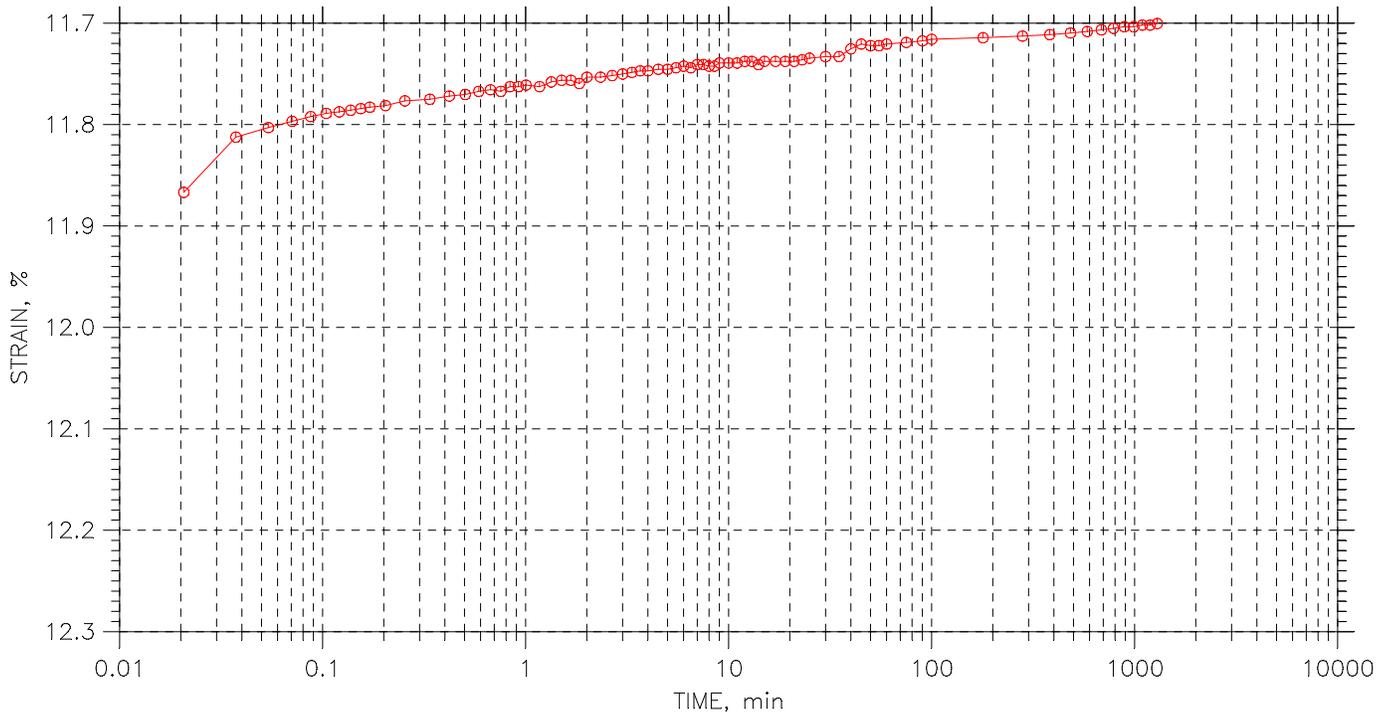
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Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 5 of 13

Stress: 0.5 tsf



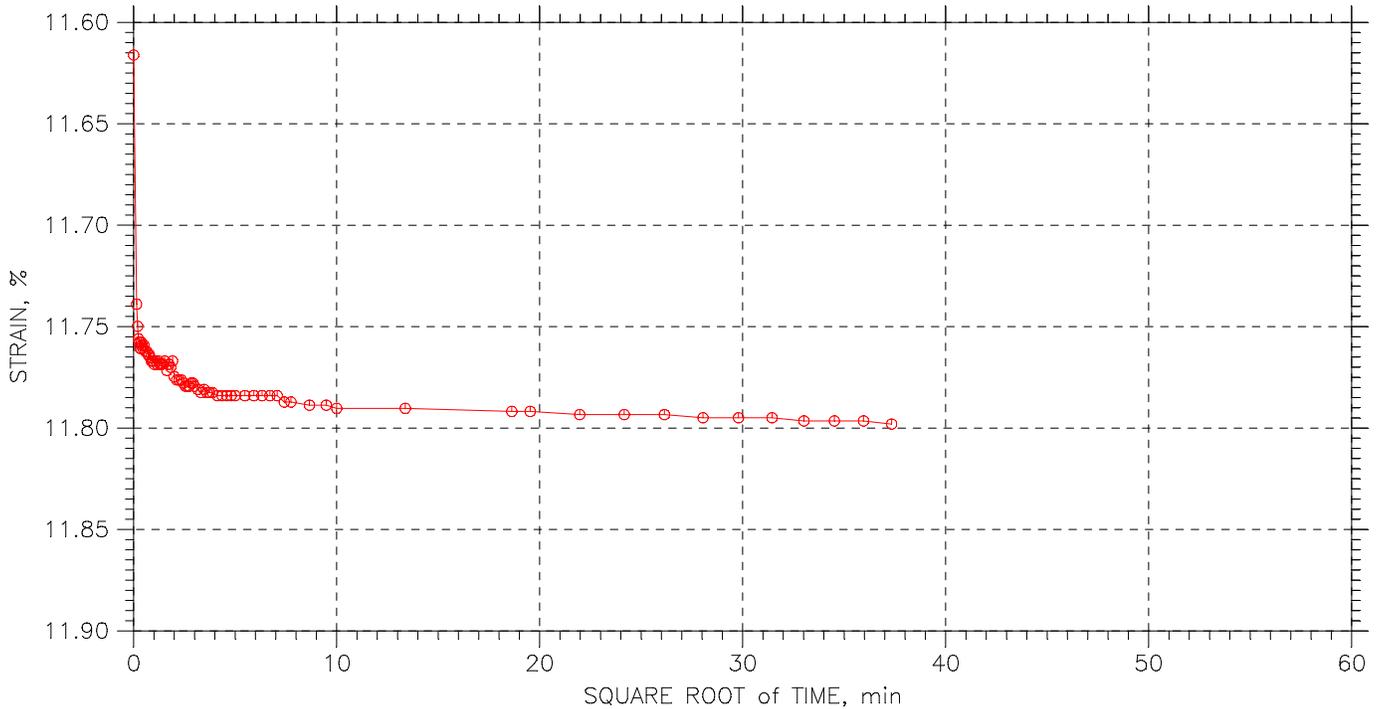
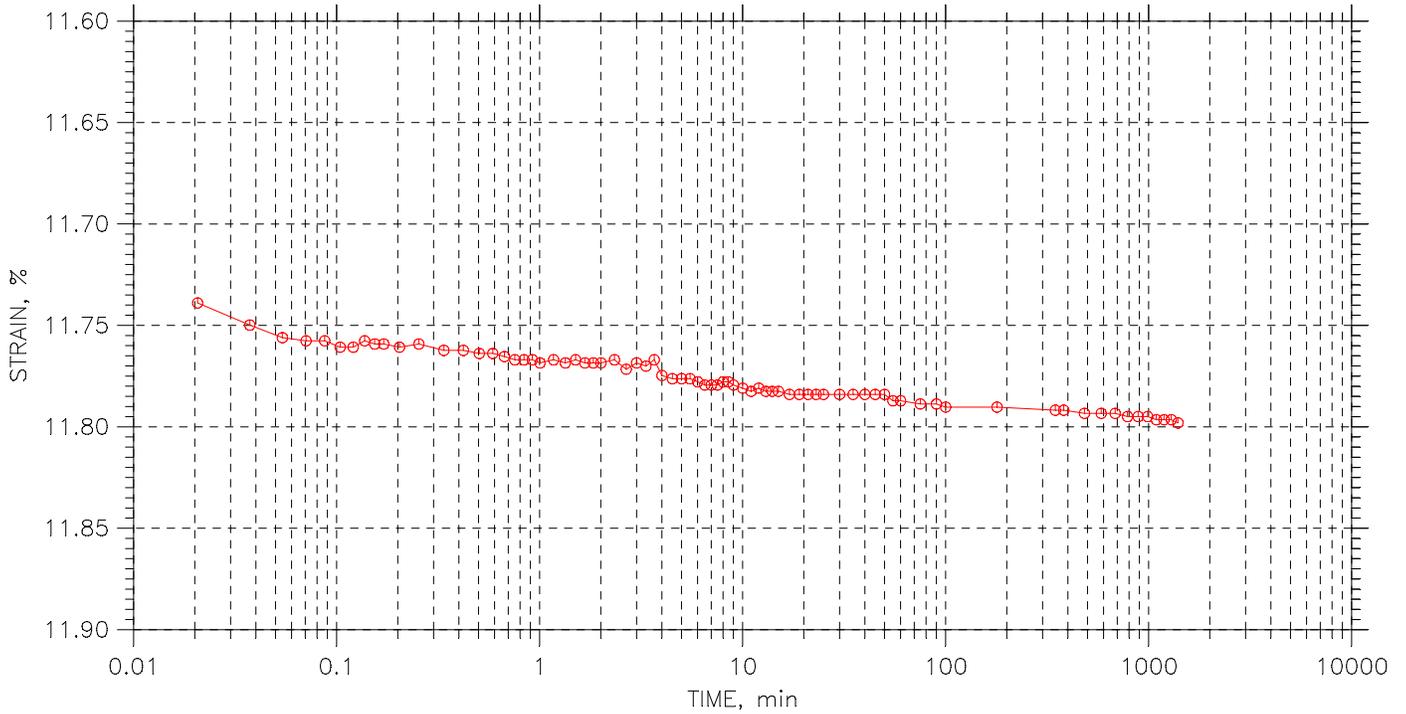
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Boring No.: 25A2S-07	Tested By: jm	Checked By: mm
Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 6 of 13

Stress: 1. tsf



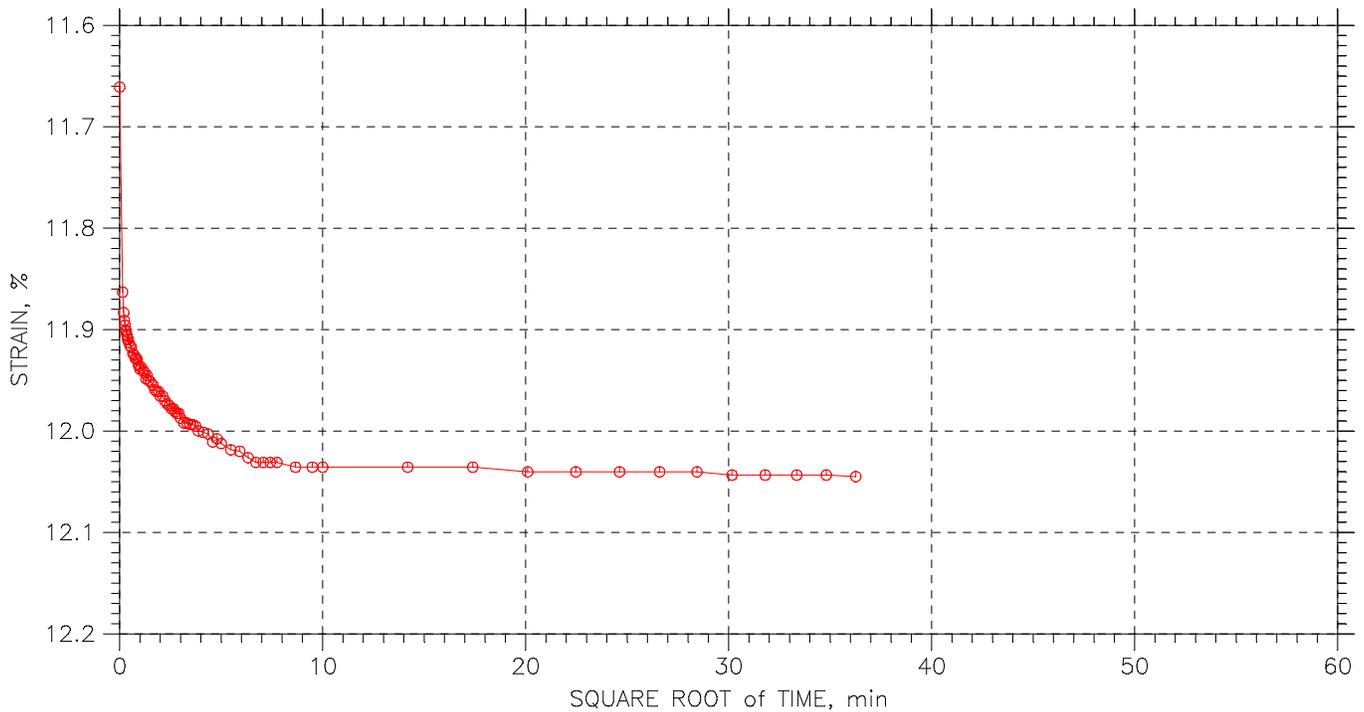
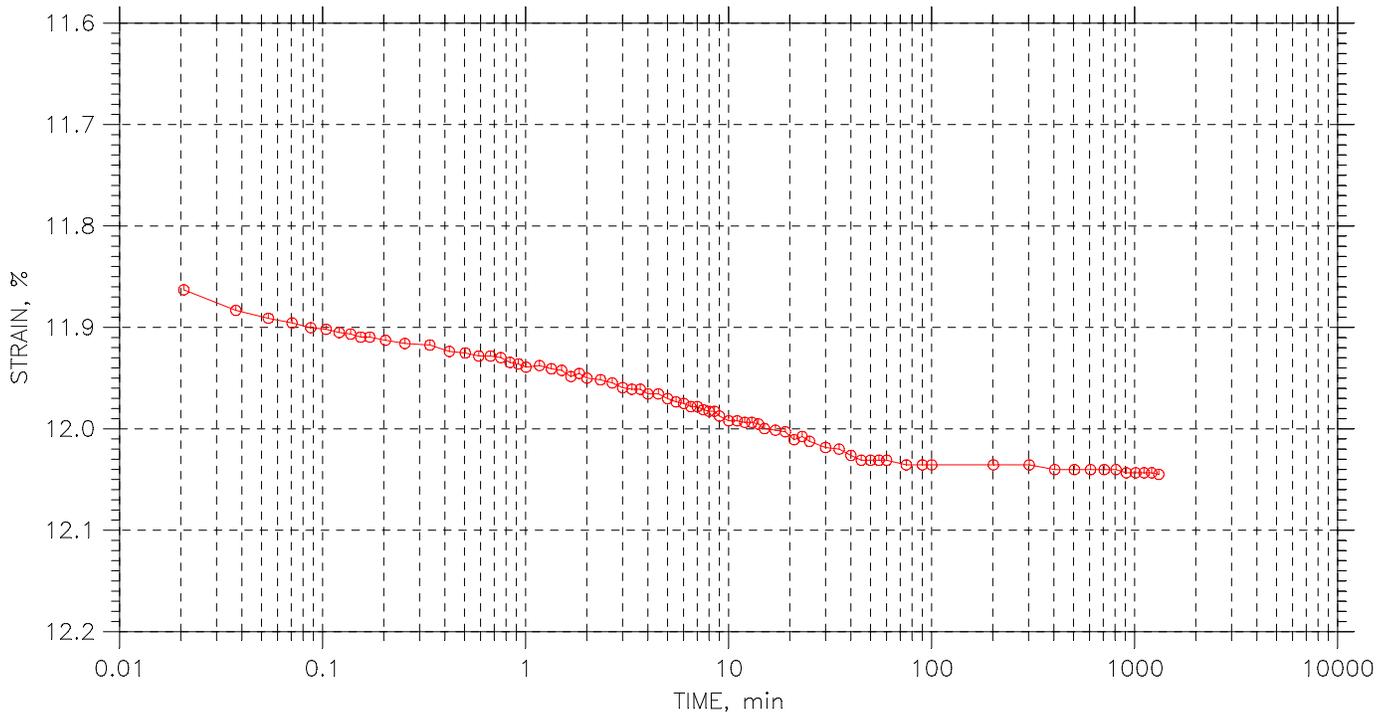
Project: JEPH Engr. Battalion	Location: WRSMR, NM	Project No.: GTX-1594
Boring No.: 25A2S-07	Tested By: jm	Checked By: mm
Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 7 of 13

Stress: 2. tsf



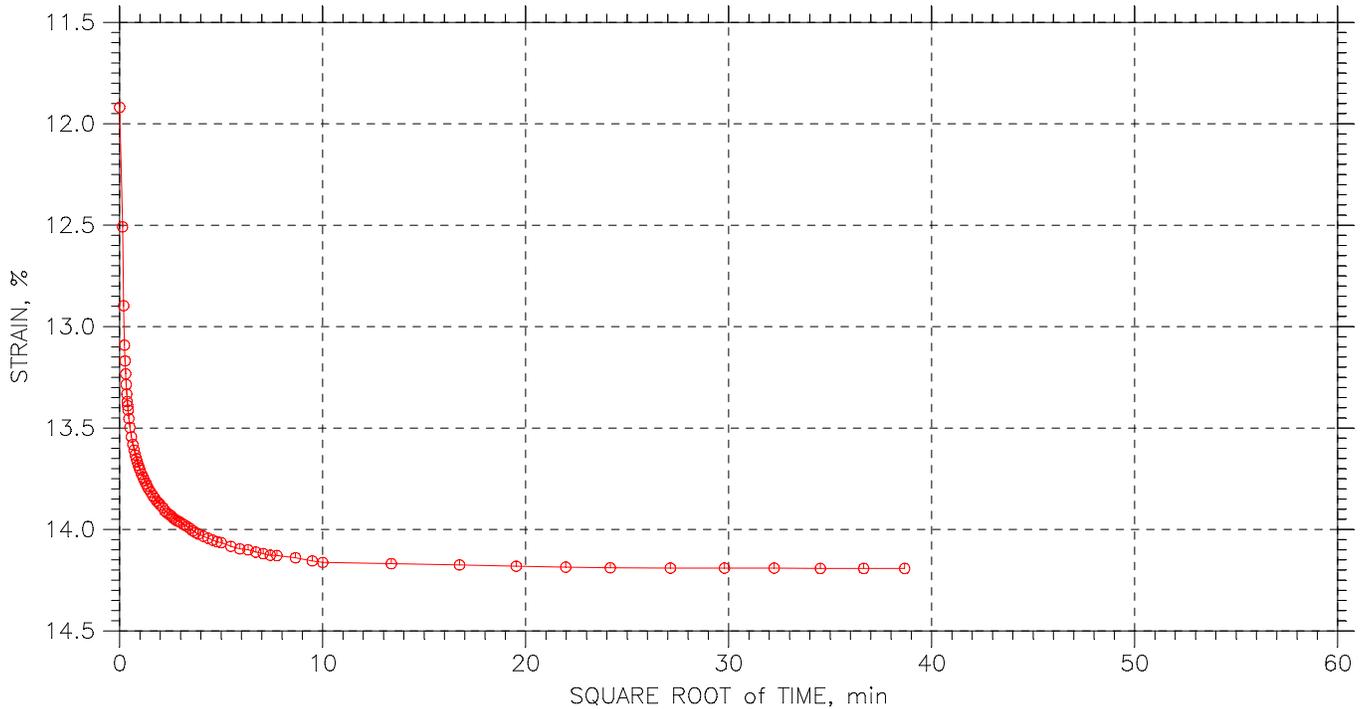
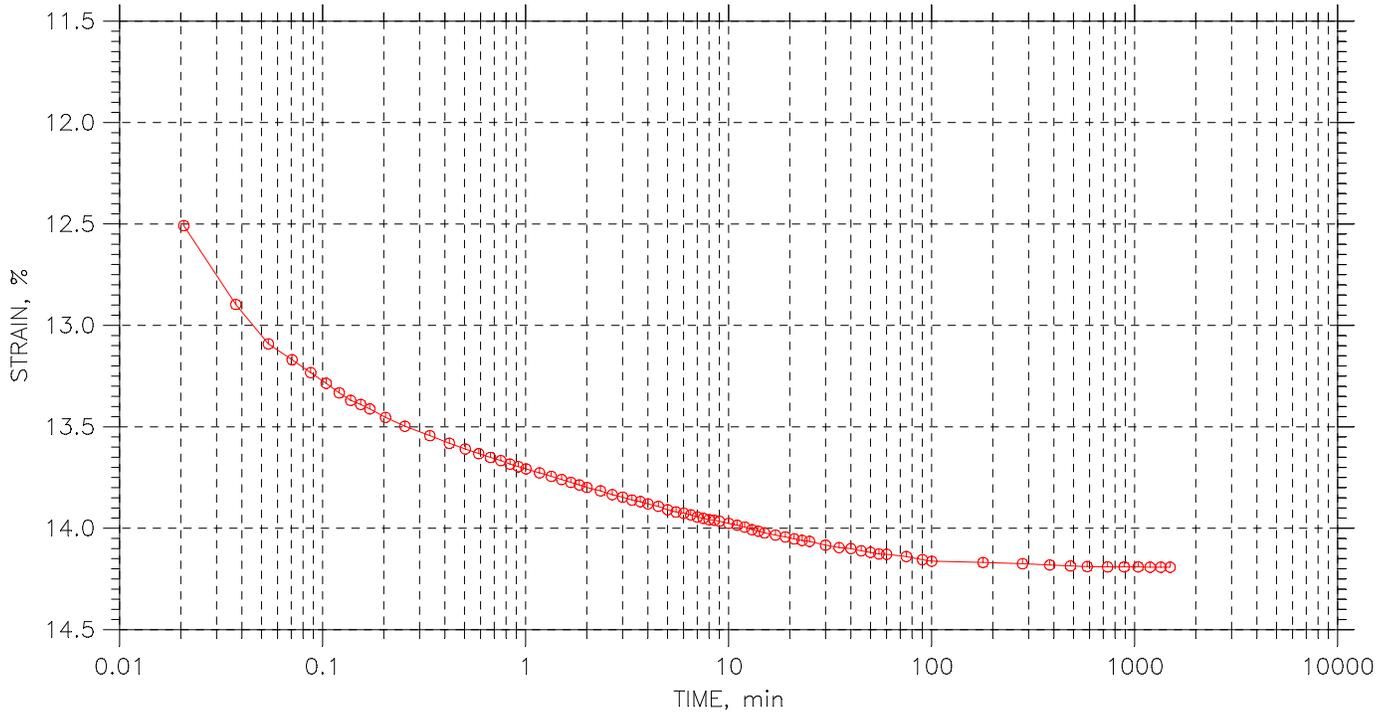
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Boring No.: 25A2S-07	Tested By: jm	Checked By: mm
Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 8 of 13

Stress: 4. tsf



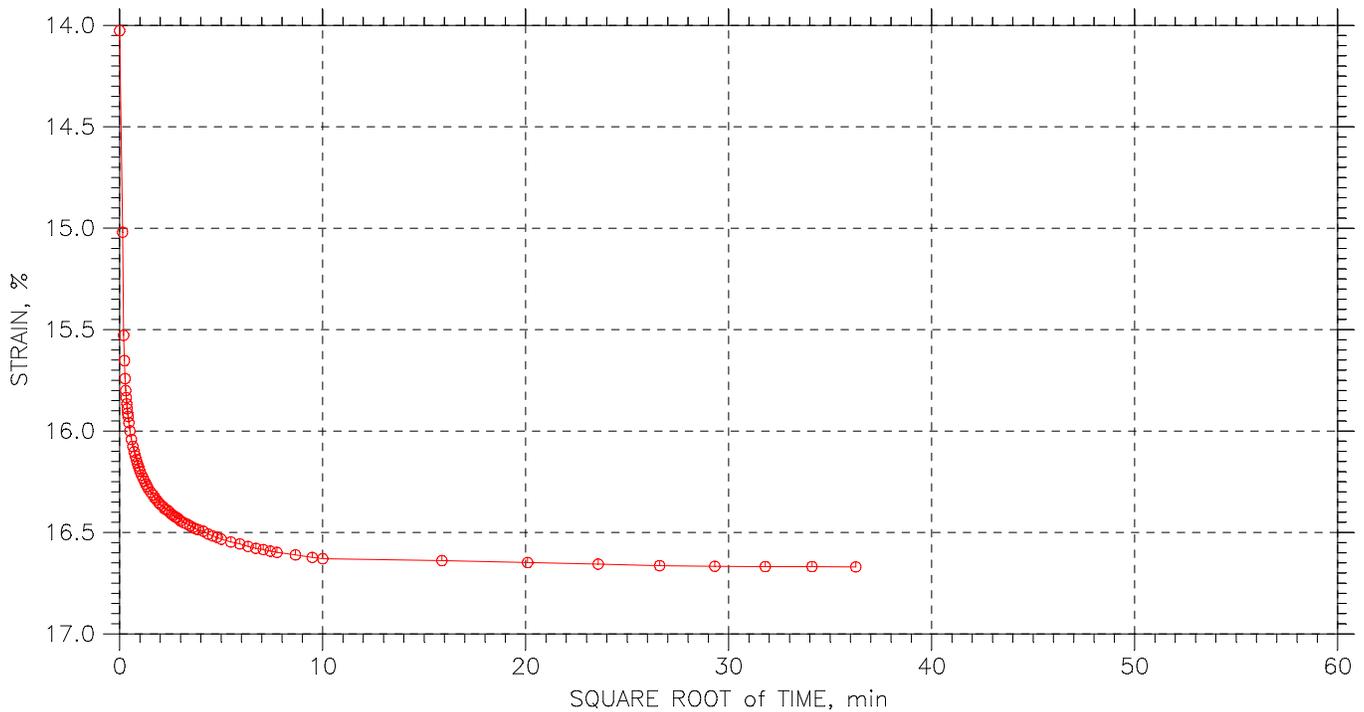
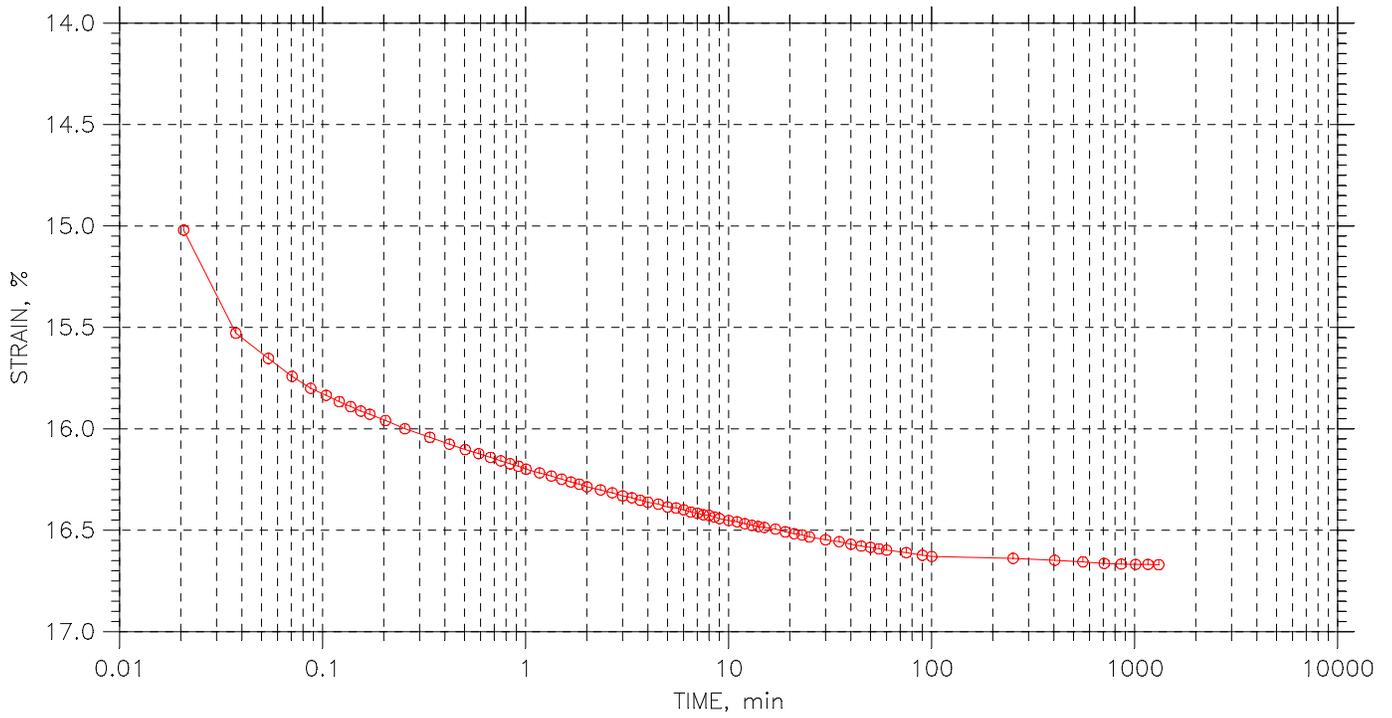
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Boring No.: 25A2S-07	Tested By: jm	Checked By: mm
Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 9 of 13

Stress: 8. tsf



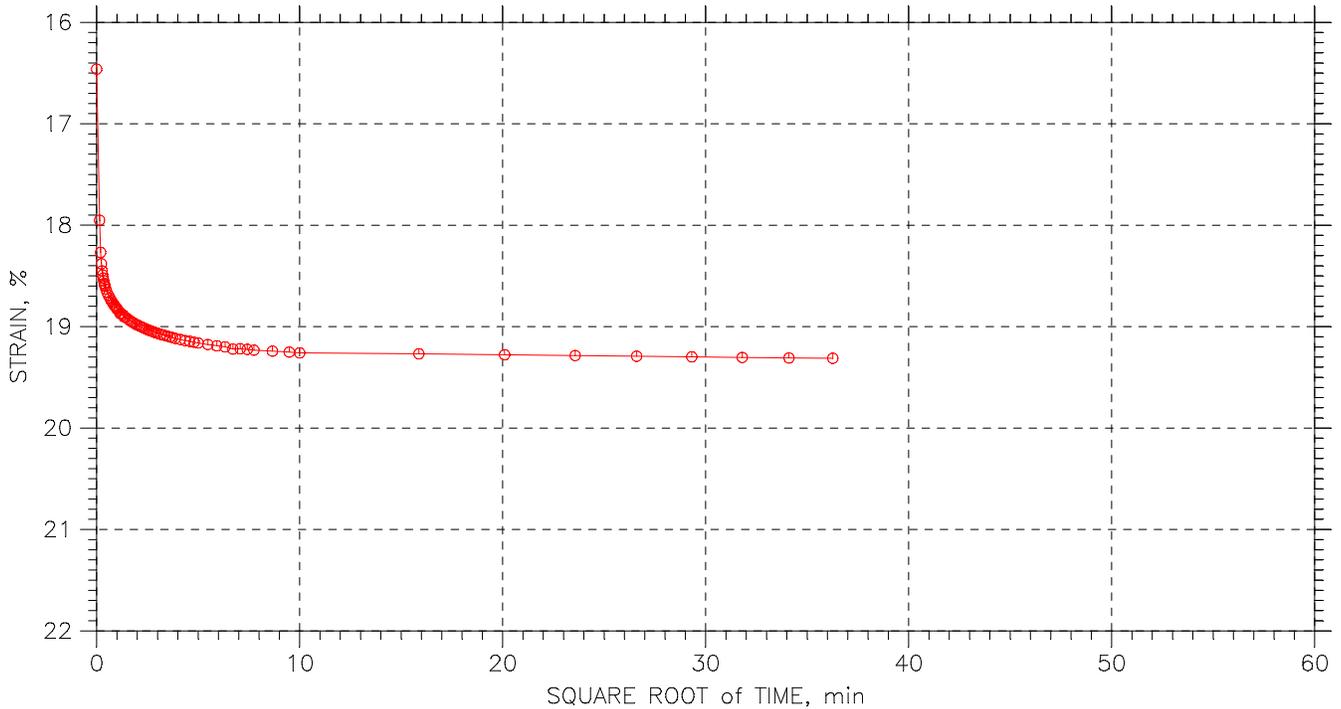
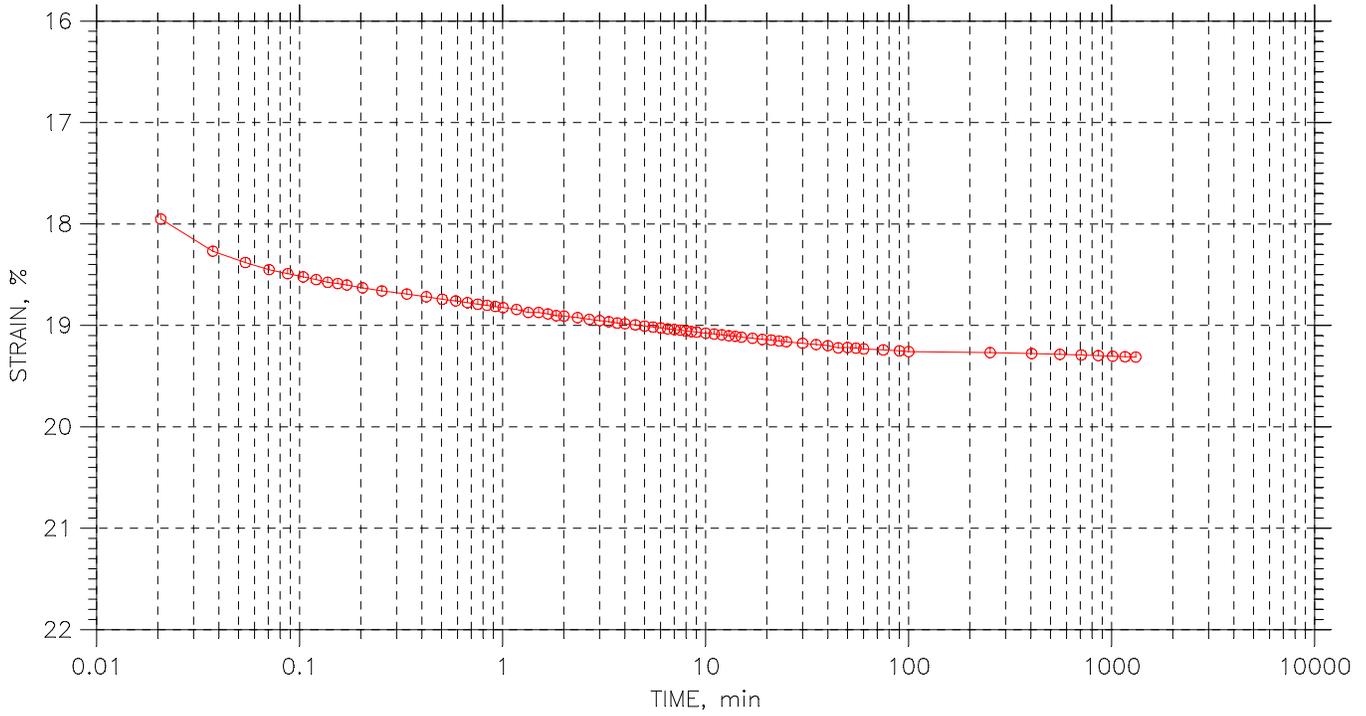
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Boring No.: 25A2S-07	Tested By: jm	Checked By: mm
Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 10 of 13

Stress: 16. tsf



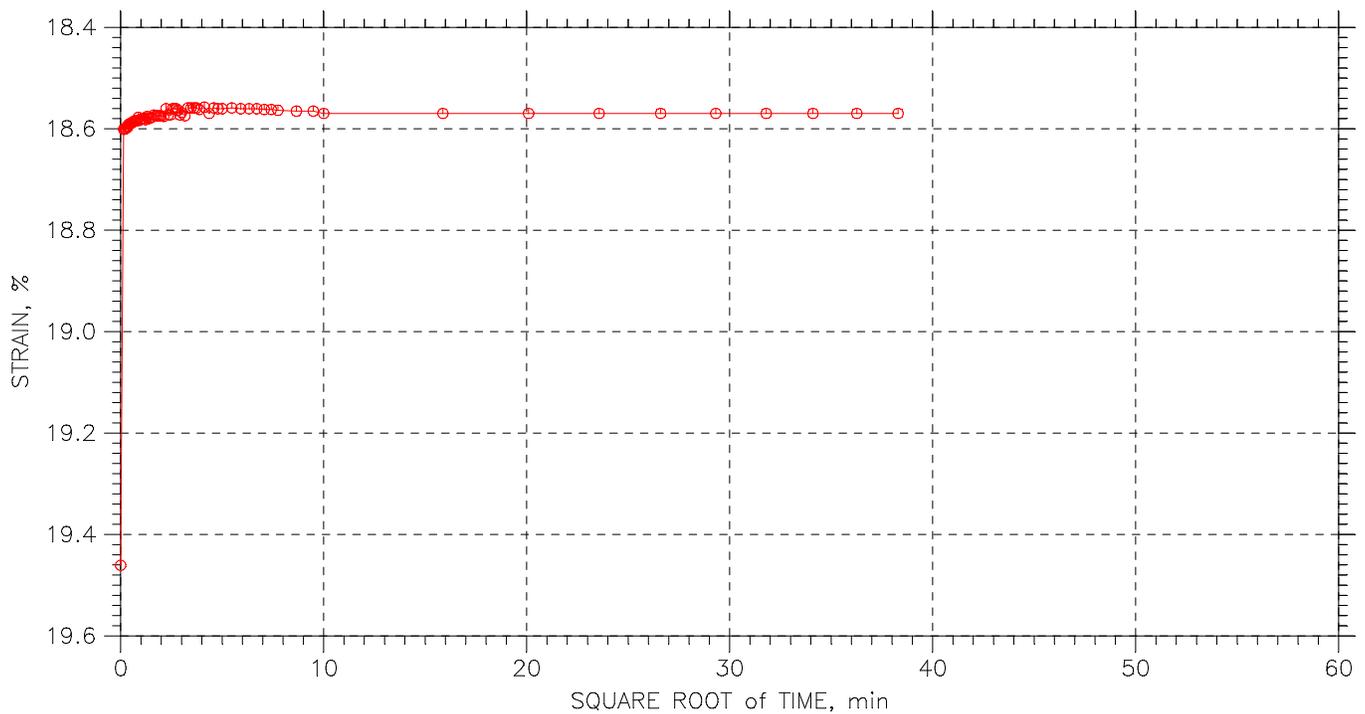
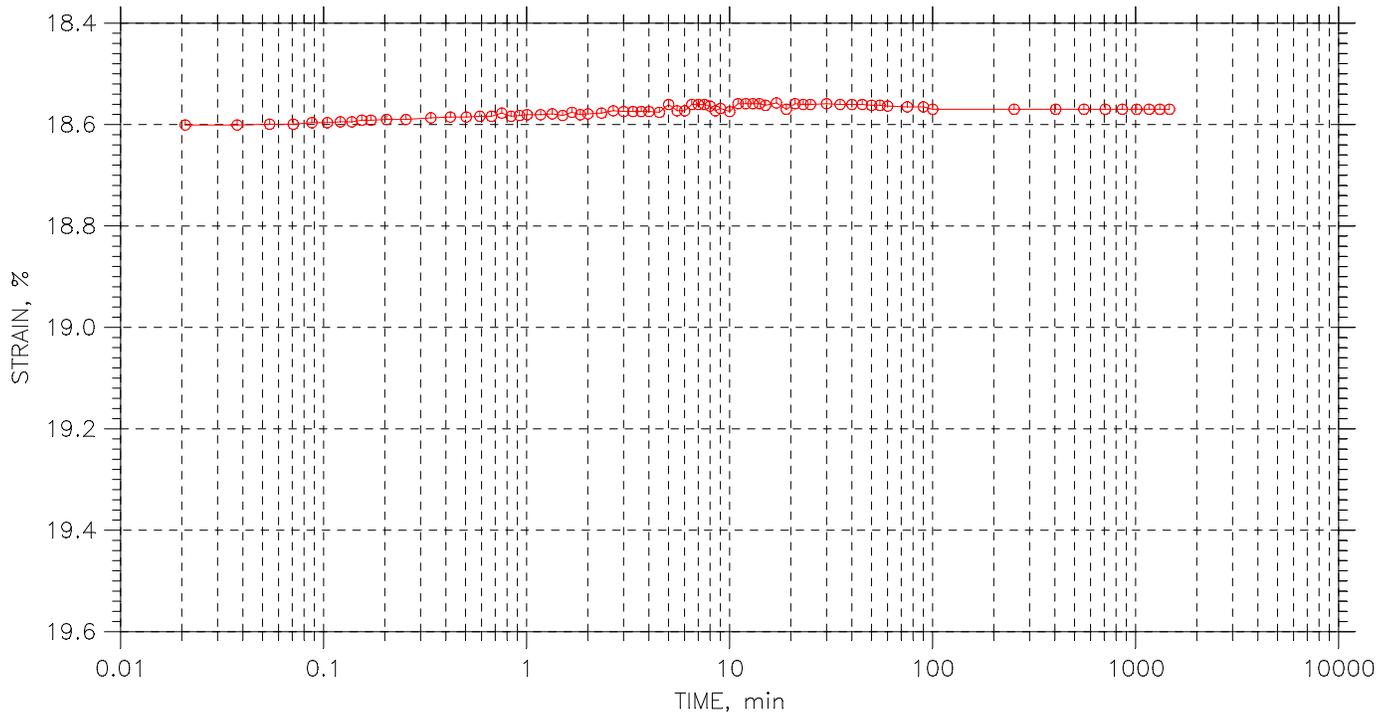
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Boring No.: 25A2S-07	Tested By: jm	Checked By: mm
Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 11 of 13

Stress: 4. tsf



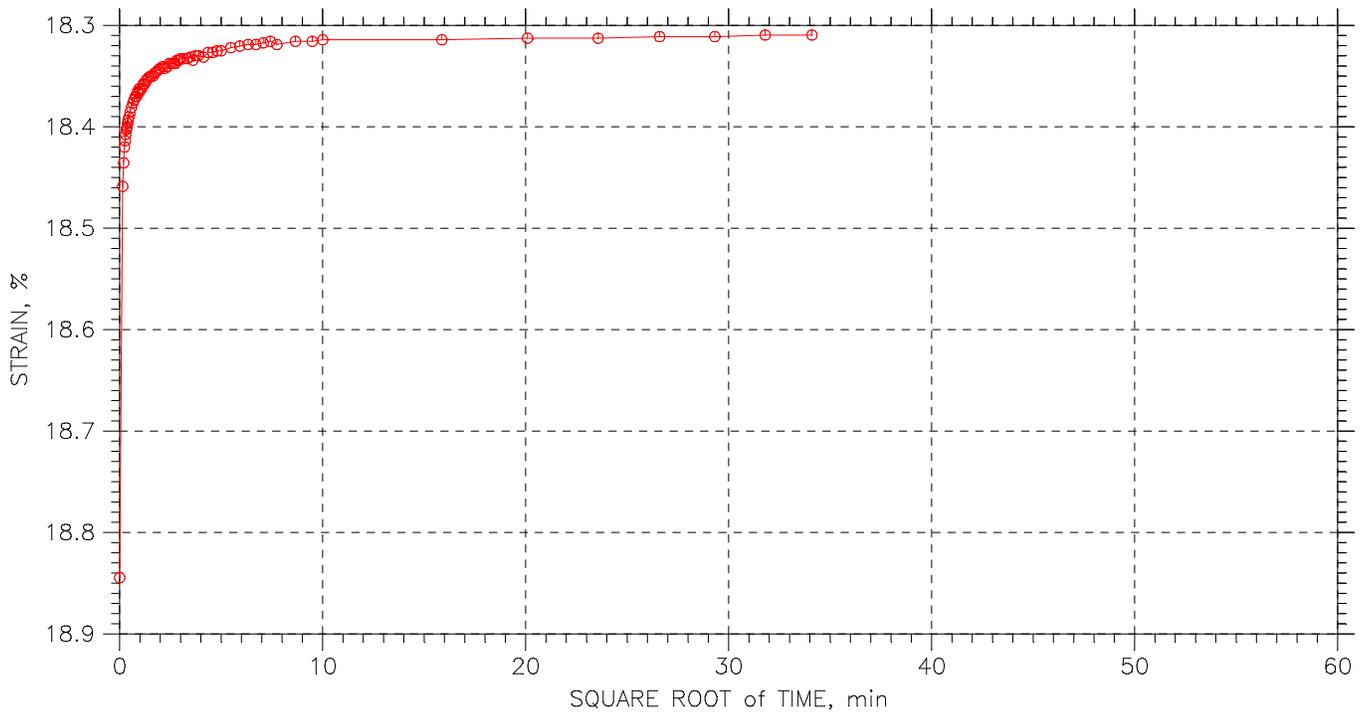
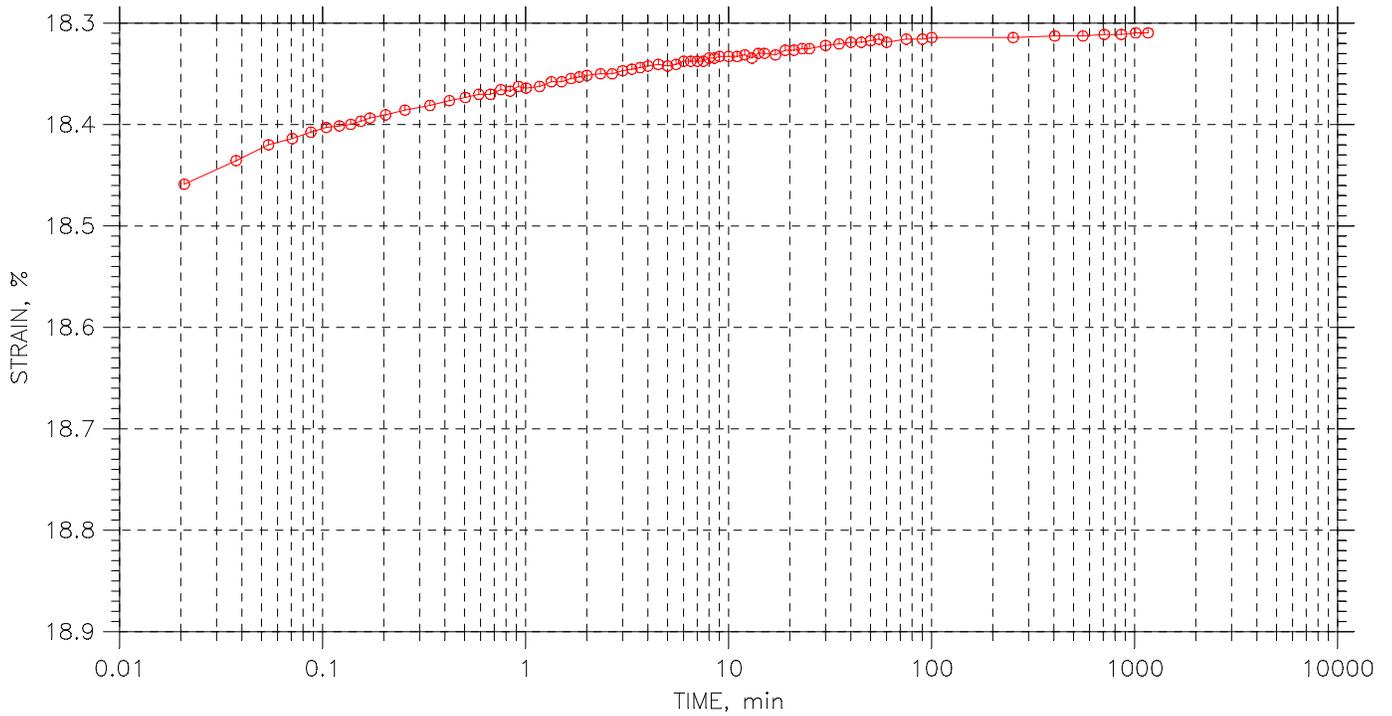
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Boring No.: 25A2S-07	Tested By: jm	Checked By: mm
Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 12 of 13

Stress: 1. tsf



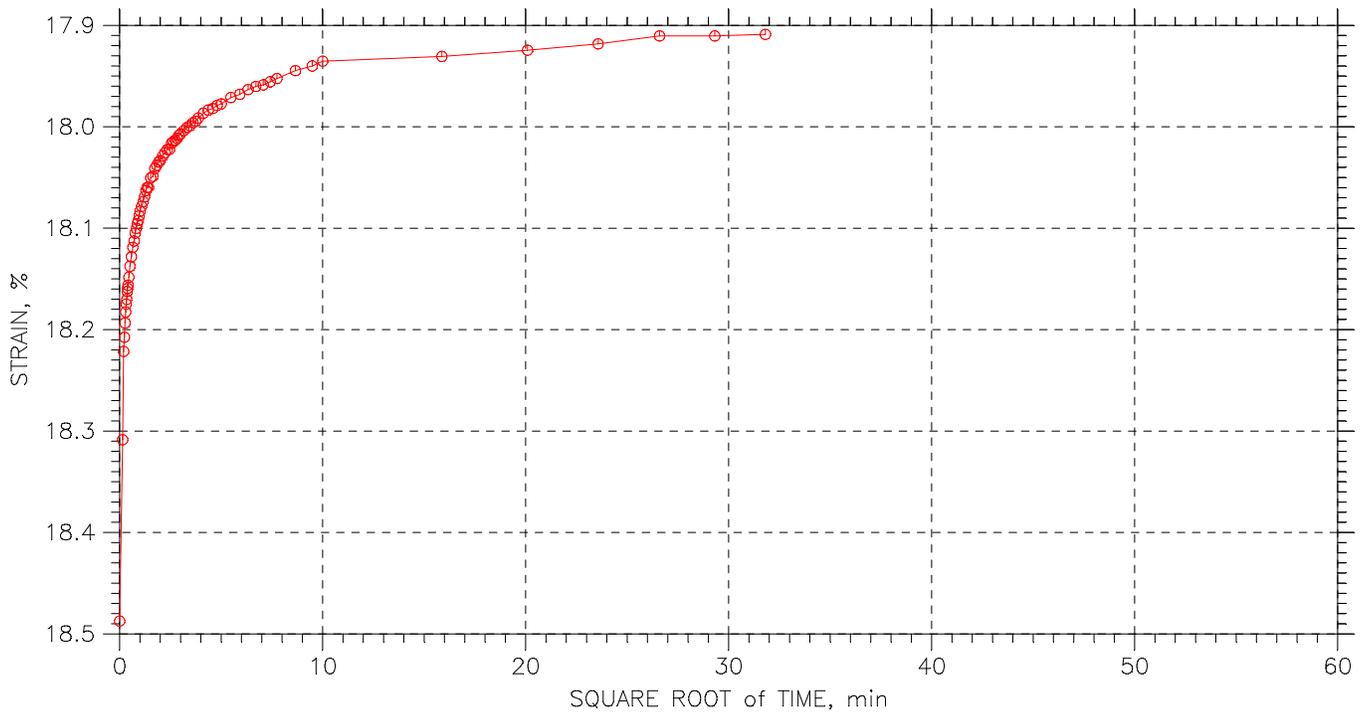
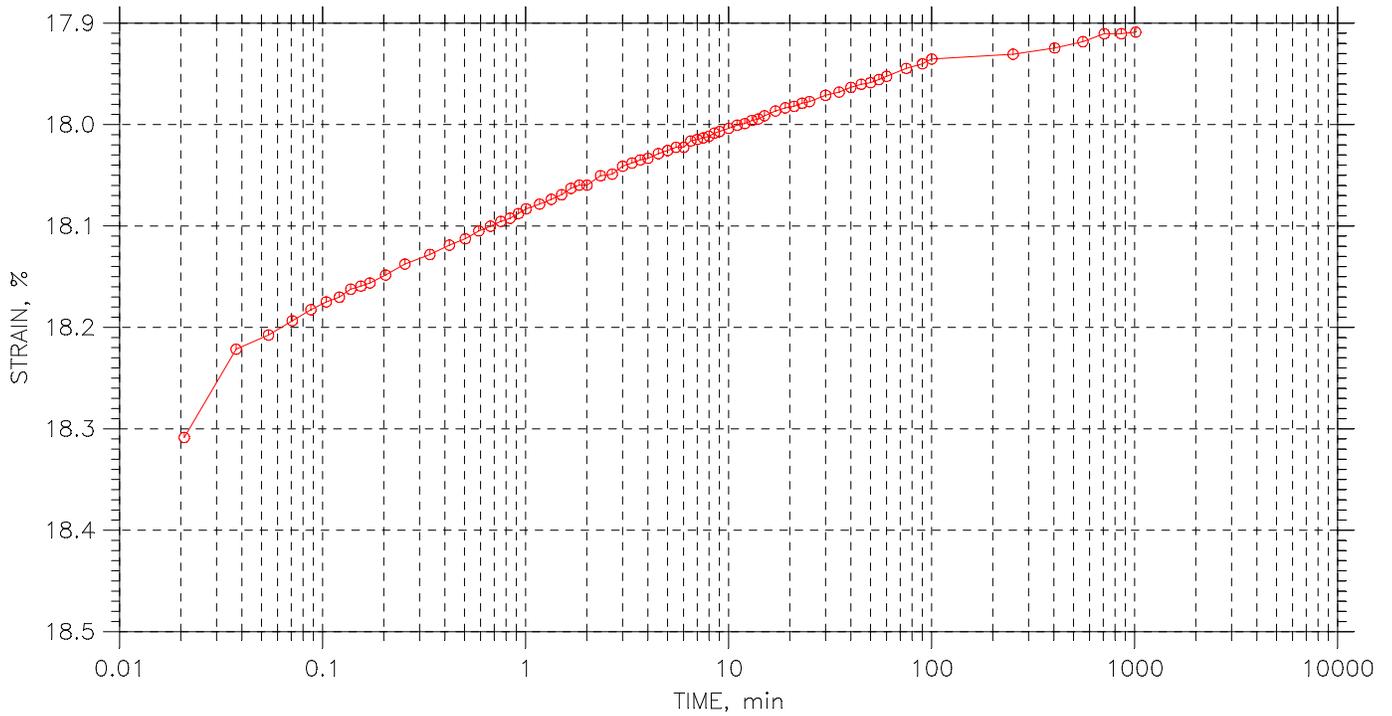
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Boring No.: 25A2S-07	Tested By: jm	Checked By: mm
Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

CONSOLIDATION TEST DATA

TIME CURVES

Constant Load Step: 13 of 13

Stress: 0.25 tsf



Project: JEPH Engr. Battalion	Location: WRSMR, NM	Project No.: GTX-1594
Boring No.: 25A2S-07	Tested By: jm	Checked By: mm
Sample No.: ---	Test Date: 8/4/10	Depth: 7.5-8.9
Test No.: C-1.1	Sample Type: UD	Elevation: ---
Description: Brown Clayey sand (sc)		
Remarks:		
Thursday, March 03, 2011		

APPENDIX B

Subsurface Exploration Data

Identification of Soil
Boring Logs, Nos. 25A2S-1 thru 25A2S-7

TERMINOLOGY USED TO DESCRIBE THE RELATIVE DENSITY, CONSISTENCY, OR FIRMNESS OF SOIL

The terminology used on the boring logs to describe relative density, consistency, or firmness of soil to the standard penetration resistance is presented below. The standard penetration resistance (N-value) was obtained utilizing a split spoon sampler with 2" O.D., 1-3/8" I.D. samplers following ASTM designation D 1586 procedures.

1. **RELATIVE DENSITY:** Terms for description of relative density of cohesionless soils such as sand, uncemented sand, and sand gravel mixtures

N	Relative Density
0 – 4	Very Loose
5 – 10	Loose
11 – 30	Medium Loose
31 – 50	Dense
50 +	Very Dense

2. **RELATIVE CONSISTENCY:** Terms for description of clay which is saturated or near saturation.

N	Relative Consistency	Remarks
0 – 2	Very Soft	Easily penetrates soil several inches with fist
3 – 4	Soft	Easily penetrates soil several inches with thumb
5 – 8	Medium Stiff	Can penetrate soil several inches with thumb applying moderate effort
9 – 15	Stiff	Readily indent soil with thumb but penetrates only with great effort
16 – 30	Very Stiff	Readily indent soil with thumbnail
30 +	Hard	Indent soil with difficulty by thumbnail

3. **RELATIVE FIRMNESS:** Terms for the description of partially saturated and/or cemented soil which commonly occurs in the Southwest including clay, cemented granular materials, silt, silty, and clayey granular soils.

N	Relative Density
0–4	Very Soft
5–8	Soft
9–15	Moderately firm
16–30	Firm
31–50	Very Firm
50+	Hard

SOIL MOISTURE CLASSIFICATION

MOISTURE CONDITION: Terms for moisture conditions as dry, moist, or wet for soils.

Moisture Condition	Field Identification	Estimated Range Of Moisture	
		Group A (%)	Group B (%)
Dry	Absence of moisture, dusty, dry to the touch	0-4	0-8
Damp	Grains appear slightly darkened, but no visible water. Silt/clay may clump. Sand will not bulk. Soils are below plastic limits	4-8	8-16
Moist	Grains appear darkened, but no visible water. Silt/clay will clump. Sand will bulk. Soils are often at or near plastic limits.	8-16	16-30
Wet	Visible water on larger grain surfaces. Sand and cohesionless silt exhibit dilancy. Cohesive silt/clay can be readily remolded. "Wet" indicates that the soil is much wetter than the optimum moisture content and above the plastic limit (APL).	>16	>30
Water Bearing	A water producing formation	N/A	N/A

Group A- Course Grained Soils, nonplastic to plasticity index <7.
Includes: SM, SP-SM, SP, SW, GM, GP, and GW.

Group B- Fine Grained Soils to clayey sands & gravels with a plasticity index >7.
Includes: GC, SC, ML, MH, CL, and CH.

UNIFIED SOIL CLASSIFICATION SYSTEM

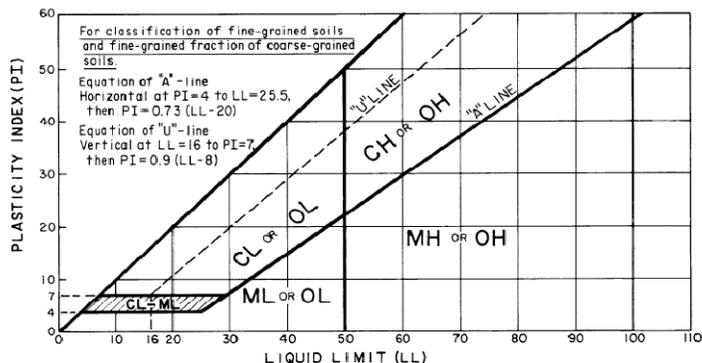
Soils are visually classified by the Unified Soil Classification System on the boring logs presented in the report. Grain-size analysis and Atterberg Limits Tests are often performed on selected samples to aid in classification. The classification system is briefly outlined on this chart. For a more detailed description of the system, see "The Unified Soil Classification System". Corp of Engineers, US Army Technical Memorandum no. 3-357 (Revised April 1960) or ASTM Designation: D 2487

MAJOR DIVISIONS		GRAPHIC SYMBOLS	GROUP SYMBOLS	TYPICAL NAMES	
COARSE-GRAINED SOILS (Less than 50% Passes No. 200 sieve)	GRAVELS (Less than 50% of coarse fraction passes No. 4 sieve)	CLEAN GRAVELS (Less than 5% passes No. 200 sieve)	GW	Well graded gravels, gravel-sand mixtures, or sand-gravel-cobble mixtures	
		GRAVELS WITH FINES (More than 12% passes No. 200 sieve)	"A" Limits plot below line or hatched zone on plasticity chart	GP	Poorly graded gravels, gravel-sand mixtures or sand-gravel-cobble mixtures
		GRAVELS WITH FINES (More than 12% passes No. 200 sieve)	"A" Limits plot above line and hatched zone on plasticity chart	GM	Silty gravels, gravel-sand-silt mixtures
		GRAVELS WITH FINES (More than 12% passes No. 200 sieve)	"A" Limits plot above line and hatched zone on plasticity chart	GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS (50% or more of coarse fraction passes No.4 sieve)	CLEAN SANDS (Less than 5% passes No. 200 sieve)	SW	Well graded sands, gravelly sands	
		CLEAN SANDS (Less than 5% passes No. 200 sieve)	SP	Poorly graded sands, gravelly sand	
		SANDS WITH FINES (More than 12% passes No. 200 sieve)	"A" Limits plot below line or hatched zone on plasticity chart	SM	Silty sands, sand -silty mixtures
		SANDS WITH FINES (More than 12% passes No. 200 sieve)	"A" Limits plot above line and hatched zone on plasticity chart	SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS (50% or more passes No. 200 Sieve)	SILTS Limits plot below "A" line or hatched zone on plasticity chart	SILTS OF NO PLASTICITY (Liquid Limit Less Than 50)	ML	Inorganic silts, clayey silts with slight plasticity to no plasticity	
		SILTS OF HIGH PLASTICITY (Liquid Limit More Than 50)	MH	Inorganic silts, micaceous or diatomoceous silty soils, elastic silts	
	CLAYS Limits plot above "A" line and hatched zone on plasticity chart	CLAYS OF MEDIUM PLASTICITY (Liquid Limit Less Than 50)	CL	Inorganic clays of medium plasticity; gravelly clays, sandy clays, silty clays, lean clays	
		CLAYS OF HIGH PLASTICITY (Liquid Limit More Than 50)	CH	Inorganic clays of high plasticity, fat clays, sand clays of high plasticity	

Note: Coarse grained soils between 5% and 12% passing the No. 200 sieve and the grained soils with limits plotting in the hatched zone on the plasticity chart to have double symbol.

DEFINITIONS OF SOIL FRACTIONS

SOIL COMPONENT	PARTICLE SIZE RANGE
COBBLES	Above 3 inches
GRAVEL	3 Inches to No. 4 sieve
Coarse Gravel	3 inches to 3/4 inch
Fine Gravel	3/4 inch to No. 4 sieve
SAND	No. 4 sieve to No. 200
Coarse Gravel	No.4 sieve to No. 10
Medium	No. 10 sieve to No. 40
Fine	No. 40 sieve to No. 200
FINE (Silt or Clay)	Below No. 200 sieve





International Inc.

Hole No. 25A2S-1

DRILLING LOG		DIVISION SWD	INSTALLATION Ft. Worth	SHEET 1 OF 1 SHEETS
1. PROJECT UEPH - Engineers Battalion WSMR, NM		10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons		
2. LOCATION(Coordinates or Station) N 32° 22' 30.2241" W 106° 28' 03.5672"		11. DATUM FOR ELEVATION SHOWN (TBM or MSL)		
3. DRILLING AGENCY PSI		12. MANUFACTURER'S DESIGNATION OF DRILL BK 81		
4. HOLE NO.(As shown on drawing title and file number) 25A2S-1		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 11	DISTURBED 11	UNDISTURBED 0
5. NAME OF DRILLER Jake Elliot		14. TOTAL NUMBER CORE BOXES		
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER Dry		
7. THICKNESS OF OVERBURDEN		16. DATE HOLE STARTED 7-13-10	COMPLETED 7-13-10	
8. DEPTH DRILLED INTO ROCK		17. ELEVATION TOP OF HOLE 4172.01'		
9. TOTAL DEPTH OF HOLE 25'		18. TOTAL CORE RECOVERY FOR BORING %		
		19. SIGNATURE OF INSPECTOR Gary Stansfield		

MOISTURE (%) a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	Splitspoon Samples		REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
				Sample Interval e	Blow Counts (Recovery) f	
6.3	2		<u>0.0' to 7.1'</u> CLAYEY SAND (SC), Reddish Brown, Medium Plasticity, Dry	0.0' 1.5'	6-10-11 (18")	Caving after: 9' 7"
6.8	4		<u>7.1' to 9.3'</u> SILTY SAND (SM), Light Brown, Non-Plastic, Dry	2.5' 4.0'	9-19-21 (10")	
6.4	6		<u>9.3' to 12.8'</u> POORLY GRADED SAND (SP), Brown, Non-Plastic, Dry	5.0' 6.5'	7-15-15 (8")	
3.8	8		<u>12.8' to 22.4'</u> CLAYEY SAND (SC), Brown, Medium Plasticity, Dry to Damp	7.5' 9.0'	2-3-2 (12")	
1.7	10		<u>22.4' to 26.5'</u> CLAYEY SAND (SC), Light Tan, Medium Plasticity, Dry	10.0' 11.5'	3-4-2 (10")	
4.0	12			12.5' 14.0'	33-50+@5" (2")	
4.7	14			15.0' 16.5'	33-32-21 (2")	
12.4	16			17.5' 19.0'	40-38-50 (1")	
1.8	18			20.0' 21.5'	14-12-13 (4")	
2.1	20			22.5' 24.0'	18-37-47 (3.5")	
3.4	22			25.0' 26.5'	23-31-39 (2")	
	24					
	26					
	28					



International Inc.

Hole No. 25A2S-2

DRILLING LOG		DIVISION SWD	INSTALLATION Ft. Worth	SHEET 1 OF 1 SHEETS
1. PROJECT UEPH - Engineers Battalion WSMR, NM		10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons		
2. LOCATION(Coordinates or Station) N 32° 22' 30.0858" W 106° 28' 01.5006"		11. DATUM FOR ELEVATION SHOWN (TBM or MSL)		
3. DRILLING AGENCY PSI		12. MANUFACTURER'S DESIGNATION OF DRILL BK 81		
4. HOLE NO.(As shown on drawing title and file number) 25A2S-2		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 11	DISTURBED 11	UNDISTURBED 0
5. NAME OF DRILLER Jake Elliot		14. TOTAL NUMBER CORE BOXES		
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER Dry		
7. THICKNESS OF OVERBURDEN		16. DATE HOLE STARTED 7-15-10	COMPLETED 7-15-10	
8. DEPTH DRILLED INTO ROCK		17. ELEVATION TOP OF HOLE 4168.74'		
9. TOTAL DEPTH OF HOLE 25'		18. TOTAL CORE RECOVERY FOR BORING %		
		19. SIGNATURE OF INSPECTOR Gary Stansfield		

MOISTURE (%) a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	Splitspoon Samples		REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
				Sample Interval e	Blow Counts (Recovery) f	
	4.7		0.0' to 5.0' CLAYEY SAND (SC), Reddish Brown, Medium Plasticity, Dry	0.0'	14-19-23	Caving after: 12' 0"
	6.1			1.5'	(6")	
	6.1		5.0' to 10.3' SILTY CLAYEY SAND (SC-SM), Reddish Brown, Low Plasticity, Damp	2.5'	5-12-14	
	6.1			4.0'	(12")	
	5.7		10.3' to 12.5' WELL GRADED SAND (SW-SM) with silt, Brown, Non-Plastic, Dry	5.0'	2-13-13	
	5.7			6.5'	(9")	
	1.4		12.5' to 15.8' SILTY SAND (SM) with gravel, Brown, Non-Plastic, Dry	7.5'	2-4-6	
	1.4			9.0'	(6")	
	2.3		15.8' to 26.5' CLAYEY SAND (SC), Brown, Medium Plasticity, Dry to Damp	10.0'	5-6-10	
	2.3			11.5'	(9")	
	5.9			12.5'	50+@1"	
	5.9			14.0'	(0")	
	4.0			15.0'	16-32-32	
	4.0			16.5'	(4")	
	3.0			17.5'	17-47-50	
	3.0			19.0'	(1")	
	2.6			20.0'	12-16-15	
	2.6			21.5'	(2")	
	7.1			22.5'	50+@4"	
	7.1			24.0'	(0")	
				25.0'	23-29-31	
				26.5'	(5")	



International Inc.

Hole No. 25A2S-3

DRILLING LOG		DIVISION SWD	INSTALLATION Ft. Worth	SHEET 1 OF 1 SHEETS		
1. PROJECT UEPH - Engineers Battalion WSMR, NM			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons			
2. LOCATION(Coordinates or Station) N 32° 22' 28.6714" W 106° 28' 03.3089"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81			
4. HOLE NO.(As shown on drawing title and file number) 25A2S-3		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 11		UNDISTURBED 1		
5. NAME OF DRILLER Jake Elliot			14. TOTAL NUMBER CORE BOXES			
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER Dry			
7. THICKNESS OF OVERBURDEN			16. DATE HOLE STARTED 7-13-10		COMPLETED 7-13-10	
8. DEPTH DRILLED INTO ROCK			17. ELEVATION TOP OF HOLE 4171.31'			
9. TOTAL DEPTH OF HOLE 25'			18. TOTAL CORE RECOVERY FOR BORING %			
			19. SIGNATURE OF INSPECTOR Gary Stansfield			
MOISTURE (%) a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	Splitspoon Sample Interval e	Samples Blow Counts (Recovery) f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
4.1	0.0'		0.0' to 26.5' CLAYEY SAND (SC), Reddish Brown, Medium Plasticity, Dry to Damp	0.0'	32-47-21	Caving after: 14' 9" Shelby Tube ST(2.5' - 4')
	1.5'			(6")		
5.9	2.5'			ST		
	4.0'					
6.2	5.0'			8-9-10		
	6.5'			(6")		
6.3	7.5'			3-6-5		
	9.0'			(4.5")		
2.9	10.0'			3-3-4		
	11.5'			(4.5")		
3.0	12.5'			3-10-50		
	14.0'			(4")		
3.0	15.0'			18-21-23		
	16.5'	(3")				
4.5	17.5'	4-20-28				
	19.0'	(6")				
4.3	20.0'	8-20-23				
	21.5'	(5")				
4.9	22.5'	7-17-19				
	24.0'	(5")				
3.6	25.0'	10-24-28				
	26.5'	(5")				



International Inc.

Hole No. 25A2S-4

DRILLING LOG		DIVISION	INSTALLATION	SHEET	
		SWD	Ft. Worth	1 OF 1 SHEETS	
1. PROJECT UEPH - Engineers Battalion WSMR, NM			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons		
2. LOCATION(Coordinates or Station) N 32° 22' 27.0777" W 106° 28' 03.5159"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)		
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81		
4. HOLE NO.(As shown on drawing title and file number) 25A2S-4		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 11		UNDISTURBED 1	
5. NAME OF DRILLER Jake Elliot			14. TOTAL NUMBER CORE BOXES		
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER Dry		
7. THICKNESS OF OVERBURDEN			16. DATE HOLE STARTED 7-14-10 COMPLETED 7-14-10		
8. DEPTH DRILLED INTO ROCK			17. ELEVATION TOP OF HOLE 4171.78'		
9. TOTAL DEPTH OF HOLE 25'			18. TOTAL CORE RECOVERY FOR BORING %		
			19. SIGNATURE OF INSPECTOR Gary Stansfield		

MOISTURE (%) a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	Splitspoon Samples		REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
				Sample Interval e	Blow Counts (Recovery) f	
3.8	0.0'		0.0' to 7.5' CLAYEY SAND (SC), Reddish Brown, Medium Plasticity, Dry	0.0'	17-16-15	Caving after: 10' 6"
	1.5'				(3")	
5.5	2.5'				3-12-8	
	4.0'				(7")	
6.2	7.5'		7.5' to 15.0' WELL GRADED SAND (SW-SM) with silt, Ligth Brown, Non-Plastic, Dry	5.0'	7-11-8	Shelby Tube ST(7.5' - 9')
	6.5'				(8")	
2.2	15.0'		15.0' to 22.0' SILTY SAND (SM), Ligth Brown, Non-Plastic, Dry	7.5'	ST	
	9.0'					
2.1	22.0'		22.0' to 26.5' POORLY GRADED SAND (SP), Brown, Non-Plastic, Dry	10.0'	4-8-9	
	11.5'				(4")	
1.9	12.5'				4-8-13	
	14.0'				(6")	
1.6	15.0'			15.0'	7-9-9	
	16.5'				(5")	
1.4	17.5'			17.5'	10-15-22	
	19.0'				(0")	
1.7	20.0'			20.0'	15-43-50+@3"	
	21.5'				(7")	
1.5	22.5'			22.5'	50+@2"	
	24.0'				(0")	
	25.0'			25.0'	24-32-21	
	26.5'				(0")	



International Inc.

Hole No. 25A2S-5

DRILLING LOG		DIVISION SWD	INSTALLATION Ft. Worth	SHEET 1 OF 1 SHEETS
1. PROJECT UEPH - Engineers Battalion WSMR, NM		10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons		
2. LOCATION(Coordinates or Station) N 32° 22' 27.2604" W 106° 28' 01.7379"		11. DATUM FOR ELEVATION SHOWN (TBM or MSL)		
3. DRILLING AGENCY PSI		12. MANUFACTURER'S DESIGNATION OF DRILL BK 81		
4. HOLE NO.(As shown on drawing title and file number) 25A2S-5		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 11	DISTURBED 11	UNDISTURBED 0
5. NAME OF DRILLER Jake Elliot		14. TOTAL NUMBER CORE BOXES		
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER Dry		
7. THICKNESS OF OVERBURDEN		16. DATE HOLE STARTED 7-14-10	COMPLETED 7-14-10	
8. DEPTH DRILLED INTO ROCK		17. ELEVATION TOP OF HOLE 4168.96'		
9. TOTAL DEPTH OF HOLE 25'		18. TOTAL CORE RECOVERY FOR BORING %		
		19. SIGNATURE OF INSPECTOR Gary Stansfield		

MOISTURE (%) a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	Spoon Samples		REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
				Sample Interval e	Blow Counts (Recovery) f	
5.6	2		<u>0.0' to 12.3'</u> CLAYEY SAND (SC), Reddish Brown, Medium Plasticity, Dry	0.0' 1.5'	9-14-16 (6")	Caving after: 11' 5"
6.8	4		<u>12.3' to 15.4'</u> CLAYEY SAND (SC), Light Brown, Medium Plasticity, Dry	2.5' 4.0'	9-9-11 (8")	
6.3	6		<u>15.4' to 18.3'</u> SILTY SAND (SM), Light Brown, Non-Plastic, Dry	5.0' 6.5'	7-7-9 (7")	
5.1	8		<u>18.3' to 26.5'</u> SANDY LEAN CLAY (CL), Reddish Brown, Medium to High Plasticity, Damp	7.5' 9.0'	5-9-4 (6")	
2.1	10			10.0' 11.5'	3-4-6 (1.5")	
4.6	12			12.5' 14.0'	7-12-10 (2")	
2.0	14			15.0' 16.5'	7-10-10 (2")	
9.2	16			17.5' 19.0'	8-23-28 (4")	
6.4	18			20.0' 21.5'	7-21-18 (3")	
4.9	20			22.5' 24.0'	6-20-25 (6.5")	
6.5	22			25.0' 26.5'	10-18-15 (7.5")	
	24					
	26					
	28					



International Inc.

Hole No. 25A2S-6

DRILLING LOG		DIVISION	INSTALLATION		SHEET	
		SWD	Ft. Worth		1 OF 1 SHEETS	
1. PROJECT UEPH - Engineers Battalion WSMR, NM			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons			
2. LOCATION(Coordinates or Station) N 32° 22' 27.1166" W 106° 27' 59.9622"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)			
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81			
4. HOLE NO.(As shown on drawing title and file number) 25A2S-6		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED	UNDISTURBED	
				11	0	
5. NAME OF DRILLER Jake Elliot			14. TOTAL NUMBER CORE BOXES			
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER Dry			
7. THICKNESS OF OVERBURDEN			16. DATE HOLE		STARTED	COMPLETED
8. DEPTH DRILLED INTO ROCK					7-14-10	7-14-10
9. TOTAL DEPTH OF HOLE 25'			17. ELEVATION TOP OF HOLE 4168.32'			
			18. TOTAL CORE RECOVERY FOR BORING %			
			19. SIGNATURE OF INSPECTOR Gary Stansfield			
MOISTURE (%) a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	Splitspoon Samples		REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
				Sample Interval e	Blow Counts (Recovery) f	
5.9	2		0.0' to 16.4' CLAYEY SAND (SC), Reddish Brown, Medium Plasticity, Dry to Damp	0.0' 1.5'	3-8-11 (8")	Caving after: 12' 0"
6.9	4		16.4' to 21.3' CLAYEY SAND (SC), Light Brown, Medium Plasticity, Dry	2.5' 4.0'	7-21-17 (8")	
7.2	6		21.3' to 26.1' POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry	5.0' 6.5'	7-13-11 (10")	
8.9	8		26.1' to 26.5' CLAYEY SAND (SC), Brown, Medium Plasticity, Dry to Damp	7.5' 9.0'	5-10-8 (10")	
6.9	10			10.0' 11.5'	2-6-11 (9")	
5.0	12			12.5' 14.0'	5-9-18 (7")	
2.4	14			15.0' 16.5'	5-10-10 (1")	
4.4	16			17.5' 19.0'	5-7-7 (1")	
2.1	18			20.0' 21.5'	5-4-7 (1")	
3.2	20				22.5' 24.0'	
6.7	22			25.0' 26.5'	32-50+@4" (2")	
	24					
	26					
	28					



International Inc.

Hole No. 25A2S-7

DRILLING LOG		DIVISION SWD	INSTALLATION Ft. Worth	SHEET 1 OF 1 SHEETS
1. PROJECT UEPH - Engineers Battalion WSMR, NM			10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons	
2. LOCATION(Coordinates or Station) N 32° 22' 29.1288" W 106° 28' 00.1478"			11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	
3. DRILLING AGENCY PSI			12. MANUFACTURER'S DESIGNATION OF DRILL BK 81	
4. HOLE NO.(As shown on drawing title and file number) 25A2S-7		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 11		UNDISTURBED 1
5. NAME OF DRILLER Jake Elliot			14. TOTAL NUMBER CORE BOXES	
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER Dry	
7. THICKNESS OF OVERBURDEN			16. DATE HOLE STARTED 7-15-10 COMPLETED 7-15-10	
8. DEPTH DRILLED INTO ROCK			17. ELEVATION TOP OF HOLE 4168.70'	
9. TOTAL DEPTH OF HOLE 25'			18. TOTAL CORE RECOVERY FOR BORING %	
			19. SIGNATURE OF INSPECTOR Gary Stansfield	

MOISTURE (%) a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	Splitspoon Samples		REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	
				Sample Interval e	Blow Counts (Recovery) f		
3.8	2	[Hatched Pattern]	0.0' to 20.0' CLAYEY SAND (SC), Reddish Brown, Medium Plasticity, Dry	0.0' 1.5'	8-9-17 (5")	Caving after: 13' 8"	
6.0	4		20.0' to 22.4' SILTY SAND (SM), Reddish Brown, Non-Plastic, Dry	2.5' 4.0'	5-13-16 (8.5")		
6.4	6		22.4' to 26.5' CLAYEY SAND (SC), Reddish Brown, Medium Plasticity, Dry	5.0' 6.5'	14-14-14 (8")		Shelby Tube ST(7.5' - 8.9')
5.7	8			7.5' 9.0'	ST		
6.1	10			10.0' 11.5'	20-17-10 (6")		
4.6	12			12.5' 14.0'	3-5-8 (6")		
3.8	14			15.0' 16.5'	9-11-9 (3")		
4.3	16			17.5' 19.0'	6-9-9 (2")		
2.9	18			20.0' 21.5'	6-10-17 (5")		
3.2	20			22.5' 24.0'	15-17-17 (5")		
4.5	22			25.0' 26.5'	17-25-22 (4")		
	24						
	26						
	28						

ENC ON INTERNATIONAL, INC.

Engineering, Environmental & Technical Services

Project: 801-10 Engineers Battalion UEPH

Date: 7-19-10

Location: 25A2S-1

Personnel: JS/JG/GS

Depth of zero point below surface: 0 inches

Hammer Weight: 17.6 lbs

Material Classification: Clayey Sand

Weather: Sunny

Pavement Conditions: N/A

Water Table Depth: Not Encountered

	1	2	3	4	5	6	7
#	Number of Blows	Cummulative Penetration (mm)	Penetration Between Readings (mm)	Penetration per Blow (mm)	Hammer Blow Factor	DCP Index (mm/blow)	CBR %
1	7	50	50	7.1	1	7.1	32.5
2	8	100	50	6.3	1	6.3	37.2
3	10	150	50	5.0	1	5.0	50
4	10	200	50	5.0	1	5.0	50
5	8	250	50	6.3	1	6.3	37.2
6	9	300	50	5.6	1	5.6	42.4
7	15	350	50	3.3	1	3.3	76.7
8	10	400	50	5.0	1	5.0	50
9	12	450	50	4.2	1	4.2	58.5
10	13	500	50	3.8	1	3.8	65.5
11	16	550	50	3.1	1	3.1	80
12	16	600	50	3.1	1	3.1	80
13	10	650	50	5.0	1	5.0	50
14	22	700	50	2.3	1	2.3	100
15	21	750	50	2.4	1	2.4	100
16	22	800	50	2.3	1	2.3	100
17	23	850	50	2.2	1	2.2	100
18	25	900	50	2.0	1	2.0	100

DCP TEST DATA

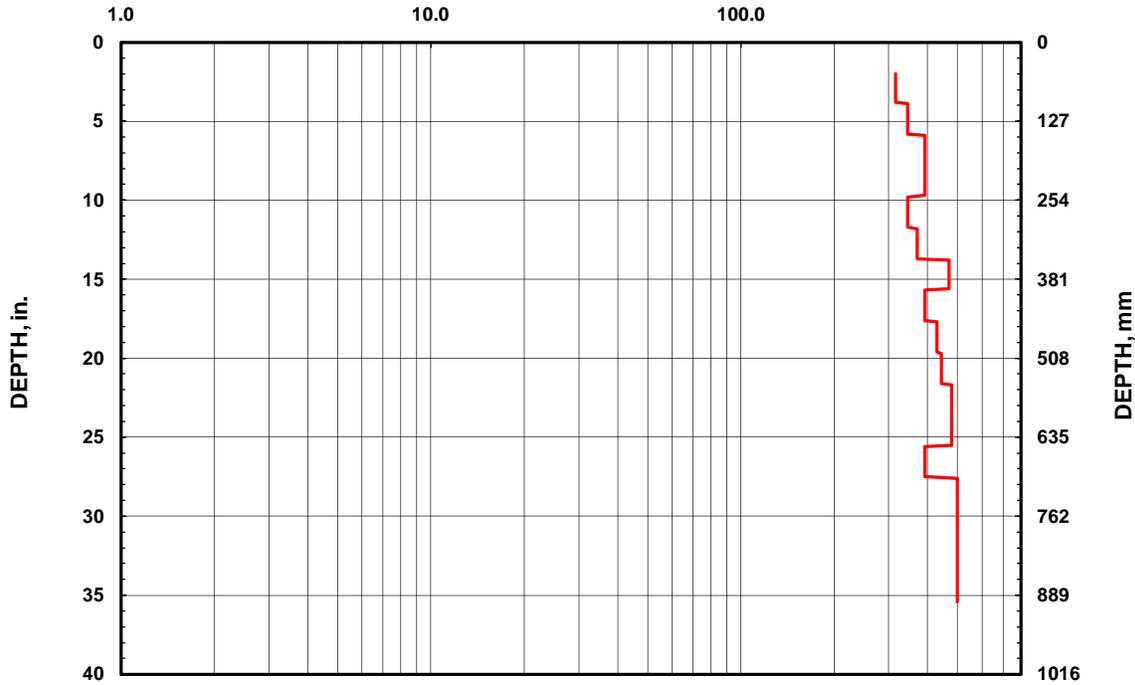
Project: 801-10 Engineers Battalion UEPH
Location: 25A2S-1

Date: 19-Jul-10
Soil Type(s): Clayey Sands

Hammer
 10.1 lbs.
 17.6 lbs.
 Both hammers used

Soil Type
 CH
 CL
 All other soils

Subgrade Modulus VS Depth



Blow Count	Penetration (mm)	Hammer	Correlation	K-Value	Depth (mm)	Depth (inch)
7	50	1	1	316	50	2
8	100	1	1	345	100	3.9
10	150	1	1	392	150	5.9
10	200	1	1	392	200	7.9
8	250	1	1	345	250	9.8
9	300	1	1	370	300	11.8
15	350	1	1	469	350	13.8
10	400	1	1	392	400	15.7
12	450	1	1	428	450	17.7
13	500	1	1	444	500	19.7
16	550	1	1	479	550	21.7
16	600	1	1	479	600	23.6
10	650	1	1	392	650	25.6
22	700	1	1	500	700	27.6
21	750	1	1	500	750	29.5
22	800	1	1	500	800	31.5
23	850	1	1	500	850	33.5
25	900	1	1	500	900	35.4

ENC ON INTERNATIONAL, INC.

Engineering, Environmental & Technical Services

Project: 801-10 Engineers Battalion UEPH

Date: 7-19-10

Location: 25A2S-4

Personnel: JS/JG/GS

Depth of zero point below surface: 0 inches

Hammer Weight: 17.6 lbs

Material Classification: Clayey Sand

Weather: Sunny

Pavement Conditions: N/A

Water Table Depth: Not Encountered

	1	2	3	4	5	6	7
#	Number of Blows	Cummulative Penetration (mm)	Penetration Between Readings (mm)	Penetration per Blow (mm)	Hammer Blow Factor	DCP Index (mm/blow)	CBR %
1	12	50	50	4.2	1	4.2	58.5
2	20	100	50	2.5	1	2.5	100
3	20	150	50	2.5	1	2.5	100
4	22	200	50	2.3	1	2.3	100
5	22	250	50	2.3	1	2.3	100
6	15	300	50	3.3	1	3.3	76.7
7	11	350	50	4.5	1	4.5	54.2
8	10	400	50	5.0	1	5.0	50
9	13	450	50	3.8	1	3.8	65.5
10	14	500	50	3.6	1	3.6	69.6
11	12	550	50	4.2	1	4.2	58.5
12	11	600	50	4.5	1	4.5	54.2
13	14	650	50	3.6	1	3.6	69.6
14	17	700	50	2.9	1	2.9	100
15	16	750	50	3.1	1	3.1	80
16	17	800	50	2.9	1	2.9	100
17	17	850	50	2.9	1	2.9	100
18	18	900	50	2.8	1	2.8	100

DCP TEST DATA

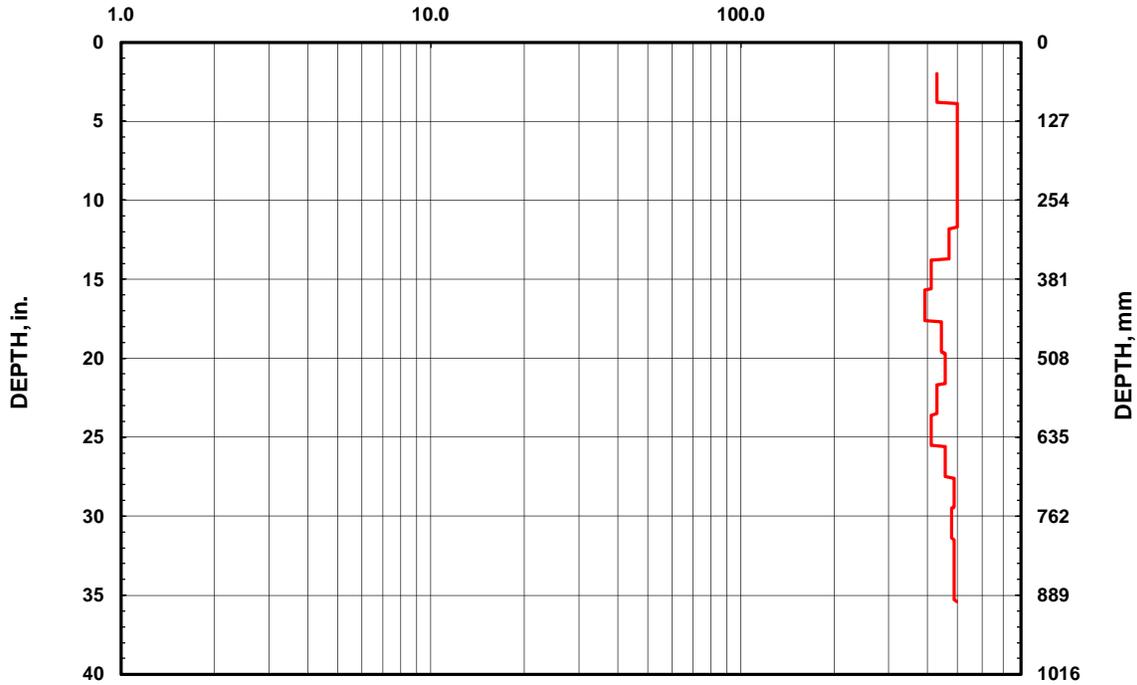
Project: 801-10 Engineers Battalion UEPH
Location: 25A2S-4

Date: 19-Jul-10
Soil Type(s): Clayey Sands

Hammer
 10.1 lbs.
 17.6 lbs.
 Both hammers used

Soil Type
 CH
 CL
 All other soils

Subgrade Modulus VS Depth



Blow Count	Penetration (mm)	Hammer	Correlation	K-Value	Depth (mm)	Depth (inch)
12	50	1	1	428	50	2
20	100	1	1	500	100	3.9
20	150	1	1	500	150	5.9
22	200	1	1	500	200	7.9
22	250	1	1	500	250	9.8
15	300	1	1	469	300	11.8
11	350	1	1	411	350	13.8
10	400	1	1	392	400	15.7
13	450	1	1	444	450	17.7
14	500	1	1	457	500	19.7
12	550	1	1	428	550	21.7
11	600	1	1	411	600	23.6
14	650	1	1	457	650	25.6
17	700	1	1	488	700	27.6
16	750	1	1	479	750	29.5
17	800	1	1	488	800	31.5
17	850	1	1	488	850	33.5
18	900	1	1	496	900	35.4

ENC ON INTERNATIONAL, INC.

Engineering, Environmental & Technical Services

Project: 801-10 Engineers Battalion UEPH
 Location: 25A2S-6
 Depth of zero point below surface: 0 inches
 Material Classification: Clayey Sand
 Pavement Conditions: N/A

Date: 7-19-10
 Personnel: JS/JG/GS
 Hammer Weight: 17.6 lbs
 Weather: Sunny
 Water Table Depth: N/A

	1	2	3	4	5	6	7
#	Number of Blows	Cummulative Penetration (mm)	Penetration Between Readings (mm)	Penetration per Blow (mm)	Hammer Blow Factor	DCP Index (mm/blow)	CBR %
1	7	50	50	7.1	1	7.1	32.5
2	6	100	50	8.3	1	8.3	27.3
3	7	150	50	7.1	1	7.1	32.5
4	10	200	50	5.0	1	5.0	50
5	10	250	50	5.0	1	5.0	50
6	8	300	50	6.3	1	6.3	37.2
7	7	350	50	7.1	1	7.1	32.5
8	5	400	50	10.0	1	10.0	20
9	4	450	50	12.5	1	12.5	17.3
10	4	500	50	12.5	1	12.5	17.3
11	15	550	50	3.3	1	3.3	76.7
12	15	600	50	3.3	1	3.3	76.7
13	15	650	50	3.3	1	3.3	76.7
14	22	700	50	2.3	1	2.3	100
15	26	750	50	1.9	1	1.9	100
16	28	800	50	1.8	1	1.8	100
17	26	850	50	1.9	1	1.9	100
18	28	900	50	1.8	1	1.8	100

DCP TEST DATA

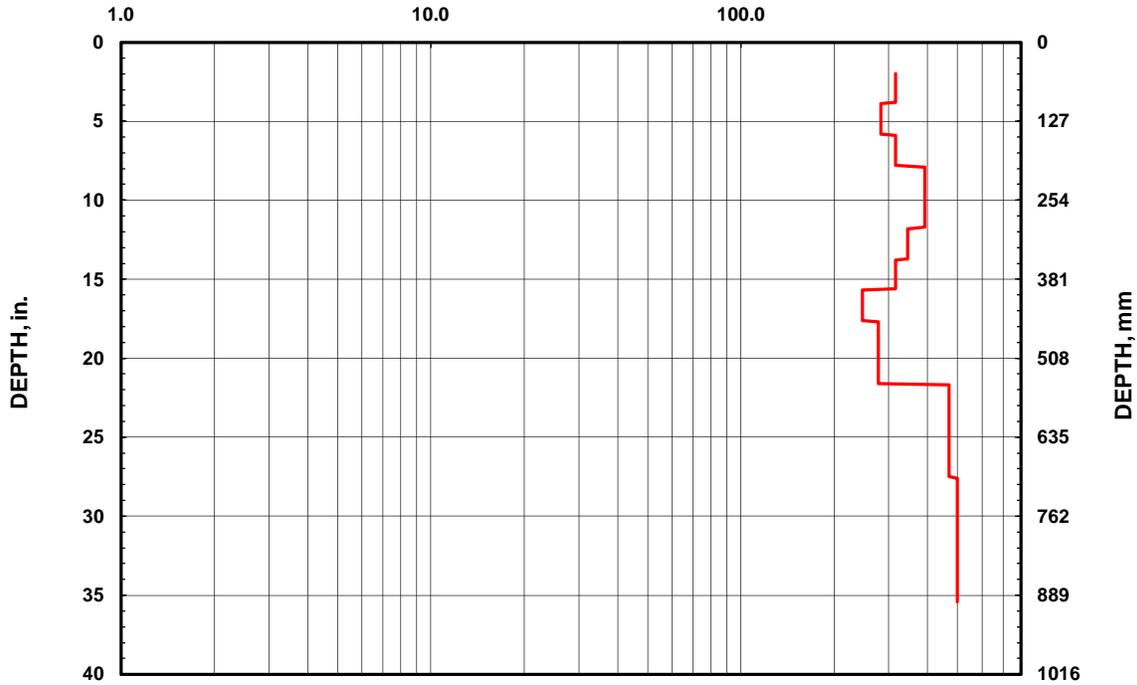
Project: 801-10 Engineers Battalion UEPH
Location: 25A2S-6

Date: 19-Jul-10
Soil Type(s): Clayey Sands

Hammer
 10.1 lbs.
 17.6 lbs.
 Both hammers used

Soil Type
 CH
 CL
 All other soils

Subgrade Modulus VS Depth



Blow Count	Penetration (mm)	Hammer	Correlation	K-Value	Depth (mm)	Depth (inch)
7	50	1	1	316	50	2
6	100	1	1	283	100	3.9
7	150	1	1	316	150	5.9
10	200	1	1	392	200	7.9
10	250	1	1	392	250	9.8
8	300	1	1	345	300	11.8
7	350	1	1	316	350	13.8
5	400	1	1	246	400	15.7
4	450	1	1	277	450	17.7
4	500	1	1	277	500	19.7
15	550	1	1	469	550	21.7
15	600	1	1	469	600	23.6
15	650	1	1	469	650	25.6
22	700	1	1	500	700	27.6
26	750	1	1	500	750	29.5
28	800	1	1	500	800	31.5
26	850	1	1	500	850	33.5
28	900	1	1	500	900	35.4

ENC ON INTERNATIONAL, INC.

Engineering, Environmental & Technical Services

Project: 801-10 Engineers Battalion UEPH
 Location: 25A2S-7
 Depth of zero point below surface: 0 inches
 Material Classification: Clayey Sand
 Pavement Conditions: N/A

Date: 7-19-10
 Personnel: JS/JG/GS
 Hammer Weight: 17.6 lbs
 Weather: Sunny
 Water Table Depth: N/A

#	1	2	3	4	5	6	7
	Number of Blows	Cummulative Penetration (mm)	Penetration Between Readings (mm)	Penetration per Blow (mm)	Hammer Blow Factor	DCP Index (mm/blow)	CBR %
1	8	50	50	6.3	1	6.3	37.2
2	7	100	50	7.1	1	7.1	32.5
3	8	150	50	6.3	1	6.3	37.2
4	8	200	50	6.3	1	6.3	37.2
5	7	250	50	7.1	1	7.1	32.5
6	6	300	50	8.3	1	8.3	27.3
7	12	350	50	4.2	1	4.2	58.5
8	14	400	50	3.6	1	3.6	69.6
9	11	450	50	4.5	1	4.5	54.2
10	8	500	50	6.3	1	6.3	37.2
11	6	550	50	8.3	1	8.3	27.3
12	6	600	50	8.3	1	8.3	27.3
13	4	650	50	12.5	1	12.5	17.3
14	8	700	50	6.3	1	6.3	37.2
15	16	750	50	3.1	1	3.1	80
16	16	800	50	3.1	1	3.1	80
17	16	850	50	3.1	1	3.1	80
18	20	900	50	2.5	1	2.5	100

DCP TEST DATA

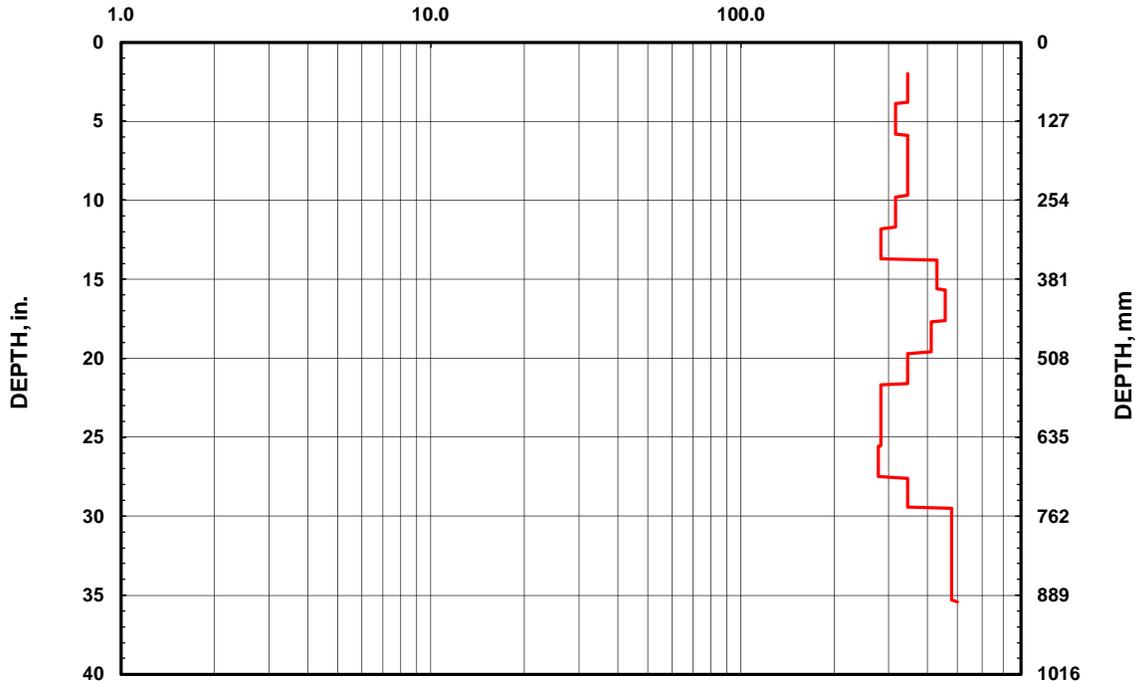
Project: 801-10 Engineers Battalion UEPH
Location: 25A2S-7

Date: 19-Jul-10
Soil Type(s): Clayey Sands

Hammer
 10.1 lbs.
 17.6 lbs.
 Both hammers used

Soil Type
 CH
 CL
 All other soils

Subgrade Modulus VS Depth



Blow Count	Penetration (mm)	Hammer	Correlation	K-Value	Depth (mm)	Depth (inch)
8	50	1	1	345	50	2
7	100	1	1	316	100	3.9
8	150	1	1	345	150	5.9
8	200	1	1	345	200	7.9
7	250	1	1	316	250	9.8
6	300	1	1	283	300	11.8
12	350	1	1	428	350	13.8
14	400	1	1	457	400	15.7
11	450	1	1	411	450	17.7
8	500	1	1	345	500	19.7
6	550	1	1	283	550	21.7
6	600	1	1	283	600	23.6
4	650	1	1	277	650	25.6
8	700	1	1	345	700	27.6
16	750	1	1	479	750	29.5
16	800	1	1	479	800	31.5
16	850	1	1	479	850	33.5
20	900	1	1	500	900	35.4

APPENDIX C

Engineering Calculations

Engineering Calculations

BY CDF DATE 8/9/10
 CHKD. BY RW DATE 8/9/10
 SUBJECT SETTLEMENT ANALYSIS + BEARING CAPACITY CHECK

SHEET NO. 1 OF Page 218 of 429
 JOB NO. 10619.018.00

ENGINEERING BATTALION USPH
 WHITE SANDS MISSILE RANGE

THEORY:

MAX COLUMN LOAD, $P = 150$ KIPS

ALLOWABLE BEARING PRESSURE, $q_{all} \Rightarrow 3,000$ psf
 to
 $\geq 4,000$ psf

FOOTING SIZES: $q_n = 3,000$ psf ; Area = $7.1' \times 7.1'$
 $q_n = 4,000$ psf ; Area = $6.1' \times 6.1'$

CONTINUED ON COMPUTER BASED CALCULATIONS...

BEARING CAPACITY CHECK:

Square Foundation, $q_u = 1.3 c' N_c + q N_q + 0.4 \gamma N_y$

where $\phi = 33^\circ$; $N_c = 48.09$; $N_q = 32.23$; $N_y = 31.94$

ACTUAL FOOTING SIZE $\Rightarrow 7.1' \times 7.1'$ CONSTRUCTION SIZE $\Rightarrow 7.5' \times 7.5'$
 $q_u = 1.3(25)(48.09) + (120 \times 2)(32.23) + (0.4)(15)(120)(31.94)$
 $= 20,796.5$ psf

$$FS = q_u / q_{all} \Rightarrow \frac{20,796.5}{3,000} \gg 3$$

therefore O.K.

ACTUAL FOOTING SIZE $\Rightarrow 6.1' \times 6.1'$ CONSTRUCTION SIZE $\Rightarrow 6.5' \times 6.5'$
 $q_u = (1.3)(25)(48.09) + (120 \times 2)(32.23) + (0.4)(6.5)(120)(31.94)$
 $= 19,263.4$ psf

$$FS = q_u / q_{all} \Rightarrow \frac{19,263.4}{4,000} \gg 3$$

therefore O.K.



Hole No. 25A2S-6

DRILLING LOG		DIVISION SWD	INSTALLATION Ft. Worth	SHEET 1 OF 1 SHEETS
1. PROJECT UEPH - Engineers Battalion WSMR, NM		10. SIZE AND TYPE OF BIT 8" H.S.A. & 2" Spoons		
2. LOCATION (Coordinates or Station) N 32° 22' 27.1166" W 106° 27' 59.9622"		11. DATUM FOR ELEVATION SHOWN (TBM or MSL)		
3. DRILLING AGENCY PSI		12. MANUFACTURER'S DESIGNATION OF DRILL BK 81		
4. HOLE NO. (As shown on drawing title and file number) 25A2S-6		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN 11	DISTURBED 0	UNDISTURBED 0
5. NAME OF DRILLER Jake Elliot		14. TOTAL NUMBER CORE BOXES		
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER Dry		
7. THICKNESS OF OVERBURDEN		16. DATE HOLE STARTED 7-14-10	COMPLETED 7-14-10	
8. DEPTH DRILLED INTO ROCK		17. ELEVATION TOP OF HOLE 4168.32'		
9. TOTAL DEPTH OF HOLE 25'		18. TOTAL CORE RECOVERY FOR BORING %		
		19. SIGNATURE OF INSPECTOR Gary Stansfield		

MOISTURE a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	Splitspoon Samples		REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
				Sample Interval e	Blow Counts (Recovery) f	
	0.0' to 1.5'		CLAYEY SAND (SC), Reddish Brown, Medium Plasticity, Damp	0.0' to 1.5'	3-8-11 (8")	19 $\bar{N} = 29$
	2.5' to 4.0'			2.5' to 4.0'	7-21-17 (8")	38 Caving after: 12' 0"
	5.0' to 6.5'		CLAYEY SAND (SC), Light Brown, Medium Plasticity, Dry to Damp	5.0' to 6.5'	7-13-11 (10")	24 Grab Samples
	7.5' to 9.0'		POORLY GRADED SAND (SP-SM) with silt, Light Brown, Non-Plastic, Dry	7.5' to 9.0'	5-10-8 (10")	18 7.5' to 9' 15' to 16.5' 20' to 21.5'
	10.0' to 11.5'		CLAYEY SAND (SC), Brown, Medium Plasticity, Damp	10.0' to 11.5'	2-6-11 (9")	17 $\bar{N} = 20$
	12.5' to 14.0'			12.5' to 14.0'	5-9-18 (7")	27 $\bar{N} = 24$
	15.0' to 16.5'			15.0' to 16.5'	5-10-10 (1")	20
	17.5' to 19.0'			17.5' to 19.0'	5-7-7 (1")	14
	20.0' to 21.5'			20.0' to 21.5'	5-4-7 (1")	11 $\bar{N} = 13$
	22.5' to 24.0'			22.5' to 24.0'	17-37-50 (4")	87
	25.0' to 26.5'			25.0' to 26.5'	32-50+@4" (2")	100 $\bar{N} = 94$

SC
 $\gamma = 120 \text{ pcf}$
 $\phi = 33^\circ$
 $C = 25 \text{ psc}$

SC
 $\gamma = 120$
 $\phi = 32$
 $C = 25$

SC
 $\gamma = 120$
 $\phi = 32$
 $C = 25$

SC + SP-SM
 $\gamma = 120$
 $\phi = 30$
 $C = 20$

SP-SM + SC
 $\gamma = 120$
 $\phi = 40$
 $C = 15$

Spread Footing Settlement Calculation
Schmertmann & One Dimensional Consolidation



Project Data			
Project Name	Engineering Battalion UEPH		
Project Location	White Sands Missile Range, NM		
Job Number	10619018		
Description	Settlement calculations for maximum load		
Calculated By	Cedric Fairbanks	Initials:	<u>CF</u>
Checked By	Richard Wargo	Initials:	<u>RW</u>
Date	August 9, 2010		

Foundation Details	
Footing Width B (ft)	7.07
Footing Length L (ft)	7.07
Footing Depth (ft)	2
Footing Load (kips)	150
Footing Bearing Pressure (ksf)	3.00
Depth to Water Table (ft)	150

Soil Properties								
Layer	Top of Layer (ft)	Bottom of Layer (ft)	Calculation Method	Total Unit Weight (pcf)	Soil Modulus (tsf)	Net Precon. (p _c - p _o) (tsf)	Comp. Ratio CR	Recomp. Ratio RR
1	0	5	Schmertmann	120	210			
2	5	12	Schmertmann	120	175			
3	12	18	Schmertmann	120	195			
4	18	23	Schmertmann	120	100			
5	23	26	Schmertmann	120	500			
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

Layer	Bottom Of Layer (ft)	Calculation Method	Overburden Pressure p_o (psf)		Preconsolidation Pressure p_c (psf)		Applied Pressure Δp (psf)		Total Pressure $p_o + \Delta p$ (psf)		Layer Settlement (inches)	Total Cumulative Settlement (inches)
			Top of Layer	Bottom of Layer	Top of Layer	Bottom of Layer	Top of Layer	Bottom of Layer	Top of Layer	Bottom of Layer		
1	5	Schmertmann	0	600							0.11	0.11
2	12	Schmertmann	600	1440							0.43	0.54
3	18	Schmertmann	1440	2160							0.06	0.60
4	23	Schmertmann	2160	2760							0.00	0.60
5	26	Schmertmann	2760	3120							0.00	0.60
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												



Spread Footing Settlement Calculation
Schmertmann & One Dimensional Consolidation

Project Data			
Project Name	Engineering Battalion UEPH		
Project Location	White Sands Missile Range, NM		
Job Number	10619018		
Description	Settlement calculations for maximum load		
Calculated By	Cedric Fairbanks	Initials:	<u>CFR</u>
Checked By	Richard Wargo	Initials:	<u>RW</u>
Date	August 9, 2010		

Foundation Details	
Footing Width B (ft)	6.12
Footing Length L (ft)	6.12
Footing Depth (ft)	2
Footing Load (kips)	150
Footing Bearing Pressure (ksf)	4.00
Depth to Water Table (ft)	150

Soil Properties								
Layer	Top of Layer (ft)	Bottom of Layer (ft)	Calculation Method	Total Unit Weight (pcf)	Soil Modulus (tsf)	Net Precon. (p _c - p _o) (tsf)	Comp. Ratio CR	Recomp. Ratio RR
1	0	5	Schmertmann	120	210			
2	5	12	Schmertmann	120	175			
3	12	18	Schmertmann	120	195			
4	18	23	Schmertmann	120	100			
5	23	26	Schmertmann	120	500			
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

Layer	Bottom Of Layer (ft)	Calculation Method	Overburden Pressure p_o (psf)		Preconsolidation Pressure p_c (psf)		Applied Pressure Δp (psf)		Total Pressure $p_o + \Delta p$ (psf)		Layer Settlement (inches)	Total Cumulative Settlement (inches)
			Top of Layer	Bottom of Layer	Top of Layer	Bottom of Layer	Top of Layer	Bottom of Layer	Top of Layer	Bottom of Layer		
1	5	Schmertmann	0	600							0.17	0.17
2	12	Schmertmann	600	1440							0.53	0.70
3	18	Schmertmann	1440	2160							0.03	0.73
4	23	Schmertmann	2160	2760							0.00	0.73
5	26	Schmertmann	2760	3120							0.00	0.73
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Pavement Thickness Report
U.S. Army Corps of Engineers

PCASE Version 2.08
PCASE Version 2.08
PCASE Version 2.08
PCASE Version 2.08
PCASE Version 2.08

Engineering Battalion UEPH, White Sands Missile Range, NM
By: Cedric Fairbanks
Checked: Rich Wargo

RIGID PAVEMENT

Design Name :
Design Type :
Pavement Type :
Road Type :
Terrain Type :
Analysis Type :
Depth of Frost (in) :
Wander Width (in) :
% Load Transfer :
Effective K (pci) :
Reduced Sub Effective K (pci) :
Design Index :
Design Class :

DESIGN
Roads
Rigid
Parking Lot
Flat
K
0
33.35
25
125
0
2
F

DESIGN LIFE	25 YEARS
USE:	9.5 INCHES CONCRETE (650 PSI) NO CRUSHED STONE BASE

with firetrucks

Layer Information

Layer Type	Material Type	Frost Code	Flexural Strength (psi)	% Steel	Analysis	Minimum Thickness (in)	Non frost Design Thickness (in)	Reduced Subgrade Strength (in)	Limited Subgrade Penetration (in)	K Strength (pci)
PCC	N/A	NFS	650	0.2	Compute	6	9.21	0	0	0
Natural Subgrade	Cohesive Cut	NFS	0	0	Manual	0	0	0	0	125

Traffic Information

Pattern Name : POL TRUCK PARKING

Vehicles	Weight (lb)	Passes per Life Span	Equivalent Passes
CAR - PASSENGER	3000	2028488	1
FIRETRUCK	84000	1300	1300
TRUCK, 2 AXLE 6 TIRE	25000	100000	1
TRUCK, 5 AXLE	60000	50000	1
TRUCK, LARGE PICKUP OR SUV	7500	2028488	1
TRUCK, SMALL PICKUP OR SUV	5000	2028488	1

Pavement Thickness Report
U.S. Army Corps of Engineers

PCASE Version 2.08
PCASE Version 2.08
PCASE Version 2.08
PCASE Version 2.08
PCASE Version 2.08

Engineering Battalion UEPH, White Sands Missile Range, NM
By: Cedric Fairbanks
Checked: Rich Wargo

RIGID PAVEMENT

Design Name :
Design Type :
Pavement Type :
Road Type :
Terrain Type :
Analysis Type :
Depth of Frost (in) :
Wander Width (in) :
% Load Transfer :
Effective K (pci) :
Reduced Sub Effective K (pci) :
Design Index :
Design Class :

DESIGN
Roads
Rigid
Parking Lot
Flat
K
0
33.35
25
125
0
3
F

DESIGN LIFE	25 YEARS
USE:	8.0 INCHES CONCRETE (650 PSI) NO CRUSHED STONE BASE

no firetrucks

Layer Information

Layer Type	Material Type	Frost Code	Flexural Strength (psi)	% Steel	Analysis	Minimum Thickness (in)	Non frost Design Thickness (in)	Reduced Subgrade Strength (in)	Limited Subgrade Penetration (in)	K Strength (pci)
PCC	N/A	NFS	650	0.2	Compute	6	6	0	0	0
Natural Subgrade	Cohesive Cut	NFS	0	0	Manual	0	0	0	0	125

Traffic Information

Pattern Name : Heavy Duty Vehicle Design

Vehicles	Weight (lb)	Passes per Life Span	Equivalent Passes
CAR - PASSENGER	3000	2028488	1
TRUCK, 2 AXLE 6 TIRE	25000	100000	100000
TRUCK, 5 AXLE	60000	50000	5
TRUCK, LARGE PICKUP OR SUV	7500	2028488	1
TRUCK, SMALL PICKUP OR SUV	5000	2028488	1

APPENDIX D

Minimum Testing Requirements for Pavement Structures

2010 SWF FDA Pavement Testing

2010 SWF FDA Pavement Testing

Pavement Material Testing Requirements. Testing shall be the responsibility of the contractor to ensure that the subgrade, aggregate base course, aggregate surface course, and hot-mix surface course are properly constructed. The following testing requirements shall be included in the contract specifications as a minimum:

a. In-place density testing of the subgrade, aggregate base course, and subbase course shall be performed, at a minimum, every 600 square yards per lift in accordance with ASTM D 1556 and ASTM D 6938. ASTM D 1556 shall be used as a check at least once per lift for each 3,000 square yards of completed subgrade and aggregate base course.

b. Before starting work, at least one sample of aggregate 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 aggregate 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.

c. Wear tests shall be performed in accordance with ASTM C 131. A minimum of one test per aggregate base course material source shall be run.

d. Thickness of the aggregate base course and subbase course shall be measured for each 600 square yards of material placed. Compacted thickness of the aggregate base and subbase course shall be as presented in this report and the completed section shall be within 3/8-inch of the thickness presented.

e. 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.

f. 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.

2010 SWF FDA Pavement Testing

<u>Test Property</u>	<u>50 Blows</u>
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

g. 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).

h. 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. rface smoothness shall not exceed 3/8-inch.

GEOTECHNICAL ENGINEERING STUDY
UEPH Engineer Battalion
WSMR, NM
W9126G-09-D-0001 (PN 072110)
(SE Ref. 10619018.00)
ENCON Project # 801-10

January 12, 2011

APPENDIX B
LIST OF DRAWINGS
NOT USED

APPENDIX C

UTILITY CONNECTIONS

SEE APPENDIX J – DRAWINGS

Hydrant # 1
North East Corner

Static Pressure 105 psi
Pitot 82 psi
Discharge Coeff .90
Residual 90 psi
Outlet Diameter 2.50
Hydrant Flow 1519
Hydrant Flow @ 10 psi = 4116
Hydrant Flow @ 20 psi = 3876
Hydrant Flow @ 0 psi = 4344

Hydrant # 2
North West Corner

Static Pressure 97 psi
Pitot 75 psi
Discharge Coeff .90
Residual 83 psi
Outlet Diameter 2.50
Hydrant Flow 1453
Hydrant Flow @ 10 psi = 3897
Hydrant Flow @ 20 psi = 3648
Hydrant Flow @ 0 psi = 4133

Appendix E

Environmental Information

Contractors working on behalf of the government will adhere to the current Environmental Policy and Environmental Management System (EMS) requirements while performing services on White Sands Missile Range. The contractor representative shall identify personnel whose roles, responsibilities and activities may impact the environment and shall demonstrate that these personnel receive EMS awareness training via WSMR's current EMS brochure or equivalent training within 30 days of receiving notice to proceed. The list of personnel who receive awareness training shall be provided to the Contracting Officer's Representative and the EMS Manager.

White Sands Missile Range – EUPH Barracks Concept Renderings





Engineers Battalion - Unit Operations Facility Area Development Guide

August 2008
Contract # W9126G-06-D-0011
White Sands Missile Range, New Mexico



**US Army Corps
of Engineers**
JACOBS HUITT-ZOLIARS

3.3 Barracks

Unaccompanied Enlisted Personnel Housing is integral to the quality of soldier life at the Engineers Battalion UOF. Barracks should be a center of community activity and easily accessible to work facilities, the HQ and amenities (see Figure 3-10). They should be welcoming and sensitive to pedestrian circulation and physical scale. Their architecture should be in keeping with the overall style and theme of the district while projecting a residential image. Outdoor areas are as critical as indoor rooms since these spaces provide socialization and visual amenities. Barracks for the Engineers Battalion UOF are sited as four L-shaped footprints north of the Parade Field. Figure 3-13 shows a schematic floor plan.

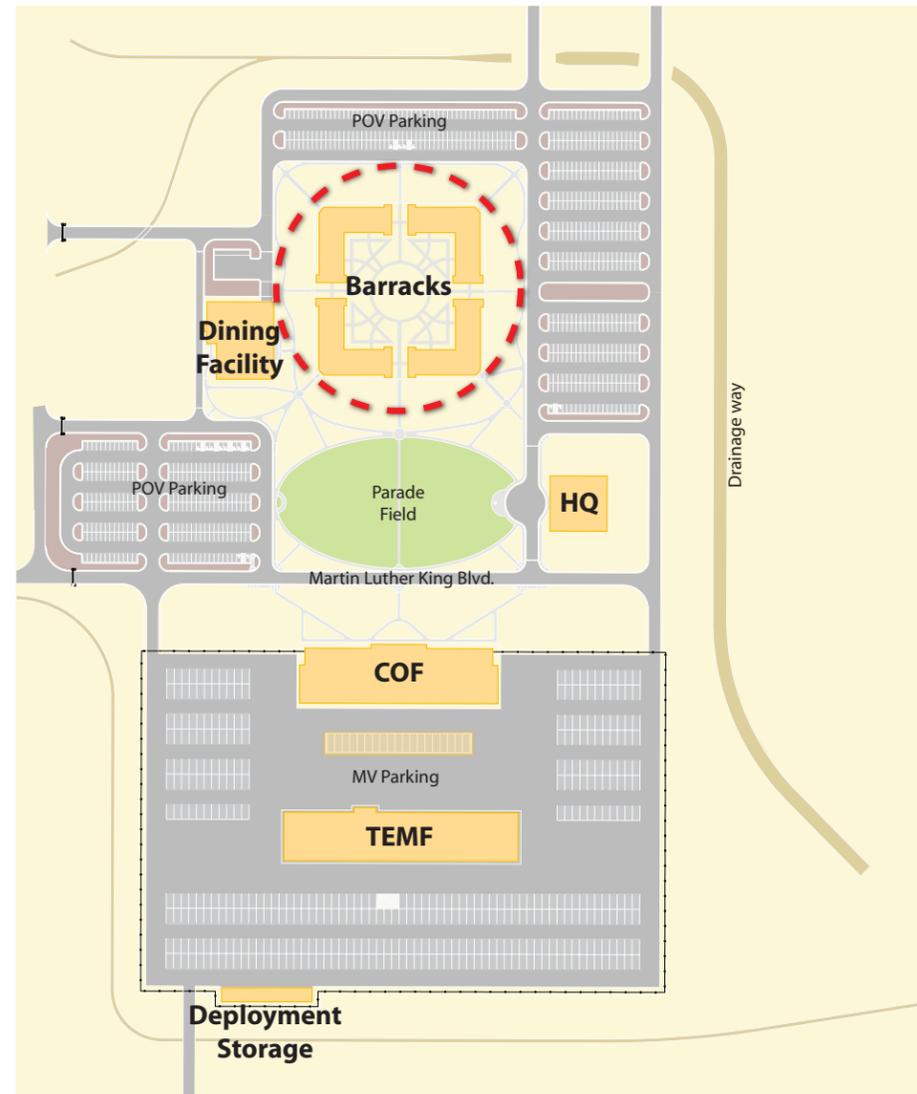


Figure 3-10: Barracks Key Plan

Massing

The Barracks design needs to address pedestrians at the entries by being sensitive to human scale in its massing (see Figure 3-11). The facility should have appropriate architectural components and proportion, incorporating a layered design detail that creates a composite building mass expressive of incremental, organic growth. The subdivision of the building into company sized accommodations accessible through multiple points of entry is communicated through vertical corner entry portals that serve building wings arranged on the perpendicular around a central quadrangle.

Form

Four two-story barracks buildings enclose a quadrangle, defining semi-private open space that promotes relaxation and informal interaction among its inhabitants. Double loaded interior hallways terminate in a portal lobby shared with the matching wing of each Barracks. Vertical circulation is provided at the portal lobby, and an enclosed exterior stair well is located at the opposite end of each wing. Figure 3-11 shows the overall intended building form of the Barracks.

Siting

The Barracks are sited directly north of the Parade Field and are bordered by POV parking on the north and west. Additional POV parking is located southeast of the Barracks, and is shared between the Barracks and the Dining Facility. Roadway circulation does not separate the parade ground and the Barracks, providing for unimpeded pedestrian circulation between these two features. Additional pedestrian circulation encircles the perimeter of parcel and connects the Barracks to surrounding parking and to the Battalion HQ. Internal quadrangle and external landscaped spaces are defined by the arrangement of the Barracks and surrounding facility footprints, and include landscape development to further enhance these spaces. Clusters of shade trees define gathering areas within the Barracks quadrangle areas and external pedestrian nodes. Figure 3-10 shows the site of the Barracks.



Figure 3-11: Barracks View Looking Northwest

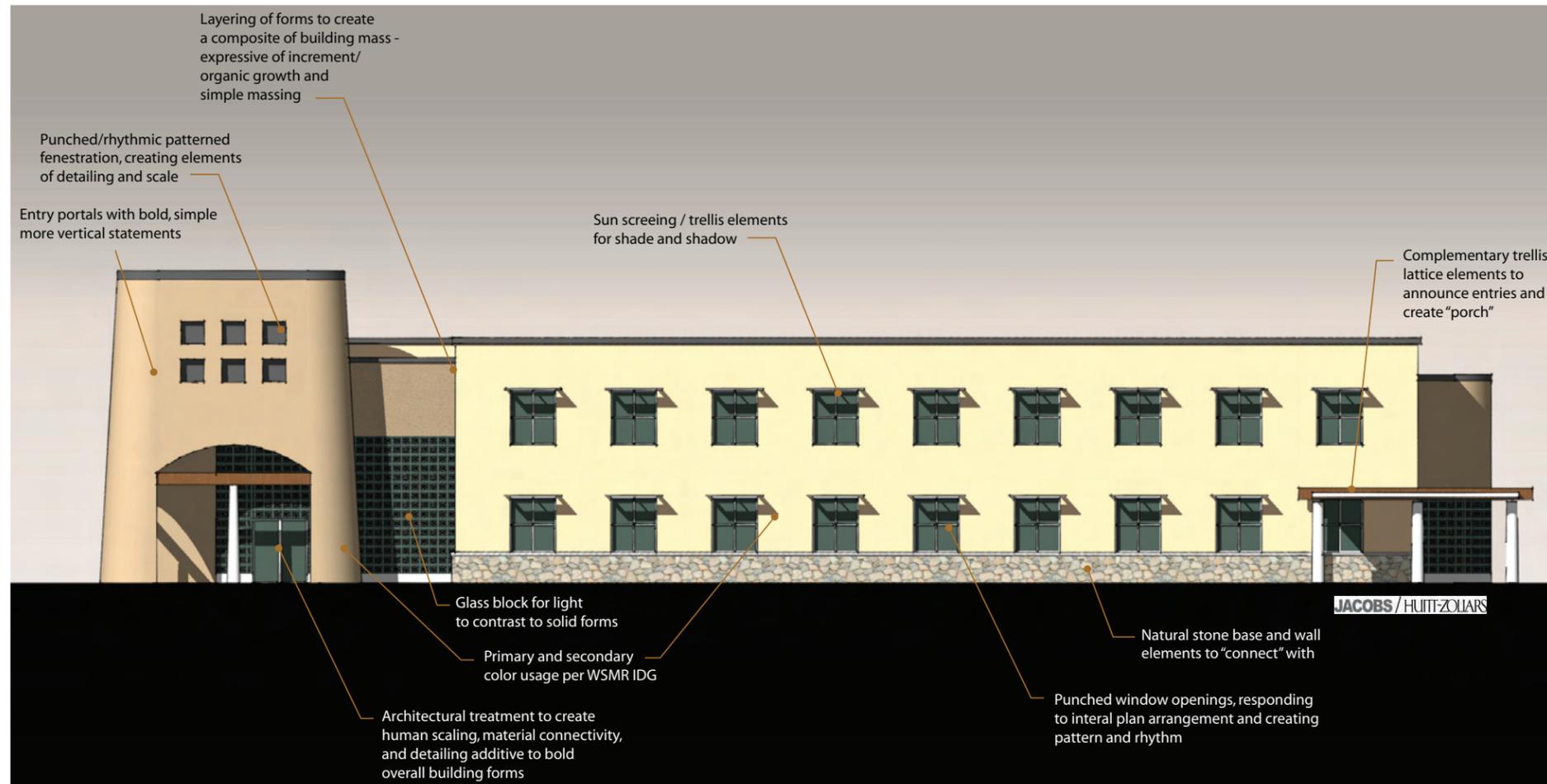


Figure 3-12: Barracks Elevation

Roof Style

Use a flat roof behind a parapet wall. The parapet should be minimally decorated, with only a thin band to define the edge, and be designed to conceal mechanical systems located on the roof. The roof of the vertical entry portals should rise above that of the building wings and feature a stronger edge band to reinforce its organizing function (see Figures 3-11 and 3-12).

Wall Treatment

Use an exterior insulation finish system (EIFS) consistent with the New Mexico regional character. Use a formal massing and rhythmic fenestration that reinforces the distribution of the building entry portals. Round and taper the corners of the vertical building portals to reference New Mexico adobe architecture. Use a darker wall color for the entry portals. Accent wing windows with trellis elements for shading and shadow. Introduce glass block as a wall element at the entry portals to contrast to the solid form of the wings.

Entry Portal and Exit Stairwell Canopy

This area is intended to create a welcoming and clearly identifiable entry. The tower treatments at corner portals should feature the tapered and rounded New Mexico motif, and be detailed with punched/rhythmic patterned fenestration. Detailing should be added throughout the portal to create human scaling and accessibility. Columns and beams should be concrete. The exit stairway ground landing should be sheltered with a trellis or lattice element to announce their secondary order of entry, and to create a "porch."

Wall Base

Along the wings, use a base of natural stone to "ground" the building. Size the base appropriately to the building volume to form a significant element.

Color Palette

Use warm, neutral colors as the principal wall colors (see Table 3-3). Use an accent color, or colors, on building elements such as entry canopies and exterior stairs.

Table 3-3: Barracks Color Palette

Base	Walls	Roof	Windows, Frames, Metals	Trim and Accents
Natural Stone or equivalent	EIFS 1: Pantone: 11-0907 TPX Almond EIFS 2: Pantone: 16-1210 TPX Mocha	Modified Bituminous, SBS Type, 3-Ply System White Color	Glazing: Double-pane, low emissivity glass with brown anodized aluminum frames	Match adjacent wall color



Note: Colors depicted are approximate and may vary with color printing method. Please consult the cited manufacturer's reference for a true color depiction.

The final color selection is subject to review and approval of the DPW architect.

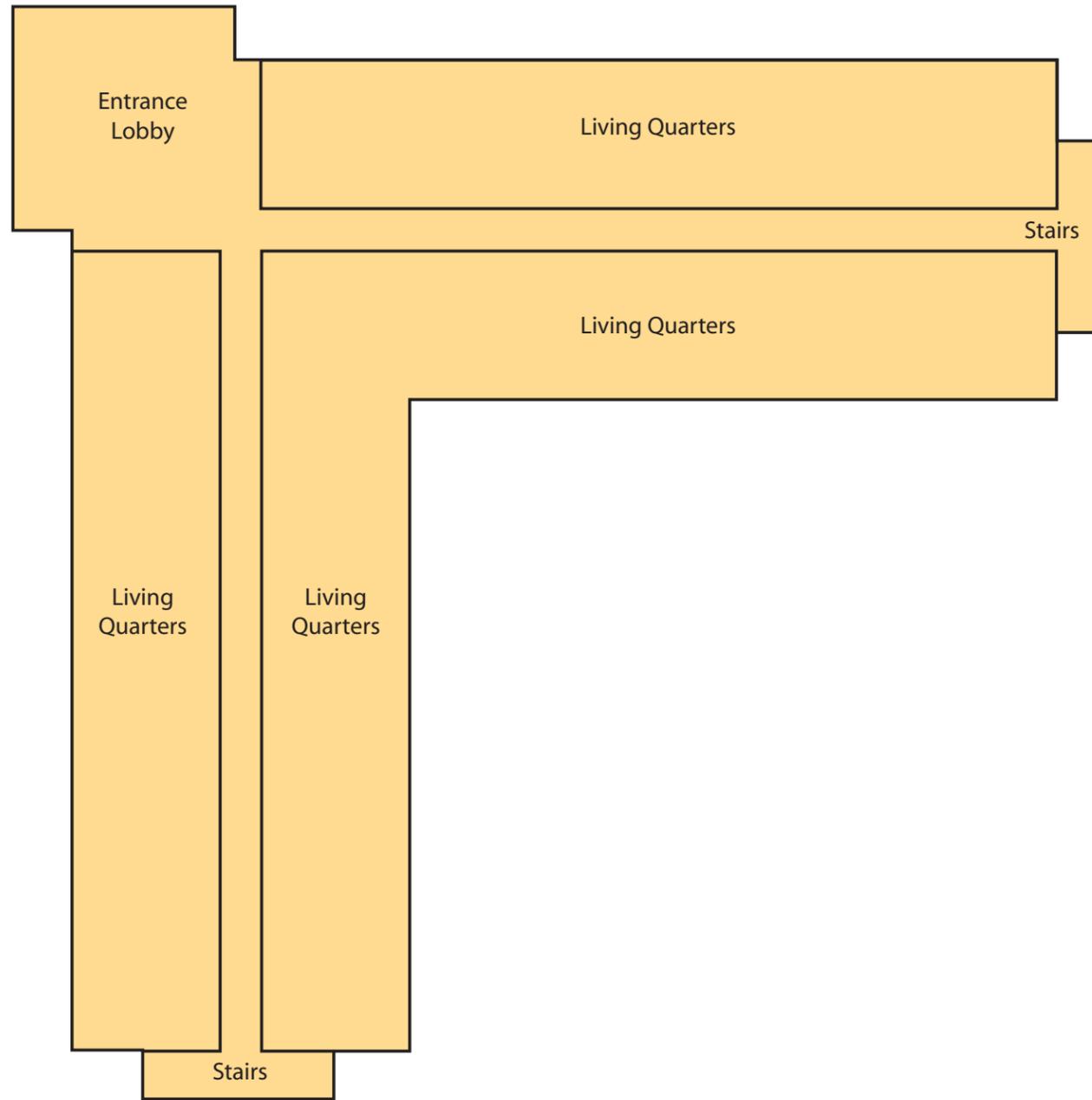


Figure 3-13: Barracks Schematic Floor Plan

Note: Floor plans are depicted here for illustrative purposes only. Design-builders should consult Centers for Standardization plans and USACE standards, which will prevail in the event of variance.

Projection: UTM

Horiz. Datum: WGS84

Zone: 13N

Units: Meters

Vert. Datum: NAVD88

Point of Contact:

Carol Placchi

GIS Manager - Caelum-Unitec

Office: 575-678-0683

APPENDIX H

EXTERIOR SIGNAGE



11.4 SIGNS

11.4.1 Signs are used to visually communicate information. They are highly visible features that should be attractive and compatible with their surroundings. Careful consideration must be given to what a sign says, how it is said, its visual appearance and organization, its location, structural support system, and relation to other signs within the installation. Standardized signage systems facilitate movement, provide a sense of orientation, and reinforce standards of excellence. Signage creates a unifying element throughout the installation that visually ties the installation themes together and builds a reference and continuity that translates into confidence and reassurance when traveling throughout the installation. The standards to apply for signage color, type, and sizing is found in [UFC 3-120-01, Air Force Sign Standard, 6 Feb 2003](#). TM 5-807-10, Signage, 1 December 1983, was cancelled in September 2000, without replacement. UFC 3-120-01, Air Force Sign Standard, 6 Feb 2003, has been accepted by the services as the signage criteria.

11.4.2 Sign System Characteristics. There are several basic characteristics that, by serving to convey necessary information clearly and attractively, are an integral part of any successful signage system. Use of exposed concrete bases or pedestals, or colored rock veneer as a pedestal for major signs and marquees is considered acceptable at WSMR. This will tie the signage into the concrete and rock accent themes seen in landscaping and architectural elements on post to ensure prominence and focus. It is common on post and in the local surrounding areas to make use of rock (Jobe "Rainbow") in this way. Concrete as an exposed architectural element is becoming more prevalent and is encouraged in recent designs. Common to all signage graphics should be the round WSMR emblem/logo (see Figure 11.4.2). The use of this WSMR insignia assures the desired "Team WSMR" theme. The older four-sided "zia" version is no longer acceptable.

11.4.2.1 Simplicity. An effective strategy provides only needed information, avoids redundancy, and eliminates oversigning with resultant clutter and visual confusion. Sign messages must be clear, simple, and easy for motorists to process quickly.

11.4.2.2 Continuity. It is essential that the system be applied uniformly and consistently throughout the entire



Figure 11.4.2 –WSMR emblem /logo supports installation-wide “Team WSMR” theme.

Site Elements Design Standards



installation. The importance of consistent implementation extends from the larger issues of sign type and size down to accurate color continuity and matching typestyles.

11.4.2.3 Visibility. Sign location is a very important ingredient within the system. Signs must be located at significant decision points and oriented to provide clear sight lines for the intended user. Close coordination of locations with respect to landscaping, utilities, adjacent signage, and various other street design elements is important to ensure long-term maximum visibility.

11.4.2.4 Legibility. Sign typestyle, line spacing, color, and size all combine to create the crucial design characteristics of legibility. This aspect of sign design should take into consideration users such as motorist, pedestrians, or bicyclists, and the relative travel speed at which each type of user will be traveling when viewing the signs.

11.4.2.5 Lighting. Solar powered lighting will be used for signs requiring nighttime illumination especially in remote areas of the installation.

11.4.3 Vocabulary-Communications.

11.4.3.1 A common language has been created for establishing a signing system. The different components that create the sign package have been named and referred to within the total signing system.

11.4.3.2 The creation of a "signing language" helps generate a unified bond within sign types that make up a signing family (Fig. 11.4.3.2).

- Reference
- Information/Message
- Presentation
- Architectural Influence
- Graphic Architecture

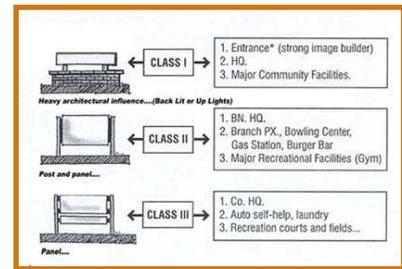


Figure 11.4.4.2 - Signs can be organized into classes within the visual hierarchy.

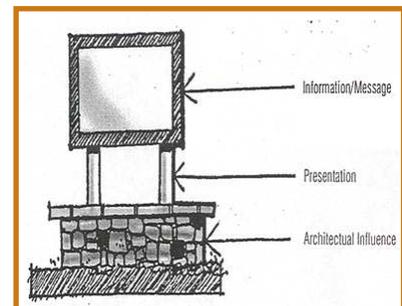


Figure 11.4.3.2 - Signing language helps establish a signing system.



11.4.4 Visual Hierarchy.

11.4.4.1 The entire signing system must communicate, through a range of sign and typestyle sizes, the relative importance of the individual activity that the sign identifies. The system should follow a logical progression from a point of origin to the desired destination.

11.4.4.2 A stated ranking method supports the visual standard of hierarchy within the signing system. Signs can be organized within assigned classes with emphasis on the function and image of the installation (Fig. 11.4.4.2).

11.4.4.3 Within each class, the level of architectural influence evokes the importance of the sign to the installation. This is also critical to the idea of progression. The importance of a sign must be presented in its size and level of detail.

11.4.4.4 As individuals move closer to their destination on the installation, the scale of the sign becomes progressively smaller and the level of the message more detailed.

11.4.5 Types of Signs.

11.4.5.1 Information / Identification Signs.

These are signs that identify entrances to the installation, areas within the installation, major tenants, buildings, and organizational or functional components (Fig. 11.4.5.1a). They identify a location, and greet the visitor to that location. They should be compatible in scale and character with the architecture and also blend with the natural surroundings (Fig. 11.4.5.1b). These signs are designed to include the following:

11.4.5.1.1 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

11.4.5.1.2 Color:

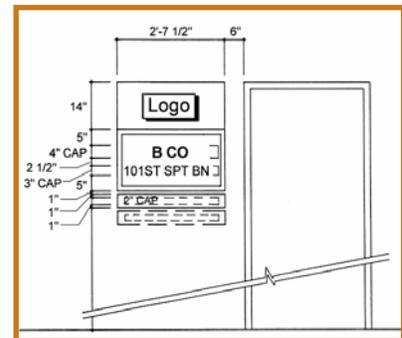


Figure 11.4.5.1a - Building mounted information sign.



Figure 11.4.5.1b - Use of street addresses on all building identification sign.

Site Elements Design Standards



- Panel: Dark Brown
- Lettering: White
- Post: Dark Brown
- Exposed panel backs and edges: Dark Brown
- All paint: Semi gloss

11.4.5.1.3 Materials:

- Panel: Double-face 1/8" thick aluminum
- Post: Steel Pipe
- Foundation: Concrete pier or direct burial

11.4.5.1.4 Building Identification.

11.4.5.1.4.1 Street Addresses. The addressing procedures prescribed in [DoD 4525.8-M, DoD Official Mail Manual](#) are mandatory for use by all DoD components. DoD 4525.8-M, Chapter 3 prescribes the following:

All DoD address shall be assigned so they are compatible with the United States Postal Services automated delivery point sequencing (C3.3).

The DoD installation is responsible for assigning city-style, street address on the installation (C3.3.2.2).

Street addresses shall be assigned and used even though a DoD activity may deliver the mail to the addressee (C3.3.2.2.1).

Only geographically locatable civilian-style street address (such as 4102 Cindy Avenue, Fig. 11.4.5.1.4.1) shall be used (C3.3.2.2.4).

Installations shall not use one street address for the entire installation and then use secondary unit designators such as "Building 123" to designate the delivery addresses on the installation (C3.3.2.2.5).

Addresses such as "Building 123 Roberts Street" are not a valid address format and shall not be used (C3.3.2.2.6).

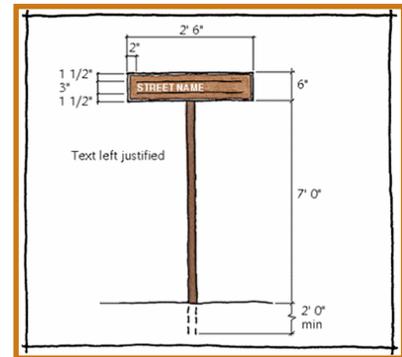


Figure 11.4.5.1.4.1 - Typical street signs.

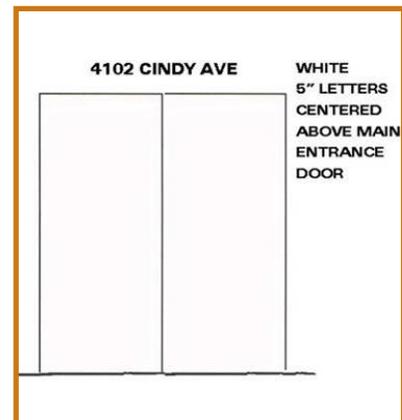


Figure 11.4.5.1.4.2a - Street address location.

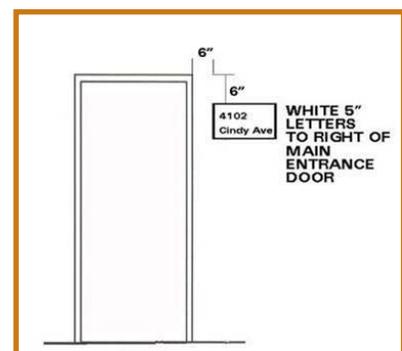


Figure 11.4.5.1.4.2b - Street address location at entrance doors.



11.4.5.1.4.2 Address Placement.

Place addresses by the front entrance of the building so they can be seen (C3.3.2.3.1).

Place both the street name and address number on the building if both the building number and street address are visible from the street.

Building identification signs will use street addresses (Fig. 11.4.5.1.4.2a).

Buildings without identification signs shall have the address number and street name centered above the main entrance or located to the right side (Fig. 11.4.5.1.4.2b).

11.4.5.1.5 Housing Areas.

11.4.5.1.5.1 The sign should be complimentary to the architectural setting of the housing area and approved by the installation Real Property Planning Board.

11.4.5.1.5.2 Housing numbers should be placed on the curb in front of the respective house and on the house where lighting will effectively light the numbering.

11.4.5.1.6 Installation Identification Signs.

11.4.5.1.6.1 Installation identification signs name the installation and display the official US Army plaque (Fig. 11.4.5.1.6.1). The designation "United States Army" must appear at the top of the sign in accordance with [AR 420-70](#), para 2-7h. Every installation entrance shall have an installation identification sign displaying only the US Army plaque, with the words "United States Army, Fort (Name of Fort), and gate name as indicated in Figure 11.4.5.1.6.1 - Installation Entrance Signs. The placement of Senior Mission Commander logo, unit crest, and other installation identification signs, monuments, or displays shall be located inside the installation beyond the cleared area of the Access Control Point (ACP) of entry. When used service-wide, these signs convey a uniform image of strength and stability to the public. Emblems, branch colors, unit mottos, names, and titles of individuals are not to be displayed.

11.4.5.1.6.2 Installation identification signs consist of three types:

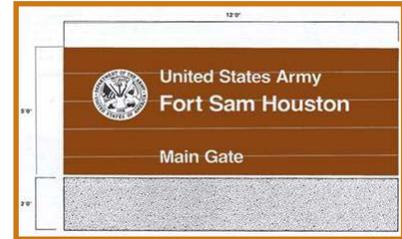


Figure 11.4.5.1.6.1 - Installation entrance signs.

Site Elements Design Standards



- 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.

11.4.5.1.6.3 See [UFC 3-120-01, Air Force Sign Standard, 6 Feb 2003](#), for sign specifications and for sign placement guidelines.

11.4.5.1.7 Street Signs.

Street name identification signs should be designed with the same lettering, color, and materials as other information signs.

11.4.5.1.8 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.

11.4.5.2 Directional Signs.

These signs guide the motorist or pedestrian in, around, and out of the installation (Fig. 11.4.5.2). 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:

11.4.5.2.1 **Typeface:** Lettering is self-adhesive backing material.

- Helvetica Medium upper and lower case

11.4.5.2.2 **Arrow:**

- Place at end indicating direction (Fig. 11.4.5.2.2).
- Stroke width: Helvetica Medium cap

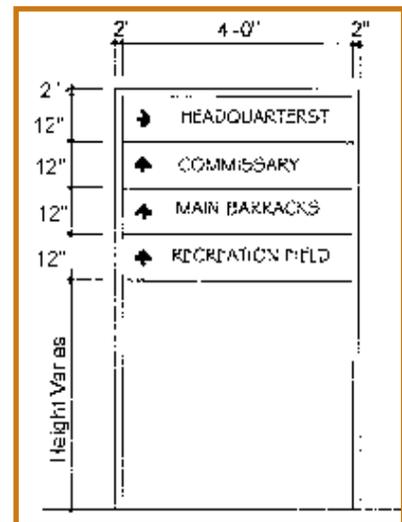


Figure 11.4.5.2 – Direction sign.

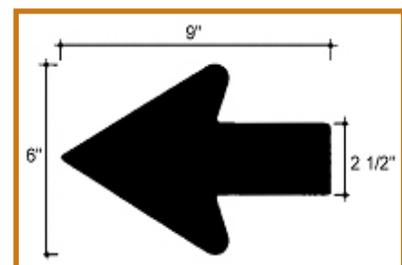


Figure 11.4.5.2.2 - Typical arrow for use on all destination signs.



11.4.5.2.3 Color:

- Panel: Dark Brown
- Lettering: White
- Post: Dark Brown
- Exposed panel backs and edges: Dark Brown
- All paint: Semi gloss

11.4.5.2.4 Materials:

- Panel: Double-face 1/8" thick aluminum
- Post: Steel Pipe
- Foundation: Concrete pier or direct burial

11.4.5.3 Regulatory Signs

These signs provide the rules for travel and parking on the installation. They include speed signs, turning and lane use signs, warning signs, parking control signs, etc. (Fig. 11.4.5.3). Related to these signs are pavement markings and traffic signals. These signs are designed to include the following:

11.4.5.3.1 **Typeface:** Lettering is self-adhesive backing material.

- Helvetica Medium upper and lower case

11.4.5.3.2 Color:

- Panel: Dark Brown
- Lettering: White
- Post: Dark Brown
- Exposed panel backs and edges: Dark Brown
- All paint: Semi gloss

11.4.5.3.3 Materials:

- Panel: Double-face 1/8" thick aluminum

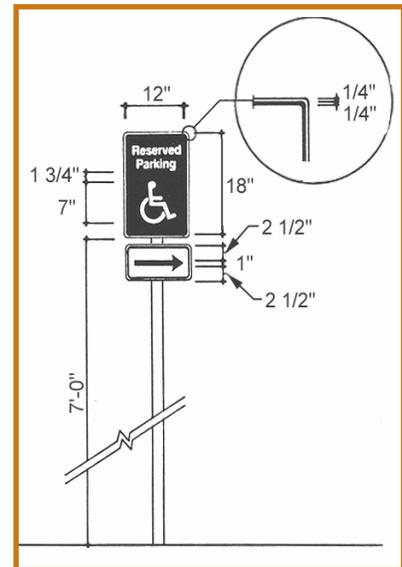


Figure 11.4.5.3 - Regulatory sign.

Site Elements Design Standards



- Post: Steel Pipe
- Foundation: Concrete pier or direct burial

11.4.5.3.4 Traffic Control Signs.

11.4.5.3.4.1 CONUS Installations. National highway standards will be used for signs to regulate vehicular traffic on CONUS installation ([AR 420-72, Transportation Infrastructure and Dams](#), Para 2-15f). These standards are described in the [Manual of Uniform Traffic Control Devices \(MUTCD\)](#). Also see [MTMC Pamphlet 55-14, Traffic Engineering for Better Signs and Markings](#). This pamphlet clarifies existing standards and provides definite guidelines for installation officials to conform to the MUTCD. These standards shall be used installation wide to include installation Access Control Points.

11.4.532.4.2 OCONUS Installations. OCONUS installation streets and roads are to be considered extensions of the road system of the host nation and shall use traffic control device standards and criteria of the host nation ([AR 420-72, Transportation Infrastructure and Dams](#), Para 2-15e).

11.4.5.3.5 Prohibitory (Warning) Signs. This category of signage is intended to maintain security and safety on the installation perimeter and at other specific secure areas. These signs notify visitors of restrictions, as well as other security procedures. The guidelines for design, fabrication, and placement of warning signs are found in [UFC 3-120-01, Air Force Sign Standard, 6 Feb 2003](#).

11.4.6 Electronic Exterior Signs

All exterior flashing signs, traveling lights, or signs animated by lights of changing degrees of intensity or color are prohibited.

11.4.7 Sign Placement

Placement of signs differs according to the type of sign and the specific site constraints. The following guidelines apply to placement of the majority of signs.

Do not place more than one sign at any location. Traffic rules are the exception to this rule (Fig. 11.4.7a and Fig. 11.4.7b).

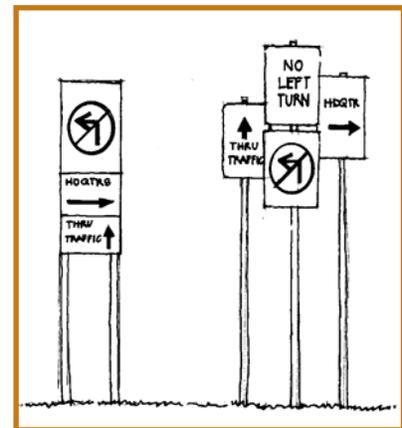


Figure 11.4.7a - Sign should be simple, legible, and combined.

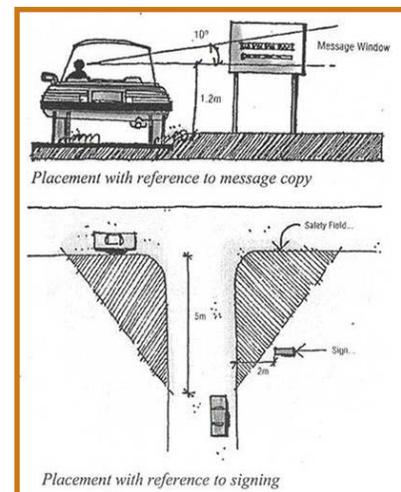


Figure 11.4.7b - Placement is critical to ensure easy readability.



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 11.4.7b). Provide proper placement to avoid a hazard to children.

11.4.8 Sign System Typography.

11.4.8.1 Military Emblems. The Army has a rich tradition of military heraldry. Military emblems are an important part of the soldiers' identity and the emblems have been carefully crafted over the years to express unit pride and unique history and function of the unit. The care and use of organizational emblems in a signage system can add visual interest as well as build pride and a sense of history. However, the overuse of miscellaneous emblems can lead to clutter and a dilution of their importance. Colors for military emblems must be in accordance with the Institute of Heraldry.

11.4.8.2 Department of the Army Plaque. The plaque should be displayed on installation identification signage to emphasize the heritage and professionalism of the United States Army. The design of the plaque must be in accordance with [Army Regulation \(AR\) 840-1, Department of the Army Seal, and Department of the Army Emblem and Branch of Service Plaques](#), and must be reproduced in full color.

11.4.8.3 Insignias. The use of branch insignia, shoulder sleeve insignia, coat of arms and/or distinctive insignia on headquarters signs is permitted. All military emblems must appear in full color. Motivational symbols or motifs will not be used.

11.4.9 Reduce Visual Clutter.

11.4.9.1 Over-signing detracts from a uniform sign system and if left uncontrolled will eventually destroy the integrity of the system (Fig. 11.4.9.1).

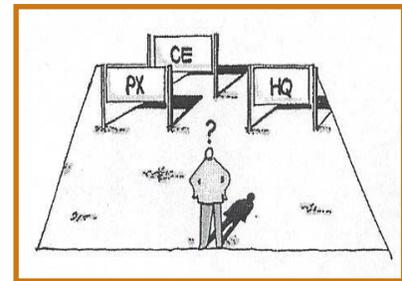


Figure 11.4.9.1 - Visual clutter causes confusion.

Site Elements Design Standards



11.4.9.2 Clutter creates confusion and ineffectiveness. Often motorist and pedestrians are confused by the bombardment of messages that have no relationship to each other, or the communication is on such a minimal level that the sign serves no purpose.

11.4.10 Location Maps.

11.4.10.1 The location map is an integral element of an installation entrance. The location map display provides information and sense of place to the viewer. The design and construction should be of compatible architectural materials found throughout the installation (Fig. 11.4.10.1).

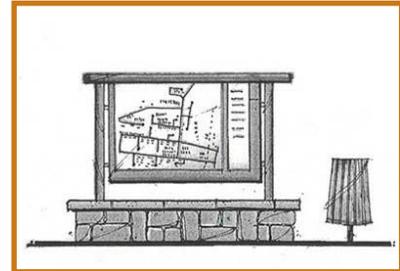


Figure 11.4.10.1 - Location maps provide a sense of place.

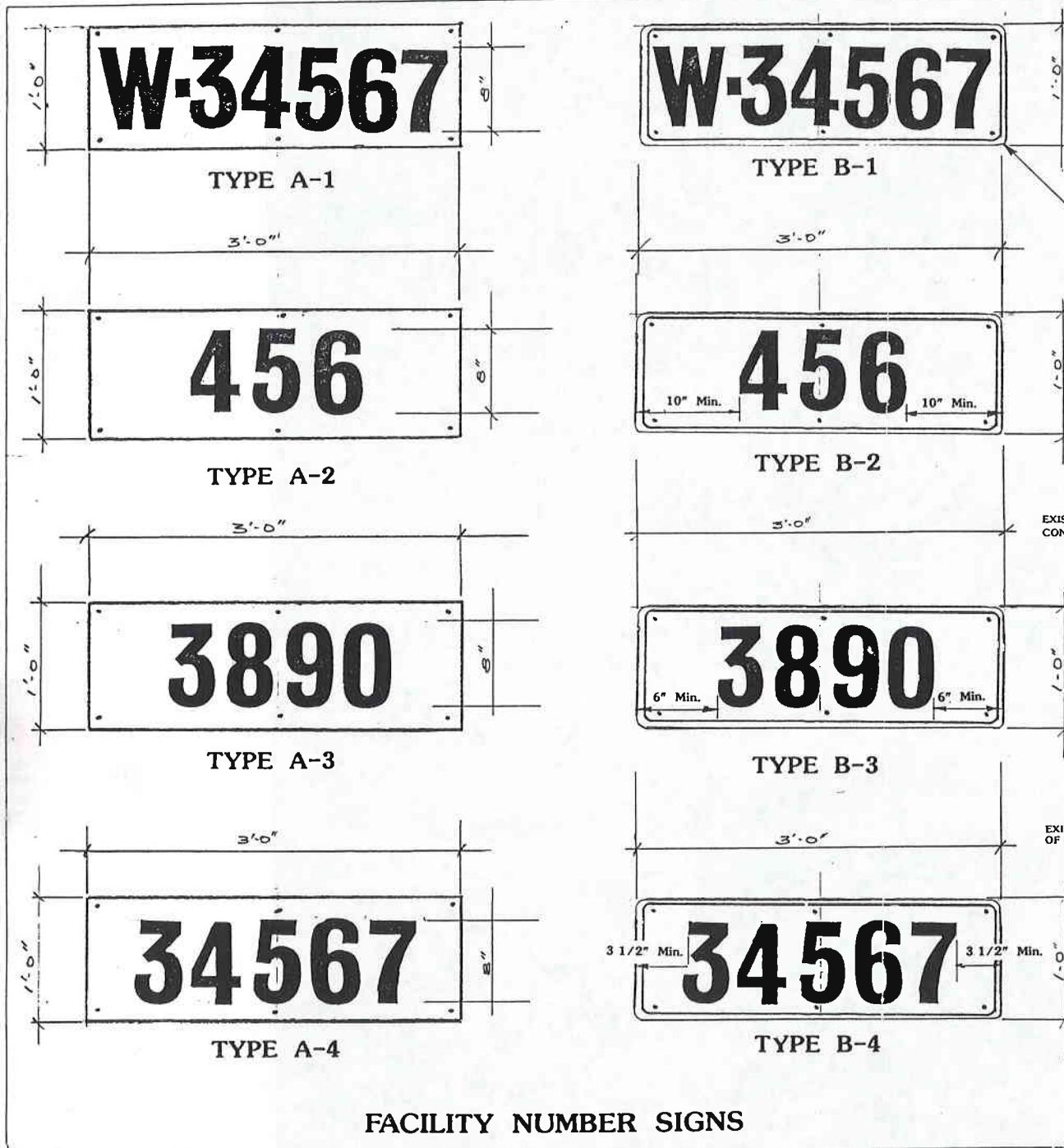
11.4.10.2 The location map should contain the following characteristics within the design.

- Plexiglas covered map for protection
- Architectural compatible materials used for the base
- Paved walk-up area
- Litter receptacle
- Provide parking adjacent
- Provide current takeaway maps

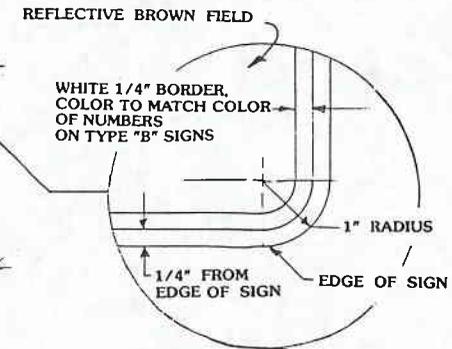
11.5 LIGHTING

11.5.1 Lighting is a functional requirement of installations that also impacts the visual environment. The installation lighting system conveys a sense of order and organization. There are five primary types of lighting on military installations. They are:

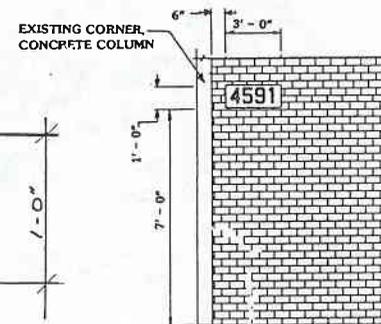
- Roadway Lighting
- Pedestrian Lighting
- Parking Lot Lighting
- Outdoor Architectural Lighting
- Security Lighting



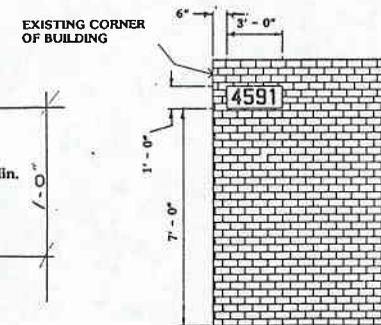
FACILITY NUMBER SIGNS



CORNER DETAIL ON TYPE "B" SIGNS



UPPER LEFT HAND CORNER SIGN LOCATION (MINIMUM)



- ALL LETTERS AND NUMBERS "HELVETICA, MEDIUM" IN WHITE
- 1/4" WHITE BORDER (TYPE "B" ONLY) ON REFLECTIVE BROWN FIELD.
- 1" RADIUS CORNERS (TYPE "B" ONLY)
- 3'-0" x 1'-0", .090 ALUMINUM
- ALUMINUM PLATE MATERIAL SHALL BE THOROUGHLY CLEAN WITH SOLVENT. BROWN SCOTHLITE MATERIAL OR APPROVED EQUAL IS CUT AND APPLIED TO ONE SIDE OF METAL. PRECUT LETTERS AND/OR NUMBERS FROM WHITE SCOTHLITE REFLECTIVE MATERIAL OR APPROVED EQUAL ARE APPLIED. ALL MATERIAL APPLICATIONS ARE APPLIED WITH VACUUM DEVICE WHICH IS A HEAT MACHINE. MACHINE HAS FIVE MINUTES HEATING CYCLE AND REQUIRES FIVE MINUTES COOLING TIME. WHOLE PROCESS SHOULD TAKE 45 MINUTES TO ONE HOUR. COPY OF PROCESS TO BE USE SHALL BE SUBMITTED TO COR FOR APPROVAL.
- PRE-DRILL 6 HOLES 1/4" IN DIA. AS INDICATED ON DETAIL
- ACTUAL LOCATION OF FACILITY NUMBERS PLATES TO BE DETERMINED BY THE COR
- USE APPROPRIATE FASTENERS TO INSTALL NEW PLATES TO MASONRY, WOOD, METAL OR STUCCO. FASTENERS MUST BE APPROVED BY THE COR.

INSTALLATION NOTES:

- SUCH ITEMS AS EXISTING DOWNSPOUTS SHALL NOT OBSCURE THE VIEW OF THE NEW FACILITY NUMBER SIGN
- NATURAL GROWTH SUCH AS TREES, IF THEY INTERFERE VISUALLY, SHALL BE TRIMMED
- SIGNS SHALL BE LOCATED ON THE UPPER LEFT HAND SIDE, FRONT AND REAR, OF ALL BUILDINGS AND ACCORDING TO DETAILS
- IN SUCH CASES, WHERE THE REAR IS EITHER NOT ACCESSIBLE OR THE SIDE IS THE SECONDARY ENTRANCE, THAT SHALL DICTATE THE LOCATION OF THE SECONDARY SIGN

NUMBER	DATE	DESCRIPTION	BY	APPROVED
REVISIONS				
WHITE BRAND MISSILE RANGE, NEW MEXICO DIRECTORATE OF PUBLIC WORKS				
DESIGNED BY	APPROVED	MODERNIZATION OF INTERIOR/EXTERIOR OF COMMERCIAL BUILDINGS		
DRAWN BY	DATE	TYPICAL MISCELLANEOUS DETAILS		
APPROVED	DRAWING NUMBER	PLATE		
	WS-W069-96-29	29		
DATE	SHEET	OF		

Landscape Design Standards



SECTION 10



10.1 INTRODUCTION

10.1.1 The Landscape Design Standards includes the selection, placement, and maintenance of plant material on the installation. Landscape plantings provide a simple and cost effective enhancement to the general appearance of the installation (Fig. 10.1.1a and Fig. 10.1.1b).

10.1.2 The visual image conveyed by a military installation, even with force protection barriers is defined not just by architectural character and site organization, but also by an attractive, organized landscape design. The presence of plant material on the installation greatly enhances the visual character and environmental quality of the installation.

10.1.3 Plantings and associated landscaping enhancements add an element of human scale to open spaces and can be used functionally to screen undesirable views, buffer winds, reinforce the hierarchy of the circulation system, be a force protection component or provide a visual transition between dissimilar land uses.

10.2 LANDSCAPE OBJECTIVES

10.2.1 The overall objective of the use of plant material within the installation is to improve the physical and psychological well being of the people who live and work on



Figure 10.1.1a – Example of landscape enhancement.



Figure 10.1.1b – Example of landscape enhancement.



the installation. This is achieved through the following objectives:

10.2.1.1 Preserve and enhance existing healthy trees, forest lands, and detailed planting features such as shrubs and groundcovers.

10.2.1.2 Improve the overall visual quality of the installation through the use of native plant material to (Fig. 10.2.1.2):

10.2.1.2.1 Blend to built environment with the natural environment.

10.2.1.2.2 Provide scale and shade comfort to pedestrian environments (Fig. 10.2.1.2.2).

10.2.1.2.3 Reinforce the hierarchy of the circulation system (Fig. 10.2.1.2.3).

10.2.1.2.4 Screen unsightly views or elements.

10.2.1.2.5 Buffer incompatible land uses.

10.2.1.2.6 Minimize maintenance and irrigation through the use of native plant materials that require less maintenance and irrigation to survive. Support Water Management Plan Best Management Practice regarding Water Efficient Landscaping (BMP#3).

10.2.1.2.7 Enhance Antiterrorism capabilities.

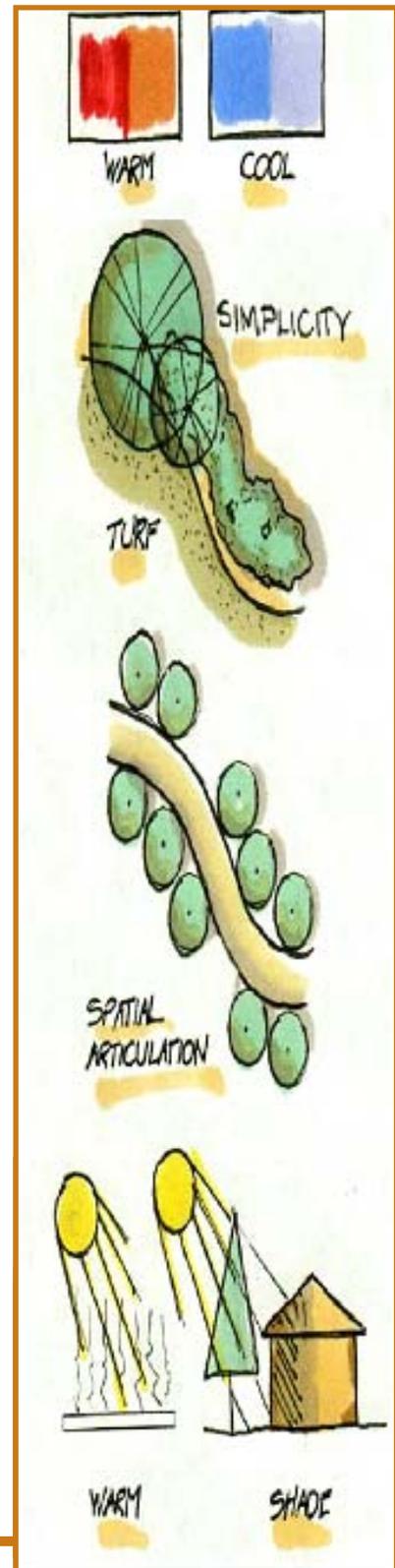
10.2.1.2.8 For energy conservation of buildings, provide windbreaks in winter, shade in summer, and directive paths for convection cooling in the summer.

10.3 PRINCIPLES OF LANDSCAPE DEVELOPMENT

10.3.1 Landscape design is based on the following principles.

10.3.1.1 **Unity.** The selection and placement of plant material can be used to blend, screen, and soften incompatible architectural or other unattractive visual impacts. Plant material as a unifying element can be placed in front of a building or view to frame and enhance the visual impact.

10.3.1.2 **Balance.** Plant material can be selected and placed to provide visual equilibrium or balance through the use of



Landscape Design Standards



either a symmetrical or asymmetrical planting scheme. Symmetrical plantings are generally more formal while asymmetrical plantings are informal.

10.3.1.3 **Contrast.** Plant material can be selected and placed to provide differences in size and shape that add interest to the environment. Plants can be located to provide a backdrop for other plants such as a hedge behind a bed of annuals or perennials.

10.3.1.4 **Rhythm.** Repetition of a single plant or a mass of plants provides visual interest and formality to the landscape. Rhythm produces emphasis and unity and is especially effective in articulating main circulation routes.

10.3.1.5 **Color and Texture.** Plants can be selected and placed to provide visual interest according to their color and texture. Colors are classified as either warm (red, orange, yellow) or cool (violet, blue, green). Texture is classified as either coarse or fine.

10.3.1.6 **Simplicity.** Landscape plans should be broad and simple in form to limit excessive maintenance. Plant material should be grouped in beds with simple edges that are easy to mow. Small turf areas should be avoided because of the difficulty of mowing. The use of annuals should be minimal because of the high maintenance involved.

10.3.1.7 **Ultimate Effect.** The landscape plan should be prepared with consideration for the mature size of all plants. The spacing of all material should utilize nursery industrial standards for mature material to account for spread as well as height. The ultimate height of the material should also be considered in relation to windows and other visual concerns.

10.3.1.8 **Spatial Articulation.** Plants can be selected and placed to create enclosed spaces or to separate spaces from one another. They can also be used to direct people by visually defining and reinforcing patterns of movement. The degree of enclosure, separation, or movement is dependent upon the density, form, and type of plants used (Fig. 10.3.1.8).

10.4 SUSTAINABLE LANDSCAPE DEVELOPMENT

10.4.1 The use of plant material on the installation promotes the sustainability of the development. Trees, shrubs,

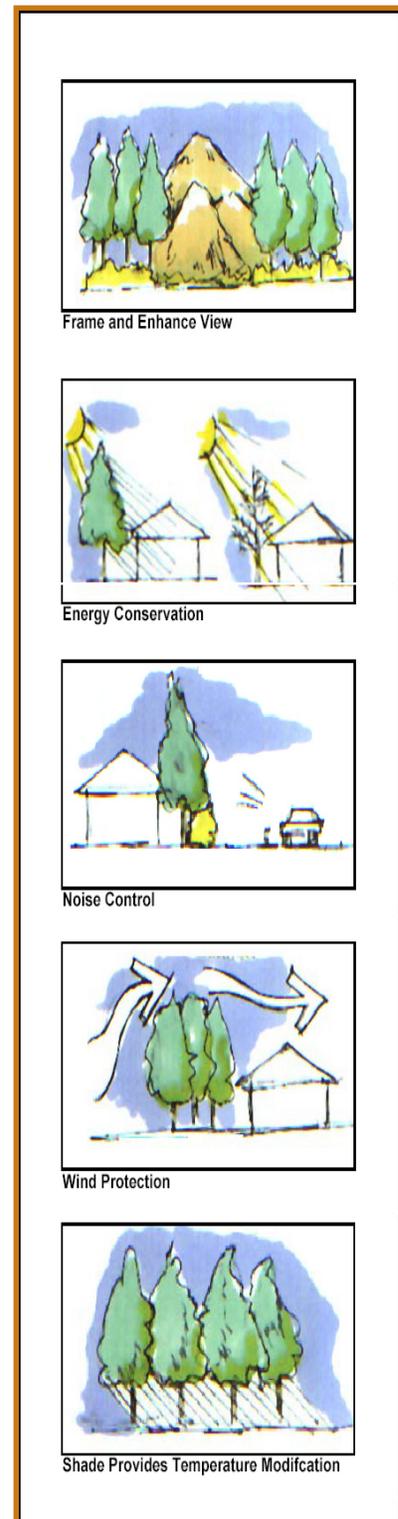


Figure 10.5.2.2.1 - Windscreen.



groundcover, and vines provide aesthetic appeal as well as preservation of fauna and flora, water and energy conservation, climate modification, erosion control, air purification, and noise abatement. Consider installing open cell articulating concrete blocks (ACBs) with plants on about 5' centers for erosion control lining. Groundcover can be used for lining detention basins and ditches. Bring ACBs up to about the 1-year return period flood event profile in ditches to act as toe protection. ACBs and more colorful plants can be added at the bank line at a formed berm to prevent rilling (overbank runoff) and provide a safe windscreen.

10.5 LANDSCAPE DESIGN GUIDELINES

10.5.1 Proposed plantings must be reviewed to ensure that site conditions (soil, topography, adjacent uses, and architecture) and climatic criteria (sun, shade, and moisture requirements) are considered in the desired plant design and selection (i.e., form, texture, color, size). The uses and users of the site must also be considered. Landscape planting plans should be approved by qualified personnel to provide quality assurance and promote design consistency within each visual zone.

10.5.2 The following paragraphs present landscaping guidelines for the various locations of plant material use.

10.5.2.1 Foundation Planting. Foundation planting provides a green background for additional plantings, adds scale and character to the building, helps to integrate the building with its surroundings, screens HVAC and other utilities and helps create a sense of arrival. When developing foundation planting plans consideration should be given Antiterrorism measures (See paragraph 10.11).

10.5.2.1.1 Focal and seasonal plantings should be located at building entries for pedestrian interest.

10.5.2.1.2 Use the architecture of the building to evaluate the planting design and selection of plants.

10.5.2.1.3 Plant materials should not block windows and views from interior spaces.

10.5.2.1.4 Trees shall be setback from the building walls to provide space for mature growth and to prevent root systems from damaging the foundation.

Landscape Design Standards



10.5.2.1.5 A symmetrical foundation planting design should be used for a symmetrical building.

10.5.2.1.6 Due to the possibility of insect problems (bee stings, etc.) do not plant flowering plants near entrances.

10.5.2.2 Screening.

10.5.2.2.1 Windscreens. Use a combination of evergreen and deciduous trees to provide windbreak protection from prevailing winds. Windbreak plantings should be irregular in form, rather than straight and evenly spaced, in order to provide more effective wind control and to visually blend with the natural character of the installation (Fig. 10.5.2.2.1).

10.5.2.2.2 Screening of Dumpsters. Landscape planting should be used to supplement wood fence and masonry wall dumpster enclosures (Fig. 10.5.2.2.2).

10.5.2.3 Buffer Planting. Use a mixture of evergreen and deciduous trees and shrubs to visually separate land uses and to help separate visual zones.

10.5.2.4 Open Space Planting. Enhance open space areas with planting. Use a mix of evergreen, deciduous, and flowering trees. Plant the same kind of trees in massive groupings to impact the vast open areas (Fig. 10.5.2.4).

10.5.2.5 Street Trees. Street tree plantings should be used to reinforce vehicular hierarchy, orient and direct traffic, upgrade views, and to visually de-emphasize on-street parking (Fig. 10.5.2.5). Also, in the design of a street tree planting, separate plant species may be used to identify distinctive details or areas of the installation, for example, a particular land use relationship, historical district, community area, or other similar entity.

10.5.2.5.1 Use formal street trees in single rows to visually reinforce primary and secondary roads. Use regularly spaced

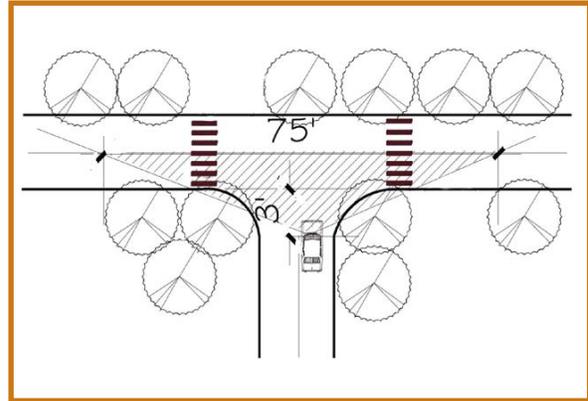


Figure 10.5.2.5 - Trees help imply road hierarchy.

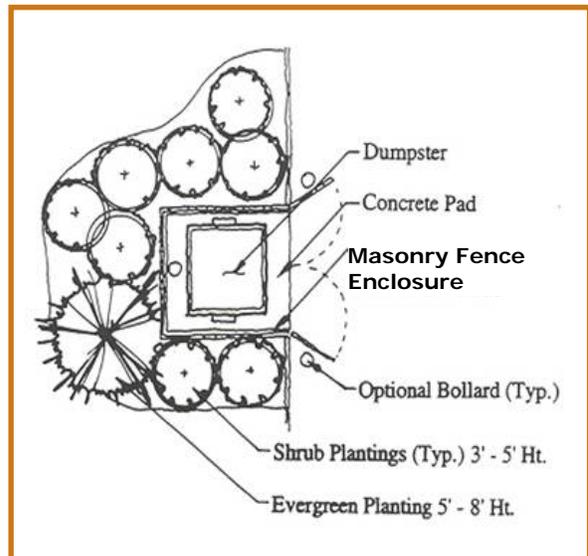


Figure 10.5.2.2.2 - Dumpster screening.



Figure 10.5.2.4 - Enhance open spaces with plantings.



and uniformly shaped deciduous trees to provide a regimented appearance.

10.5.2.5.2 Use informal groupings of street trees along tertiary routes. Utilize medium size deciduous trees to screen on-street parking along roadways. Set trees 1 to 2 meters (3 to 6 feet) from the back of curbs. Spacing should be uniform, except where curb cuts interrupt regular spacing.

10.5.2.5.3 As a general rule, street trees should be deciduous species, resistant to salt and root pressure, and should have a 10' to 12' high clearance between the street pavement and branch height to allow adequate clearance for pedestrian and vehicle traffic to pass unimpeded by lower branches.

10.5.2.5.4 The street tree layout should be coordinated with the layout of proposed street lighting.

10.5.2.5.5 Appropriate plant heights should be used within sight triangles to ensure safe views from intersections.

10.5.2.5.6 Weeping trees should not be used in locations where they may hang over the roadway or block views.

10.5.2.6 **Parking Lot Planting.** Parking lots are often the least attractive elements on a military installation. The use of landscape plant material and earth berms can greatly improve the appearance of these areas as well as help define circulation and reduce heat gain during summer months (Fig. 10.5.2.6). Prudent drainage layouts can also result in a greener, lush landscape.

10.5.2.6.1 Use shade tree plantings at parking lots to reduce glare and moderate ambient air temperatures on the lot. Optimum spacing of parking lot shade trees is 10 to 12 meters (35 to 40 feet) on center.

10.5.2.6.2 Choose trees and shrubs that require minimum maintenance and will not litter the parking area with leaves, fruit, or nuts.

10.5.2.6.3 Consider sight distances near entrances and exits when selecting and placing plant material.

10.5.2.6.4 Select trees, shrubs, and ground covers that can withstand harsher conditions, such as sun, glare, heat, and reduced water supply.

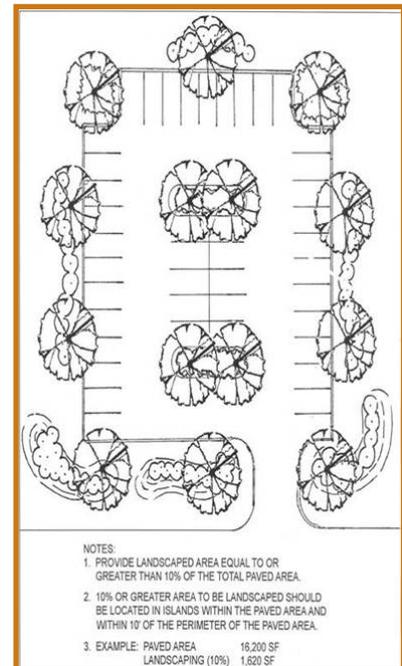


Figure 10.5.2.6 Parking lot planting.

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10.5.2.6.5 Use a mix of evergreen and deciduous plant material to screen parking areas from adjacent uses except for windscreens. For windscreens ensure plants are tightly packed enough to function. Deciduous trees can't be relied on for cold winter winds. Recommend using evergreens more for windscreens and deciduous trees more for summer shade. Provide well-draining soils, water-conserving irrigation, and adjacent ditches to protect from root rot.

10.5.2.7 Environmental Control Planting. When properly placed, plants can provide environmental benefits, as well as address visual concerns.

10.5.2.7.1 Use deciduous trees and shrubs at courtyards, buildings and along streets to provide shade, moderate temperatures and reduce glare during the summer months while allowing solar exposure in the winter.

10.5.2.7.2 Locate deciduous plantings on the southeast and southwest corner of buildings or courtyards to mitigate solar radiation and glare due to heat build-up and lower sun angles in the mid-morning and late afternoon hours.

10.5.2.7.3 Use mixed massings of deciduous shrubs and evergreen trees and shrubs to provide sound control along primary and secondary roads.

10.5.2.8 Image Planting. The image of the installation is formed by the visual impressions that exist within the installation. The primary locations of highly visible images are the main gate, along primary circulation systems, and at areas of high concentrations of people. Features such as signs, statues, static displays, and other primary visual images can be improved by the use of trees, shrubs, and ground cover.

10.5.2.9 Entrances to the Installation. The entrances and streetscapes into the installation are areas to place landscaping that will develop a strong visual image and provide visual interest during all four seasons. The entrance to the installation creates the first visual impression for the visitor (Fig. 10.5.2.9).

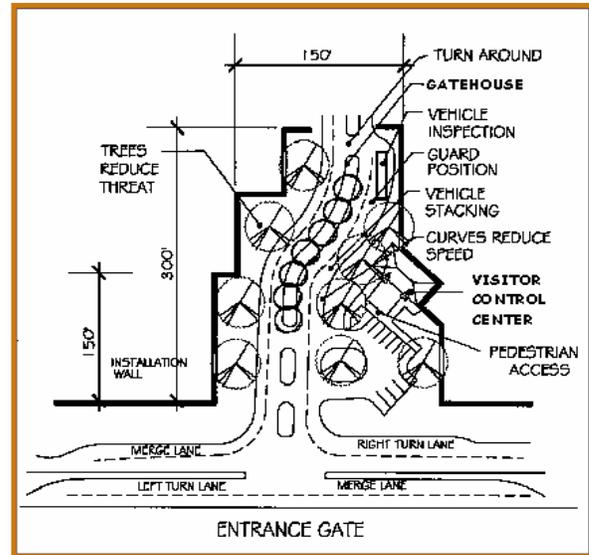


Figure 10.5.2.9 - Landscaping at entrance gates will meet AT/FP requirements.



10.5.2.9.1 The landscape materials and planting areas should be proportional in scale to the hierarchy of the street on which they are located.

10.5.2.9.2 Landscaping must be integrated with the Force Protection requirements of Section 12. Low shrubs, groundcover, annual/perennial plants and canopy trees provide seasonal interest as well as maintain views required to ensure force protection measures. Large evergreen trees are discouraged in these locations because they may obstruct sightlines and impact the need for force protection. Adequate lines of sight must be maintained for guard personnel to observe vehicular and pedestrian traffic approaching the gate.

10.5.2.10 Zeroscaping. Where appropriate, to conserve water and lower maintenance consider zeroscaping. Zeroscaping means NO plants. This may be appropriate for industrialized, temporary, and remote areas but not around where people reside for any interval or permanent offices.

10.5.2.11 Xeriscape. Xeriscape is the conservation of water and energy through creative and adaptive landscape design but including water-wise plants. Xeriscape landscapes provide attractive solutions that save money, water, and maintenance. The following website provides guidance on specific design principles of the xeriscape design process and xeriscape design application:

- [USAF Landscape Design Guide, Xeriscape.](#)

10.6 PLANT MATERIAL SELECTION

10.6.1 Trees, shrubs, ground cover and turf are the major elements of a planting composition. Basic plant selection criteria should consider creating a unified composition utilizing native materials for low maintenance and sustainability, avoiding incompatible colors, textures and forms, and matching the appropriate plant to the land use, situation, and environmental condition.

10.6.2 The ability of plant material to provide lasting benefit is dependent upon the plant's hardiness and its appropriateness to the site use. Major factors affecting plant hardiness are soil type and organic content, temperature, moisture and light. These climatic conditions can be modified to an extent by specific site conditions, such as wind protection, solar orientation, and planting design, to create microclimates.

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10.6.3 Selecting appropriate plants for a given condition is only one aspect of planting design. Compositional arrangement to provide texture variety and to accent site and building features is another. The selection and composition of a planting design requires an understanding of each plant's characteristics, form, and environmental needs as well as how each plant can relate to and complement other plants in the design. Plants are used in four basic design categories (Fig. 10.6.3):

- Canopy
- Barrier
- Screen (or Baffle)
- Groundcover

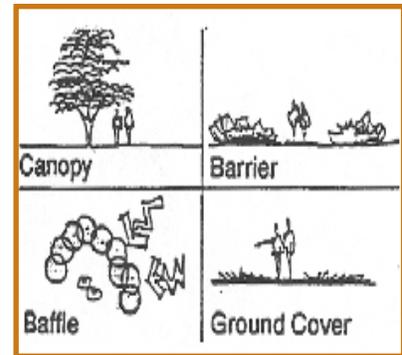


Figure 10.6.3 - Four basic uses of plantings.

10.7 PLANT PALETTE AND PLANT CATEGORIES

10.7.1 The plant palette and categories are designed to help the designer choose the best plant for each particular set of design requirements. The plants that appear on the palette and in the categories were selected for their hardiness and their ability to survive in this geographical area. To use them effectively, the design requirements must be well defined for the specific site.

10.7.2 The Plant Palette.

10.7.2.1 A select group of plant materials has been divided into the following six categories:

- deciduous trees
- coniferous trees
- deciduous shrubs
- coniferous shrubs
- broadleaf evergreen shrubs
- groundcover and vines

10.7.2.2 On the palette, the plants appear in alphabetical order by their botanical name, followed by their common name, design characteristics, cultural information,



recommended use, and miscellaneous notes. The plant palette is presented in a matrix format in [Appendix O](#).

10.7.3 The Plant Categories.

10.7.3.1 Plants from the plant palette with similar characteristics have been cataloged in the Plant Categories. These characteristics could be cultural (e.g., upright, narrow form), environmental (e.g., shade tolerant), ornamental (e.g., red fall color), or functional (e.g., screening plant). Characteristics include: Cultural Conditions (mature height and spread, form and growth rate, disease and pest resistance), Environmental Conditions (sun/shade, pH range, soil moisture required, and wind/sun), and Ornamental Characteristics (flower color, autumn color, fruit color, and/or summer leaf color).

10.7.3.2 Each category describes a list of plants that share a similar quality. For example, materials that are shade tolerant would be placed in the Shade Tolerant group under the "Environmental Conditions" heading. To further explain the Categories, under the "Environmental Conditions" heading, in the Shade Tolerant group, all shade tolerant deciduous trees would be listed under "Deciduous Trees"; all shade tolerant Coniferous trees would be listed under "Coniferous Trees"; and so on.

10.8 PLANT MATERIAL INSTALLATION

10.8.1 A key step in assuring successful planting is to select plants of the highest quality. Plant material should be of the size, genus, species, and variety to comply with the recommendations and requirements of the "American Standard for Nursery Stock" ANSI Z60.1.

10.8.2 As part of the design process and prior to plant installation, review the installation's Master Plans, Basic

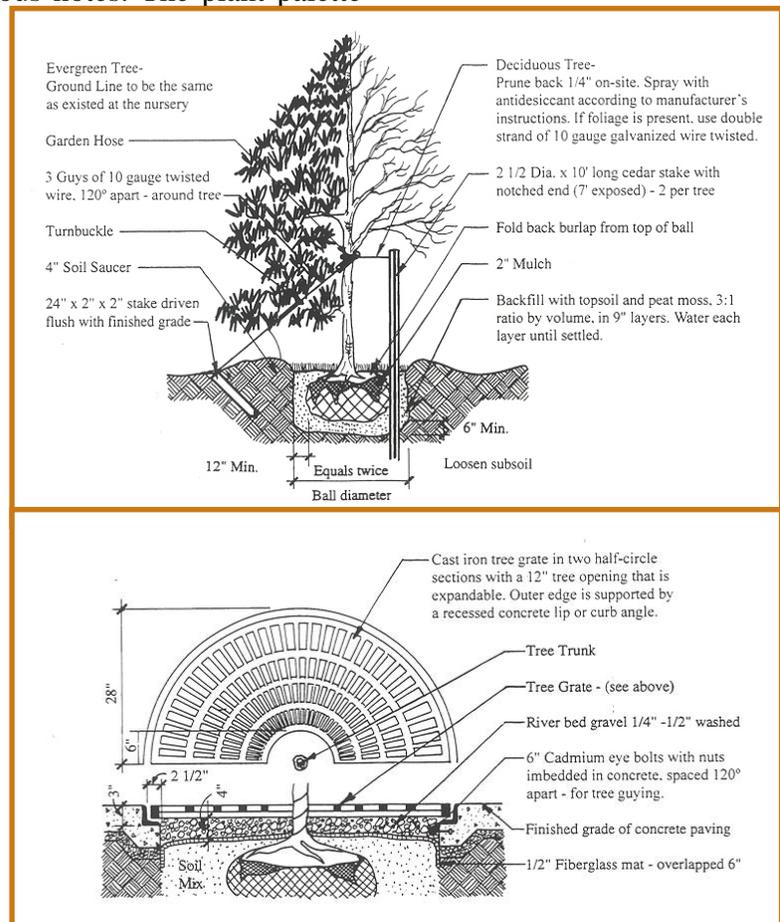


Figure 10.8.4 - Plant installation.

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Information Maps, or As Built Drawings for utility locations and verify with the Directorate of Public Works or equivalent.

10.8.3 The planting and establishment of trees, shrubs, ground covers, and vines is detailed in [TM 5-803-13](#), Chapter 3.

10.8.4 General Guidelines for Plant Installation (Fig. 10.8.4).

10.8.4.1 At planting time, thin plants by removing one-third of the vegetative material.

10.8.4.2 Spray all evergreens with an antidesiccant within 24 hours of planting.

10.8.4.3 Water all plants thoroughly during the first 24-hour period after planting.

10.8.4.4 Site all plants and stakes plumb.

10.8.4.5 Space plants according to their mature size (Fig. 10.8.4.5).

10.8.4.6 Install plant materials in groups for greater impact (Fig. 10.8.4.6).

10.8.4.7 Installation of Lawn Areas.

10.8.4.8 Installation techniques for turf are detailed in [Unified Facilities Criteria \(UFC\) 3-210-05FA, Design: Landscape Design and Planting Criteria](#), Chapter 4. The details include site evaluation, site preparation, selection of turf, and maintenance requirements.

10.9 MAINTENANCE OF PLANT MATERIAL

10.9.1 The ease of maintenance should be one of the primary goals when considering the success of any planting design (Fig. 10.9.1).

10.9.2 Pruning. In general plant material should be allowed to conform to its natural shape. This practice allows the plant to mature in a health manner, and saves the time and energy required for trimming. The pruning of trees and shrubs is done to maintain overall plant health, direct plant growth, maintain a desired shape, and increase flower or fruit development.

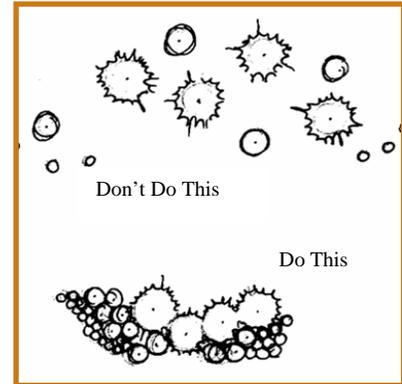


Figure 10.8.4.6 – Grouped plants have greater impact.

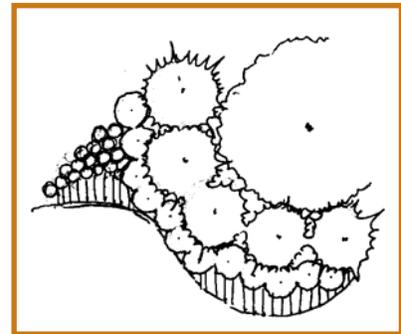


Figure 10.9.1 - Group plants in mulched beds to reduce maintenance.

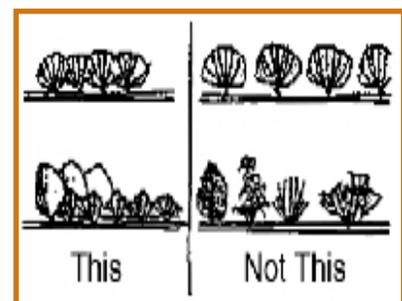


Figure 10.8.4.5 – Space plants according to their mature size.



10.9.2.1 Pruning Shrubs.

- Do not prune shrubs flat across the top.
- Prune branches yearly on thick-branched shrubs and at the base of the shrub.
- When pruning deciduous shrubs prune shrub stems as close to the ground as possible and shrub branches as close to the stem as possible.
- When "thinning out" deciduous shrubs prune about one-third of all branches where they meet their main stem.

10.9.2.2 Pruning Trees.

- Remove a large limb by making three cuts as follows:
- Make the first cut at the bottom of the branch 12-24" from the branch attachment (Cut A, Fig 10.9.2.2).
- Make the second cut on the top of the branch within 1" of the undercut (Cut B, Fig 10.9.2.2).
- Make the final cut just beyond the outer portion of the branch collar (Cut C, Fig 10.9.2.2). The first two cuts were necessary to remove the weight of the branch to allow cut #3 to be clean without ripping the bark.
- Never cut the central leader of the tree.
- Coniferous evergreens trees should be pruned, during the spring, by snipping off new growth. Avoid geometrically shaping plant material while pruning.

10.9.3 Mulching.

- Use mulch around the base of plant material to provide for greater moisture and help inhibit the growth of weeds and grasses. Mulch should be maintained at a depth of two (2) to four (4) inches.

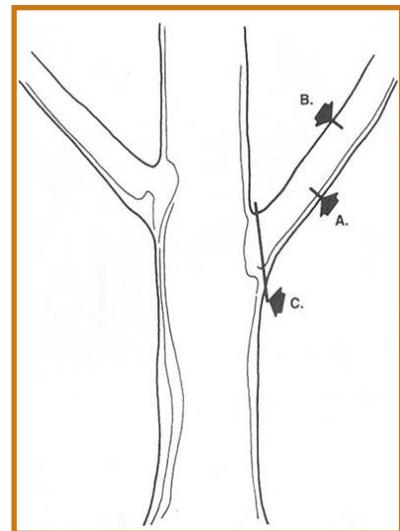


Figure 10.9.2.2 - Proper tree pruning procedures.

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- The best time to mulch for water conservation is in the late spring. Apply mulch immediately to new fall plantings.

10.9.4 Ground Cover Maintenance. Although ground covers do not require pruning, they may be periodically dug up in the spring or fall for propagation and to prevent overcrowding in their beds.

10.9.5 Landscape Maintenance Schedule. The general objective of a landscape maintenance schedule is to ensure an orderly and efficient care of the grounds. The landscape maintenance schedule included in the Army Installation Design Guide ([See Appendix F](#)) identifies times throughout the year when specified maintenance should be undertaken. Use of the landscape maintenance schedule will improve all aspects of landscape on the installation. Materials and supplies can be ordered in a timely fashion, manpower needs can be calculated and anticipated, and a correlation between the level of maintenance and appropriate cost can be derived.

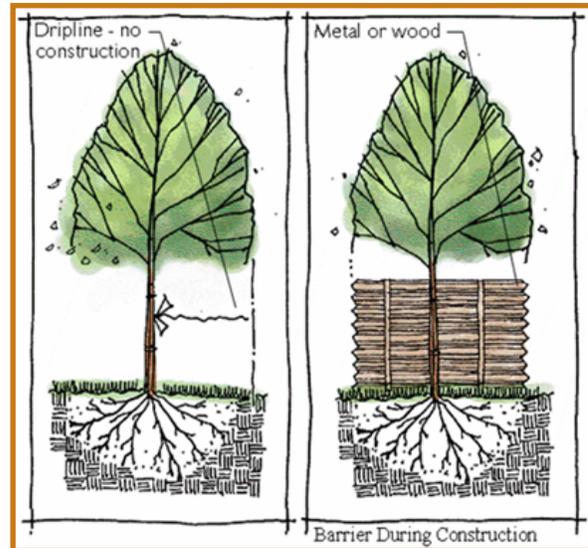


Figure 10.10.3 - Construct a barrier at drip line during construction to maintain grade.

10.10 TREE PROTECTION AND PRESERVATION

10.10.1 Existing urban trees and forest should be preserved if they are in good health. Construction should be planned to provide for the preservation of significant trees.

10.10.2 During the clearing and construction process, trees should be protected from damage. Construction barricades should be erected to protect the existing trees to be preserved. The barricades should be no closer to the trunk of the tree than one-half the distance from the trunk to the drip line. Existing trees that cannot be preserved should be considered for transplanting to a different location on site or to a different site.

10.10.3 Changes in the grade of the soil around trees can cause extensive root damage and eventually death of the tree. To prevent damage to the tree, it is important to maintain the existing grade for least the size of the tree's canopy (the drip line) (Fig. 10.10.3).



10.11 ANTI-TERRORISM/FORCE PROTECTION CONSIDERATIONS

10.11.1 The presence of vegetation on an installation can have both beneficial and detrimental impacts on security. The selection and placement of landscape plant material on Army installations is an integral element in the provision of protective measures to reduce the threat of terrorism.

10.11.2 Proper selection and placement of trees and shrubs can be utilized to provide visual screening without creating concealment for covert activity. The landscape architect responsible for tree placement should work closely with installation force protection experts to design a landscape plan that provides visual screening without compromising Antiterrorism measures (Fig. 10.11.2).

10.11.3 The plant material must allow building occupants to see out, but must not allow outside forces to monitor interior activity. The landscape architect should incorporate the following aspects into the design:

- Avoid conditions within 10 meters (33 feet) of inhabited structures that permit concealment of aggressors or obscure the view of objects or packages 150-millimeters (6 inches) in height from the view of security personnel. This results in the placement of shrubs and trees that are loose rather than dense in growth habit and possess multiple small stems rather than a single trunk that will obscure a 150 mm (6 inch) package.
- Vegetation groupings provide reduction of blast effect.
- Plant material selection and placement shall minimize potential hiding places for bombs and aggressors.
- Provide vegetation screens for play areas and outdoor recreation areas to obscure from off-installation view.
- Use trees to obscure sight lines of on-installation buildings from off-installation buildings (Fig. 10.11.3).

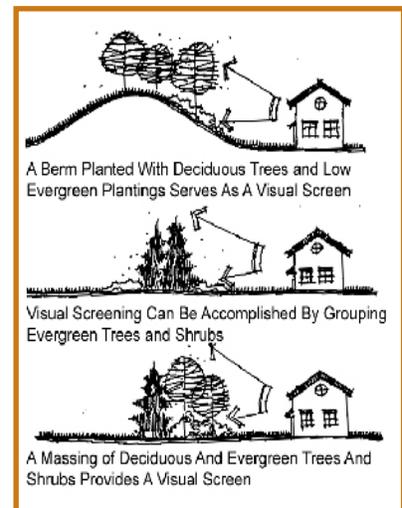


Figure 10.11.2 - Use trees to obscure sight lines.

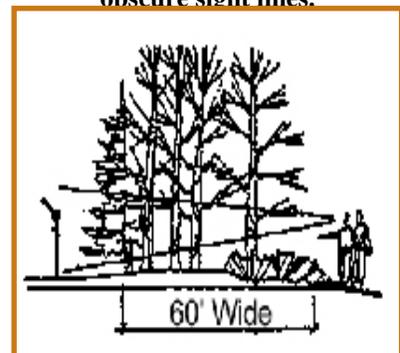


Figure 10.11.3 Establish a visual buffer along installation perimeter.

Landscape Design Standards



10.12 ARMY STANDARDS

10.12.1 The cited Army Standards shall be met.

- [Army Regulation \(AR\) 420-70, *Buildings and Structures*](#)
- [Unified Facilities Criteria \(UFC\) 3-210-05FA, *Design: Landscape Design and Planting Criteria*](#)
- [Technical Manual \(TM\) 5-630, *Natural Resources Land Management*](#)
- American Standard for Nursery Stock, ANSI Z60.1
- Overseas (Host Nation Standards)

10.13 REFERENCES

10.13.1 The following references are provided for guidance.

- [Unified Facilities Criteria \(UFC\) 2-600-01, *Installation Design, Chap 10*](#)
- [USAF Landscape Design Guide](#)
- C. Brickell and D. Joyce. *Pruning and Training*, 1996.

Links

[Go to Section 11](#)

[Go to Table of Contents](#)

APPENDIX J

DRAWINGS

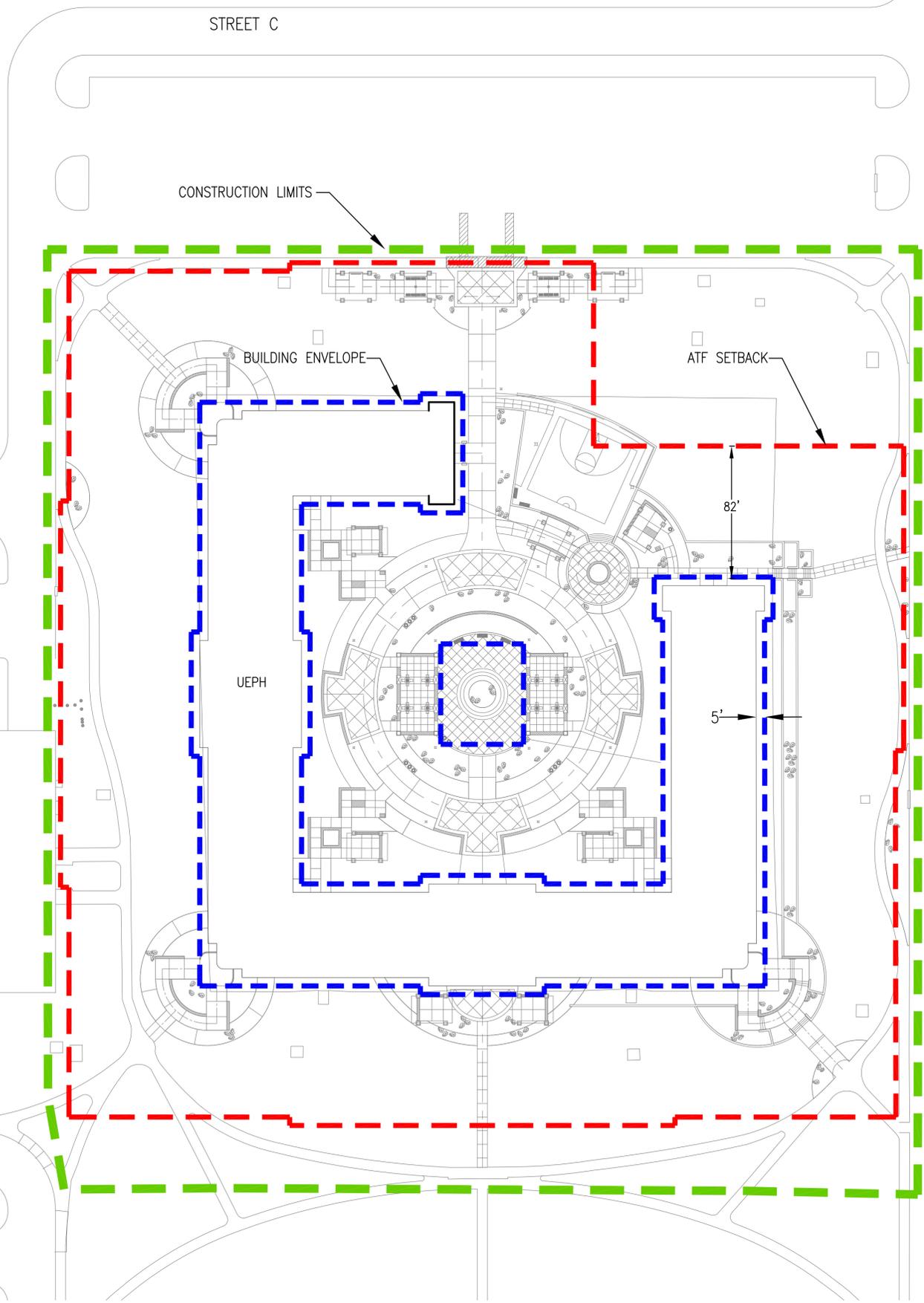


40' 20' 0' 40'
SCALE IN FEET

LEGEND:

- - - CONSTRUCTION LIMITS
- - - BUILDING ENVELOPE
- - - ATF 82 FOOT SETBACK

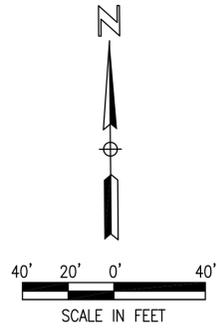
FENCE NOTE:
CONSTRUCTION AREA TO BE FENCED.



DATE: SEPTEMBER 24, 2010
JACOBS / HUITT-ZOLLARS

UEPH BARRACKS
WHITE SANDS MISSILE RANGE
WHITE SANDS, NEW MEXICO
RFP EXHIBIT - A
SITE PLAN

Sheet
reference
number:
EX-A



LEGEND

- PROPOSED WATER
- PROPOSED STORM
- EX. WATER METER
- EX. ELECTRIC TRANSFORMER W/ METER
- EX. WATER
- EX. GAS
- EX. S. SEWER
- EX. STORM
- EX. ELEC.
- EX. COMM.
- EX. VALVE
- EX. S. SEWER MANHOLE
- EX. S. SEWER CLEANOUT
- EX. ELEC. MANHOLE
- EX. COMM. MANHOLE
- EX. ELEC. JUNCTION BOX

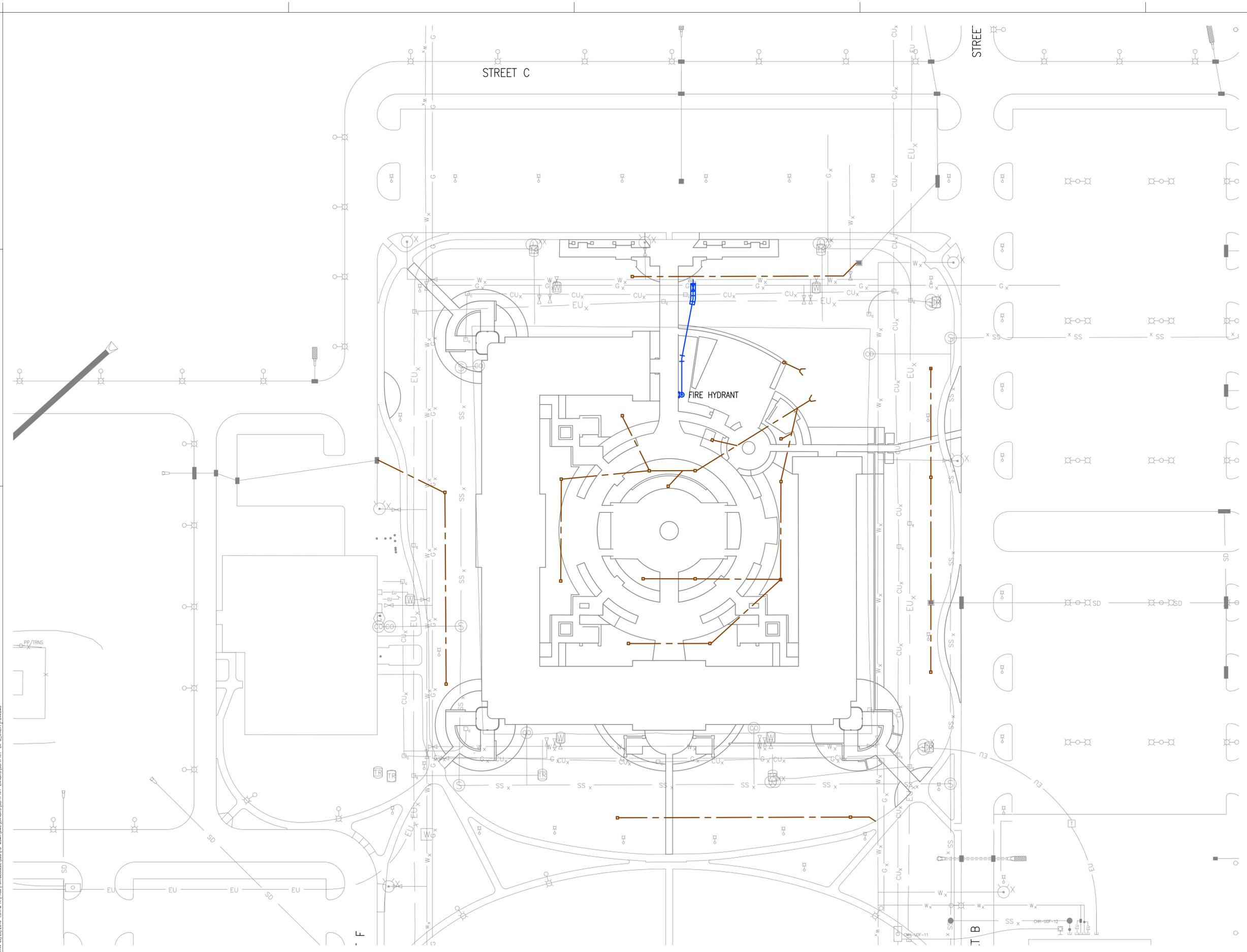
NOTES

SEE APPENDIX AP, EXCERPTS FROM EN BATTALION GTF INFRASTRUCTURE PLANS FOR DETAILED INFO ON THE EXISTING UTILITY INFORMATION.

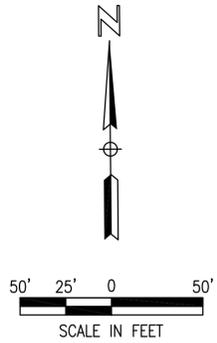
DATE: SEPTEMBER 24, 2010
JACOBS / HUITT-ZOLLARS

UEPH BARRACKS
WHITE SANDS MISSILE RANGE
WHITE SANDS, NEW MEXICO
RFP EXHIBIT - B
UTILITY PLAN

Sheet reference number:
EX-B



MARTIN 09/22/2010 03:17M H:\PROJ\WHITE SANDS\UEPH\BARRACKS\UEPH RFP EXHIBIT\UEPH RFP EX-B UTILITY PLAN.DWG



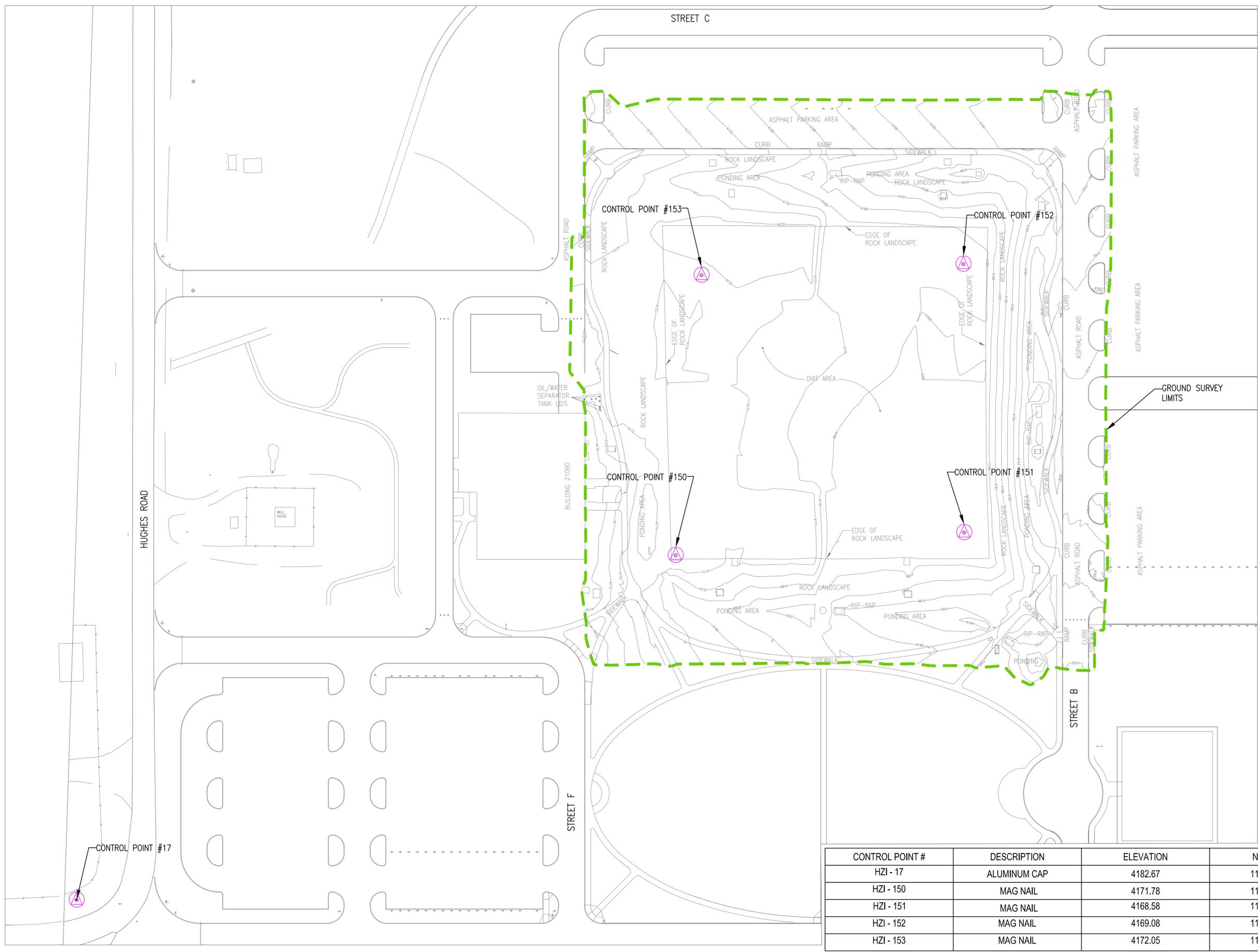
- LEGEND:**
- GROUND SURVEY LIMITS
 - SURVEY CONTROL POINTS
 - 4107' EXISTING CONTOURS

SURVEY DATUM NOTES:
THE COORDINATE SYSTEM OF THIS DRAWING IS UTM ZONE 13 NORTH, US SURVEY FEET, SCALED TO SURFACE (FROM 0.00 NORTH, 0.00 EAST) BY A FACTOR OF 1.0003621061. ELEVATIONS ARE NAVD 88

DATE: SEPTEMBER 24, 2010
JACOBS / HUITT-ZOLLARS

UEPH BARRACKS
WHITE SANDS MISSILE RANGE
WHITE SANDS, NEW MEXICO
RFP EXHIBIT - C
SITE SURVEY

Sheet reference number:
EX-C

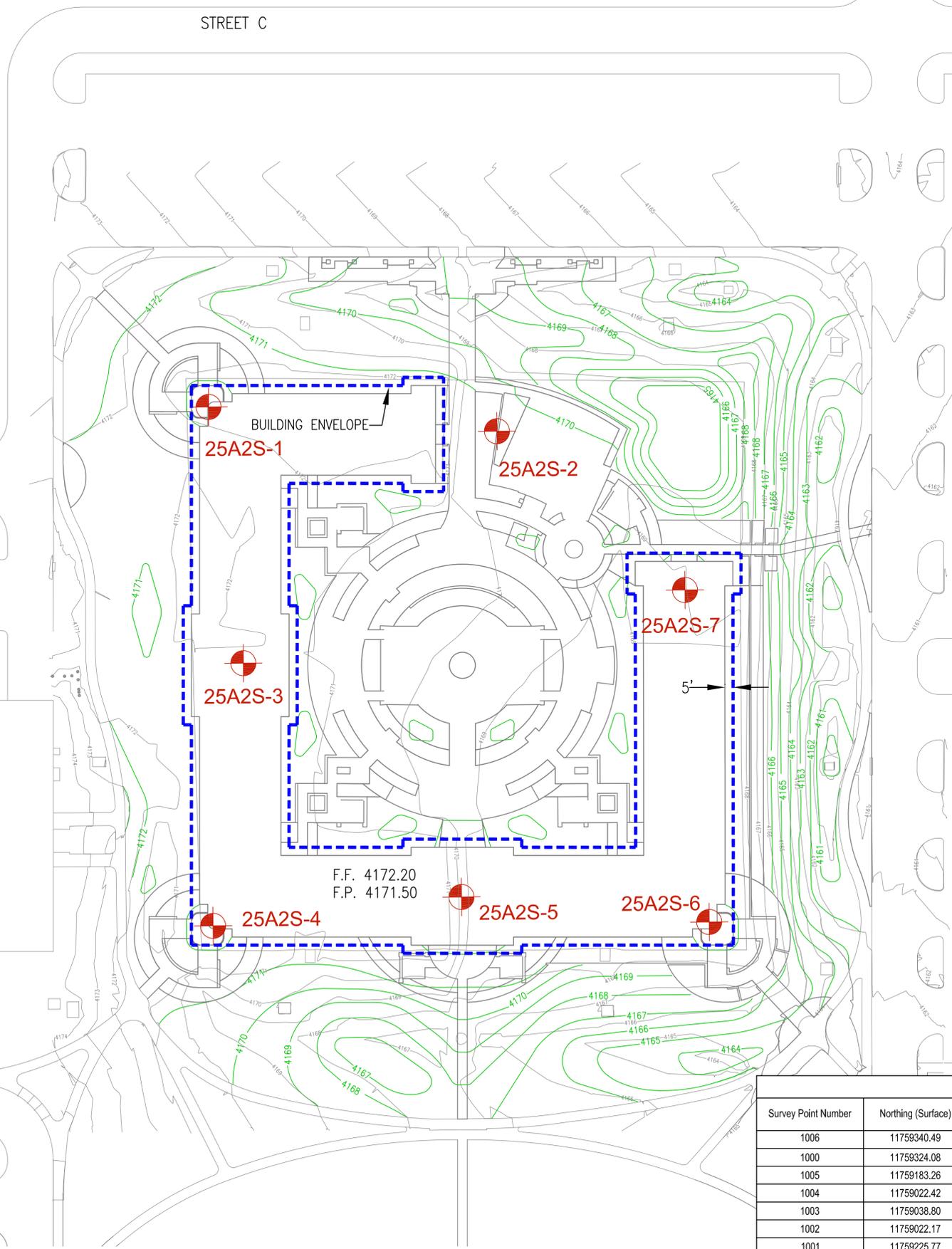


CONTROL POINT #	DESCRIPTION	ELEVATION	NORTHING	EASTING
HZI - 17	ALUMINUM CAP	4182.67	11758654.19	1187233.58
HZI - 150	MAG NAIL	4171.78	11759011.22	1187867
HZI - 151	MAG NAIL	4168.58	11759032.56	1188172.20
HZI - 152	MAG NAIL	4169.08	11759314.80	1188173.91
HZI - 153	MAG NAIL	4172.05	11759305.58	1187897.77

K:\MARTIN_09\27\2010_433PM_H\PROJ\SITE\UEPH\UEPH_RFP_EXHIBIT_C\SITE_SURVEY.rvt



40' 20' 0' 40'
SCALE IN FEET



STREET C

BUILDING ENVELOPE

25A2S-1

25A2S-2

25A2S-7

25A2S-3

F.F. 4172.20
F.P. 4171.50

25A2S-5

25A2S-6

5'

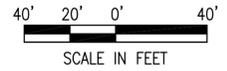
- LEGEND:
- - - BUILDING ENVELOPE
 - BORING LOCATIONS
 - F.F. 4172.20 FINISH FLOOR ELEVATION
 - F.P. 4171.50 FINISH PAD ELEVATION
 - EXISTING CONTOURS
 - PROPOSED CONTOURS

DATE: SEPTEMBER 24, 2010
JACOBS / HUITT-ZOLIARS

UEPH Bore Hole							
Survey Point Number	Northing (Surface)	Easting (Surface)	Elevation (NAVD 88)	Latitude (NAD 83)	Longitude (NAD 83)	Ellipsoid Heights	Bore Hole Name
1006	11759340.49	1187870.82	4172.01	32°22'30.224"N	106°28'03.5672"W	4094.57	SET 25A2S-1
1000	11759324.08	1188047.88	4168.74	32°22'30.0858"N	106°28'01.5006"W	4091.30	SET 25A2S-2
1005	11759183.26	1187890.82	4171.31	32°22'28.6714"N	106°28'03.3089"W	4093.87	SET 25A2S-3
1004	11759022.42	1187870.85	4171.78	32°22'27.0777"N	106°28'03.5159"W	4094.35	SET 25A2S-4
1003	11759038.80	1188023.62	4168.96	32°22'27.2604"N	106°28'01.7379"W	4091.52	SET 25A2S-5
1002	11759022.17	1188175.72	4168.32	32°22'27.1166"N	106°27'59.9622"W	4090.88	SET 25A2S-6
1001	11759225.77	1188162.59	4168.70	32°22'29.1288"N	106°28'00.1478"W	4091.26	SET 25A2S-7

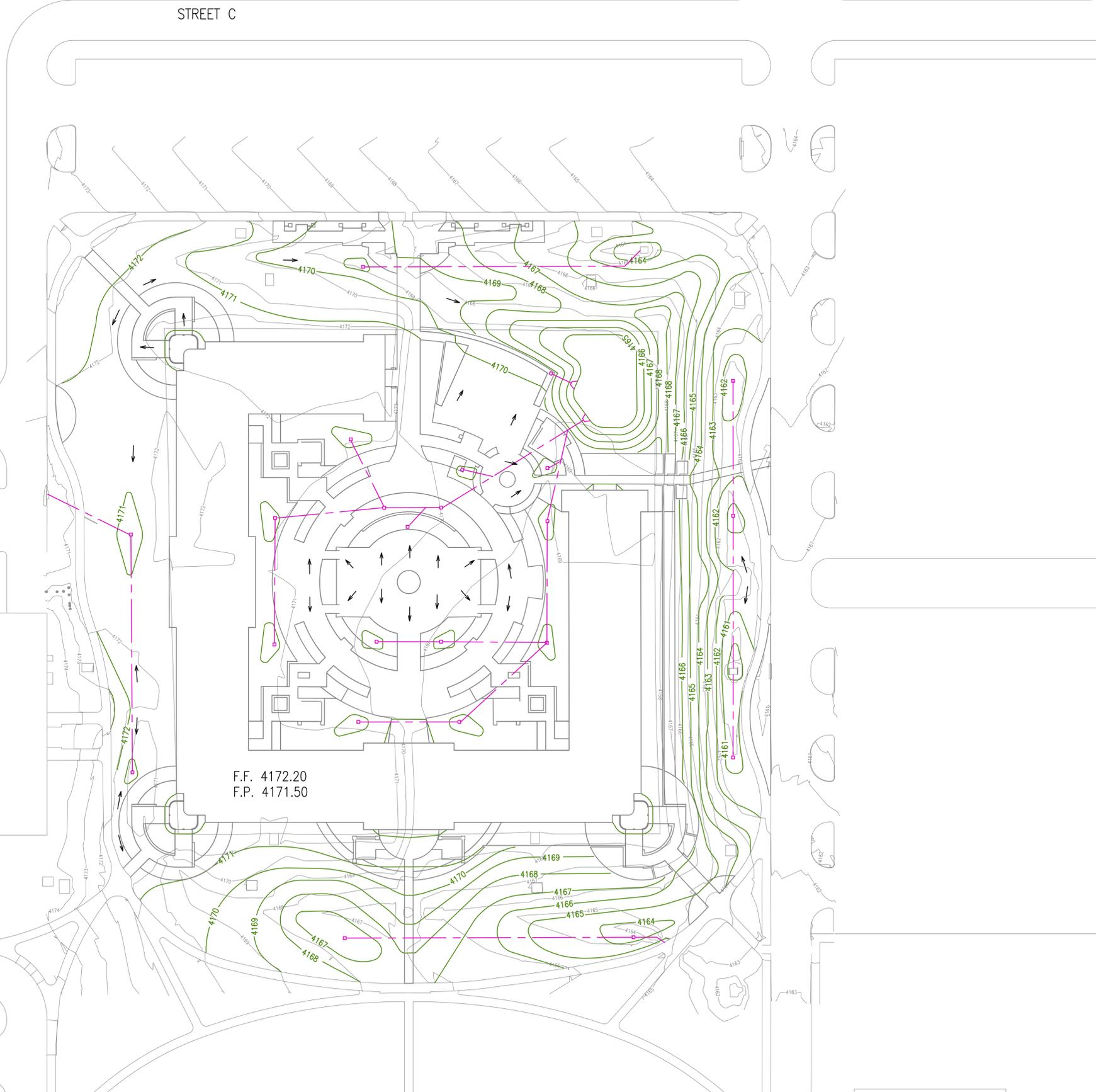
UEPH BARRACKS
WHITE SANDS MISSILE RANGE
WHITE SANDS, NEW MEXICO
RFP EXHIBIT - D
BORE HOLE LOCATION MAP

Sheet
reference
number:
EX-D



LEGEND

-  PROPOSED STORM
-  PROPOSED CONTOURS
-  EXISTING CONTOURS
-  SURFACE FLOW
- F.F. 4172.20 FINISH FLOOR ELEVATION
- F.P. 4171.50 FINISH PAD ELEVATION



F.F. 4172.20
F.P. 4171.50

DATE: SEPTEMBER 24, 2010
JACOBS / HUITT-ZOLLARS

UEPH BARRACKS
WHITE SANDS MISSILE RANGE
WHITE SANDS, NEW MEXICO
RFP EXHIBIT - E
GRADING PLAN

Sheet
reference
number:
EX-E

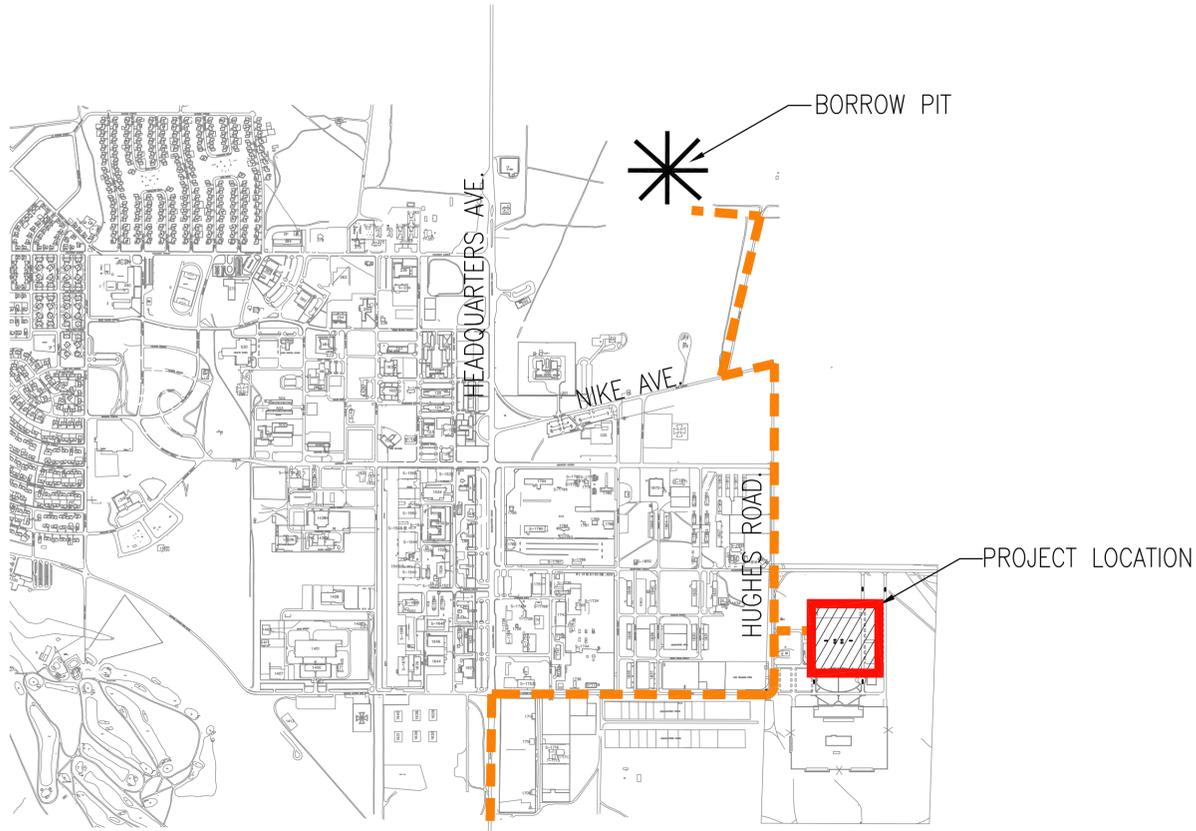


1000' 500' 0' 1000'
SCALE IN FEET

LEGEND:

--- HAUL ROUTE

▨ PROJECT LOCATION



213

CONSTRUCTION ENTRANCE



WSMR RT. 3

WAR ROAD

213

DATE: SEPTEMBER 24, 2010
JACOBS / HUITT-ZOLIARS

UEPH BARRACKS
WHITE SANDS MISSILE RANGE
WHITE SANDS, NEW MEXICO
RFP EXHIBIT - G
HAUL ROUTE - BORROW PIT

Sheet
reference
number:
EX-G

APPENDIX K
LIFE CYCLE COST ANALYSIS
UTILITY RATES

ENERGY CONSUMPTION AND COST DATA FOR 2009

22 June 2010

Page 1 of 1

35955 WHITE SANDS MISSILE RANGE

AEWRS DATA					TABLE 1-1		DATACHECK	Est. GHG Emissions (MTCO ₂ e)
Energy Type	Consumption Units	Consumption	Cost (K \$)	BBTUS	Calculated Consumption	Cost (K \$)	Unit Cost (\$)	
Electricity	MWH	83,466	\$7,098	284.8	83,466.0	7,097.9	\$0.09 /kWh	54,023.9
Fuel Oil	Thou Gal	0	\$0	0.0	0.0	0.0	\$0.00	0.0
Natural Gas	Thou Cu Ft	92,255	\$422	95.1	92,255.0	422.1	\$4.58 /Thou CF	5,055.4
LPG/Propane	Thou Gal	388	\$523	37.0	387.9	522.7	\$1.35 /gallon	2,308.8
Coal	Sh Ton	0	\$0	0.0	0.0	0.0	\$0.00	0.0
Purch. Steam	BBtu	0	\$0	0.0	0.0	0.0	\$0.00	0.0
Other	BBtu	0	\$0	0.0	0.0	0.0	\$0.00	0.0
							Total:	61,388.0

FY 2009

APPENDIX L

LEED Project Credit Guidance (MAY 10)

This spreadsheet indicates Army required credits, Army preferred credits, project-specific ranking of individual point preferences, assumptions guidance for individual credits, and references to related language in the RFP for individual credits.

LEED Credit Paragraph	LEED Project Credit Guidance	Army Guidance: Required - Preferred - Avoid		Project Preference Ranking: (1=most preferred, blank=no preference, X=preference not applicable to this credit, Rqd=required)	REMARKS
PAR	FEATURE				
SUSTAINABLE SITES					
SSPR1	Construction Activity Pollution Prevention (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.	
SS1	Site Selection		X	See paragraph LEED CREDITS COORDINATION.	

SS2	Development Density & Community Connectivity - OPTION 1 DENSITY		X	See paragraph LEED CREDITS COORDINATION.
	Development Density & Community Connectivity - OPTION 2 CONNECTIVITY		X	See paragraph LEED CREDITS COORDINATION.
SS3	Brownfield Redevelopment		X	See paragraph LEED CREDITS COORDINATION.
SS4.1	Alternative Transportation: Public Transportation Access		X	See paragraph LEED CREDITS COORDINATION.
SS4.2	Alternative Transportation: Bicycle Storage & Changing Rooms	Pref		Assume that non-transient building occupants are NOT housed on Post unless indicated otherwise.
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 1			Requires provision of vehicles, which cannot be purchased with construction funds. Assume Government will not provide vehicles unless indicated otherwise. Assume that 50% of GOV fleet is NOT alternative fuel vehicles unless indicated otherwise.
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 2	Pref		
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 3			Requires provision of vehicle refueling stations. Installation must support type of fuel and commit to maintaining/supporting refueling stations.
SS4.4	Alternative Transportation: Parking Capacity	Pref		

SS5.1	Site Development: Protect or Restore Habitat			
SS5.2	Site Development: Maximize Open Space	Pref		Assume AGMBC option for aggregated open space at another location on the installation is not available to the project unless indicated otherwise.
SS6.1	Stormwater Design: Quantity Control	Pref		See paragraph STORMWATER MANAGEMENT.
SS6.2	Stormwater Design: Quality Control	Pref		See paragraph STORMWATER MANAGEMENT.
SS7.1	Heat Island Effect: Non-Roof			
SS7.2	Heat Island Effect: Roof	Pref		Coordinate with nearby airfield requirements, which may preclude this credit.
SS8	Light Pollution Reduction	Pref		
<u>WATER EFFICIENCY</u>				
WEPR1	Water Use Reduction (Version 3 only)	Rqd	Rqd	All LEED prerequisites are required to be met.
WE1.1	Water Efficient Landscaping: Reduce by 50%	Pref		See paragraph IRRIGATION. Project must include landscaping to be eligible for this credit.
WE1.2	Water Efficient Landscaping: No Potable Water Use or No Irrigation	Pref		Project must include landscaping to be eligible for this credit.
WE2	Innovative Wastewater Technologies - OPTION 1			
WE2	Innovative Wastewater Technologies - OPTION 2			
WE3	Water Use Reduction	Pref		See paragraph BUILDING WATER USE REDUCTION.

ENERGY AND ATMOSPHERE				
EAPR1	Fundamental Commissioning of the Building Energy Systems (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
EAPR2	Minimum Energy Performance (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
EAPR3	Fundamental Refrigerant Management (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
EA1	Optimize Energy Performance	Rqd	1	Earning of LEED EA1 points as indicated in paragraph ENERGY CONSERVATION , as a minimum, is required.
EA2.1	On-Site Renewable Energy	Pref		See paragraph ENERGY CONSERVATION .
EA3	Enhanced Commissioning	Rqd		See paragraph COMMISSIONING . The Commissioning Authority may be provided through the Design-Build Contractor only if in accordance with USGBC Credit Interpretation Ruling (CIR) dated 9/15/06. Commissioning Authority activities begin during design phase and continue well beyond beneficial occupancy. Assume Government will not provide CxA post-occupancy activities unless indicated otherwise.
EA4	Enhanced Refrigerant Management			
EA5	Measurement & Verification			Assume Government will not provide post-occupancy activities unless indicated otherwise.
EA6	Green Power		X	See paragraph LEED CREDITS COORDINATION .

MATERIALS AND RESOURCES				
MRPR1	Storage & Collection of Recyclables (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met. Coordinate with Installation during design development on collection service and receptacles.
MR1	Building Reuse			
MR2.1	Construction Waste Management: Divert 50% From Disposal	Pref		See paragraph CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT.
MR2.2	Construction Waste Management: Divert 75% From Disposal	Pref		
MR3	Materials Reuse			
MR4.1	Recycled Content: 10% (post-consumer + 1/2 pre-consumer)	Pref		See paragraph RECYCLED CONTENT.
MR4.2	Recycled Content: 20% (post-consumer + 1/2 pre-consumer)	Pref		
MR5.1	Regional Materials:10% Extracted, Processed & Manufactured Regionally			
MR5.2	Regional Materials:20% Extracted, Processed & Manufactured Regionally			

MR6	Rapidly Renewable Materials	Pref		See paragraph BIOBASED AND ENVIRONMENTALLY PREFERABLE MATERIALS and paragraph FEDERAL BIOBASED PRODUCTS PREFERRED PROCUREMENT PROGRAM.
MR7	Certified Wood	Pref		See paragraph BIOBASED AND ENVIRONMENTALLY PREFERABLE MATERIALS.
INDOOR ENVIRONMENTAL QUALITY				
EQPR1	Minimum IAQ Performance (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
EQPR2	Environmental Tobacco Smoke (ETS) Control (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met. Assume all buildings are smoke free unless indicated otherwise (family housing, barracks and other lodging are facility types where smoking may be permitted in some cases).
EQ1	Outdoor Air Delivery Monitoring			
EQ2	Increased Ventilation			
EQ3.1	Construction IAQ Management Plan: During Construction	Pref		See paragraph CONSTRUCTION IAQ MANAGEMENT.
EQ3.2	Construction IAQ Management Plan: Before Occupancy	Pref		See paragraph CONSTRUCTION IAQ MANAGEMENT.
EQ4.1	Low Emitting Materials: Adhesives & Sealants	Pref		See paragraph LOW-EMITTING MATERIALS.
EQ4.2	Low Emitting Materials: Paints & Coatings	Pref		See paragraph LOW-EMITTING MATERIALS.
EQ4.3	Low Emitting Materials: Carpet/Flooring Systems	Pref		See paragraph LOW-EMITTING MATERIALS.

EQ4.4	Low Emitting Materials: Composite Wood & Agrifiber Products	Pref		See paragraph LOW-EMITTING MATERIALS.
EQ5	Indoor Chemical & Pollutant Source Control	Pref		System requiring weekly cleaning to earn this credit is not a permitted option unless indicated otherwise.
EQ6.1	Controllability of Systems: Lighting			
EQ6.2	Controllability of Systems: Thermal Comfort			
EQ7.1	Thermal Comfort: Design	Rqd		See paragraph HEATING, VENTILATING AND AIR CONDITIONING.
EQ7.2	Thermal Comfort: Verification			Project must earn credit EQ7.1 to be eligible for this credit. Assume Government will not provide post-occupancy activities unless indicated otherwise.
EQ8.1	Daylight & Views: Daylight 75% of Spaces	Pref		See paragraph DAYLIGHTING.
EQ8.2	Daylight & Views: Views for 90% of Spaces	Pref		
INNOVATION & DESIGN PROCESS				
IDc1.1	Innovation in Design			See paragraph INNOVATION AND DESIGN CREDITS. Assume Government will not provide any activities associated with ID credits.
IDc1.2	Innovation in Design			
IDc1.3	Innovation in Design			
IDc1.4	Innovation in Design			
IDc2	LEED Accredited Professional	Rqd	Rqd	LEED AP during design and construction is required.
REGIONAL PRIORITY CREDITS (Version 3 only)				See paragraph LEED CREDITS COORDINATION.

APPENDIX M

LEED OWNER'S PROJECT REQUIREMENTS

LEED-NC Version 2.2 Registered Project Checklist

8/26/2010

WSMR UEPH

Points required by RFP or provided (Includes both GOV/LDE & Building CTR Points) to Meet Silver Rating

Possible points by GOV/LDE or Building CTR.

Yes	Yes	?	?	No	POINTS NOT AVAILABLE OR NOT ALLOWED
D/B	GOV	D/B	GOV		

1 5 0 0 7 Sustainable Sites 14 Points Notes

Yes	Yes	?	?	No		
D/B	GOV	D/B	GOV			
Y					Prereq 1	Construction Activity Pollution Prevention
	1				Credit 1	Site Selection
				1	Credit 2	Development Density & Community Connectivity
				1	Credit 3	Brownfield Redevelopment
				1	Credit 4.1	Alternative Transportation, Public Transportation Access
				1	Credit 4.2	Alternative Transportation, Bicycle Storage & Changing Rooms
	1				Credit 4.3	Alternative Transportation, Low-Emitting and Fuel-Efficient Vehicles
	1				Credit 4.4	Alternative Transportation, Parking Capacity
				1	Credit 5.1	Site Development, Protect or Restore Habitat
	1				Credit 5.2	Site Development, Maximize Open Space
				1	Credit 6.1	Stormwater Design, Quantity Control
				1	Credit 6.2	Stormwater Design, Quality Control
	1				Credit 7.1	Heat Island Effect, Non-Roof
					Credit 7.2	Heat Island Effect, Roof
1					Credit 8	Light Pollution Reduction

Yes Yes ? ? No
D/B GOV D/B GOV

4 0 0 0 0 Water Efficiency 5 Points

Yes	Yes	?	?	No		
D/B	GOV	D/B	GOV			
1					Credit 1.1	Water Efficient Landscaping, Reduce by 50%
1					Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation
					Credit 2	Innovative Wastewater Technologies
1					Credit 3.1	Water Use Reduction, 20% Reduction
1					Credit 3.2	Water Use Reduction, 30% Reduction

Yes Yes ? ? No
D/B GOV D/B GOV

3 0 0 0 1 Energy & Atmosphere 17 Points

Yes	Yes	?	?	No		
D/B	GOV	D/B	GOV			
Y					Prereq 1	Fundamental Commissioning of the Building Energy Systems
Y					Prereq 2	Minimum Energy Performance
Y					Prereq 3	Fundamental Refrigerant Management
2		8			Credit 1	Optimize Energy Performance
					Credit 2	On-Site Renewable Energy
1					Credit 3	Enhanced Commissioning
					Credit 4	Enhanced Refrigerant Management
					Credit 5	Measurement & Verification
				1	Credit 6	Green Power

Yes Yes ? ? No
D/B GOV D/B GOV

1 0 0 0 0 Materials & Resources 13 Points

Yes	Yes	?	?	No		
D/B	GOV	D/B	GOV			
Y					Prereq 1	Storage & Collection of Recyclables
					Credit 1.1	Building Reuse, Maintain 75% of Existing Walls, Floors & Roof
					Credit 1.2	Building Reuse, Maintain 100% of Existing Walls, Floors & Roof
					Credit 1.3	Building Reuse, Maintain 50% of Interior Non-Structural Elements
1					Credit 2.1	Construction Waste Management, Divert 50% from Disposal
					Credit 2.2	Construction Waste Management, Divert 75% from Disposal
					Credit 3.1	Materials Reuse, 5%
					Credit 3.2	Materials Reuse, 10%
					Credit 4.1	Recycled Content, 10% (post-consumer + 1/2 pre-consumer)
					Credit 4.2	Recycled Content, 20% (post-consumer + 1/2 pre-consumer)
					Credit 5.1	Regional Materials, 10% Extracted, Processed & Manufactured Regionally
					Credit 5.2	Regional Materials, 20% Extracted, Processed & Manufactured Regionally
					Credit 6	Rapidly Renewable Materials
					Credit 7	Certified Wood

Yes D/B	Yes GOV	? D/B	? GOV	No D/B			
1	0	0	0	0	Indoor Environmental Quality		15 Points
Y					Prereq 1	Minimum IAQ Performance	Required
Y					Prereq 2	Environmental Tobacco Smoke (ETS) Control	Required
					Credit 1	Outdoor Air Delivery Monitoring	1
					Credit 2	Increased Ventilation	1
					Credit 3.1	Construction IAQ Management Plan, During Construction	1
					Credit 3.2	Construction IAQ Management Plan, Before Occupancy	1
					Credit 4.1	Low-Emitting Materials, Adhesives & Sealants	1
					Credit 4.2	Low-Emitting Materials, Paints & Coatings	1
					Credit 4.3	Low-Emitting Materials, Carpet Systems	1
					Credit 4.4	Low-Emitting Materials, Composite Wood & Agrifiber Products	1
					Credit 5	Indoor Chemical & Pollutant Source Control	1
					Credit 6.1	Controllability of Systems, Lighting	1
					Credit 6.2	Controllability of Systems, Thermal Comfort	1
1					Credit 7.1	Thermal Comfort, Design	1 2
					Credit 7.2	Thermal Comfort, Verification	1
					Credit 8.1	Daylight & Views, Daylight 75% of Spaces	1
					Credit 8.2	Daylight & Views, Views for 90% of Spaces	1

Yes D/B	Yes GOV	? D/B	? GOV	No D/B			
1	0	0	0	0	Innovation & Design Process		5 Points
					Credit 1.1	Innovation in Design: Specific Title	1
					Credit 1.2	Innovation in Design: Specific Title	1
					Credit 1.3	Innovation in Design: Specific Title	1
					Credit 1.4	Innovation in Design: Specific Title	1
1					Credit 2	LEED® Accredited Professional	1

Yes D/B	Yes GOV	? D/B	? GOV	No D/B			
11	5	0	0	8	Project Totals (pre-certification estimates)		69 Points
16	TOTAL			8	Certified 26-32 points Silver 33-38 points Gold 39-51 points Platinum 52-69 points		

Notes:

- Engineers Battalion was designed using a campus approach, these credits can be earned if they are documented using this approach.
- These credits are required by ECB 2010-14.

APPENDIX N

LEED Requirements for Multiple Contractor Combined Projects

When site work and building(s) for a project are accomplished by separate contractors, it is referred to as a Combined Project for purposes of LEED scoring and documentation and the following is required:

- LEED points relating to site work must be combined with the LEED points for each building to arrive at a single LEED Combined Project score.
- LEED points having both building requirements and site requirements (combined bldg/site points) must be coordinated between the contractors.
- LEED aggregate materials points must be coordinated between the contractors and a division of responsibilities for each contractor's required contribution to the point must be developed.
- LEED Project documentation from separate contractors must be combined.

Multiple Contractor Combined Project Definition. See paragraph MULTIPLE CONTRACTOR COMBINED PROJECT in paragraph PROJECT SPECIFIC REQUIREMENTS of the Statement of Work to see if this project is part of a Multiple Contractor Combined Project. A summary of the separate projects that constitute the Combined Project may be provided at paragraph SUSTAINABLE DESIGN – ADDITIONAL INFORMATION or may be obtained from the Contracting Officer's Representative. Typical Multiple Contractor Combined Projects are comprised of the site work contract and all the building-only contracts for buildings that the site work is provided for in the separate site work contract.

LEED Points Coordination. See Appendix LEED Strategy Table(s) for the total number of points each contractor is responsible for obtaining, for special requirements relating to combined building/site points and for each contractor's requirement relating to aggregate materials points each portion of this Multiple Contractor Combined Project. Each contractor providing a building is referred to as Building CTR and Site CTR refers to the contractor providing the site development. For each building included in the site work contract, the site work contractor is both Building CTR and Site CTR for that building. Aggregate materials percentages indicated in the table(s) are percentage of that contractor's materials total.

Point Substitutions. During preparation of the Proposal, each contractor is free to substitute other LEED points for those indicated in the LEED Strategy Table(s), except points marked "NO" in the "Building CTR Substitutions Permitted" column may not be deleted or added by substitution by building contractor and points marked "NO" in the "Site CTR Substitutions Permitted" column may not be deleted or added by substitution by site contractor. Credit substitutions after award are not permitted except with the advance approval of the Contracting Officer.

LEED Documentation. Each contractor is responsible for developing all project LEED documentation demonstrating compliance for their portion of the work and must utilize the LEED Letter Templates. Each contractor is responsible for updating construction phase LEED documentation at least monthly until construction closeout. No CTR will duplicate the data of another CTR within their own documentation. Each contractor will include the contractor name, project name and number and individual building description as applicable on each Letter Template. The LEED Letter Templates are copyright protected and shall be used only for this specific contract and this registered project.

Compiling LEED Documentation from Multiple Contractors. At completion and acceptance of final design submittals the completed design phase letter templates and their attachments from all CTRs in the Multiple Contractor Combined Project will be compiled at the registered site project. All CTRs will furnish electronic copies of their completed letter templates and their attachments for this purpose. Monthly during construction and at construction closeout all CTRs current construction phase letter templates and their attachments will be compiled at the registered site project. Summary letter templates for all

aggregate credits (see AGMBC for which credits are aggregate credits) will be created and maintained monthly with summary data from all from all CTRs in the Multiple Contractor Combined Project at the registered site project. All CTRs will furnish electronic copies of the current updated templates and their attachments for this purpose monthly and at closeout.

Site Work Portion of Multiple Contractor Combined Project, Administration by the Government. If paragraph 16.4.2 CREDIT VALIDATION indicates this is the site work portion of a Multiple Contractor Combined Project and that administration of the online project is by the Government, the Government will provide access to blank Letter Templates for site CTRs use and the Government will perform the compiling indicated in paragraph Compiling LEED Documentation from Multiple Contractors above.

Site Work Portion of Multiple Contractor Combined Project, Shared Administration. If paragraph 16.4.2 CREDIT VALIDATION indicates this is the site work portion of a Multiple Contractor Combined Project and that administration of the online project is shared between Contractor and Government, the Contractor will administer the registered site project until final design acceptance, at which point administration will be transferred to the Government. The Government will administer the project during construction and the Government will perform the compiling indicated in paragraph Compiling LEED Documentation from Multiple Contractors above.

Site Work Portion of Multiple Contractor Combined Project, Administration by the Contractor. If paragraph 16.4.2 CREDIT VALIDATION indicates this is the site work portion of a Multiple Contractor Combined Project and that administration of the online project is by the Contractor, the Contractor will administer the project and **the Contractor will perform the compiling indicated in paragraph Compiling LEED Documentation from Multiple Contractors above.**

Standard Design Building(s) portion of Multiple Contractor Combined Project, Administration by the Government. If paragraph 16.4.2 CREDIT VALIDATION indicates this is a standard design building(s) portion of a Multiple Contractor Combined Project and that administration of the online project is by the Government, the Government will provide access to blank Letter Templates for standard design building CTRs use as follows:

Instructions for Obtaining LEED Letter Templates for Registered Army Standard Designs

General. Contractors providing Army standard design buildings only (site work by another contractor) in a Multiple Contractor Combined project obtain their LEED Letter Templates for the project from the Center of Standardization (COS) for that standard design.

Information You Need to Provide. After award, contact the COS POC indicated below requesting LEED Letter Templates for your project. In your request, indicate the following:

- Project name, location, Contractor name, PN number and contract number
- Description of building(s) you are responsible for (example: S/ML/L COF w/detached admin)
- LEED Documentation Responsible Party name, phone number, email contact info
- Responsible party certification of understanding that Letter Templates furnished by the Government for this project are copyright protected and will not be used for any purposes other than for this project documentation.

Attach the LEED Registered Project Checklist from conformed proposal which indicates the points the project will earn/contribute to.

SAMPLE EMAIL REQUEST:

To: (COS POC below)
CC: (Contracting Officer's Representative (COR) for your contract)
Subject: COS LEED Letter Templates Request

We have an awarded contract and request COS LEED Letter Templates for:

Project: 4th BCT Complex
Location: Fort Bragg, NC
Contractor: Great Design Builder Inc.
Project Number/Contract Number: PN 65555, W912HN-08-C-0001
Standard Design Building Type(s): Large Brigade HQ, Medium Battalion HQ

Our **Responsible Party** for LEED Documentation for this project is (name, phone number, email).

Certification: I, (sender name), certify that the LEED Letter Templates furnished by the Government for this project are copyright protected and I will ensure that they are not used for any purpose other than project documentation for this project only.

Attached Checklist: Please see attached LEED Project Checklist, which indicates the points this project will earn.

Salutation,
Name

*

COS Points of Contact for Obtaining Letter Templates. Email your request to the applicable POC indicated below. If there is no POC indicated for the standard design you are providing, contact your project COR for direction.

Army Standard Design

Army Family Housing
Battalion Headquarters
Brigade Headquarters
Company Operations Facilities (COF)
Criminal Investigation Facilities
Enlisted Personnel Dining Facilities
General Instruction Buildings/Classroom XXI
Military Entrance Processing Stations
Tactical Equipment Maintenance Facilities (TEMF)
Transient Officer's Quarters (part of ORTC)

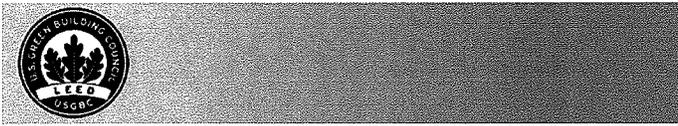
Point of Contact

Lisa.A.Bobotas@usace.army.mil
judith.f.milton@usace.army.mil
judith.f.milton@usace.army.mil
judith.f.milton@usace.army.mil
Matthew.C.Scanlon@usace.army.mil
David.A.Gary@usace.army.mil
Huong.M.Huynh@usace.army.mil
Lisa.A.Bobotas@usace.army.mil
judith.f.milton@usace.army.mil
paul.m.kai@usace.army.mil

Furnishing Completed Documentation to COS Letter Template Library. Certain completed design phase letter templates with attachments may be requested by the COS for future use as part of the standard design. If requested, provide an electronic copy to the COS Point of Contact indicated above. The Center of Standardization (COS) for individual Army standard designs may maintain a library of completed LEED documentation for that standard design. The Government will make the completed templates available to subsequent standard design projects in order to reduce duplication of documentation effort to the extent possible. To inquire about reviewing or obtaining completed LEED documentation that may be applicable to a particular project, contact the Center of Standardization POC.

APPENDIX O
LEED Strategy Tables

Not Used



WELCOME TRACIE
10493625 - WSMR - EUPH Barracks 72110
LEED NC 2.2

LEED-Online Home Credit Scorecard & Status Project Summary Team Admin Documents Public Filings Project CIR Help Project Selector Sign Out

PROJECT SUMMARY

REGISTRATION

Registration	Design Application	Design Review	Design Appeal	Design Appeal Review	Construction Application	Construction Review	Construction Appeal	Construction Appeal Review	Certification / Denial
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PROJECT SUMMARY

You have 10 new Notifications.



Click on "Edit" at the bottom of the page to update or add any information.
Note: All fields are required. You must provide an answer to all questions to update your information.

Summary	Project Address	Certification	Primary Contact	Project Manager	Owner	Architect	Project Type	Documents
BASICS		BUILDING USE						
Project Name (40 character limit):	WSMR - EUPH Barracks 72110	Owner Type:	Federal Government					
Project Access ID:	4067665227150642	Will Owner Occupy Completed Project:	Yes					
How Did You Hear About LEED?	Professional Colleague	Occupant Type:	Federal Government					
Is Project Confidential? (Confidential Projects are not listed on Web Site)	No	Estimated Date of Occupancy:	3/1/2013					
		Current Project Phase:	Design Development					
PROJECT COST		PROJECT INFORMATION						
Project cost not including site work, furniture, fit-out and equipment (FFE):	104354000	% New construction:	0					
Estimated furniture, fit-out and equipment (FFE) budget:	0	% Renovation:	0					
Estimated site work budget, including surface parking:	0	Located in Historic District:	No					
Estimated first cost/savings with green/sustainable technologies, strategies and design:	0	Year original (or new) building constructed:	2011					
Estimated 20 year life cycle savings through green/sustainable technologies, strategies and design:	0	Project Scope:	Multiple Buildings					
Estimated cost to prepare documentation for LEED Certification:	0	Hours/week building is in use/occupied:	0					
Note: Numbers only please. Please omit dollar signs, commas, and decimals. (ex. Correct: 100000 Incorrect: \$100,000.00)		PROJECT BUILDING CODE						
PROJECT SITE		Floors Above Ground Plane:		0				
Total Property Area: (in Square Feet)	0	Construction Classification Code:		-				
Gross Square Footage: (in Square Feet)	527040	Occupancy Classification Code:		-				
Total Building Footprint: (in Square Feet)	0	Project Building Code:		-				
Surface parking spaces:	0	Building Occupants:		0				
Structure Parking Spaces:	0							
Undisturbed Site Area:	0							
Site Context/Setting:	Suburban							
Site Conditions:	Greenfield (Pristine)							

Edit

APPENDIX Q
REV 2.1 – 30 SEP 2010
AREA COMPUTATIONS

Computation of Areas: Compute the “gross area” and “net area” of facilities (excluding family housing) in accordance with the following subparagraphs:

(1) Enclosed Spaces: The “gross area” is the sum of all floor spaces with an average clear height $\geq 6'-11"$ (as measured to the underside of the structural system) and having perimeter walls which are $\geq 4'-11"$. The area is calculated by measuring to the exterior dimensions of surfaces and walls.

(2) Half-Scope Spaces: Areas of the following spaces shall count as one-half scope when calculating “gross area”:

- Balconies
- Porches
- Covered exterior loading platforms or facilities
- **Covered but not enclosed spaces, canopies, training, and assembly areas**
- Covered but not enclosed passageways and walks
- Open stairways (both covered and uncovered)
- Covered ramps
- Interior corridors (Unaccompanied Enlisted Personnel Housing Only)

(3) Excluded Spaces: The following spaces shall be excluded from the “gross area” calculation:

- Crawl spaces
- Uncovered exterior loading platforms or facilities
- Exterior insulation applied to existing buildings
- Open courtyards
- Open paved terraces
- Uncovered ramps
- Uncovered stoops
- Utility tunnels and raceways
- Roof overhangs and soffits measuring less than 3'-0" from the exterior face of the building to the fascia

(4) Net Floor Area: Where required, “net area” is calculated by measuring the inside clear dimensions from the finish surfaces of walls. If required, overall “assignable net area” is determined by subtracting the following spaces from the “gross area”:

- Basements not suited as office, special mechanical, or storage space
- Elevator shafts and machinery space
- Exterior walls
- Interior partitions
- Mechanical equipment and water supply equipment space
- Permanent corridors and hallways
- Stairs and stair towers
- Janitor closets
- Electrical equipment space
- Electronic/communications equipment space

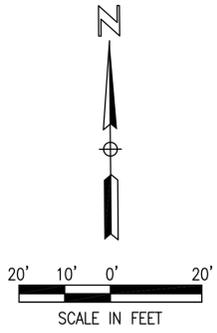
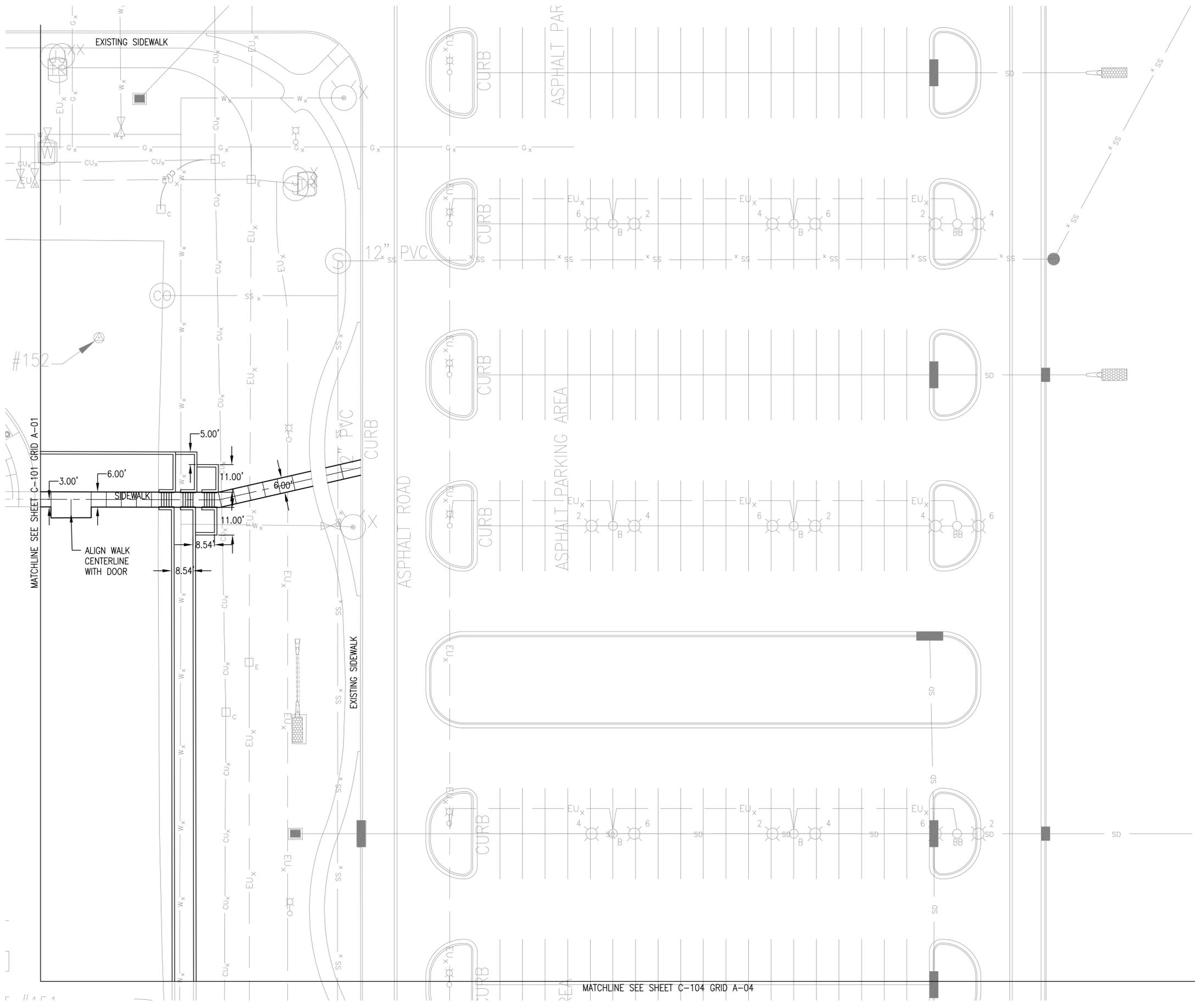
APPENDIX R

Preliminary Submittal Register

NOTE TO SPECIFIER:

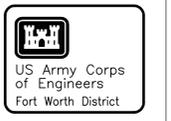
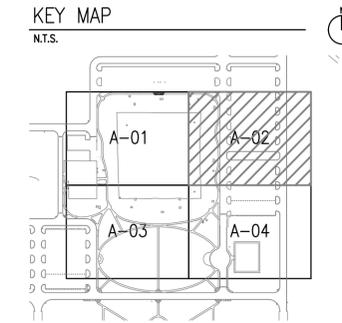
1. Appendix R" will be a Adobe Acrobat pdf version of the Specifier completed "Sample Preliminary Submittal Register." The Sample Register is Excel Spreadsheet format of the RMS Input Form 4288A, which serves two purposes.
2. First, The Register allows the both Government and the Proposers to see and estimate the cost of the Division 00 and Division 01 submittals required by the contract in addition to the Contractor generated submittal register items developed during Design After Award.
3. Secondly, after award, the Government will provide the Contractor the actual Excel Spreadsheet for the Contractor to input the data into RMS to create the Submittal Register used during contract performance. See Section 01 33 00 (Submittal Procedures), paragraph 1.8 (Submittal Register) for the contract requirements.
4. For the contract or task order Solicitation, the Specifier must complete APPENDIX R, found at the following link:
<https://rfpwizard.cecer.army.mil/HTML/Docs/Refs/Sample%20Preliminary%20Submittal%20Register.xls> , save it as a PDF file and then upload it into the Wizard as Appendix R.
5. The RMS Input Form initially includes submittals required by the standardized Model RFP Division 00 and Division 01 Sections, except Section 01 10 00, paragraph 3. Examine the Special Contract Requirements, paragraphs 3 and 6 and any other locally developed portions of the RFP for required submittals and add them to the Input Form. Do not duplicate submittals already listed in the standardized RMS Input Form, because the Contractor needs to submit this information only once.
6. After award, the Government provides the Excel spreadsheet to the selected contractor to develop and input the RMS Input form for the submittal register required by paragraph 1.8 of Section 01 33 00, Submittals.

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- LEGEND**
- CU — UNDERGROUND COMM. DUCTBANK
 - EU — UNDERGROUND ELEC. DUCTBANK
 - W — WATER LINE
 - SS — SANITARY SEWER
 - FM — FORCE MAIN
 - MG — MEDIUM PRESSURE GAS LINE
 - G_x — EXISTING GAS LINE
 - W_x — EXISTING WATER LINE
 - EU_x — EXISTING ELECTRICAL LINE
 - SD_x — EXISTING GAS LINE
 - SS_x — EXISTING SANITARY SEWER LINE
 - CU_x — EXISTING COMMUNICATION LINE
 - ⊙ — EXISTING SANITARY SEWER MANHOLE (BY OTHERS)
 - ⊕ — EXISTING STORM DRAIN MANHOLE (BY OTHERS)
 - ⊙ — EXISTING FIRE HYDRANT (BY OTHERS)
 - ⊙ — EXISTING PAD MOUNTED ELECTRICAL SWITCH (BY OTHERS)
 - ⊙ — EXISTING COMMUNICATIONS MANHOLE (BY OTHERS)
 - ⊙ — EXISTING ELECTRICAL MANHOLE (BY OTHERS)
 - ⊙ — EXISTING TRANSFORMER (BY OTHERS)
 - ⊙ — EXISTING PAD MOUNTED TRANSFORMER (BY OTHERS)

- NOTES**
- DIMENSIONS ARE TO BACK OF RESPECTIVE CURB OR STRUCTURE EDGE.
 - EXISTING UTILITIES ARE PER CONSTRUCTION PLANS, FIELD CONDITIONS MAY VARY. CONTRACTOR TO FIELD LOCATE ALL UTILITIES PRIOR TO CONSTRUCTION.
 - FOR MANHOLES IN PAVING, PAVE UP TO MANHOLE AND ADJUST RIM ELEVATION AS REQUIRED TO MATCH PAVEMENT GRADE.
 - DISPOSE OF REMOVED CURBS AND PAVEMENT OFF SITE.



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Rev.	Date	Soi No.	Contr No.	File Name	Plot Scale	Mark
	07-22-10			107201-0001-0010-02	1:1	

Designed by:	Drawn by:	Reviewed by:	Submitted by:
C. HALL	C. HALL	C. SCOTT	Chief, Arch. Branch

U.S. ARMY ENGINEER DISTRICT,
CORPS OF ENGINEERS
FORT WORTH, TEXAS

JACOBS / HULT-ZOLLARS
6688 North Central Expressway
Suite 400, MB13
Dallas, Texas 75206

WHITE SANDS MISSILE RANGE, NEW MEXICO

DIMENSION CONTROL PLAN
GRID A-02
DESIGN PACKAGE 107

Sheet reference number:
C-102
Sheet 4 of 46



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Firm Registration No. F-761

Date	Rev.	Description	E.D. No.	Action	Date
07-22-10	1	Initial Issue			

Designed by:	Drawn by:	Checked by:	Reviewed by:	Submitted by:
C. HALL	C. HALL	C. SCOTT	C. SCOTT	C. SCOTT

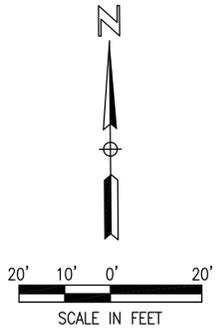
U.S. ARMY ENGINEER DISTRICT,
CORPS OF ENGINEERS
FORT WORTH, TEXAS

JACOBS / HULT-ZOLLARS
6688 North Central Expressway
Suite 400, MB13
Dallas, Texas 75206

UEPH BARRACKS
WHITE SANDS MISSILE RANGE, NEW MEXICO

LANDSCAPE PLANTING PLAN
GRID A-01
DESIGN PACKAGE 107

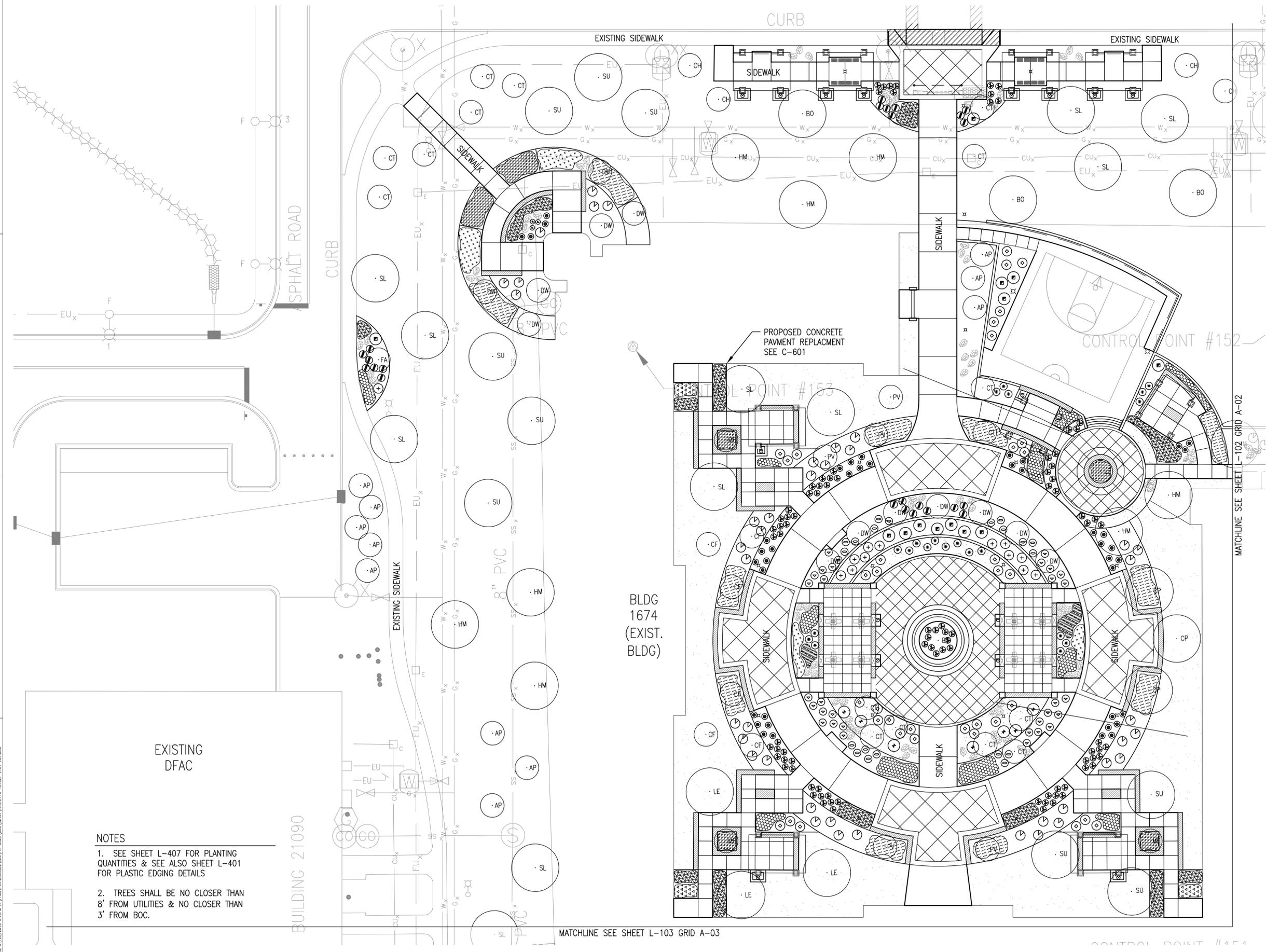
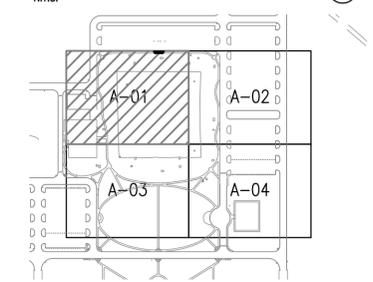
Sheet reference number:
L-101
Sheet 11 of 46



LEGEND

SYM	COMMON NAME
·AU	AUSTRIAN PINE
·BO	BURR OAK
·CP	CHINESE PISTACHE
·HM	HONEY MESQUITE
LE	LACEBARK ELM
SL	SHADEMASTER LOCUST
SU	SUNBURST LOCUST
AP	AFGAN PINE
CF	CALIFORNIA FAN PALM
CT	CHASTETREE
DW	DESERT WILLOW
FA	FRAGRANT ASH
MF	MEDITERRANEAN FAN PALM
PV	PALOVERDE
WA	WHITETHORN ACACIA
+	AGAVE
⊙	BIRD OF PARADISE
⊙	CACTUS
⊙	DEER GRASS
⊙	FAIRY DUSTER
⊙	MEXICAN FEATHERGRASS
⊙	PARRY'S AGAVE
⊙	RED YUCCA
⊙	REGAL MIST MUHLY GRASS
⊙	ROCK COTONEASTER
⊙	SOTOL
⊙	TEXAS SILVERLEAF
⊙	AUTUMN SAGE
⊙	BLUE RUG JUNIPER
⊙	FRINGED SAGE
⊙	ICEPLANT
⊙	TRAILING INDIGO BUSH
⊙	TRAILING LANTANA
⊙	TRAILING ROSEMARY
⊙	TRUMPET VINE
⊙	BOULDERS
⊙	AGGREGATE PADRE CANYON RED (APC)

KEY MAP

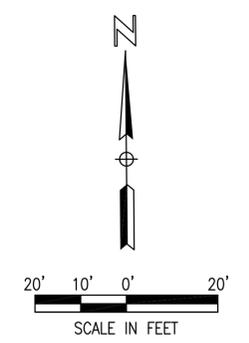
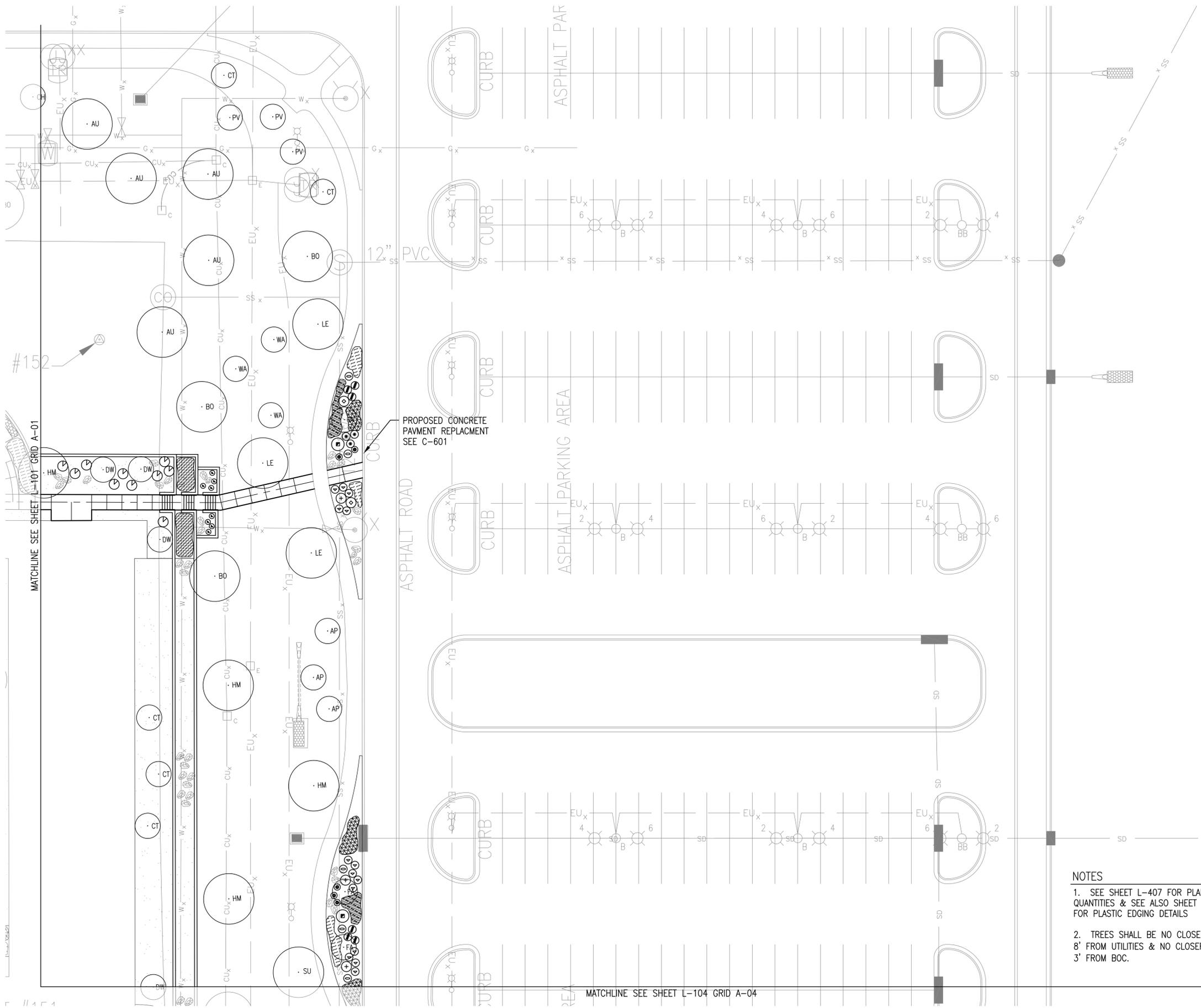


NOTES

- SEE SHEET L-407 FOR PLANTING QUANTITIES & SEE ALSO SHEET L-401 FOR PLASTIC EDGING DETAILS
- TREES SHALL BE NO CLOSER THAN 8' FROM UTILITIES & NO CLOSER THAN 3' FROM BOC.

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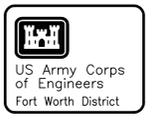
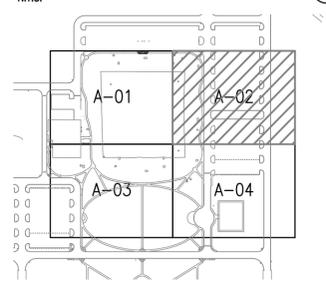
LEGEND

SYM	COMMON NAME
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·BO	BURR OAK
·CP	CHINESE PISTACHE
·HM	HONEY MESQUITE
LE	LACEBARK ELM
SL	SHADEMASTER LOCUST
SU	SUNBURST LOCUST
AP	AFGAN PINE
CF	CALIFORNIA FAN PALM
CT	CHASTETREE
DW	DESERT WILLOW
FA	FRAGRANT ASH
MF	MEDITERRANEAN FAN PALM
PV	PALOVERDE
WA	WHITETHORN ACACIA
+	AGAVE
⊕	BIRD OF PARADISE
⊙	CACTUS
⊕	DEER GRASS
⊙	FAIRY DUSTER
⊕	MEXICAN FEATHERGRASS
⊕	PARRY'S AGAVE
⊕	RED YUCCA
⊙	REGAL MIST MUHLY GRASS
⊙	ROCK COTONEASTER
⊕	SOTOL
⊕	TEXAS SILVERLEAF
[Pattern]	AUTUMN SAGE
[Pattern]	BLUE RUG JUNIPER
[Pattern]	FRINGED SAGE
[Pattern]	ICEPLANT
[Pattern]	TRAILING INDIGO BUSH
[Pattern]	TRAILING LANTANA
[Pattern]	TRAILING ROSEMARY
[Pattern]	TRUMPET VINE
[Pattern]	BOULDERS
[Pattern]	AGGREGATE PADRE CANYON RED (APC)

NOTES

- SEE SHEET L-407 FOR PLANTING QUANTITIES & SEE ALSO SHEET L-401 FOR PLASTIC EDGING DETAILS
- TREES SHALL BE NO CLOSER THAN 8' FROM UTILITIES & NO CLOSER THAN 3' FROM BOC.

KEY MAP
N.T.S.



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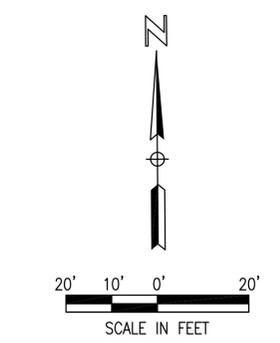
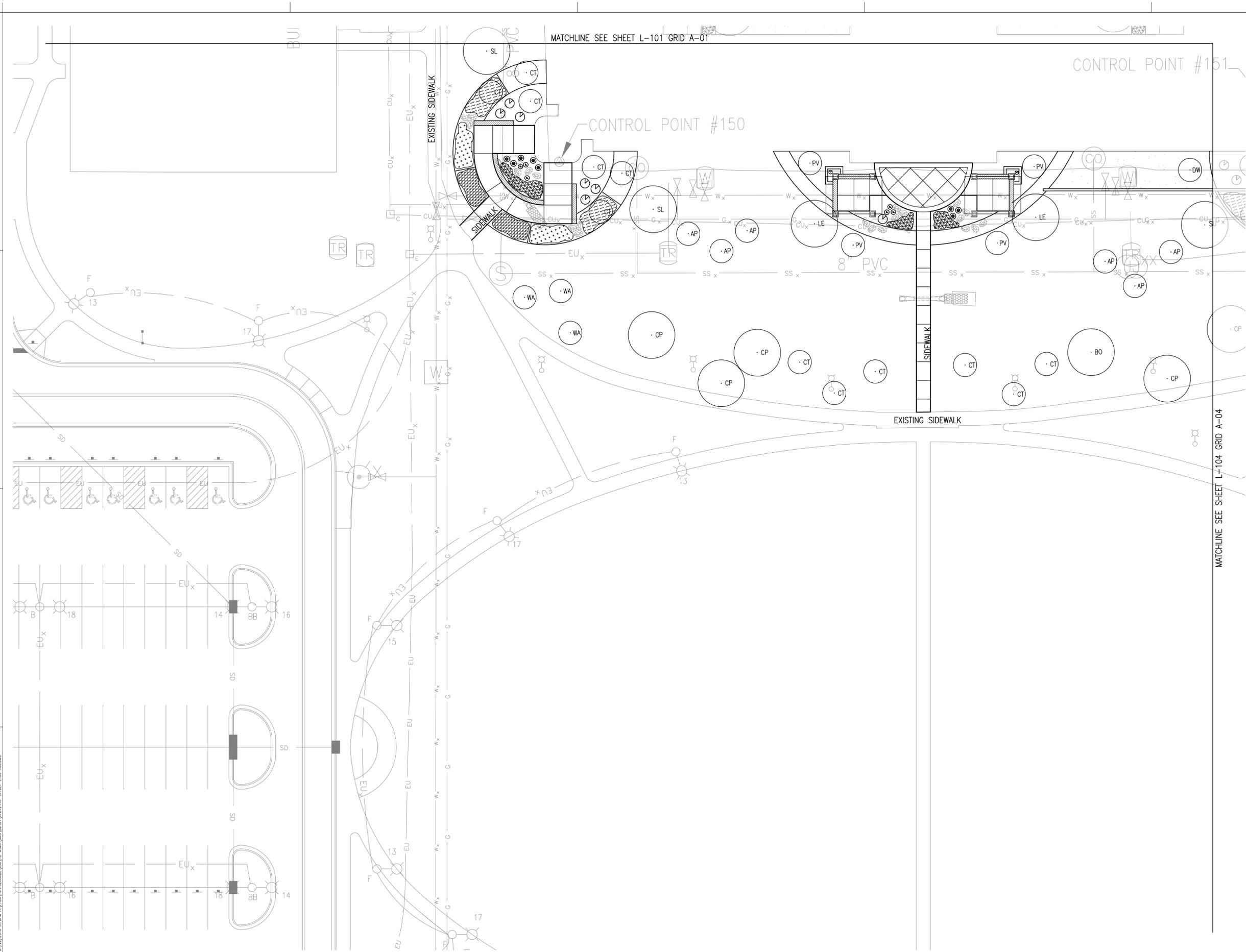
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07-22-10	1	ISSUE FOR CONSTRUCTION	C. SCOTT	C. SCOTT

Designed by: C. HALL	Drawn by: C. HALL	Reviewed by: C. SCOTT	Submitted by: Chief, Arch. Branch
Date: 07-22-10	Soil No.:	Contr. No.:	File name: M7210-10201-1-02-402
U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS			Plot scale: 1:1
JACOBS / HUILT-ZOLLARS 6688 North Central Expressway Suite 400, MB13 Dallas, Texas 75206			

WHITE SANDS MISSILE RANGE, NEW MEXICO
LANDSCAPE PLANTING PLAN
GRID A-02
DESIGN PACKAGE 107

Sheet reference number:
L-102
Sheet 12 of 46

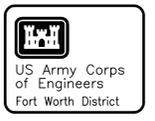
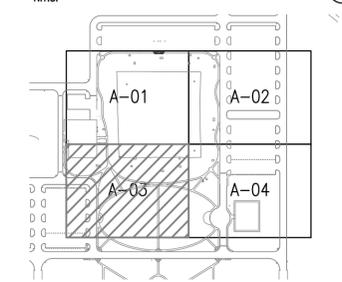
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LEGEND

SYM	COMMON NAME
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-BO	BURR OAK
-CP	CHINESE PISTACHE
-HM	HONEY MESQUITE
LE	LACEBARK ELM
SL	SHADEMASTER LOCUST
SU	SUNBURST LOCUST
AP	AFGAN PINE
CF	CALIFORNIA FAN PALM
CT	CHASTETREE
DW	DESERT WILLOW
FA	FRAGRANT ASH
MF	MEDITERRANEAN FAN PALM
PV	PALOVERDE
WA	WHITETHORN ACACIA
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⊙	REGAL MIST MUHLY GRASS
⊙	ROCK COTONEASTER
⊙	SEE SHEET L-407 FOR PLANTING QUANTITIES & SEE ALSO SHEET L-401 FOR PLANTING DIMENSIONS
⊙	AUTUMN SAGE
⊙	ICEPLANT
⊙	TRAILING INDIGO BUSH
⊙	TRAILING LANTANA
⊙	TRAILING ROSEMARY
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KEY MAP
N.T.S.



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Hult-Zollars, Inc.
 Firm Registration No. F-761

Date	Rev.	Soi No.	Contr No.	Description	Mark
07-22-10					

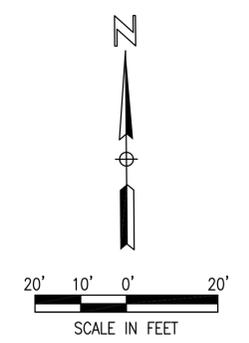
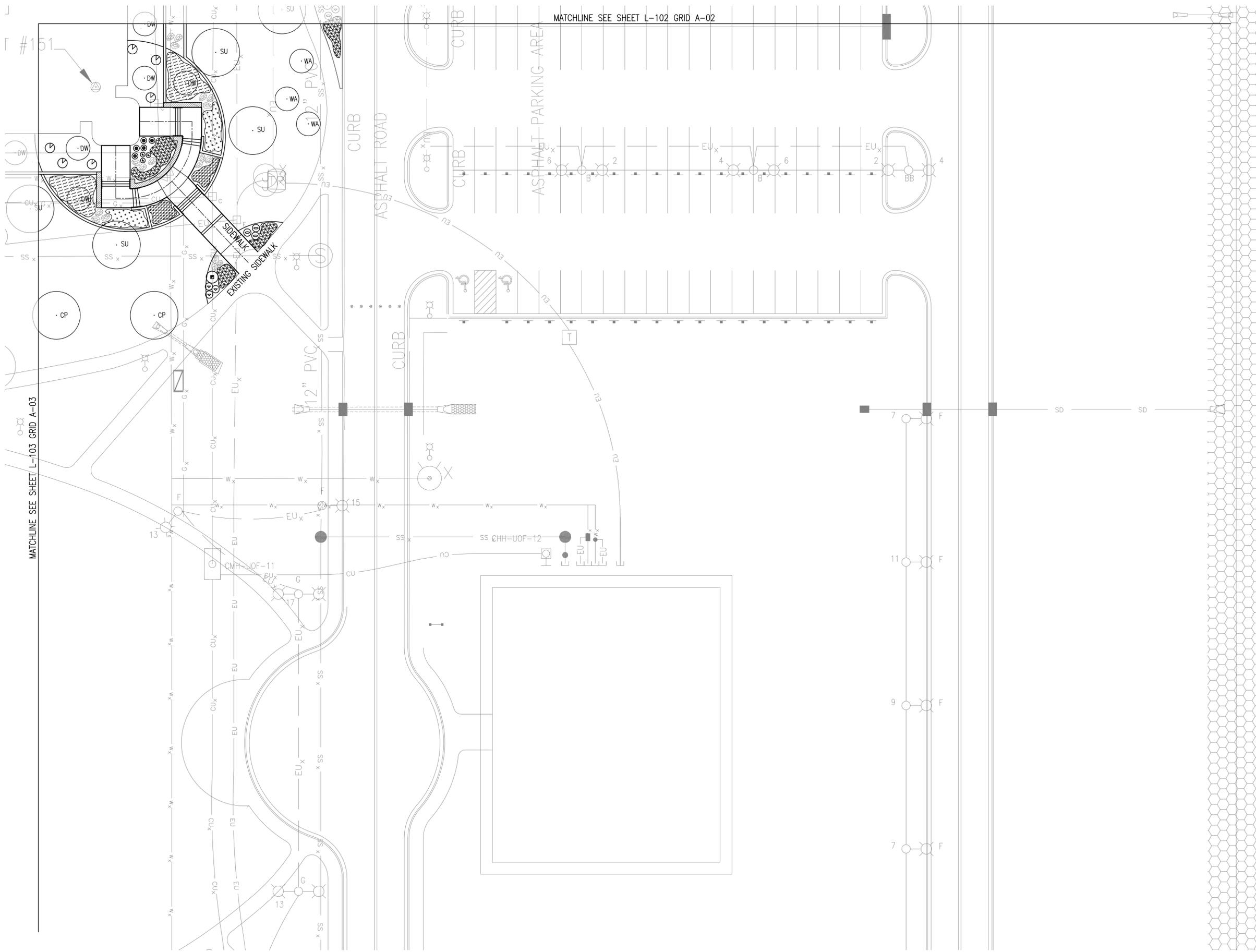
Designed by: C. HALL	Drawn by: C. HALL	Reviewed by: C. SCOTT	Submitted by: Chief, Arch. Branch
Date: 07-22-10	Soi No.:	Contr No.:	File name: M7201-0001-L103-03
			Plot scale: 1:1

U.S. ARMY ENGINEER DISTRICT,
 CORPS OF ENGINEERS
 FORT WORTH, TEXAS
JACOBS / HULT-ZOLLARS
 6688 North Central Expressway
 Suite 400, MB1.3
 Dallas, Texas 75206

UEPH BARRACKS
 WHITE SANDS MISSILE RANGE, NEW MEXICO
 LANDSCAPE PLANTING PLAN
 GRID A-03
 DESIGN PACKAGE 107

Sheet reference number:
L-103
 Sheet 13 of 46

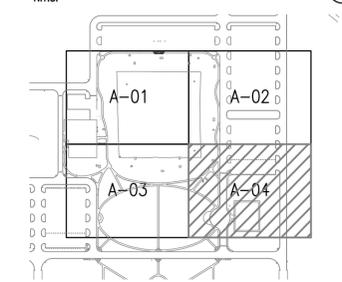
PHASE 07/22/2010 5:10PM H:\PROJ\072210\072210-0201-L-104-46L00G



LEGEND

SYM	COMMON NAME
-AU	AUSTRIAN PINE
-BO	BURR OAK
-CP	CHINESE PISTACHE
-HM	HONEY MESQUITE
LE	LACEBARK ELM
SL	SHADEMASTER LOCUST
SU	SUNBURST LOCUST
AP	AFGAN PINE
CF	CALIFORNIA FAN PALM
CT	CHASTETREE
DW	DESERT WILLOW
FA	FRAGRANT ASH
MF	MEDITERRANEAN FAN PALM
PV	PALOVERDE
WA	WHITETHORN ACACIA
+	AGAVE
⊕	BIRD OF PARADISE
⊙	CACTUS
⊙	DEER GRASS
⊙	FAIRY DUSTER
⊙	MEXICAN FEATHERGRASS
⊙	PARRY'S AGAVE
⊙	RED YUCCA
⊙	REGAL MIST MUHLY GRASS
⊙	ROCK COTONEASTER
⊙	TRAILING INDIGO BUSH
⊙	TRAILING LANTANA
⊙	TRAILING ROSEMARY
⊙	TRUMPET VINE
⊙	BOULDERS
⊙	AGGREGATE PADRE CANYON RED (APC)

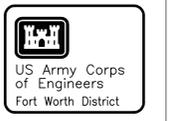
KEY MAP
N.T.S.



NOTES

1. SEE SHEET L-407 FOR PLANTING QUANTITIES & SEE ALSO SHEET L-401 FOR PLANTING DETAILS

2. ALL PLANTINGS SHALL BE NO CLOSER THAN 12' FROM UTILITIES & NO CLOSER THAN 18" FROM CURBS



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1976 on 07-22-10.
NOT FOR CONSTRUCTION

Hult-Zollars, Inc.
Firm Registration No. F-761

Rev.	Date	Description	By	Date

Designed by: C. HALL	Drawn by: C. HALL	Checked by: C. SCOTT	Reviewed by: C. SCOTT
Date: 07-22-10	Scale: 1"=20'	Contract No. MB7011-001-L-104-04	Project No. MB7011-001-L-104-04

U.S. ARMY ENGINEER DISTRICT,
CORPS OF ENGINEERS
FORT WORTH, TEXAS

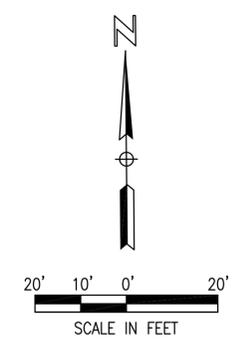
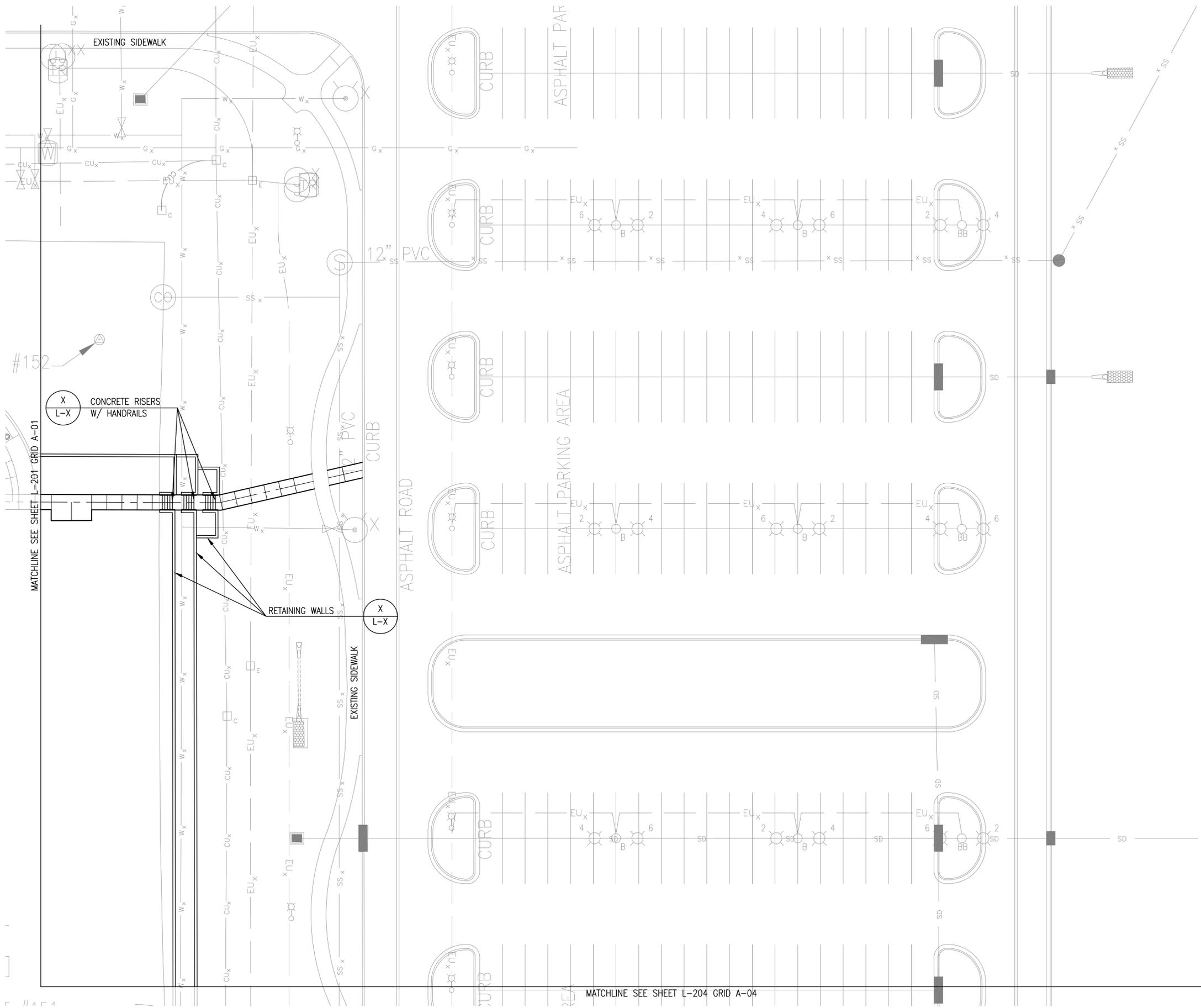
JACOBS / HULT-ZOLLARS
6688 North Central Expressway
Suite 400, MB13
Dallas, Texas 75206

WHITE SANDS MISSILE RANGE, NEW MEXICO

LANDSCAPE PLANTING PLAN
GRID A-04
DESIGN PACKAGE 107

Sheet reference number:
L-104
Sheet 14 of 46

PHASE 07/22/2010 5:10PM H:\PROJ\PERMISSIVE\LD\10-NEW\DWG\BUDGET\10-0201-L-201-402.DWG



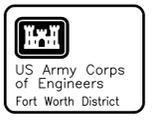
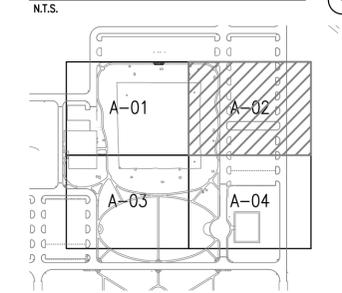
LEGEND

SYM	DESCRIPTION
○ ○ ○	TRASH & RECYCLING RECEPTACLES
○	ASH URN
—	BIKE RACK
■	METAL BENCH
⊕	GAMETABLE
⊞	BBQ GRILL
⌒	DRINKING FOUNTAIN & WATERLINE
⚡	BASKETBALL GOAL
⊙	BOLLARDS & CHAIN
⚡	EMERGENCY VEHICLE ACCESS
—	42" HT. SAFETY RAIL / FENCE
—	SEATWALL / PLANTER WALL
—	RETAINING WALL
⊗	LIGHT FIXTURES

NOTES

- SEE SHEET L-401 FOR SIDEWALK CONSTRUCTION DETAILS.
- EXISTING UTILITIES ARE PER CONSTRUCTION PLANS. FIELD CONDITIONS MAY BE DIFFERENT. MINOR ADJUSTMENTS MAY BE REQUIRED FOR UTILITY CONFLICTS WITH SITE LAYOUT.
- COORDINATION WITH ADJACENT CONTRACTORS MAY BE REQUIRED DEPENDING ON CONSTRUCTION SCHEDULE.
- SEE DIMENSION CONTROL PLANS FOR LOCATIONS AND HORIZONTAL DETAILS.
- PROVIDE EXPANSION JOINTS BETWEEN EXISTING AND PROPOSED CONCRETE SEE DETAIL 2/L-401.

KEY MAP



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Hult-Zollars, Inc.
 Firm Registration No. F-761

Date	Rev.	Description	By	Check
07-22-10	1	ISSUE FOR CONSTRUCTION	C. SCOTT	

Designed by: C. HALL	Drawn by: C. HALL	Reviewed by: C. SCOTT	Submitted by: Chief, Arch. Branch
Date: 07-22-10	Soil No.:	Contr. No.:	File name: 100710-001-L-201-402
			Plot scale: 1:1

U.S. ARMY ENGINEER DISTRICT,
 CORPS OF ENGINEERS
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JACOBS / HULT-ZOLLARS
 6688 North Central Expressway
 Suite 400, MB13
 Dallas, Texas 75206

UEPH BARRACKS
 WHITE SANDS MISSILE RANGE, NEW MEXICO
 LANDSCAPE SITE PLAN
 GRID A-02
 DESIGN PACKAGE 107

Sheet reference number:
L-202
 Sheet 16 of 46



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Hult-Zollars, Inc.
Firm Registration No. F-761

Rev.	Date	Description	By	Check
	07-22-10		C. SCOTT	

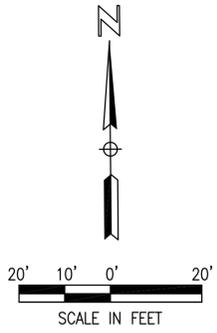
Designed by: C. HALL	Drawn by: C. HALL	Reviewed by: C. SCOTT	Submitted by: C. SCOTT
Date: 07-22-10	Soil No.:	Contr. No.:	Chief, Arch. Branch
File name: MP2010-0001-L201-003 Plot name: 07-22-10 Plot scale: 1:1			

U.S. ARMY ENGINEER DISTRICT,
CORPS OF ENGINEERS
FORT WORTH, TEXAS

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6688 North Central Expressway
Suite 400, MB13
Dallas, Texas 75206

WHITE SANDS MISSILE RANGE, NEW MEXICO
LANDSCAPE SITE PLAN
GRID A-03
DESIGN PACKAGE 107

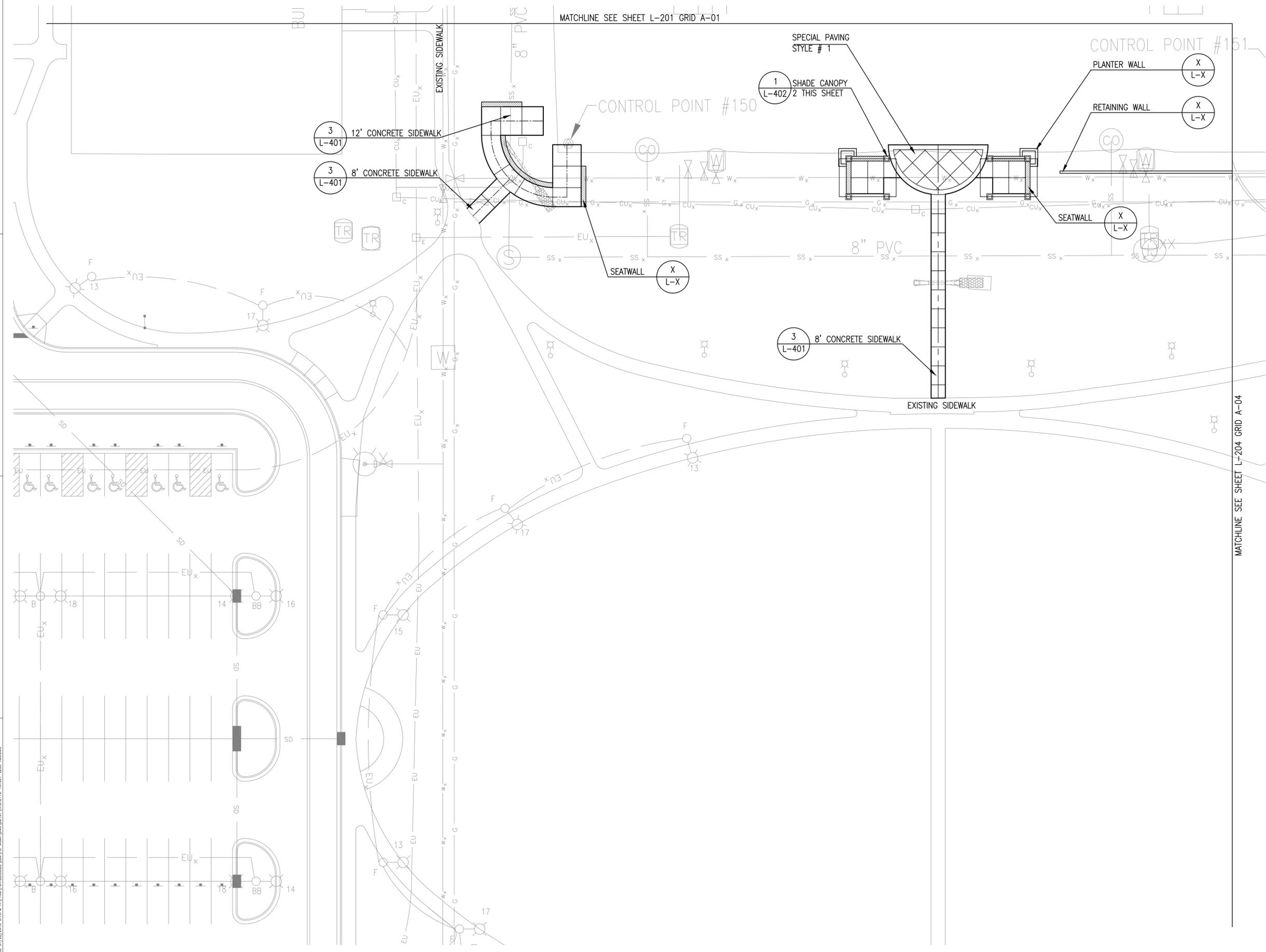
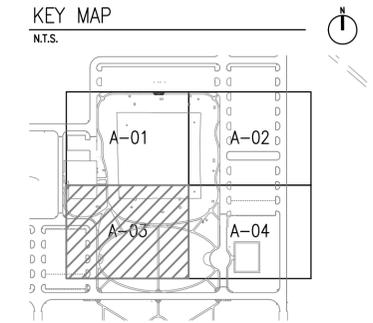
Sheet reference number:
L-203
Sheet 17 of 46



LEGEND

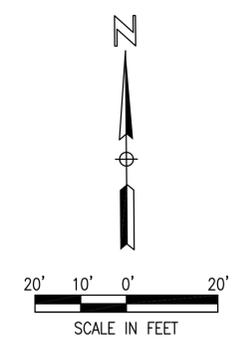
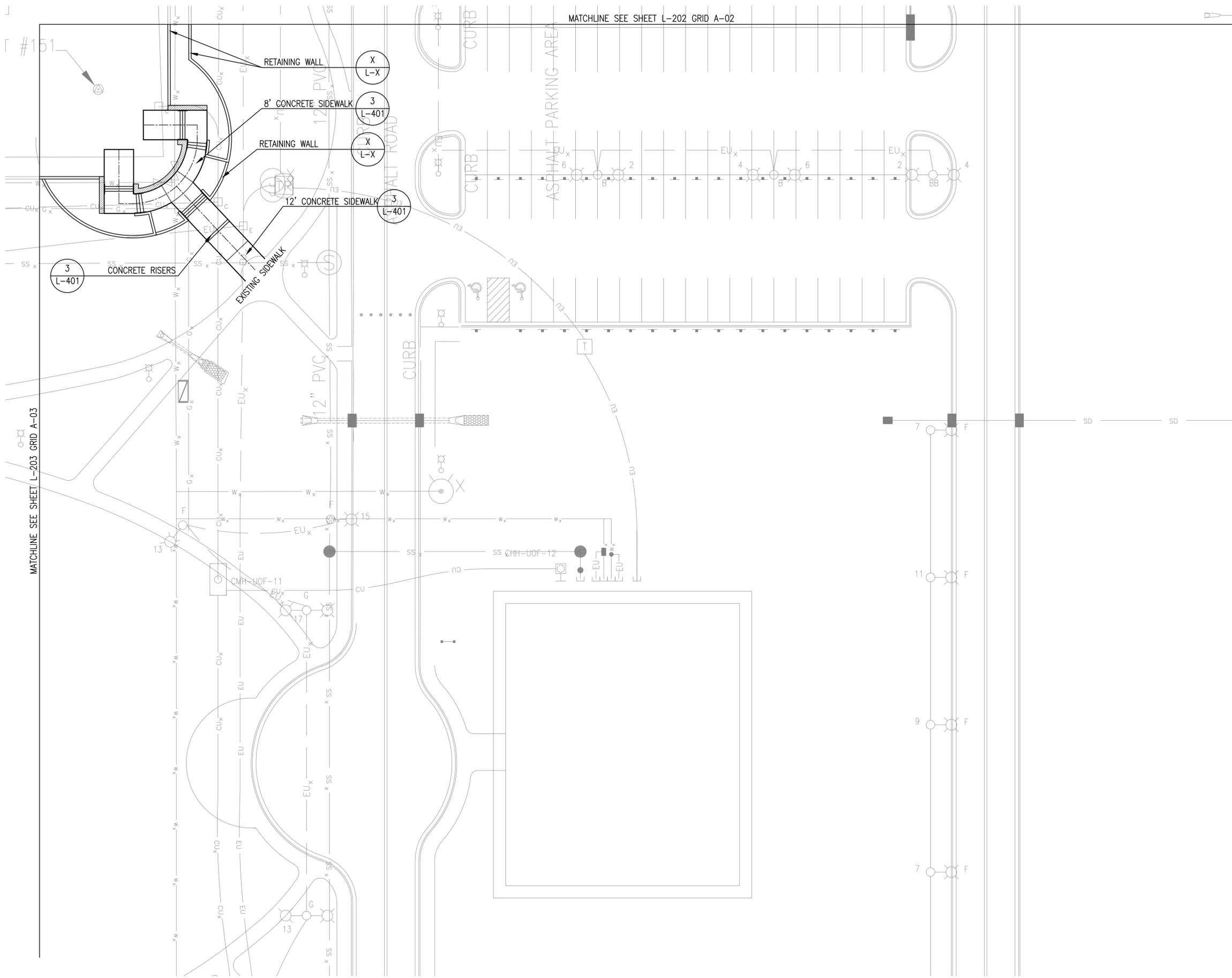
SYM	DESCRIPTION
●●●	TRASH & RECYCLING RECEPTACLES
○	ASH URN
—	BIKE RACK
■	METAL BENCH
⊕	GAMETABLE
⊞	BBQ GRILL
⊙	DRINKING FOUNTAIN & WATERLINE
⊙	BASKETBALL GOAL
⊙	BOLLARDS & CHAIN
⊞	EMERGENCY VEHICLE ACCESS
—	42" HT. SAFETY RAIL / FENCE
▨	SEATWALL / PLANTER WALL
▨	RETAINING WALL
⊙	LIGHT FIXTURES

- NOTES**
- SEE SHEET L-401 FOR SIDEWALK CONSTRUCTION DETAILS.
 - EXISTING UTILITIES ARE PER CONSTRUCTION PLANS. FIELD CONDITIONS MAY BE DIFFERENT. MINOR ADJUSTMENTS MAY BE REQUIRED FOR UTILITY CONFLICTS WITH SITE LAYOUT.
 - COORDINATION WITH ADJACENT CONTRACTORS MAY BE REQUIRED DEPENDING ON CONSTRUCTION SCHEDULE.
 - SEE DIMENSION CONTROL PLANS FOR LOCATIONS AND HORIZONTAL DETAILS.
 - PROVIDE EXPANSION JOINTS BETWEEN EXISTING AND PROPOSED CONCRETE SEE DETAIL 2/L-401.



P:\05_07_22\2010_51\PM\HYDRO\PERMISSIONS\DWG\10-NEW\DWG\07\0710-0201-L-203-A4.DWG
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PHASE 07/22/2010 5:00PM H:\PROJ\PROJ\SS\SS\LANDSCAPE\LANDSCAPE\07-22-10-0201-L-204-46L.DWG



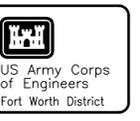
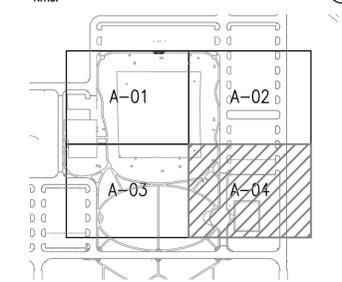
LEGEND

SYM	DESCRIPTION
○ ○ ○	TRASH & RECYCLING RECEPTACLES
○	ASH URN
—	BIKE RACK
■	METAL BENCH
⊕	GAMETABLE
⊞	BBQ GRILL
⊕	DRINKING FOUNTAIN & WATERLINE
⊕	BASKETBALL GOAL
⊕	BOLLARDS & CHAIN
▨	EMERGENCY VEHICLE ACCESS
—	42" HT. SAFETY RAIL / FENCE
▨	SEATWALL / PLANTER WALL
—	RETAINING WALL
⊕	LIGHT FIXTURES

NOTES

- SEE SHEET L-401 FOR SIDEWALK CONSTRUCTION DETAILS.
- EXISTING UTILITIES ARE PER CONSTRUCTION PLANS. FIELD CONDITIONS MAY BE DIFFERENT. MINOR ADJUSTMENTS MAY BE REQUIRED FOR UTILITY CONFLICTS WITH SITE LAYOUT.
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- SEE DIMENSION CONTROL PLANS FOR LOCATIONS AND HORIZONTAL DETAILS.
- PROVIDE EXPANSION JOINTS BETWEEN EXISTING AND PROPOSED CONCRETE SEE DETAIL 2/L-401.

KEY MAP
N.T.S.



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Hult-Zollars, Inc.
 Firm Registration No. F-761

Rev.	Date	Description	E.D. No.	Action	Date

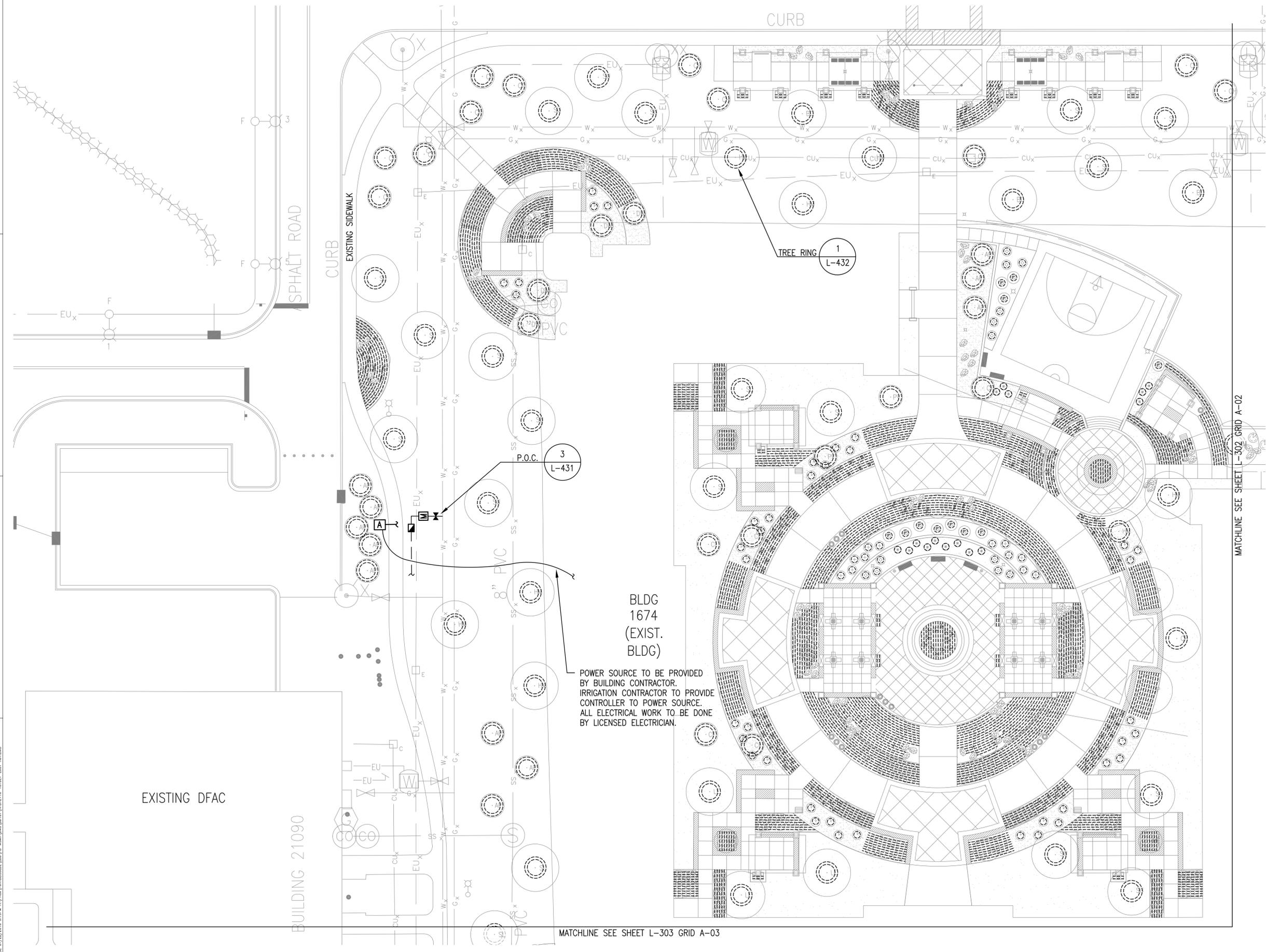
Designed by: C. HALL	Date: 07-22-10	Rev.
Drawn by: C. HALL	Soil No.	07-22-10
Reviewed by: C. SCOTT	Contr. No.	07-22-10
Submitted by: Chief, Arch. Branch	File name: 07-22-10-L-204-04	Plot scale: 1:1

U.S. ARMY ENGINEER DISTRICT,
 CORPS OF ENGINEERS
 FORT WORTH, TEXAS
JACOBS / HULT-ZOLLARS
 6688 North Central Expressway
 Suite 400, MB13
 Dallas, Texas 75206

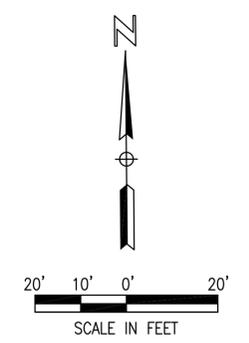
UEPH BARRACKS
 WHITE SANDS MISSILE RANGE, NEW MEXICO
 LANDSCAPE SITE PLAN
 GRID A-04
 DESIGN PACKAGE 107

Sheet reference number:
L-204
 Sheet 18 of 46

PHASE 07/22/2010 5:18PM H:\PROJ\SPRIBUSS\DWG\10-0701-L-301-401.DWG



BLDG 1674 (EXIST. BLDG)
POWER SOURCE TO BE PROVIDED BY BUILDING CONTRACTOR. IRRIGATION CONTRACTOR TO PROVIDE CONTROLLER TO POWER SOURCE. ALL ELECTRICAL WORK TO BE DONE BY LICENSED ELECTRICIAN.



LEGEND

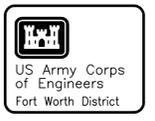
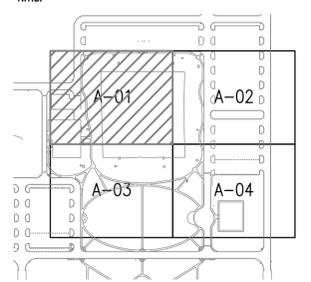
- DRIPLINE TUBING NETAFIM TECHLINE (.9GPH EMITTER @ 12" SPACING)
- MAINLINE PVC CL 200
- QUICK COUPLER RAIN BIRD 33DNP (OR APPROVED EQUAL)
- ISOLATION VALVE SCH40 PVC BALL VALVE (SAME SIZE AS MAINLINE)
- WATER METER, 1" PER DPW SPECIFICATIONS
- BACKFLOW PREVENTER 1" RPZ
- FEBCO 825YA RPZ (OR APPROVED EQUAL) W/APPROVED INSULATED LOCKING ENCLOSURE
- RAINBIRD ESP-8MC-SS CONTROLLER ON A STAINLESS STEEL PEDESTAL
- $\frac{x}{L-4XX}$ DETAIL No. SHEET No.

NOTES

1. FOR EXISTING UTILITIES REFERENCE LEGEND IN C-100 SHEET SET. EXISTING UTILITIES ARE PER CONSTRUCTION PLANS, FIELD LOCATIONS MAY VARY. CONTRACTOR TO FIELD LOCATE ALL UTILITIES PRIOR TO CONSTRUCTION.
2. FULL COVERAGE IRRIGATION IS TO BE PROVIDED BY CONTRACTOR. PLANTS VARY IN WATER NEEDS AND DRIP IRRIGATION MAY NOT BE NECESSARY FOR CERTAIN PLANT TYPES. CACTUS, CALIFORNIA FAN PALM, SOTOL, AND AGAVE MAY BE HAND WATERED UNTIL THEY HAVE BECOME ESTABLISHED AND WATERING MAY STOP OR THESE PLANTS MAY BE GROUPED IN A LOW FLOW ZONE THAT CAN BE SHUT OFF AFTER PLANT ESTABLISHMENT HAS OCCURED.

SEE SHEET L-300 FOR IRRIGATION NOTES

KEY MAP



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Huilt-Zollars, Inc. Firm Registration No. F-761

Date	Rev.	Description	D.D. No.	Action	Date
07-22-10	1				

Designed by: SUBISTOS	Drawn by: SUBISTOS	Checked by: C. SCOTT	Reviewed by: SUBISTOS	Submitted by: Chief, Arch. Branch
Date: 07-22-10	Soil No.:	Contr. No.:	File name: M7210-301-L301-401	Plot scale: 1:1

U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS
JACOBS / HUILT-ZOLLARS
6688 North Central Expressway Suite 400, MB13 Dallas, Texas 75206

WHITE SANDS MISSILE RANGE, NEW MEXICO
LANDSCAPE IRRIGATION PLAN
GRID A-01
DESIGN PACKAGE 107
Sheet reference number:
L-301
Sheet 19 of 46



US Army Corps of Engineers
Fort Worth District

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Hult-Zollars, Inc.
Firm Registration No. F-761

Date	Rev.	Description	E.D. No.	Action	Date
07-22-10 <td>1 <td>ISSUED FOR CONSTRUCTION <td></td> <td></td> <td></td> </td></td>	1 <td>ISSUED FOR CONSTRUCTION <td></td> <td></td> <td></td> </td>	ISSUED FOR CONSTRUCTION <td></td> <td></td> <td></td>			

Designed by: SUBISTOS	Checked by: C. SOUT	Reviewed by: Chief, Arch. Branch
Dwn by: SUBISTOS	Contract No. W7201-07-1-0001-L303-03	Submitted by: Chief, Arch. Branch
Date: 07-22-10	Soil No.	Plot scale: 1:1

U.S. ARMY ENGINEER DISTRICT,
CORPS OF ENGINEERS
FORT WORTH, TEXAS
JACOBS / HULT-ZOLLARS
6688 North Central Expressway
Suite 400, MB13
Dallas, Texas 75206

WHITE SANDS MISSILE RANGE, NEW MEXICO
LANDSCAPE IRRIGATION PLAN
GRID A-03
DESIGN PACKAGE 107
Sheet reference number:
L-303
Sheet 21 of 46



20' 10' 0' 20'
SCALE IN FEET

LEGEND

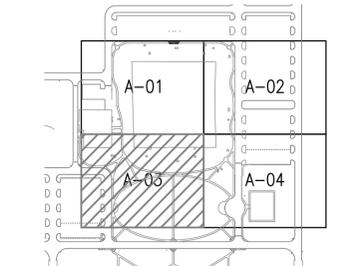
- DRIPLINE TUBING NETAFIM TECHLINE (.9GPH EMITTER @ 12" SPACING)
- MAINLINE PVC CL 200
- QUICK COUPLER RAIN BIRD 33DNP (OR APPROVED EQUAL)
- ISOLATION VALVE SCH40 PVC BALL VALVE (SAME SIZE AS MAINLINE)
- WATER METER, 1" PER DPW SPECIFICATIONS
- BACKFLOW PREVENTER 1" RPZ
- FEBCO 825YA RPZ (OR APPROVED EQUAL) W/APPROVED INSULATED LOCKING ENCLOSURE
- RAINBIRD ESP-8MC-SS CONTROLLER ON A STAINLESS STEEL PEDESTAL
- DETAIL No. L-4XX SHEET No.

NOTES

- FOR EXISTING UTILITIES REFERENCE LEGEND IN C-100 SHEET SET. EXISTING UTILITIES ARE PER CONSTRUCTION PLANS, FIELD LOCATIONS MAY VARY. CONTRACTOR TO FIELD LOCATE ALL UTILITIES PRIOR TO CONSTRUCTION.
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SEE SHEET L-300 FOR IRRIGATION NOTES

KEY MAP
N.T.S.



MATCHLINE SEE SHEET L-301 GRID A-01

BLDG 1674
(EXIST. BLDG)

TREE RING 1
L-432

EXISTING PARADE FIELD

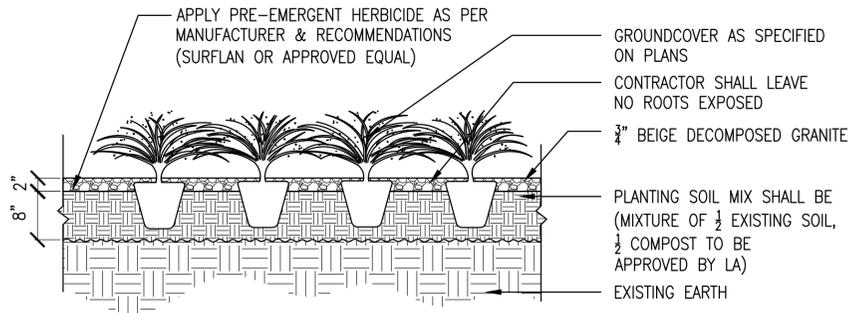
MATCHLINE SEE SHEET L-304 GRID A-04

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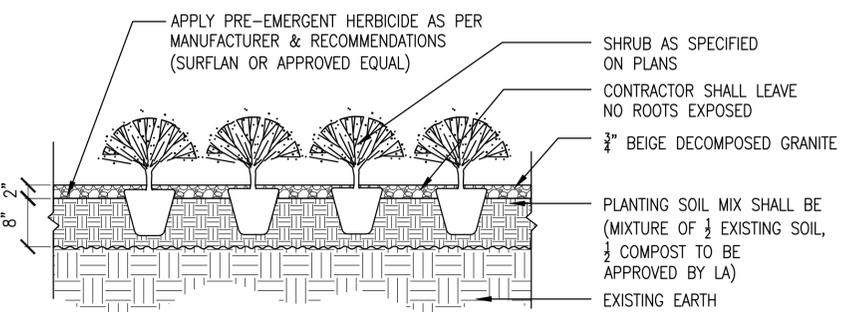
Date	Rev.	Description	D.D. No.	Action	Date
07-22-10					

Designed by: C. HALL	Drawn by: C. HALL	Checked by: C. SCOTT	Reviewed by: C. SCOTT	Submitted by: Chief, Arch. Branch
U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS	JACOBS / HULT-ZOLLARS 6688 North Central Expressway Suite 400, MB13 Dallas, Texas 75206		File name: 072210-413.dwg Plot name: 072210-413.dwg Plot scale: 1:1	

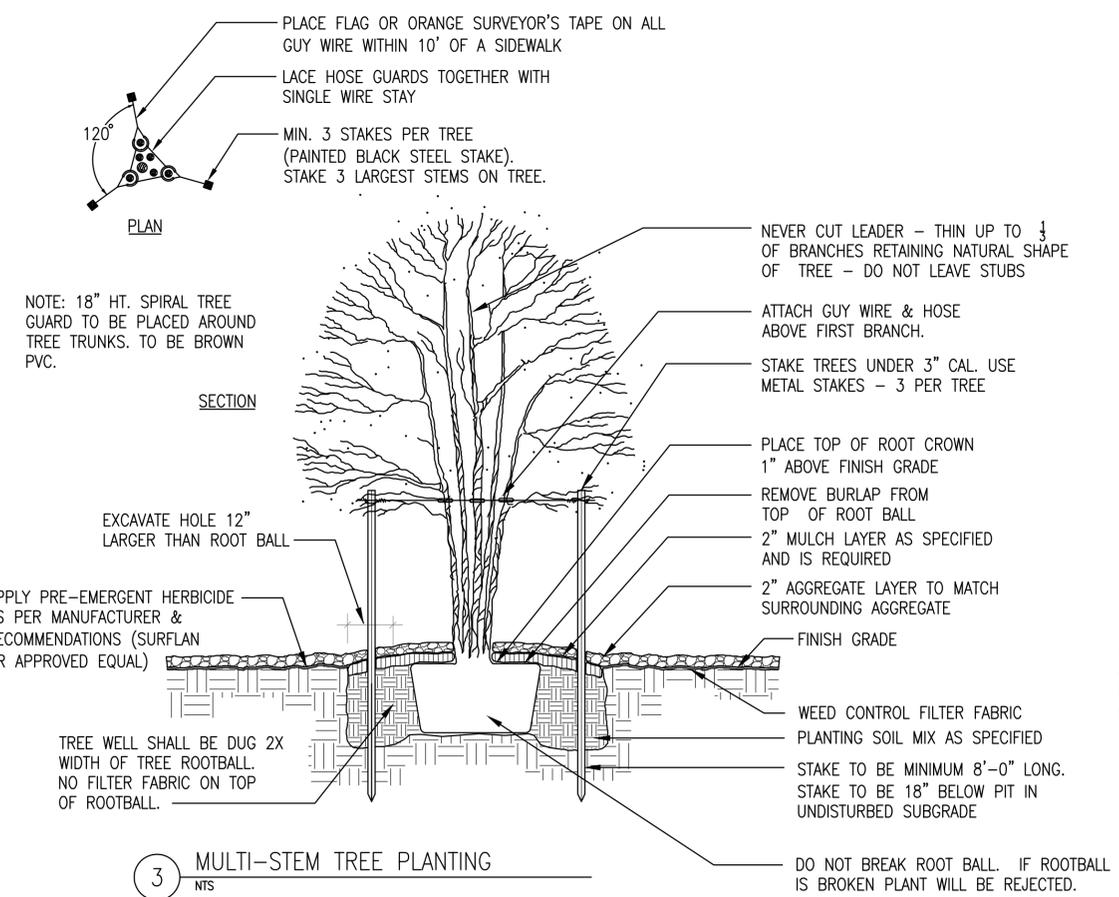
WHITE SANDS MISSILE RANGE, NEW MEXICO
LANDSCAPE DETAILS
PLANTING DETAILS
DESIGN PACKAGE 107



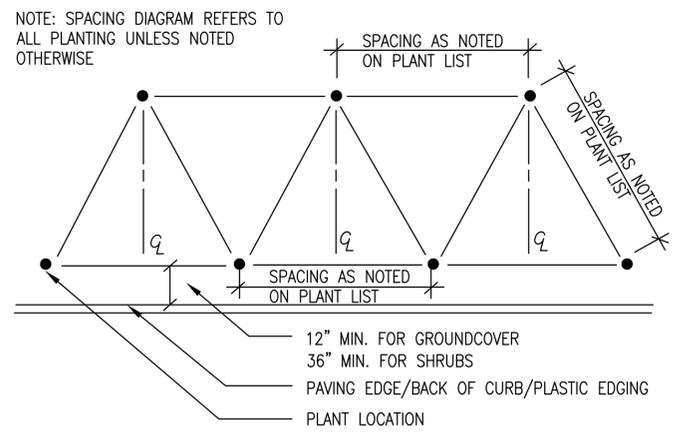
1 GROUND COVER PLANTING
NTS



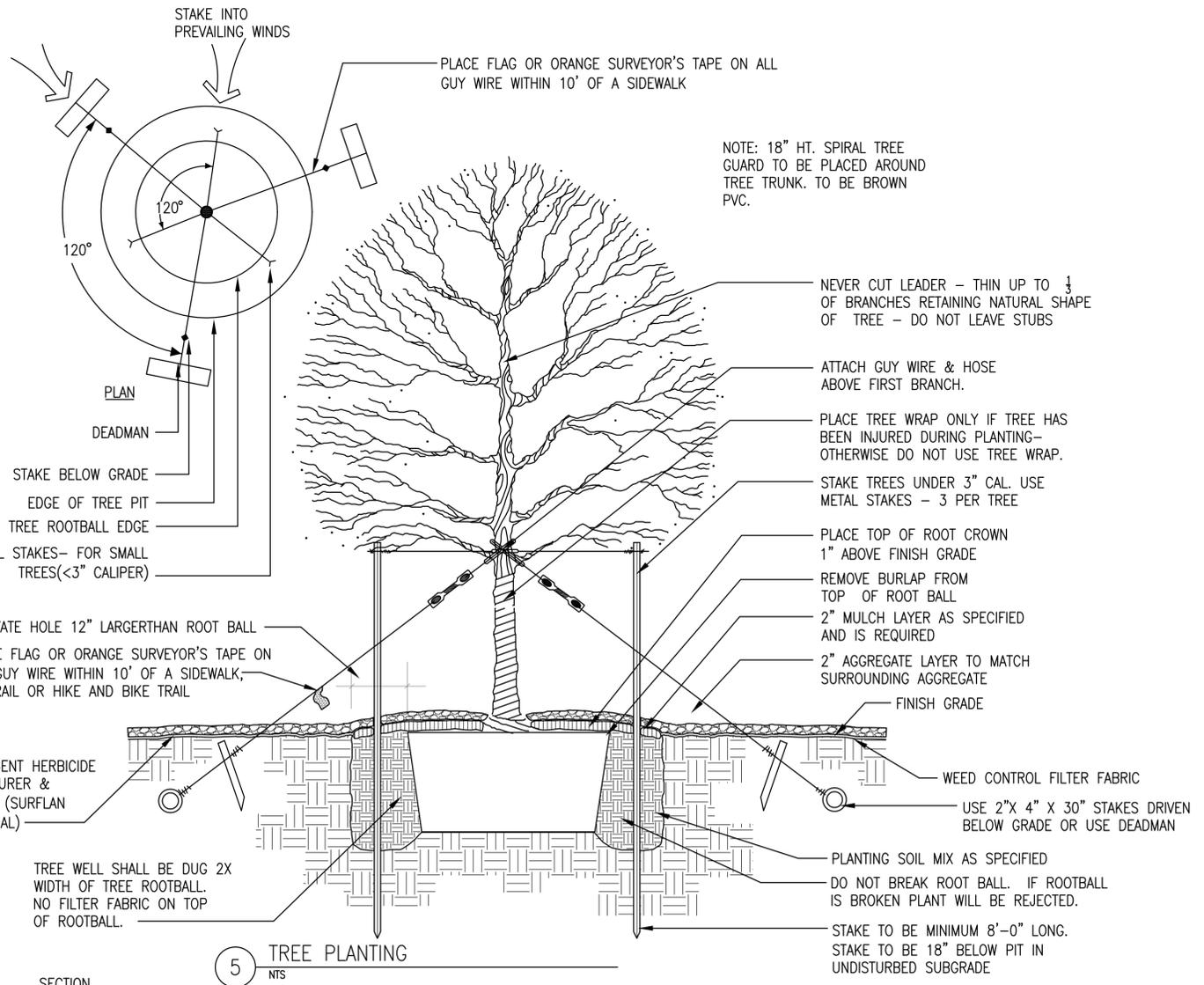
2 SHRUB PLANTING
NTS



3 MULTI-STEM TREE PLANTING
NTS



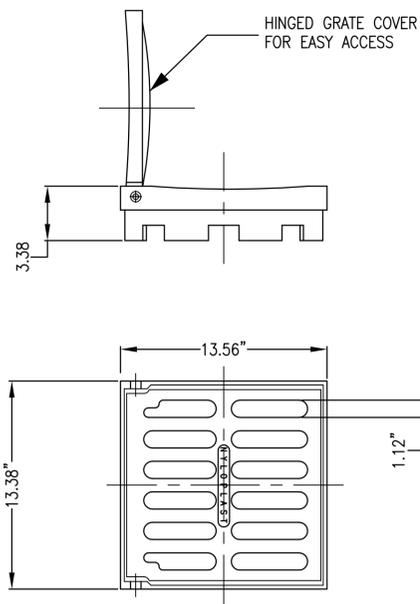
4 TRIANGULAR SPACING
NTS



5 TREE PLANTING
NTS

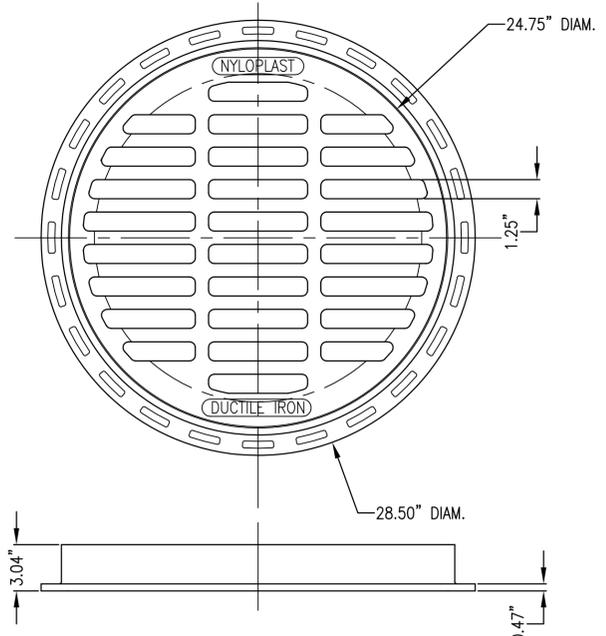
P:\052\2010\52100\52100.dwg 07/22/2010 5:21 PM H:\PROJ\052100\52100.dwg 07/22/2010 14:11:50 LING

8" - 30" IN-LINE DRAIN SPECIFICATIONS



STANDARD

APPROX. DRAIN AREA = 60.62 SQ. IN.
APPROX. WEIGHT WITH FRAME = 40.68 LBS.



STANDARD

APPROX. DRAIN AREA = 194.60 SQ. IN.
APPROX. WEIGHT WITH FRAME = 124.00 LBS.

12" GRATES

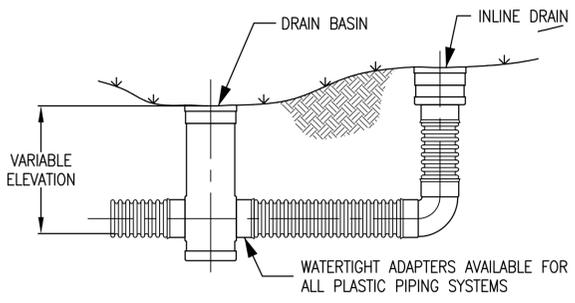
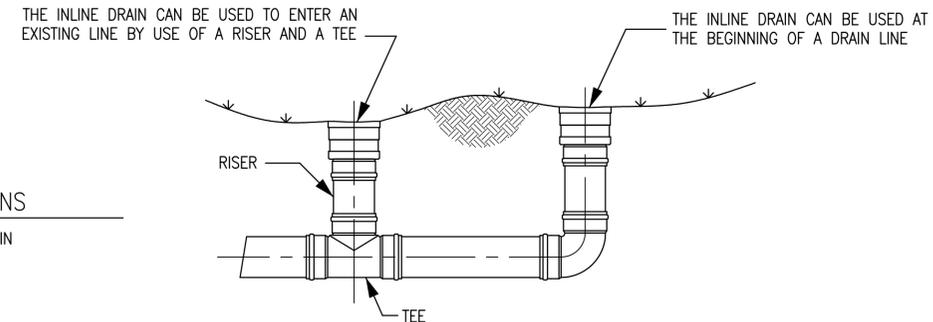
STANDARD GRATE HAS H-25 HEAVY DUTY RATING
QUALITY: MATERIALS SHALL CONFORM TO ASTM
A536 GRADE 70-50-05 & A48-CLASS 30B
MATERIAL: DUCTILE IRON GRATE W/CAST IRON FRAME
PAINT: CASTINGS ARE FURNISHED WITH A BLACK PAINT
PROVIDE LOCKING DEVICE

24" GRATES

STANDARD GRATE HAS H-25 HEAVY DUTY RATING
QUALITY: MATERIALS SHALL CONFORM TO ASTM
A536 GRADE 70-50-05
MATERIAL: DUCTILE IRON
PAINT: CASTINGS ARE FURNISHED WITH A BLACK PAINT
PROVIDE LOCKING DEVICE WITH FRAME & GRATE

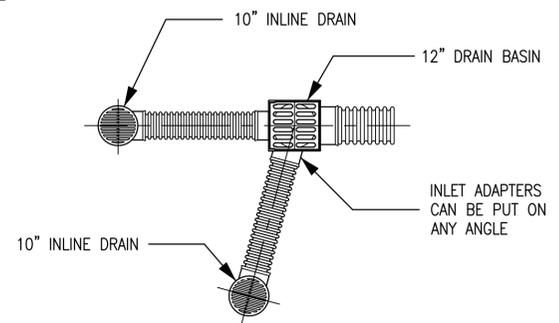
INLET DRAINS
TYPICAL INSTALLATIONS

TYPICAL INSTALLATION OF DRAIN
BASINS AND IN-LINE DRAINS

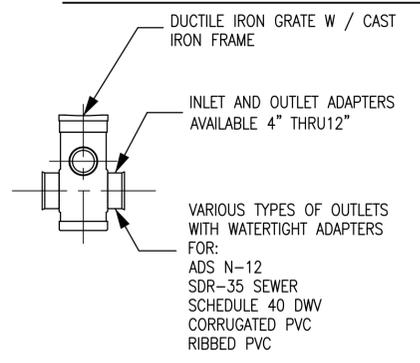


TYPICAL INSTALLATIONS

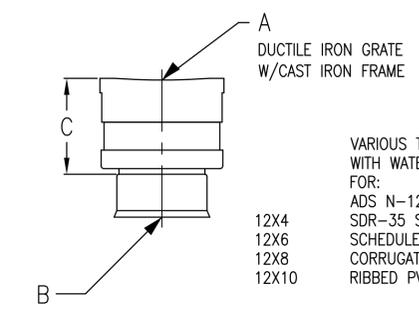
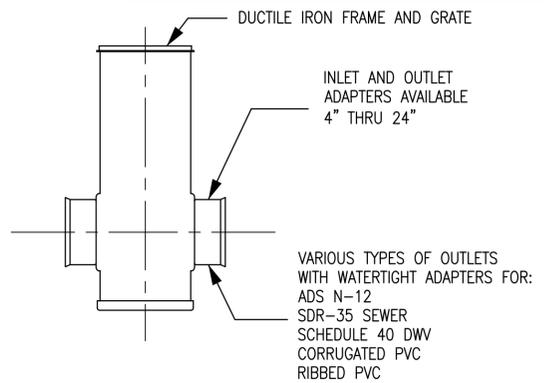
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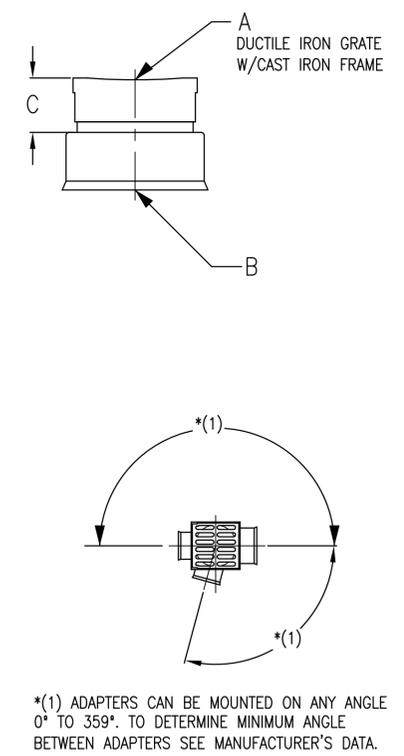
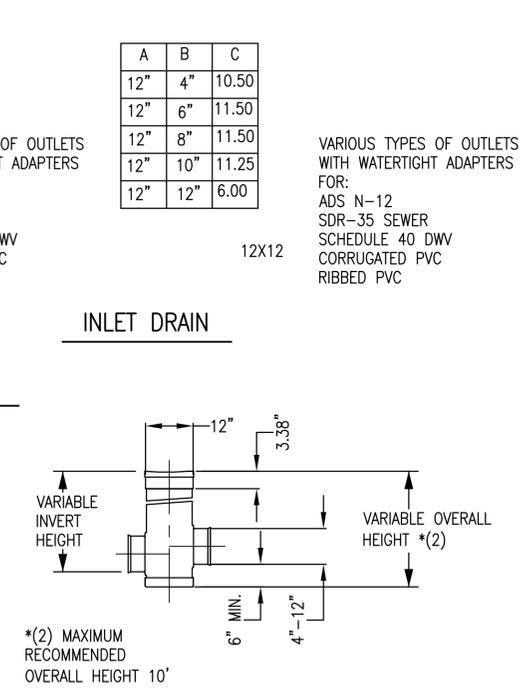
12" DRAIN BASIN



24" DRAIN BASIN



INLET DRAIN



* (1) ADAPTERS CAN BE MOUNTED ON ANY ANGLE 0° TO 359°. TO DETERMINE MINIMUM ANGLE BETWEEN ADAPTERS.

GENERAL

PVC SURFACE DRAINAGE INLETS SHALL BE OF THE IN-LINE DRAIN TYPE AS INDICATED ON THE CONTRACT DRAWING AND REFERENCED WITHIN THE CONTRACT SPECIFICATIONS. THE DUCTILE IRON GRATES (12" AND 15" FRAMES ARE CAST IRON) FOR EACH OF THESE FITTINGS ARE TO BE CONSIDERED AN INTEGRAL PART OF THE SURFACE DRAINAGE INLET AND SHALL BE FURNISHED BY THE SAME MANUFACTURER. THE SURFACE DRAINAGE INLETS SHALL BE AS MANUFACTURED BY NYLOPLAST A DIVISION OF ADVANCED DRAINAGE SYSTEMS, INC., OR PRIOR APPROVED EQUAL.

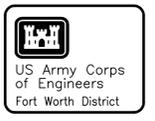
MATERIALS

THE IN-LINE DRAIN REQUIRED FOR THIS CONTRACT SHALL BE MANUFACTURED FROM PVC PIPE STOCK, UTILIZING A THERMO-MOLDING PROCESS TO REFORM THE PIPE STOCK TO THE FURNISHED CONFIGURATION. THE DRAINAGE PIPE CONNECTION STUBS SHALL BE MANUFACTURED FROM PVC PIPE STOCK AND FORMED TO PROVIDE A WATERTIGHT CONNECTION WITH THE SPECIFIED PIPE SYSTEM. THIS JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR JOINTS FOR DRAIN AND SEWER PLASTIC PIPE USING FLEXIBLE ELASTOMERIC SEALS. THE PIPE BELL SPIGOT SHALL BE JOINED TO THE IN-LINE DRAIN BODY BY USE OF A SWAGE MECHANICAL JOINT. THE PIPE STOCK USED TO MANUFACTURE THE IN-LINE DRAIN BODY AND PIPE BELL SPIGOT OF THE SURFACE DRAINAGE INLETS SHALL MEET THE MECHANICAL PROPERTY REQUIREMENTS FOR FABRICATED FITTINGS AS DESCRIBED BY ASTM D3034, STANDARD FOR SEWER PVC PIPE AND FITTINGS; ASTM F1336, STANDARD FOR PVC GASKETED SEWER FITTINGS.

THE GRATES FURNISHED FOR ALL SURFACE DRAINAGE INLETS SHALL BE DUCTILE IRON GRATES FOR SIZES 8", 10", 12", 15", 18", 24" AND 30" (12" AND 15" FRAMES ARE CAST IRON) SHALL BE MADE SPECIFICALLY FOR EACH FITTING SO AS TO PROVIDE A ROUND BOTTOM FLANGE THAT CLOSELY MATCHES THE DIAMETER OF THE SURFACE DRAINAGE INLET. GRATES FOR IN-LINE DRAINS SHALL BE CAPABLE OF SUPPORTING H-25 WHEEL LOADING FOR HEAVY-DUTY TRAFFIC OR H-10 LOADING FOR PEDESTRIAN TRAFFIC. 12" AND 15" WILL BE HINGED TO THE FRAME USING PINS. METAL USED IN THE MANUFACTURE OF THE CASTINGS SHALL CONFORM TO ASTM A536 GRADE 70-50-05 FOR DUCTILE IRON AND ASTM A-48-83 CLASS 30B FOR 12" AND 15" CAST IRON FRAMES. GRATES SHALL BE PROVIDED PAINTED BLACK.

INSTALLATION

THE SPECIFIED PVC SURFACE DRAINAGE INLET SHALL BE INSTALLED USING CONVENTIONAL FLEXIBLE PIPE BACKFILL MATERIALS AND PROCEDURES. THE BACKFILL MATERIALS SHALL BE CRUSHED STONE OR OTHER GRANULAR MATERIAL MEETING THE REQUIREMENTS OF CLASS 1 OR 2 MATERIAL AS DEFINED IN ASTM D2321. THE SURFACE DRAINAGE INLETS SHALL BE BEDDED AND BACK-FILLED UNIFORMLY IN ACCORDANCE WITH ASTM D2321. FOR H-25 LOAD RATED INSTALLATIONS, AN 8" TO 10" THICK CONCRETE RING WILL BE POURED UNDER THE GRATE AND FRAME AS RECOMMENDED BY DETAILS PROVIDED TO THE MANUFACTURER.



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1976 on 07-22-10.
NOT FOR CONSTRUCTION

Hult-Zollars, Inc.
Firm Registration No. F-761

Rev.	Date	Soi No.	Contr No.	File Name	Plot Scale	D.D. No.	Action	Date
	07-22-10			HW2010-0011-419-01	1:1			

Designed by: C. HALL
Drawn by: C. HALL
Checked by: C. SCOTT
Reviewed by: [Signature]
Submitted by: [Signature]
Chief, Arch. Branch

U.S. ARMY ENGINEER DISTRICT,
CORPS OF ENGINEERS
FORT WORTH, TEXAS

JACOBS / HULT-ZOLLARS
6688 North Central Expressway
Suite 400, MB13
Dallas, Texas 75206

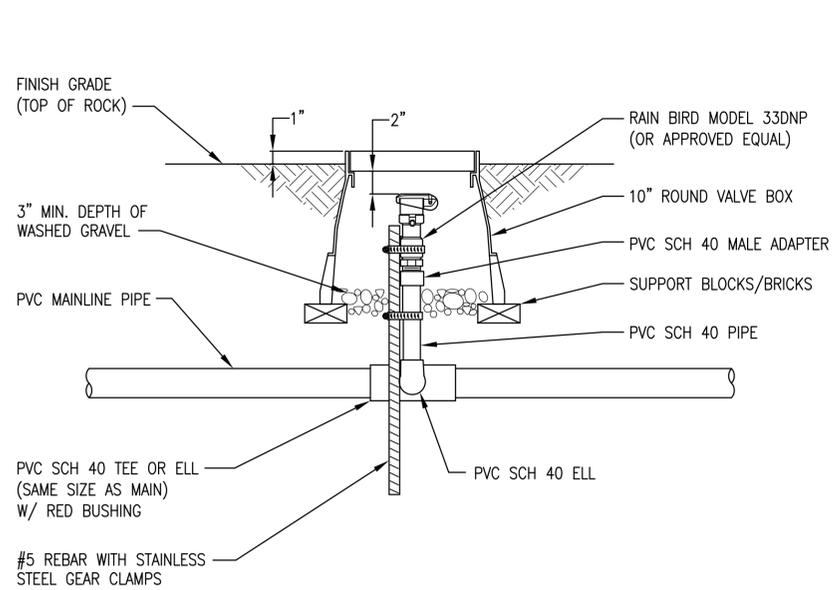
WHITE SANDS MISSILE RANGE, NEW MEXICO
LANDSCAPE DETAILS
STORM DRAIN DETAILS
DESIGN PACKAGE 107

Sheet reference number:
L-419
Sheet 39 of 46

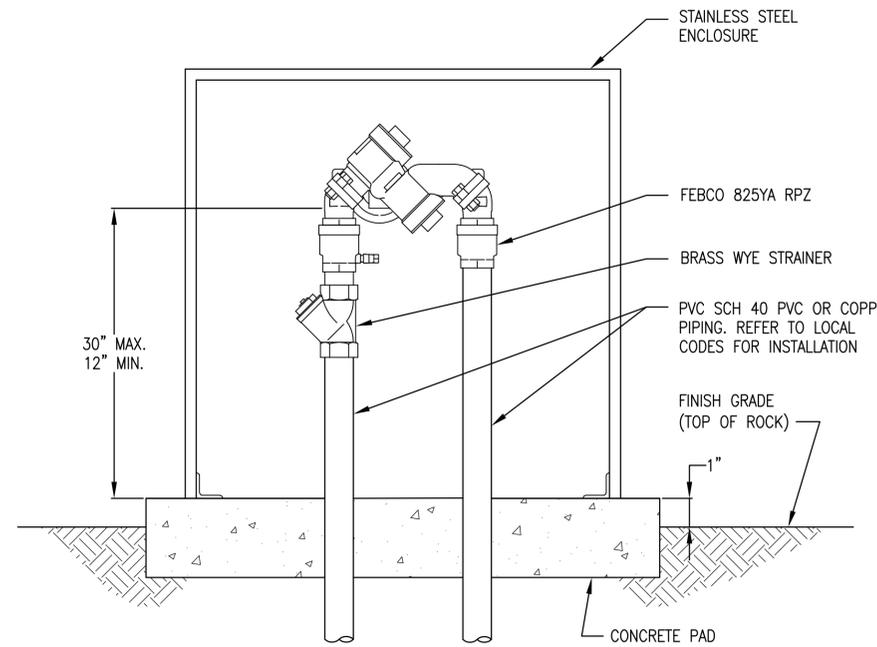
Date	Rev.	Description
07-22-10	1	Initial Issue

Designed by: C. HALL	Checked by: K. MARTIN	Reviewed by: S. BUSTOS	Submitted by: Chief, Arch. Branch
Date: 07-22-10	Soil No.:	Contr. No.:	File No.:
			MB13-0001-L430-01
			Per. No.:
			Plot scale: 1:1

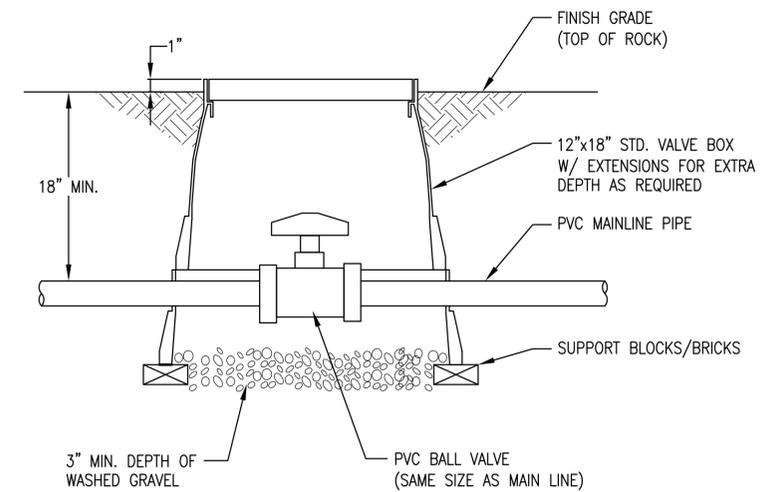
U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS	JACOBS / HULT-ZOLLARS 6688 North Central Expressway Suite 400, MB13 Dallas, Texas 75206
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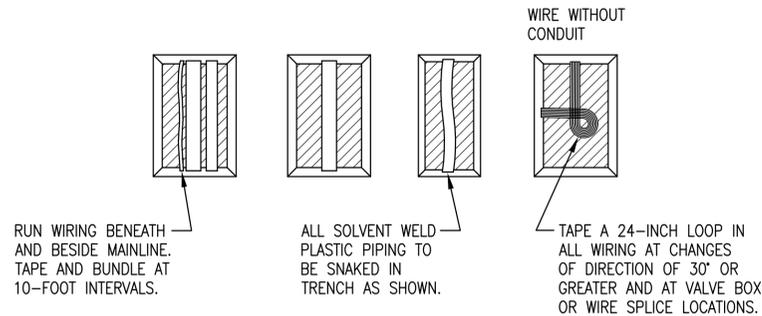
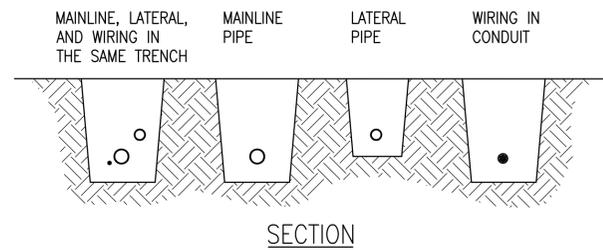
REF **1** QUICK COUPLER
NTS



REF **2** BACKFLOW PREVENTER
NTS

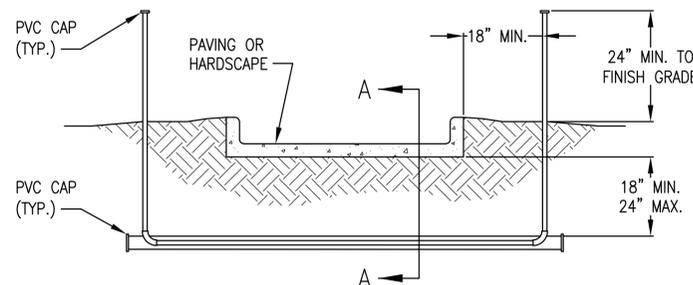
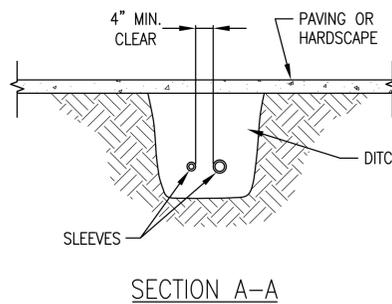


REF **3** ISOLATION VALVE
NTS



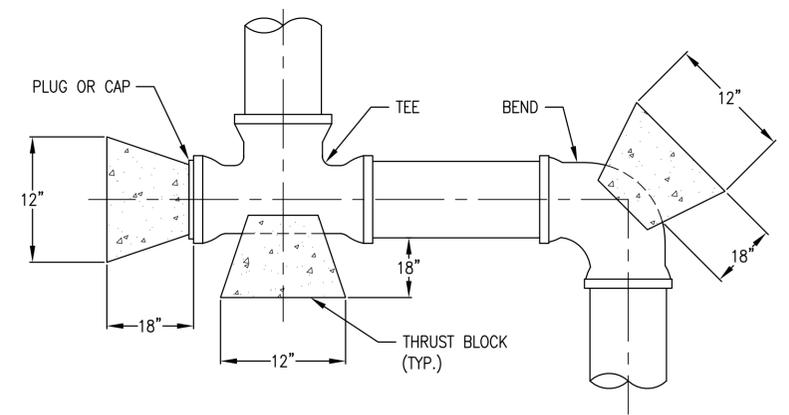
- NOTES:
1. SLEEVE BELOW ALL HARDSCAPE ELEMENTS AND PAVING. SEE DETAIL THIS SHEET.
 2. FOR PIPE AND WIRE BURIAL DEPTHS SEE GENERAL NOTES AND SPECIFICATIONS.

REF **4** PIPE AND WIRE TRENCHING
NTS



- NOTES:
1. IRRIGATION SLEEVES TO BE CLASS 200 PVC UNDER HARDSCAPE FEATURES AND SCH. 40 PVC UNDER STREETS.
 2. ALL JOINTS TO BE SOLVENT WELDED AND WATERTIGHT.
 3. WHERE THERE IS MORE THAN ONE SLEEVE, EXTEND THE SMALLER SLEEVE TO 4-INCHES MINIMUM ABOVE FINISH GRADE & CAP.
 4. MECHANICALLY TAMP TO 95% PROCTOR.

REF **5** SLEEVING
NTS



- NOTES:
1. CLASS "B" CONCRETE 2,000 PSI SHALL BE USED FOR ALL BLOCKING UNLESS OTHERWISE NOTED ON STANDARD DETAILS AND / OR PLANS.
 2. THE MINIMUM VERTICAL DIMENSION OF ALL BLOCKING SHALL BE 6". WITH AT LEAST 3" EXTENDING BOTH ABOVE AND BELOW THE PIPE CENTERLINE.
 3. FOR 22-1/2 , 45 , 90 , AND TEES AND PLUGS, THE VERTICAL DIMENSION SHALL BE EQUAL TO THE HORIZONTAL DIMENSION SHOWN.
 4. BLOCKING TO BE AGAINST UNDISTURBED TRENCH WALLS AND BOTTOM.
 5. REFER TO SPECIFICATIONS

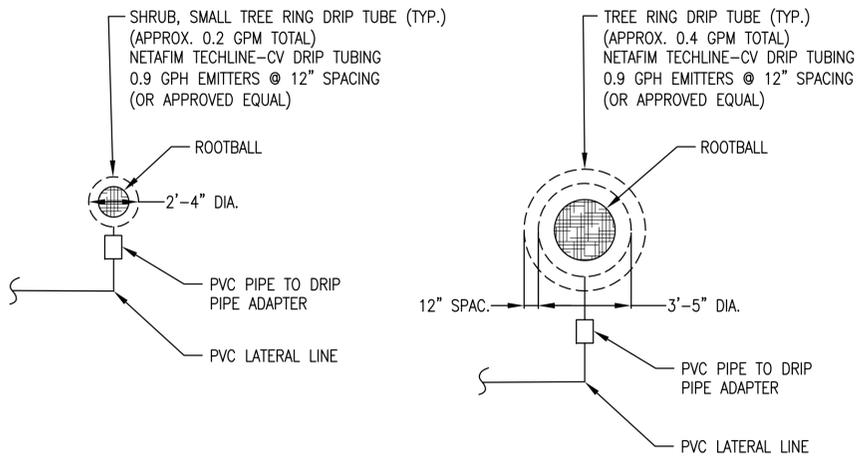
REF **6** THRUST BLOCKING
NTS

Mark	Description	D.D. No.	Action	Date

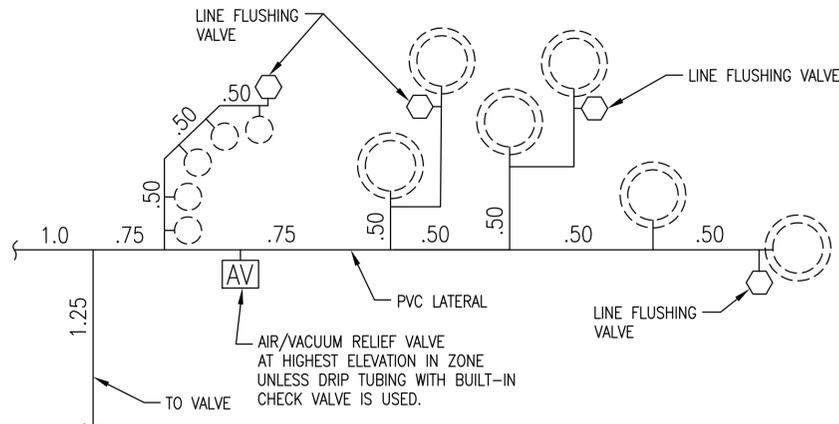
Designed by: C. HALL	Drawn by: K. MARTIN	Checked by: S. BUSTOS	Reviewed by: J. H. HULL	Submitted by: Chief, Arch. Branch
Date: 07-22-10	Soil No.:	Contr. No.:	File No.:	Plot scale: 1:1
U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS				
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WHITE SANDS MISSILE RANGE, NEW MEXICO
LANDSCAPE IRRIGATION DETAILS
IRRIGATION DETAILS
DESIGN PACKAGE 107

Sheet reference number:
L-432
Sheet 44 of 46



REF 1 DRIP PIPE TREE RING
NTS



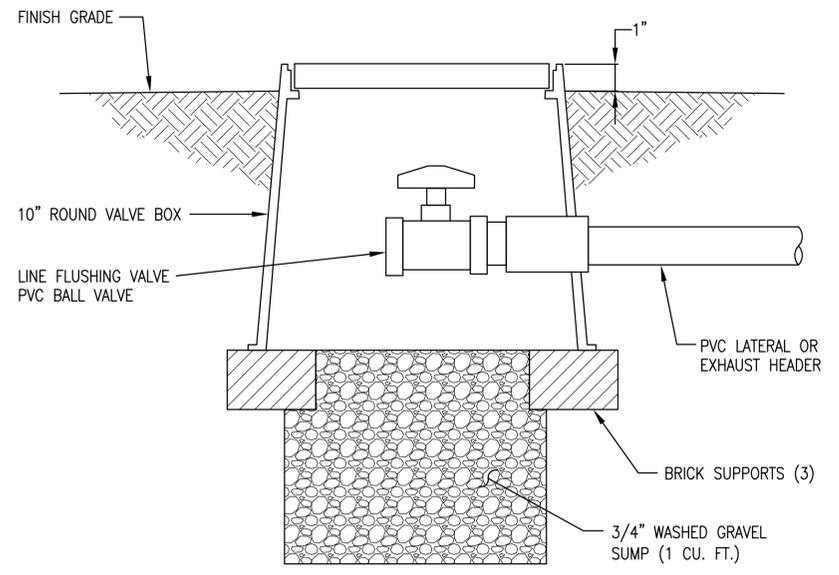
NOTES

1. LATERAL PIPE SHALL BE SIZED ACCORDING TO THE TYPICAL PIPE SIZING CHART (THIS DETAIL) OR AS SHOWN IN THE DRAWINGS. IN NO CASE SHALL PIPE VELOCITY EXCEED 5.0 FEET PER SECOND. LONG RUNS SHALL BE SIZED FOR NO MORE THAN 1.5 PSI LOSS PER 100'.

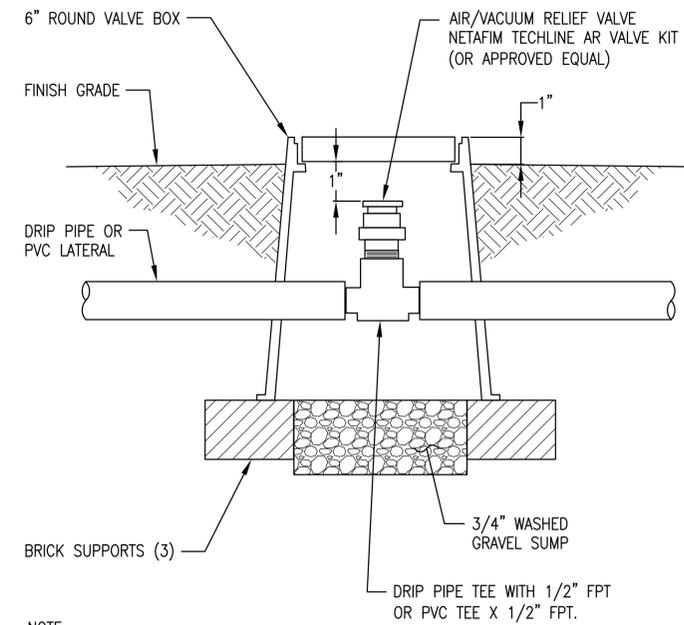
TYPICAL LATERAL PIPE SIZING CHART

SIZE	GPM
0.50"	0-2
0.75"	3-6
1.00"	7-11
1.25"	12-20
1.50"	21-35
2.00"	36-55

REF 2 TYPICAL TREE GROUPING DRIP PIPE LAYOUT
NTS

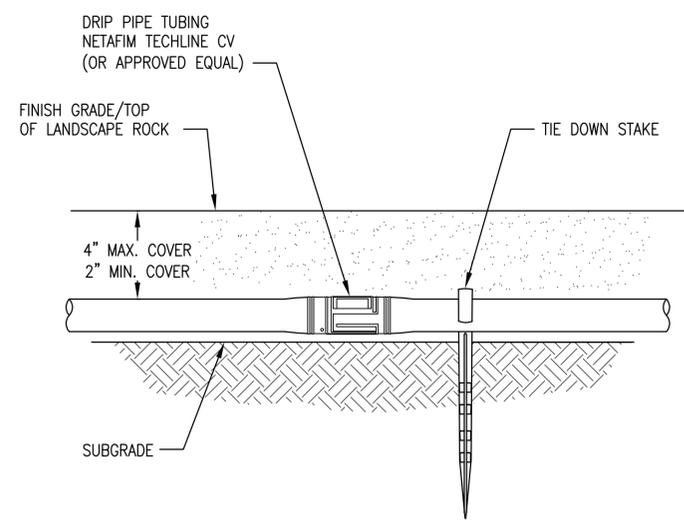


REF 3 LINE FLUSHING VALVE
NTS



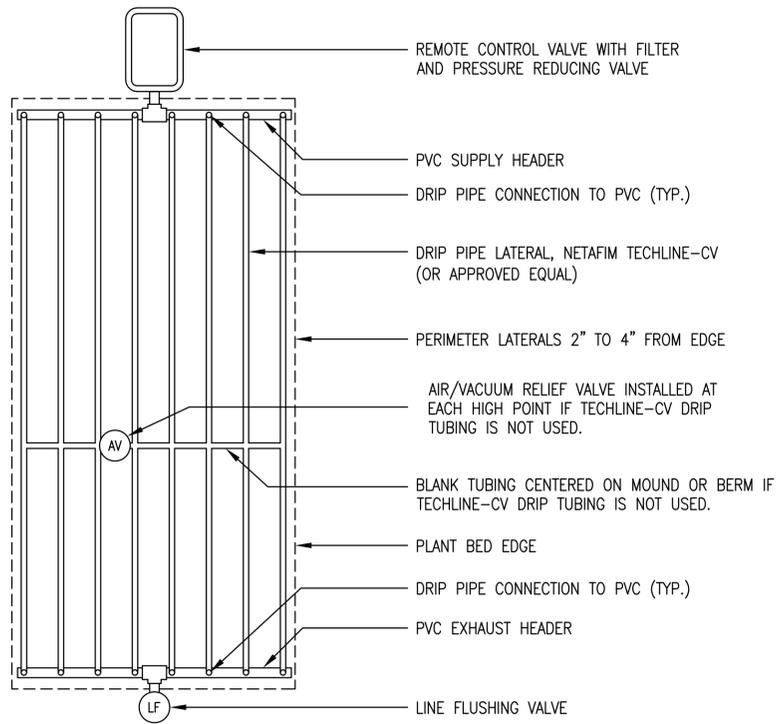
NOTE:
AIR/VACUUM RELIEF VALVES ARE NOT REQUIRED ON DRIP ZONES USING DRIP TUBING WITH BUILT-IN CHECK VALVES.

REF 4 AIR / VACUUM RELIEF VALVE
NTS

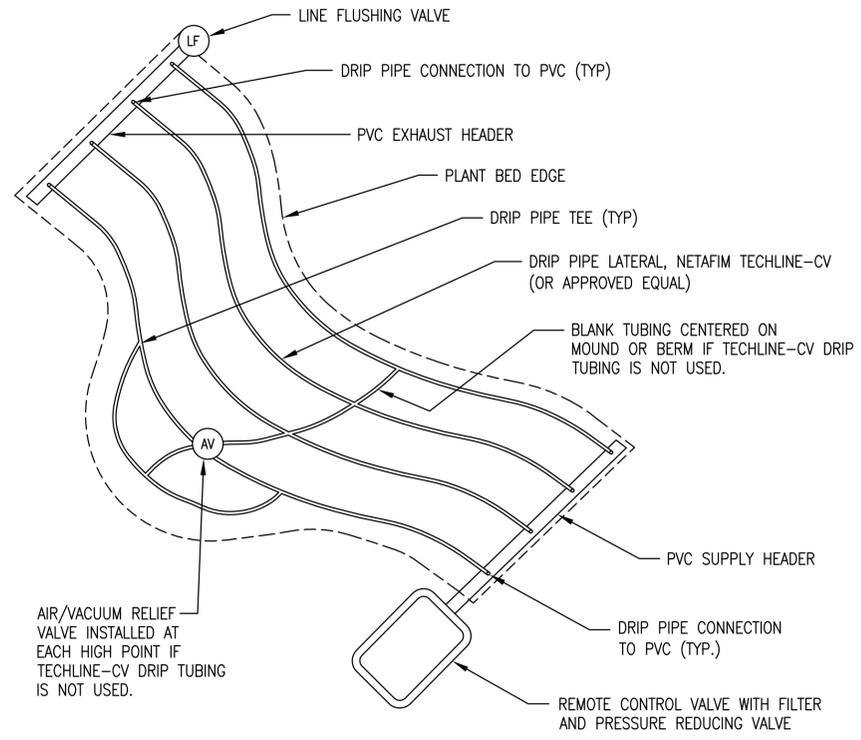


REF 5 DRIPLINE INSTALLATION
NTS

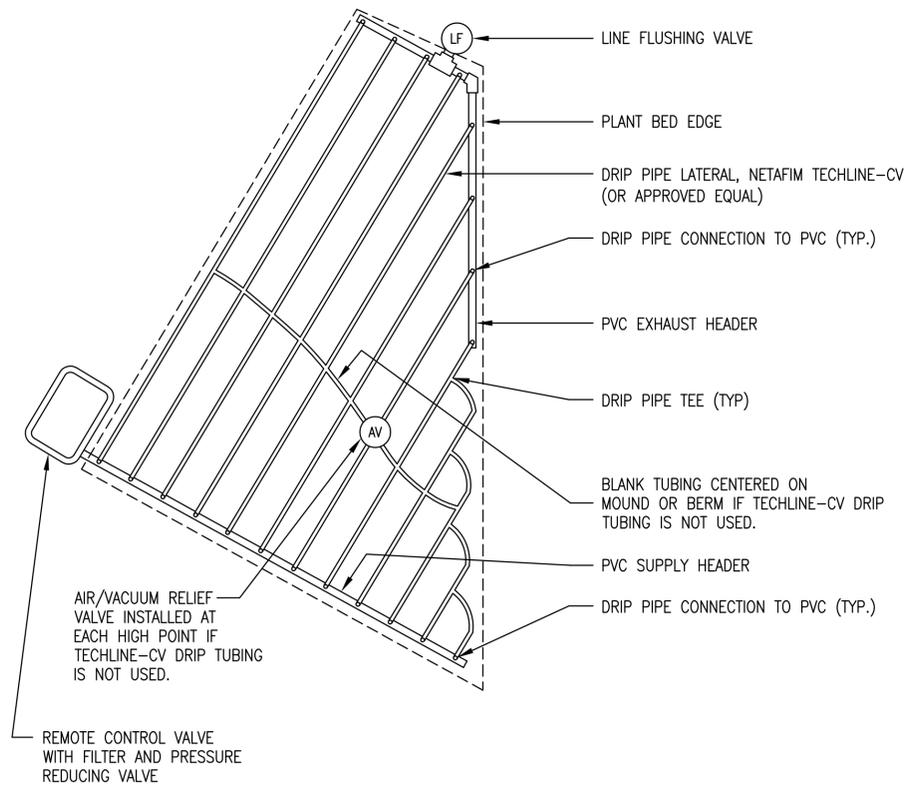
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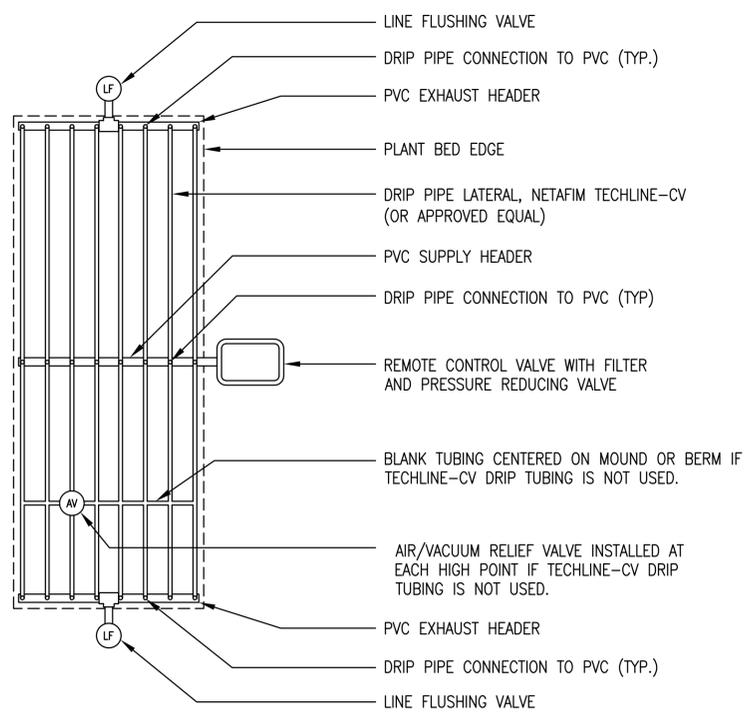
REF 1 DRIP PIPE END FEED LAYOUT
NTS



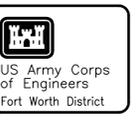
REF 2 DRIP PIPE IRREGULAR LAYOUT ODD CURVES
NTS



REF 3 DRIP PIPE IRREGULAR LAYOUT TRIANGULAR
NTS



REF 4 DRIP PIPE CENTER FEED LAYOUT
NTS



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Mark	Description	D.D. No.	Action	Date

Designed by: C. HALL	Drawn by: K. MARTIN	Checked by: S. BUSTOS	Reviewed by: S. BUSTOS	Submitted by: Chief, Arch. Branch
Date: 07-22-10	Soil No.:	Contr. No.:	File name: 072210-001-433-01	Plot scale: 1:1
U.S. ARMY ENGINEER DISTRICT, CORPS OF ENGINEERS FORT WORTH, TEXAS JACOBS / HULT-ZOLLARS 6688 North Central Expressway Suite 400, MB13 Dallas, Texas 75206				

UEPH BARRACKS WHITE SANDS MISSILE RANGE, NEW MEXICO
LANDSCAPE IRRIGATION DETAILS IRRIGATION DETAILS DESIGN PACKAGE 107

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Sheet 45 of 46

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APPENDIX BB

EXCERPTS FROM
WSMR ENGINEERS BATTALION
INFRASTRUCTURE PLANS

FOR INFORMATION ONLY

INDEX OF DRAWINGS

SHEET NO.	TITLE	FILENAME	SHEET REF. NO.
GENERAL			
1	COVER SHEET	EBF-G-001.DWG	G-001
2	INDEX OF SHEETS	EBF-G-002.DWG	G-002
3	GENERAL SYMBOLS, LEGEND AND ABBREVIATIONS	EBF-G-003.DWG	G-003
4	BORING LAYOUT	EBF-G-004.DWG	G-004
CIVIL			
5	KEY PLAN/CONTROL POINTS	EBF-C-100.DWG	C-100
6	SITE GRADING PLAN	EBF-C-201.DWG	C-201
7	SITE GRADING PLAN	EBF-C-202.DWG	C-202
8	SITE GRADING PLAN	EBF-C-203.DWG	C-203
9	SITE GRADING PLAN	EBF-C-204.DWG	C-204
10	SITE GRADING PLAN	EBF-C-205.DWG	C-205
11	SITE GRADING PLAN	EBF-C-206.DWG	C-206
12	SITE GRADING PLAN	EBF-C-207.DWG	C-207
13	SITE GRADING PLAN	EBF-C-208.DWG	C-208
14	SITE GRADING PLAN	EBF-C-209.DWG	C-209
15	SITE WARPING PLAN	EBF-C-211.DWG	C-211
16	SITE WARPING PLAN	EBF-C-212.DWG	C-212
17	SITE WARPING PLAN	EBF-C-213.DWG	C-213
18	SITE WARPING PLAN	EBF-C-214.DWG	C-214
19	SITE WARPING PLAN	EBF-C-215.DWG	C-215
20	EROSION CONTROL SITE PLAN	EBF-C-221.DWG	C-221
21	EROSION CONTROL SITE PLAN	EBF-C-222.DWG	C-222
22	EROSION CONTROL SITE PLAN	EBF-C-223.DWG	C-223
23	EROSION CONTROL SITE PLAN	EBF-C-224.DWG	C-224
24	EROSION CONTROL SITE PLAN	EBF-C-225.DWG	C-225
25	EROSION CONTROL SITE PLAN	EBF-C-226.DWG	C-226
26	EROSION CONTROL SITE PLAN	EBF-C-227.DWG	C-227
27	EROSION CONTROL SITE PLAN	EBF-C-228.DWG	C-228
28	EROSION CONTROL SITE PLAN	EBF-C-229.DWG	C-229
29	SIDEWALK GRADING PLAN	EBF-C-231.DWG	C-231
30	SIDEWALK GRADING PLAN	EBF-C-232.DWG	C-232
31	IRRIGATION PLAN	EBF-C-401.DWG	C-401
32	LANDSCAPING PLAN	EBF-C-402.DWG	C-402
33	SITE UTILITY PLAN	EBF-C-501.DWG	C-501
34	SITE UTILITY PLAN	EBF-C-502.DWG	C-502
35	SITE UTILITY PLAN	EBF-C-503.DWG	C-503
36	SITE UTILITY PLAN	EBF-C-504.DWG	C-504
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39	SITE UTILITY PLAN	EBF-C-507.DWG	C-507
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42	SITE UTILITY PLAN	EBF-C-510.DWG	C-510
43	SITE UTILITY PLAN	EBF-C-511.DWG	C-511
44	SITE UTILITY PLAN	EBF-C-512.DWG	C-512
45	SITE UTILITY PLAN	EBF-C-513.DWG	C-513
46	SITE UTILITY PLAN	EBF-C-514.DWG	C-514
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54	SITE PLAN	EBF-C-608.DWG	C-608
55	SITE PLAN	EBF-C-609.DWG	C-609
56	SIGNING AND PAVEMENT MARKING PLAN	EBF-C-611.DWG	C-611
57	SIGNING AND PAVEMENT MARKING PLAN	EBF-C-612.DWG	C-612
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63	SIGNING AND PAVEMENT MARKING PLAN	EBF-C-618.DWG	C-618
64	SIDEWALK GEOMETRIC PLAN	EBF-C-621.DWG	C-621
65	SIDEWALK GEOMETRIC PLAN	EBF-C-622.DWG	C-622
65A	HARDSTAND JOINT DETAILS	EBF-C-623.DWG	C-623
65B	RESIN MODIFIED PAVEMENT OPTION	EBF-C-624.DWG	C-624

SHEET NO.	TITLE	FILENAME	SHEET REF. NO.
66	STREET "A" PROFILE	EBF-C-701.DWG	C-701
67	STREET "B" PROFILE	EBF-C-702.DWG	C-702
68	STREET "C" PROFILE	EBF-C-703.DWG	C-703
69	STREET "D" & "E" PROFILES	EBF-C-704.DWG	C-704
70	STREET "F" & "G" PROFILES	EBF-C-705.DWG	C-705
71	STREET "H" PROFILE	EBF-C-706.DWG	C-706
72	STREET "J" & HUGHES ST. PROFILES	EBF-C-707.DWG	C-707
73	STORM SEWER PROFILES	EBF-C-711.DWG	C-711
74	STORM SEWER PROFILES	EBF-C-712.DWG	C-712
75	STORM SEWER PROFILES	EBF-C-713.DWG	C-713
76	STORM SEWER PROFILES	EBF-C-714.DWG	C-714
77	SANITARY SEWER PROFILES	EBF-C-721.DWG	C-721
78	SANITARY SEWER PROFILES	EBF-C-722.DWG	C-722
79	SANITARY SEWER COORDINATE TABLES	EBF-C-723.DWG	C-723
80	DOMESTIC WATER COORDINATE TABLES	EBF-C-724.DWG	C-724
81	NATURAL GAS COORDINATE TABLES	EBF-C-725.DWG	C-725
82	PAVEMENT DETAILS	EBF-C-901.DWG	C-901
83	MISCELLANEOUS DETAILS	EBF-C-902.DWG	C-902
84	DITCH DETAILS	EBF-C-903.DWG	C-903
85	SIGN DETAILS	EBF-C-904.DWG	C-904
86	CONCRETE PIPE BEDDING DETAIL	EBF-C-905.DWG	C-905
87	HDPE PIPE BEDDING DETAIL	EBF-C-906.DWG	C-906
88	PCCP JOINT DETAILS	EBF-C-907.DWG	C-907
89	PCCP JOINT DETAILS	EBF-C-908.DWG	C-908
90	STORM SEWER DETAILS	EBF-C-909.DWG	C-909
91	STORM SEWER DETAILS	EBF-C-910.DWG	C-910
92	STORM SEWER DETAILS	EBF-C-911.DWG	C-911
93	EROSION DETAILS	EBF-C-912.DWG	C-912
94	EROSION DETAILS	EBF-C-913.DWG	C-913
95	EROSION DETAILS	EBF-C-914.DWG	C-914
96	EROSION DETAILS	EBF-C-915.DWG	C-915
97	EROSION DETAILS	EBF-C-916.DWG	C-916
98	EROSION DETAILS	EBF-C-917.DWG	C-917
99	EROSION DETAILS	EBF-C-918.DWG	C-918
100	PEDESTRIAN ACCESS DETAILS	EBF-C-919.DWG	C-919
101	PEDESTRIAN ACCESS DETAILS	EBF-C-920.DWG	C-920
102	PEDESTRIAN ACCESS DETAILS	EBF-C-921.DWG	C-921
103	PEDESTRIAN ACCESS DETAILS	EBF-C-922.DWG	C-922
104	CURB DETAILS	EBF-C-923.DWG	C-923
105	STORM SEWER DETAILS	EBF-C-924.DWG	C-924
106	STORM SEWER DETAILS	EBF-C-925.DWG	C-925
107	STORM SEWER DETAILS	EBF-C-926.DWG	C-926
108	STORM SEWER DETAILS	EBF-C-927.DWG	C-927
109	STORM SEWER DETAILS	EBF-C-928.DWG	C-928
110	STORM SEWER DETAILS	EBF-C-929.DWG	C-929
111	STORM SEWER DETAILS	EBF-C-930.DWG	C-930
112	STORM SEWER DETAILS	EBF-C-931.DWG	C-931
113	STORM SEWER DETAILS	EBF-C-932.DWG	C-932
114	STORM SEWER DETAILS	EBF-C-933.DWG	C-933
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116	SIGN DETAILS	EBF-C-935.DWG	C-935
117	SIGN DETAILS	EBF-C-936.DWG	C-936
118	SIGN DETAILS	EBF-C-937.DWG	C-937
119	SIGN DETAILS	EBF-C-938.DWG	C-938
120	CHAIN LINK FENCE DETAILS	EBF-C-939.DWG	C-939
121	CHAIN LINK FENCE DETAILS	EBF-C-940.DWG	C-940
122	WATERLINE CONNECTION DETAILS	EBF-C-941.DWG	C-941
123	WATERLINE / SEWERLINE TRENCH TERMINOLOGY	EBF-C-942.DWG	C-942
124	CONCRETE BLOCKING DETAILS AND RESTRAINED JOINT LENGTHS	EBF-C-943.DWG	C-943
125	WATER VALVE BOX	EBF-C-944.DWG	C-944
126	RING AND COVER FOR VALVE BOX	EBF-C-945.DWG	C-945
127	WATER VALVE ANCHORAGE	EBF-C-946.DWG	C-946
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135	SEWER MANHOLE TYPE "C"	EBF-C-954.DWG	C-954
136	SEWER MANHOLE TYPE "E"	EBF-C-955.DWG	C-955
137	SEWER CONCRETE MANHOLE COVER TYPE "C"	EBF-C-956.DWG	C-956
138	SEWER MANHOLE FRAME AND COVER	EBF-C-957.DWG	C-957
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SHEET NO.	TITLE	FILENAME	SHEET REF. NO.
141	SEWER ENCASEMENT DETAILS	EBF-C-960.DWG	C-960
142	NATURAL GAS DISTRIBUTION DETAILS	EBF-C-961.DWG	C-961
143	SWING GATE DETAIL	EBF-C-962.DWG	C-962
ELECTRICAL AND COMMUNICATION			
144	ELECTRICAL SITE PLAN OVERALL INDEX	EBF-U300-KEY.DWG	U-300
145	ELECTRICAL SITE POWER AND LIGHTING PLAN	EBF-U301-PLN.DWG	U-301
146	ELECTRICAL SITE POWER AND LIGHTING PLAN	EBF-U302-PLN.DWG	U-302
147	ELECTRICAL SITE POWER AND LIGHTING PLAN	EBF-U303-PLN.DWG	U-303
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152	ELECTRICAL SITE POWER AND LIGHTING PLAN	EBF-U308-PLN.DWG	U-308
152A	ELECTRICAL SITE ALTERNATE LIGHTING PLAN	EBF-U311-ALT.DWG	U-311
152B	ELECTRICAL SITE ALTERNATE LIGHTING PLAN	EBF-U312-ALT.DWG	U-312
152C	ELECTRICAL SITE ALTERNATE LIGHTING PLAN	EBF-U313-ALT.DWG	U-313
152D	ELECTRICAL SITE ALTERNATE LIGHTING PLAN	EBF-U314-ALT.DWG	U-314
152E	ELECTRICAL SITE ALTERNATE LIGHTING PLAN	EBF-U315-ALT.DWG	U-315
152F	ELECTRICAL SITE ALTERNATE LIGHTING PLAN	EBF-U316-ALT.DWG	U-316
153	COMMUNICATIONS SITE PLAN OVERALL INDEX	EBF-U400-KEY.DWG	U-400
154	COMMUNICATIONS SITE PLAN	EBF-U401-PLN.DWG	U-401
155	COMMUNICATIONS SITE PLAN	EBF-U402-PLN.DWG	U-402
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157	COMMUNICATIONS SITE PLAN	EBF-U404-PLN.DWG	U-404
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159	COMMUNICATIONS SITE PLAN	EBF-U406-PLN.DWG	U-406
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163	COMMUNICATIONS SITE PLAN	EBF-U410-PLN.DWG	U-410
164	ELECTRIC DUCTBANK PROFILES	EBF-U-731.DWG	U-731
165	ELECTRIC DUCTBANK PROFILES	EBF-U-732.DWG	U-732
166	ELECTRIC DUCTBANK PROFILES	EBF-U-733.DWG	U-733
167	ELECTRIC DUCTBANK PROFILES	EBF-U-734.DWG	U-734
168	COMMUNICATION DUCTBANK PROFILES	EBF-U-741.DWG	U-741
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170	COMMUNICATION DUCTBANK PROFILES	EBF-U-743.DWG	U-743
171	ELECTRICAL DUCTBANK WIRING DIAGRAM	EBF-U601-DIA.DWG	U-601
172	COMMUNICATIONS DUCTBANK ONE-LINE DIAGRAM	EBF-U610-DIA.DWG	U-610
173	ELECTRICAL DETAILS DUCTBANK SECTIONS	EBF-U831-DTL.DWG	U-831
174	ELECTRICAL DETAILS LIGHTING	EBF-U832-DTL.DWG	U-832
175	ELECTRICAL MANHOLE DIMENSION DRAWING	EBF-U833-DTL.DWG	U-833
176	ELECTRICAL DETAILS PAD MOUNTED SWITCHES	EBF-U834-DTL.DWG	U-834
177	ELECTRICAL DETAILS PAD MOUNTED SWITCHES	EBF-U835-DTL.DWG	U-835
178	ELECTRICAL DETAILS PAD MOUNTED TRANSFORMERS	EBF-U836-DTL.DWG	U-836
179	ELECTRICAL DETAILS PAD MOUNTED TRANSFORMERS	EBF-U837-DTL.DWG	U-837
180	ELECTRICAL DETAILS PAD MOUNTED TRANSFORMERS	EBF-U838-DTL.DWG	U-838
181	ELECTRICAL DETAILS PAD MOUNTED TRANSFORMERS	EBF-U839-DTL.DWG	U-839
182	ELECTRICAL MANHOLE FOLD-OUT DETAILS	EBF-U840-DTL.DWG	U-840
183	ELECTRICAL MANHOLE FOLD-OUT DETAILS	EBF-U841-DTL.DWG	U-841
184	ELECTRICAL MANHOLE FOLD-OUT DETAILS	EBF-U842-DTL.DWG	U-842
184A	ELECTRICAL DETAILS OVERHEAD LINES AND POLES	EBF-U850-DTL.DWG	U-850
184B	ELECTRICAL DETAILS OVERHEAD LINES AND POLES	EBF-U851-DTL.DWG	U-851
184C	ELECTRICAL DETAILS OVERHEAD LINES AND POLES	EBF-U852-DTL.DWG	U-852
185	COMMUNICATIONS DETAILS DUCTBANK SECTIONS	EBF-U871-DTL.DWG	U-871
186	COMMUNICATIONS DETAILS MANHOLES AND HANDHOLES	EBF-U872-DTL.DWG	U-872
187	COMMUNICATIONS DETAILS MANHOLES	EBF-U873-DTL.DWG	U-873
188	COMMUNICATIONS MANHOLE FOLD-OUT DETAILS	EBF-U874-DTL.DWG	U-874



STATE OF MISSOURI
 REGISTERED PROFESSIONAL ENGINEER
 RICHARD R. BAUM
 LICENSE NO. 24320

Rev.	Date	By	Description
1	03/20/10	J. JONES	REVISED DRAWING INDEX

Designed by: R. BAUM	Checked by: J. JONES
Drawn by: J. ROSEN	Reviewed by:
Submittal by:	Chief:

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ENGINEERS BATTALION GTF
 UNIT OPERATIONS FACILITIES
 WHITE SANDS MISSILE RANGE
 NEW MEXICO

INDEX OF DRAWINGS

Sheet reference number:
G-002
 Sheet 2 of 188

GENERAL SYMBOLS

MATERIAL SYMBOLS

ABBREVIATIONS

REFER TO DISCIPLINE INFORMATION DRAWING

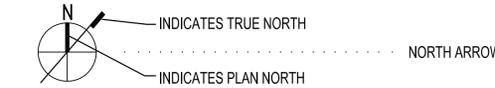
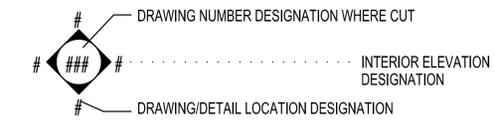
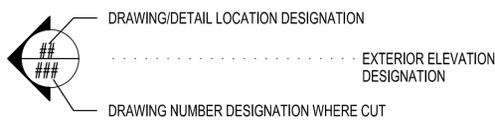
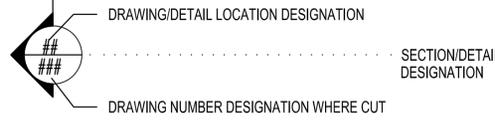
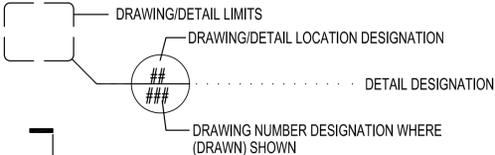


Table of material symbols with corresponding hatching patterns for STEEL, BATT INSULATION, RIGID INSULATION, GYPSUM BOARD, CONCRETE, EARTH, GRANULAR FILL, ACOUSTICAL CEILING PANEL, MARBLE, TERRAZZO, FINISH WOOD, FINISH WOOD - ELEVATION, WOOD ROUGH, STONE, CMU, WOOD BLOCKING, SHIM, PARTICLEBOARD OR PLYWOOD, GLASS, CARPET, BRICK, CAST STONE OR PRECAST CONCRETE.

Table of abbreviations with columns for symbol, description, and unit. Includes terms like AMPERE, ANCHOR BOLT, AIRBREAK SWITCH, ASBESTOS CEMENT, ASPHALTIC CONCRETE, AIR CIRCUIT BREAKER, ALUMINUM CONDUCTOR, STEEL REINFORCED, ACOUSTIC, ACOUSTIC CEILING PANEL, AREA DRAIN, ADJUSTABLE, ALUMINUM, ALTERNATE, ACCESS PANEL, APPROXIMATE, ARCHITECTURAL, ARCHITECTURAL RESTORATION, ASPHALT, AMERICAN WIRE GAGE, BOTTOM, BOTTOM OF CURB, BITUMINOUS COATED CORRUGATED METAL PIPE, BOARD, BITUMINOUS, BASE LINE, BUILDING, BLOCK, BEAM, BENCHMARK, BASEMENT, BRITISH THERMAL UNIT, CONDUIT, CAPACITY, CENTER TO CENTER, CEMENT, CUBIC FEET PER MINUTE, CAST IRON, CAST IRON PIPE, CIRCULATING, CONTROL JOINT, CIRCUIT, CENTERLINE, CLEAR, CLEARANCE, CEILING, CORRUGATED METAL PIPE, CORRUGATED METAL PIPE ARCH, CONCRETE MASONRY UNITS, CLEANOUT, COLUMN, CONCRETE, CONDUCTOR, CONNECTION, CONSTRUCTION, CONTINUOUS, CONTRACTION, CONVERTER, COPPER, (NONREINFORCED) CONCRETE PIPE, COLD-ROLLED STEEL, COUNTER SUNK, CERAMIC TILE, CURRENT TRANSFORMER, CENTER, COLD WATER, CAPILLARY WATER BARRIER, DEPTH, DEEP, DEGREE OF CURVATURE, DRAIN, DRY BULB, DECIBEL, DIRECT BURIAL, DETAIL, DRILL HOLE, DIAMETER, DIMENSION, DEAD LOAD, DOWN, DITTO, DISTRIBUTION PANEL, DOWNSPOUT, DRINKING WATER DISPENSER, DRAWING, EAST, EACH, EMPTY CONDUIT, EACH FACE, ELEVATION, ELECTRIC, EMERGENCY, ELECTRICAL METALLIC TUBING, EQUAL, EQUIPMENT, EACH WAY, ELECTRIC WATER COOLER, EXISTING, EXPANSION, EXPOSED, EXPANSION JOINT, EXTERIOR, FAHRENHEIT, FIRE, FIRE ALARM BOX, FIRE ALARM CONTROL PANEL, FLOOR DRAIN, FOUNDATION, FEEDER, FINISH FLOOR, FIRE HYDRANT, FIRE HOSE CABINET, FIGURE, FINISH, FELT JOINT, FLOOR, FLASHING, FLUORESCENT, FOUR WAY, FEET PER MINUTE, FRAME, FULL SIZE, FOOTING, GAGE, GALVANIZED, GOVERNMENT FURNISHED, CONTRACTOR INSTALLED, GOVERNMENT FURNISHED, GOVERNMENT INSTALLED, GLASS, GOVERNMENT, GALLONS PER MINUTE, GRADE, GROUND, GLAZED STRUCTURAL UNIT, GROUND WATER, GYPSUM WALL BOARD, GYPSUM, HEIGHT, HARD DRAWN, HARDWARE, HORN GAP SWITCH, HORIZONTAL, HORSEPOWER, HIGH POINT, HOUR, HIGH STRENGTH, HEAVY, HOT WATER, HEADWALL, HIGH WATER LEVEL, HERTZ, INLET, MOMENT OF INERTIA, INSIDE DIAMETER, INSIDE DIMENSION, INSULATION, INSULATED, INTERIOR, INVERT, JUNCTION BOX, JANITOR CLOSET, JUNCTION, JOIST, JOINT, KIPS (1000 LBS), KEENE'S CEMENT PLASTER, KNOCK OUT, KILOVOLT, KILOVOLT-AMPERE, KILOWATT, LOUVER, LENGTH, LENGTH OF CURVE, LIGHTNING ARRESTOR, LAVATORY, POUNDS, LEAD COVERED, LIVE LOAD, LONG LEG HORIZONTAL, LONG LEG VERTICAL, LIGHT, MACHINE, MASONRY, MATERIAL, MAXIMUM, THOUSAND BTU PER HOUR, MECHANICAL, MILITARY EQUIPMENT PARKING, METAL, MANHOLE, MINIMUM, MISCELLANEOUS, MILLIMETERS, MASS NOTIFICATION CONTROL PANEL, MASONRY OPENING, MEDIUM PRESSURE, MILES PER HOUR, MOUNTED, MOUNTING, MEMBRANE WATERPROOFING, NORTH, NON CORROSIVE, NOSE DOWN CURB, NEUTRAL, NOT IN CONTRACT, NO NUMBER, NOMINAL, NOT TO SCALE, OUTSIDE AIR, ON CENTER, OIL CIRCUIT BREAKER, OUTSIDE DIAMETER, OPENING, OPPOSITE, OVERHEAD, PIPE, PULL BOX, POINT OF CURVE, PROFILE, POINT OF INTERSECTION, POST INDICATOR VALVE, PREFORMED JOINT FILLER, PROPERTY LINE, PLATE, PLASTER, PAPER AND LEAD NEOPRENE JACKET, PLYWOOD, PANEL, PRIVATELY OWNED VEHICLE, PRELIMINARY, PRESSURE, PRIMARY, PULL SWITCH, POUNDS PER SQUARE FOOT, POUNDS PER SQUARE INCH, POINT, POINT OF TANGENT, POINT OF VERTICAL CURVE, POLYVINYL CHLORIDE, POINT OF VERTICAL INTERSECTION, POINT OF VERTICAL TANGENT, QUARRY TILE, RADIUS, RISER, RUBBER SHEATH, HORIZONTAL, REINFORCED CONCRETE PIPE, ROOF DRAIN, ROAD, RECEPTACLE, REDUCING, REGULATOR, REGISTER, REINFORCEMENT, RELOCATED, REMOVED, REQUIRED, REVISION, ROOF, RUBBER INSULATED, RAIN LEADER, ROOM, REVOLUTIONS PER MINUTE, RIGHT OF WAY, SOUTH, SECTION MODULUS, SANITARY SEWER, SUSPENDED ACOUSTICAL TILE CEILING, SCHEDULE, STORM DRAIN, SECTION, SERVICE, SHEET, SINGLE PHASE, SUSPENDED KEENE'S CEMENT PLASTER, SLOPE, SANITARY MANHOLE, SINGLE POLE, SUSPENDED PLASTER CEILING, SINGLE POLE DOUBLE THROW SPECIFICATION, SINGLE POLE, SINGLE THROW, SQUARE, STAINLESS STEEL, STREAM, SINGLE THROW, STREET, STATION, STANDARD, STEEL, STRUCTURAL, SUPPORT, SUSPENDED, SWITCH, SWITCHBOARD, SWITCHGEAR, TILE, TOP, TANGENT, TOP AND BOTTOM, TOP OF CURB, TELEPHONE, TEMPORARY, TERMINAL, TOP OF FOOTING, THREE CONDUCTOR, THREE POLE, THREE WAY, TOTAL HEAD (PUMPS), THRESHOLD, THROUGH, TEST PIT, TOP OF STEEL, TOP OF STONE, TOP OF SLAB, TOP OF WALL, TYPICAL, UNDERGROUND, UNLESS NOTED OTHERWISE, VENT, VOLT, VALVE, VELOCITY, VACUUM, VINYL ASBESTOS, VAPOR BARRIER, VARNISH CAMBRIC, VITRIFIED CLAY, VITRIFIED CLAY PIPE, VEHICLE, VERTICAL, VESTIBULE, VOLUME, VERTICAL WALL REINFORCING, WIDTH, WASTE, WATER, WATT, WEST, WITH, WITHOUT, WET BULB, WATER CLOSET, WIDTH, WINDOW DIMENSION, WATER LEVEL, WATERPROOF, WEATHERPROOF, WASTE STACK, WATER SURFACE, WATERSTOP, WEIGHT, WELDED WIRE MESH, TRANSFORMER, EXTRA STRENGTH, YEAR, 2:1 SLOPE, 2 HORIZONTAL TO 1 VERTICAL, 1 ON 2 SLOPE, 1 VERTICAL ON 2 HORIZONTAL, DEFLECTION ANGLE.



Revision table with columns for Date, Rev., and Description.

Design and review table with columns for Date, Rev., and Description.

Professional Engineer seal for J.E. Jacobs/Hitt-Zollars, No. 0920/10.

ENGINEERS BATTALION GTF UNIT OPERATIONS FACILITIES WHITE SANDS MISSILE RANGE NEW MEXICO GENERAL SYMBOLS, LEGEND AND ABBREVIATIONS

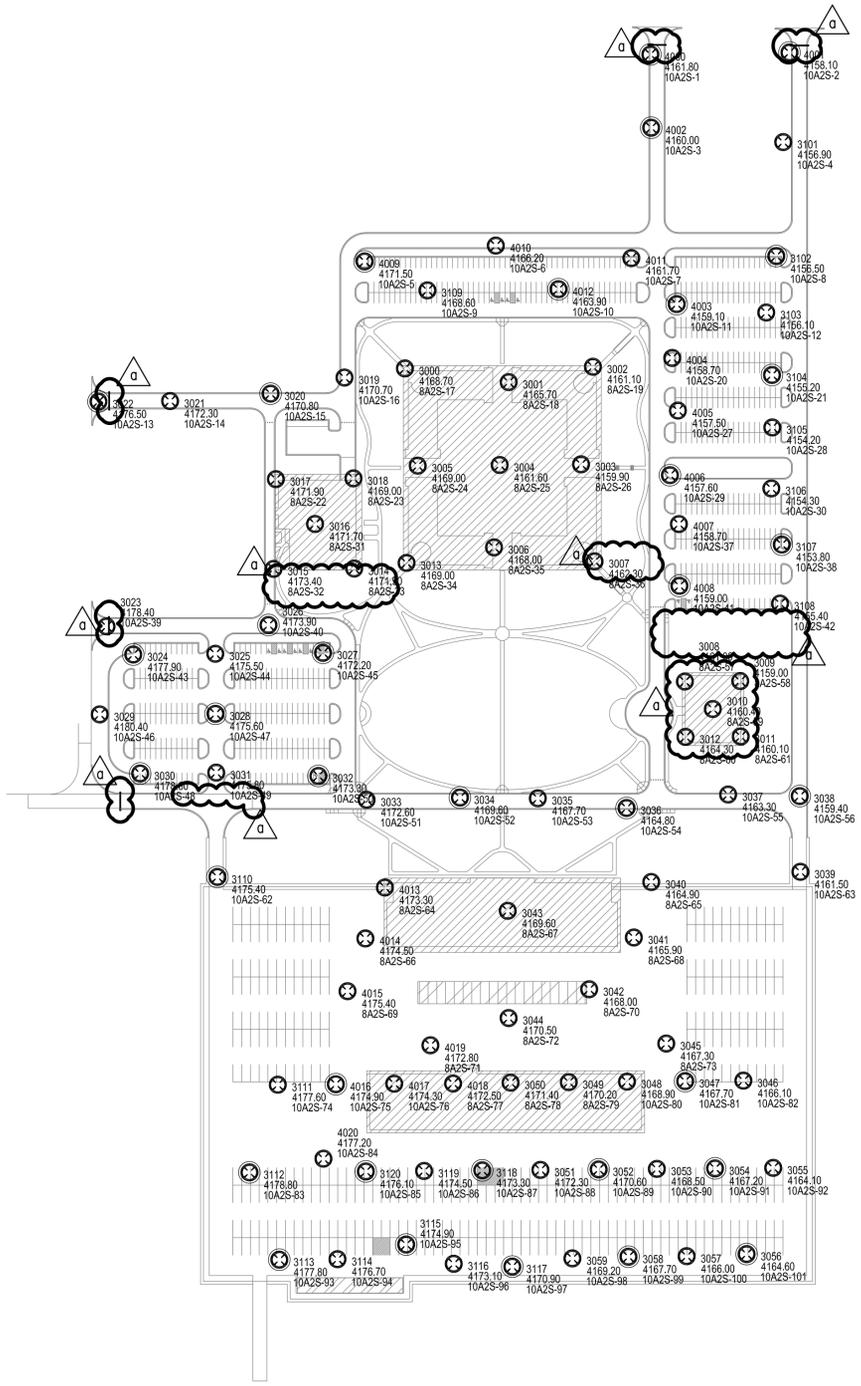
Sheet reference number: G-003 Sheet 3 of 188



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LEGEND

- BOREHOLE SYMBOL
- DCP HOLE
- 4001 BOREHOLE NUMBER
- 4158.10 EXISTING GROUND ELEVATION
- 10A2S-2 BOREHOLE NAME



SCALE: 1" = 150'

Mark	Description	Date	Action
AM 0001	3/25/08		

Designed by: R.BAUM	Date: 02/08/08	Rev.
Drawn by: J.ROSEN	Sol. no.	
Reviewed by:	Contr. No.	
Submitted by:	File name: EEF-G-004	
Chief:	Plot date: 03/20/10	
	Plot scale: 1:1	

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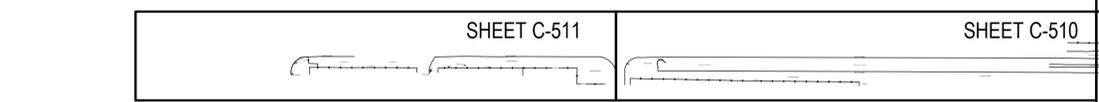
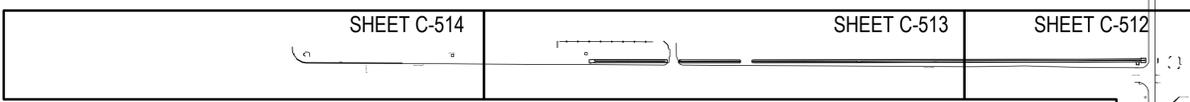
ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITY RANGE
WHITE SANDS MISSILE RANGE
NEW MEXICO

BORING LOCATION

Sheet
reference
number:
G-004
Sheet 4 of 188

1 2 3 4 5

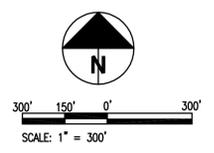
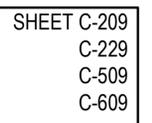
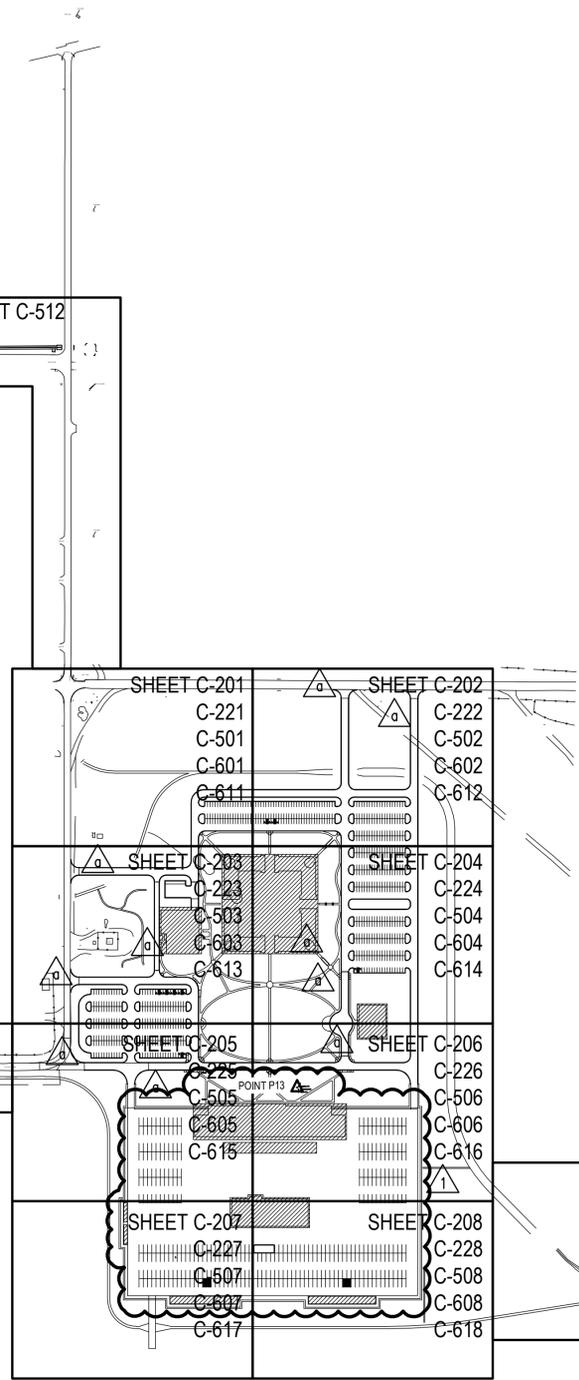
D
C
A



CONTROL POINTS

POINT	NORTHING	EASTING	ELEVATION
P09	11759497.82	1186421.79	4196.70
P10	11757674.41	1186386.54	4195.75
P13	11758533.53	1188115.94	4166.97
P16	11758623.67	1189877.72	4135.14
P35	11759640.55	1189838.13	4132.75
P36	11757598.74	1189812.57	4138.59

- NOTES:**
- ALL POINTS ARE 1/2" DIAMETER REBAR WITH YELLOW PLASTIC CAP STAMPED "CONTROL POINT".
 - THE ABOVE LIST IS A SURFACE COORDINATE SYSTEM CREATED BY SCALING UTM GRID COORDINATES IN US SURVEY FEET BY 1.00036210607.
 - ELEVATIONS ARE NAVD 88 BASED ON VERTICAL ADJUSTMENT TO BMS X243 AND A336.



DISCLAIMER
Attachment of this seal to this document is made only for the purpose of authenticating this document. Responsibility for all other documents relating to this project is disclaimed.

Rev.	Date	Description
1	10/03/08	ISSUE FOR DESCRIPTIONS
2	01/07/09	ISSUE FOR DESCRIPTIONS

Designed by: R. BAUM	Checked by: J. JONAS	Submitted by: Chief
Drawn by: I. ROSEN	Reviewed by:	
Date: 03/03/08	Soil no.:	File name: EEFF-C-100
Contr. No. W9126G-06-L-005	Task Order: 003	Proj. date: 11/19/06
		Proj. sheet: 1 of 1

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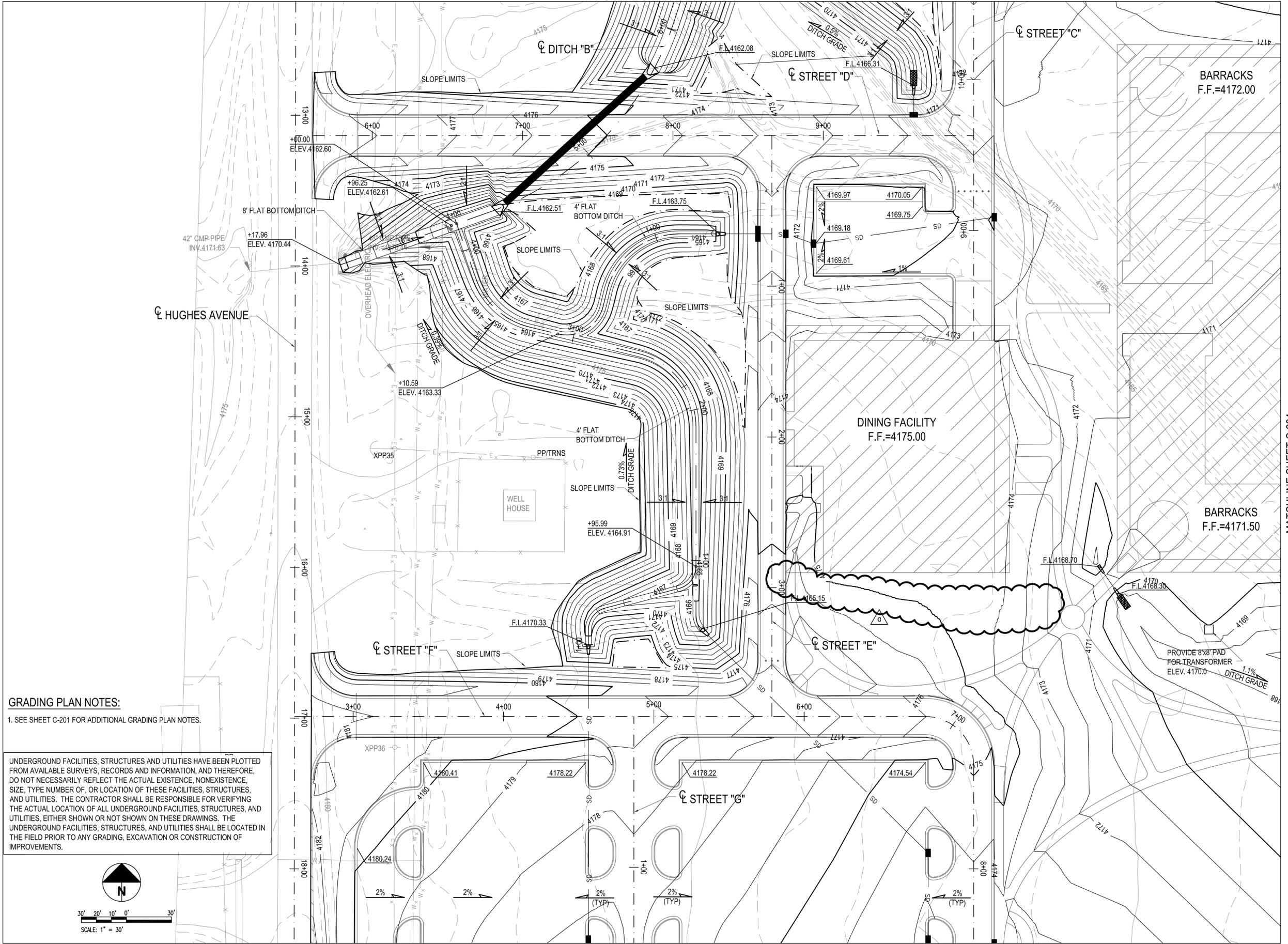
ENGINEERS BATTALION, CTE
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

KEY PLAN / CONTROL POINTS

Sheet reference number:
C-100
Sheet 5 of 188

MATCHLINE SHEET C-201

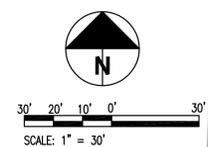
MATCHLINE SHEET C-205



GRADING PLAN NOTES:

1. SEE SHEET C-201 FOR ADDITIONAL GRADING PLAN NOTES.

UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS, RECORDS AND INFORMATION, AND THEREFORE, DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, NONEXISTENCE, SIZE, TYPE NUMBER OF, OR LOCATION OF THESE FACILITIES, STRUCTURES, AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE DRAWINGS. THE UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES SHALL BE LOCATED IN THE FIELD PRIOR TO ANY GRADING, EXCAVATION OR CONSTRUCTION OF IMPROVEMENTS.



REVISIONS
 Description of this sheet is not shown in this block. For the changes to this drawing, see the Engineering Progression for all sheets. A revision is shown in this block only.

Mark	Description	Date
Δ1	REVISED SIDEWALK GRADING	AM 0001/3/25/08

Rev.	Date	By	Check	Contract No.	File Name
020308	03/20/10	J.JONAS	J.JONAS	EBF-C-203	03/20/10

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
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FORT WORTH, TEXAS

DESIGNED BY: R.BAUM
DIV BY: M.MCPHAR
REVIEWED BY: J.JONAS
SUBMITTED BY: J.JONAS

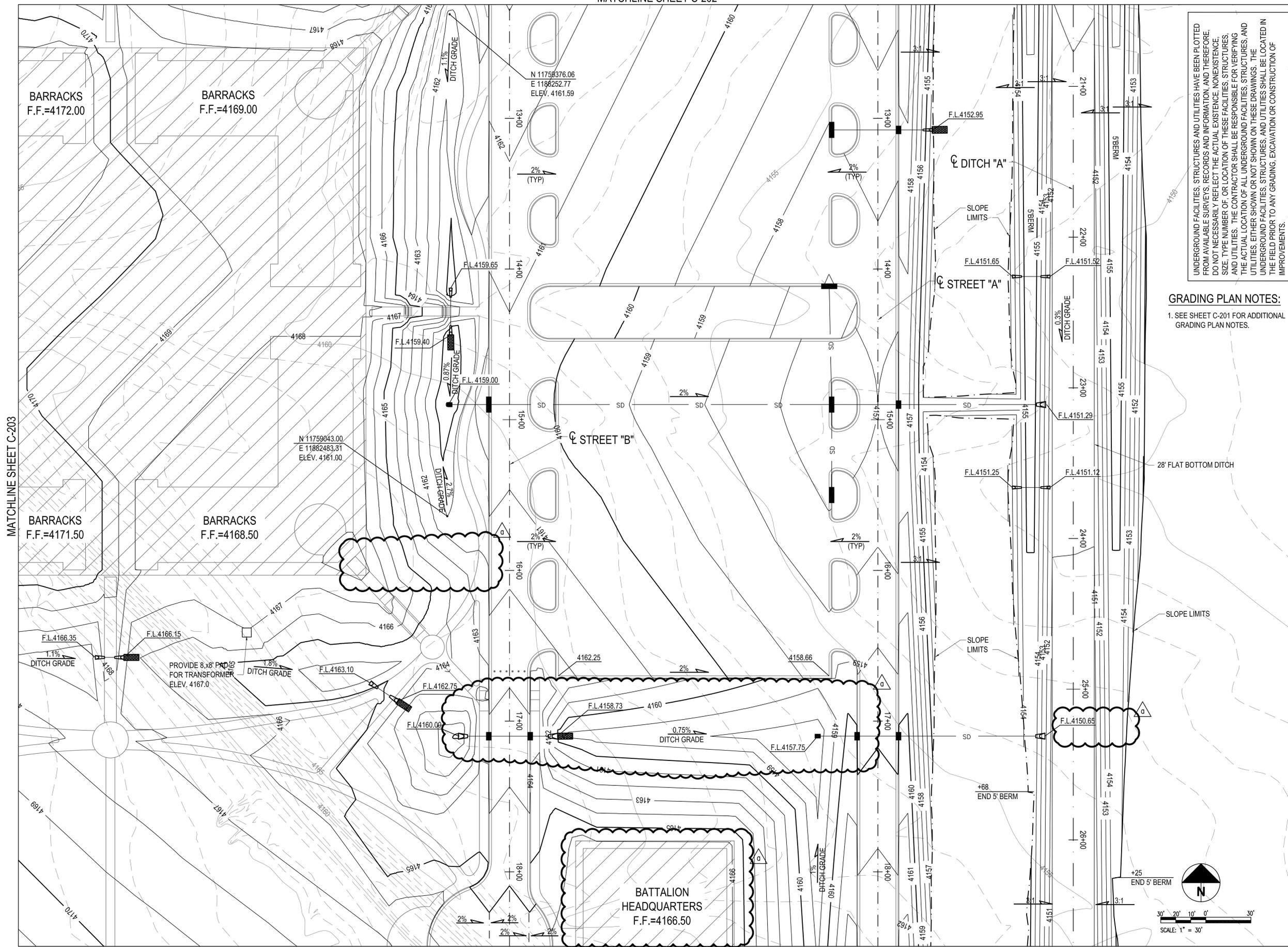
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ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

SITE GRADING PLAN

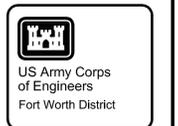
Sheet reference number:
C-203
Sheet 8 of 188

MATCHLINE SHEET C-204



UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS, RECORDS AND INFORMATION, AND THEREFORE, DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, NONEXISTENCE, SIZE, TYPE NUMBER OR LOCATION OF THESE FACILITIES, STRUCTURES AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE DRAWINGS. THE UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES SHALL BE LOCATED IN THE FIELD PRIOR TO ANY GRADING, EXCAVATION OR CONSTRUCTION OF IMPROVEMENTS.

GRADING PLAN NOTES:
 1. SEE SHEET C-201 FOR ADDITIONAL GRADING PLAN NOTES.



STATE OF MISSOURI
 REGISTERED PROFESSIONAL ENGINEER
 RICHARD J. ADAMS
 NUMBER 24320

Rev.	Date	Description
1	03/20/10	REVISED SEWER F.L. GRADING, H.O. BLDG. SIDEWALK GRADING

Designed by:	R. BAUM
Div. by:	M. MCPHEAK
Reviewed by:	J. JONES
Submitted by:	
Chief:	

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
 CORPS OF ENGINEERS
 FORT WORTH, TEXAS

CONSULTANT:
JACOBUS/HUITT-ZOLLARS
 200 NORTH BROADWAY
 FORT WORTH, TEXAS 76102
 TEL: (817) 335-4800
 FAX: (817) 335-2926

ENGINEERS BATTALION GTF
 UNIT OPERATIONS FACILITIES
 WHITE SANDS MISSILE RANGE
 NEW MEXICO

SITE GRADING PLAN

Sheet reference number:
C-204
 Sheet 9 of 188

EROSION CONTROL NOTES:

1. FOR EROSION CONTROL PLAN DETAILS SEE SHEETS C-912 THRU C-918.
2. FOR DRAINAGE DITCH GEOMETRICS SEE SHEETS C-601 THRU C-609.
3. FOR DITCH DETAILS SEE SHEET C-903.
4. FOR CULVERT OUTLET PROTECTION PLAN SEE SHEETS C-501 THRU C-509.
5. ALL FILL AND CUT SLOPES 3:1 OR GREATER SHALL USE SURFACE ROUGHENING. FOR DETAIL SEE SHEET C-917.
6. EROSION CONTROL FEATURES AS CALLED OUT IN THE PLANS SHALL BE CONSTRUCTED PRECEDING OR FOLLOWING ALL CULVERT OR OTHER DRAINS AND IN ALL DITCHES BEFORE THE WATER (RUNOFF) LEAVES THE PROJECT CONSTRUCTION LIMITS OR ENTERS A STREAM AND AT OTHER LOCATIONS AS DESIGNATED BY THE CONTRACTING OFFICER.
7. EROSION CONTROL FEATURES AS CALLED OUT IN THE PLANS SHALL BE CLEANED OF ACCUMULATED SEDIMENT WHEN APPROXIMATELY HALF OF THE FEATURES HEIGHT IS FILLED WITH SUCH SEDIMENT.
8. ALL DIMENSIONS AND LOCATIONS OF TEMPORARY SOIL EROSION AND WATER POLLUTION CONTROL DEVICES SHALL BE SUBJECT TO ADJUSTMENT, AS DESIGNATED BY THE CONTRACTING OFFICER.
9. WHEN THE TEMPORARY SOIL EROSION AND WATER POLLUTION CONTROL DEVICES NO LONGER REQUIRED FOR THE INTENDED PURPOSE, IN THE OPINION OF THE CONTRACTING OFFICER, THEY SHALL BE OBLITERATED OR REMOVED.
10. TEMPORARY EROSION CONTROL FEATURES SHALL BE CONSTRUCTED AT THE BORROW SITE AS REQUIRED.
11. ALL SIDE SLOPED 3:1 OR GREATER AND WHERE NOTED SHALL BE STABILIZED WITH SOIL CEMENT.
12. ALL DISTURBED AREAS NOT PAVED, SODDED, OR STABILIZED WITH SOIL CEMENT SHALL RECEIVE A MINIMUM OF A 2" LAYER 3/4" TAN / CREAM OR "FRANKLIN PINK" AGGREGATE.

12. ALL DISTURBED AREAS NOT PAVED, SODDED, OR STABILIZED WITH SOIL CEMENT SHALL RECEIVE A MINIMUM OF A 2" LAYER 3/4" TAN / CREAM OR "FRANKLIN PINK" AGGREGATE.

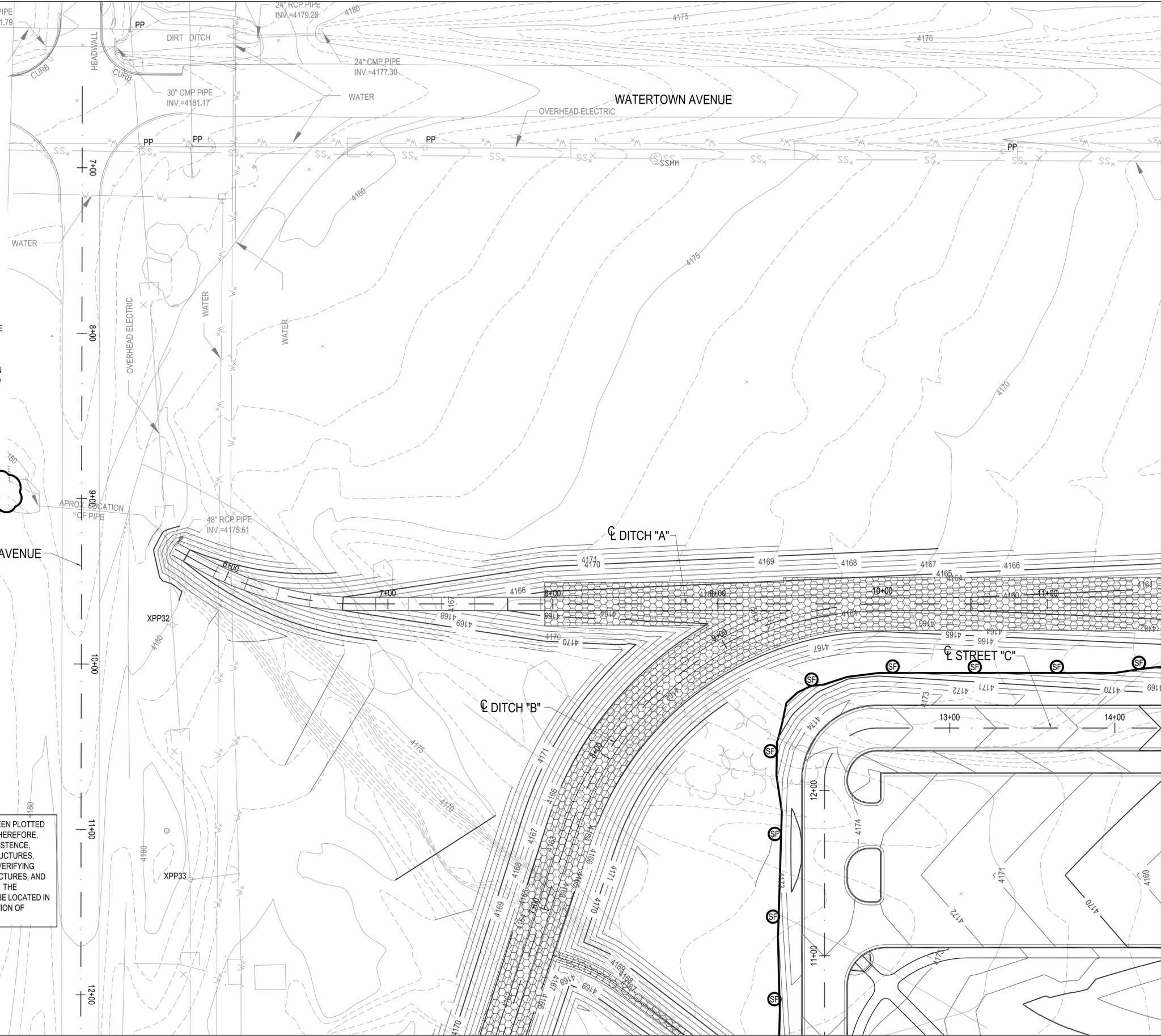
LEGEND

-  SILT FENCE
-  DROP INLET PROTECTION
-  DROP INLET PROTECTION
-  RIP-RAP
-  COURSE AGGREGATE

UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS, RECORDS AND INFORMATION, AND THEREFORE, DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, NONEXISTENCE, SIZE, TYPE NUMBER OF, OR LOCATION OF THESE FACILITIES, STRUCTURES, AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE DRAWINGS. THE UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES SHALL BE LOCATED IN THE FIELD PRIOR TO ANY GRADING, EXCAVATION OR CONSTRUCTION OF IMPROVEMENTS.



SCALE: 1" = 30'



MATCHLINE SHEET C-223

MATCHLINE SHEET C-222



Mark	Description	Date
Δ1	RENSED NOTE 12	AM 0001/3/25/08

Designed by: R.BAUM	Checked by: J.JONAS	Reviewed by: M.MCPHAK	Submitted by: J.JONAS
Date: 02/03/08	Scale: As Shown	Contract No.:	File name: EBF-C-221
U.S. ARMY ENGINEER DISTRICT, FORT WORTH CORPS OF ENGINEERS FORT WORTH, TEXAS			

ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

EROSION CONTROL
PLAN

Sheet
reference
number:
C-221
Sheet 20 of 188

1

2

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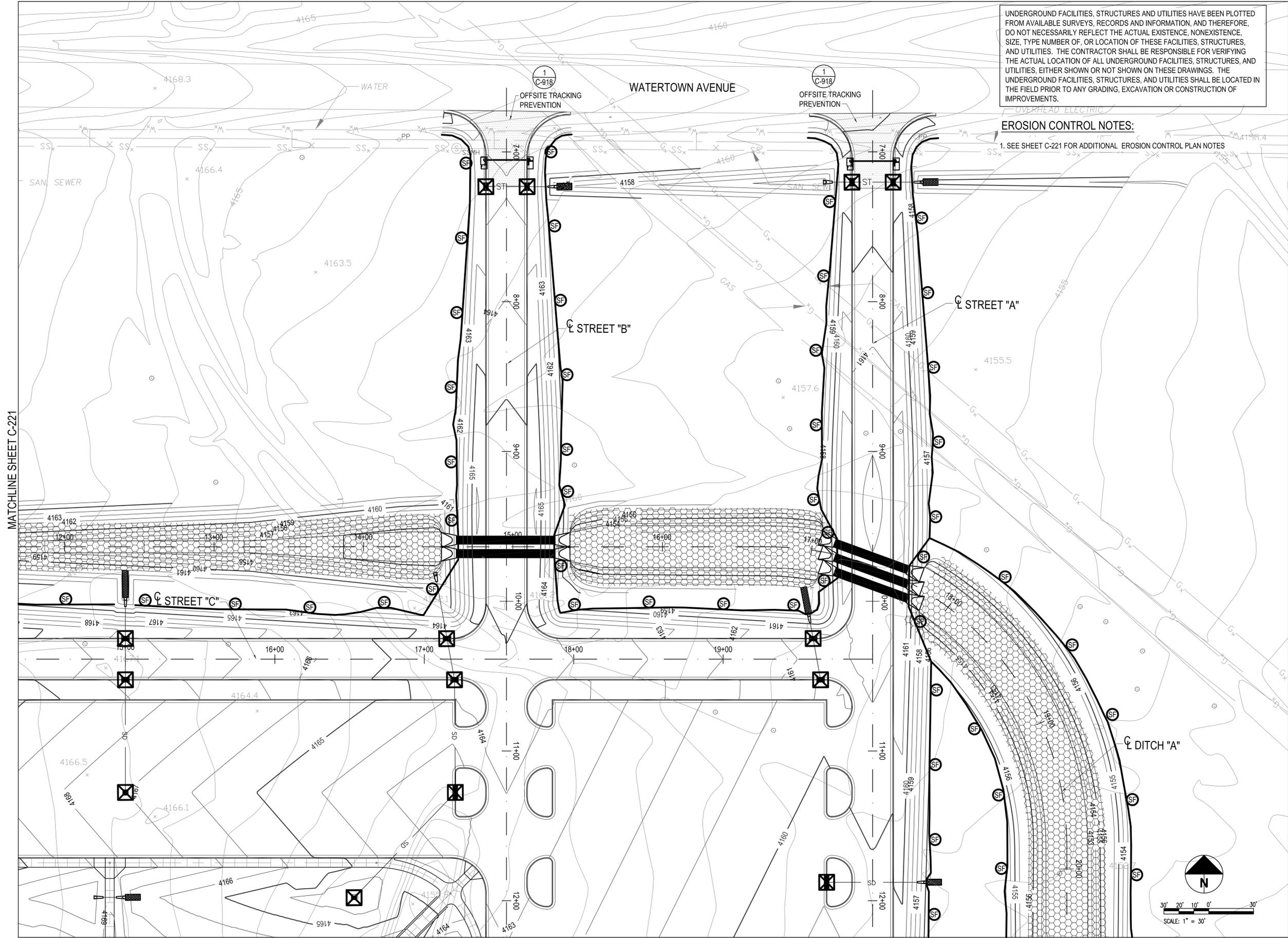
5

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UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS, RECORDS AND INFORMATION, AND THEREFORE, DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, NONEXISTENCE, SIZE, TYPE NUMBER OF, OR LOCATION OF THESE FACILITIES, STRUCTURES, AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE DRAWINGS. THE UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES SHALL BE LOCATED IN THE FIELD PRIOR TO ANY GRADING, EXCAVATION OR CONSTRUCTION OF IMPROVEMENTS.

EROSION CONTROL NOTES:
 1. SEE SHEET C-221 FOR ADDITIONAL EROSION CONTROL PLAN NOTES

MATCHLINE SHEET C-221

MATCHLINE SHEET C-224



Mark	Description	Date	Appr.

Designed by: R. BAUM	Date: 02/03/08	Rev.
Div. by: M. MCPHEAK	Sol. no.	
Reviewed by: J. JONAS	Contr. No.	
Submitted by:	File name: EBF-C-222	
Chief:	No. date: 03/20/10	
	No. scale: 1:1	

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
 CORPS OF ENGINEERS
 FORT WORTH, TEXAS

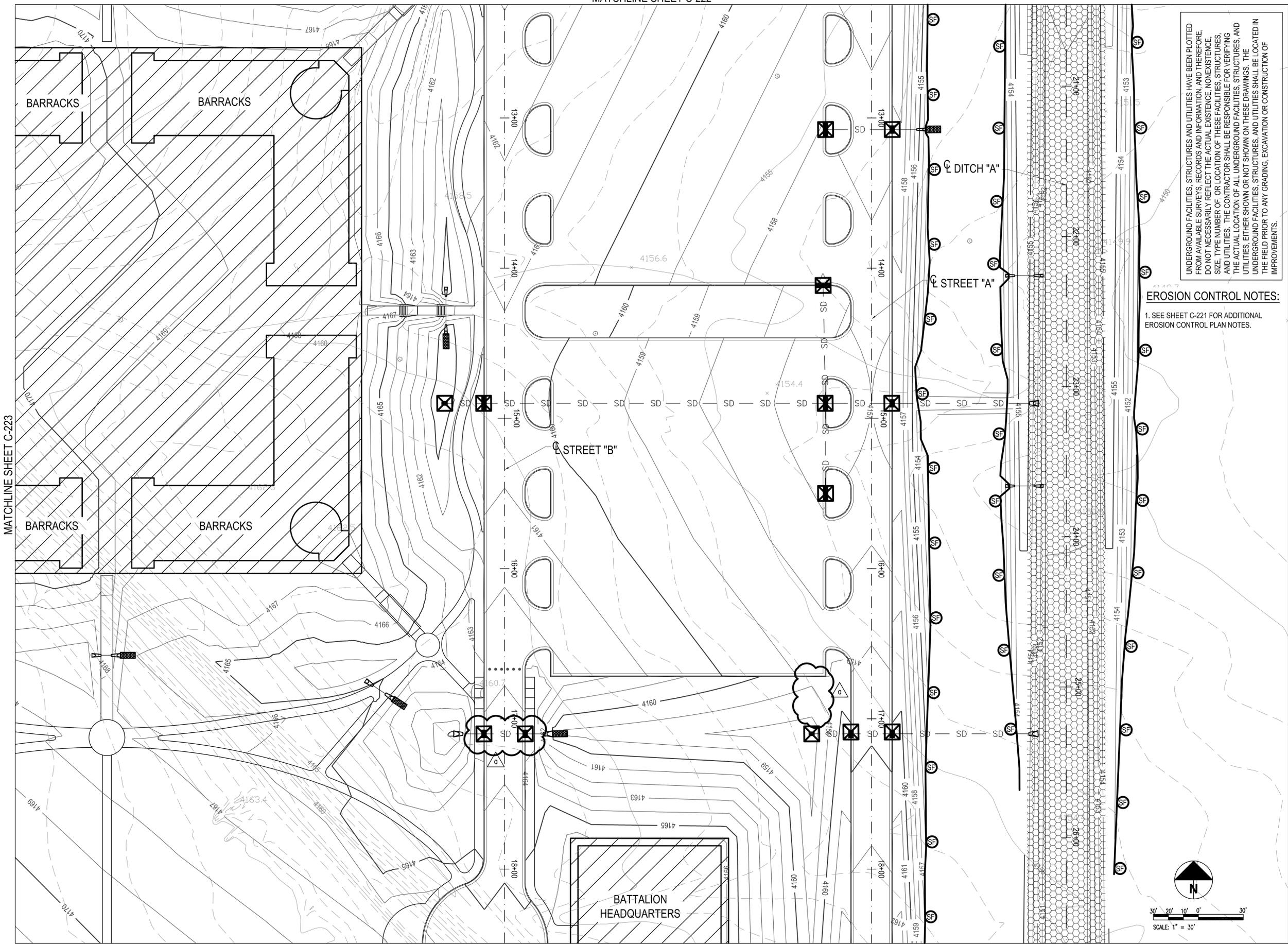
REGISTERED PROFESSIONAL ENGINEER
JE JACOBS/HUITZ-ZOLLARS

ENGINEERS BATTALION GTF
 UNIT OPERATIONS FACILITIES
 WHITE SANDS MISSILE RANGE
 NEW MEXICO

EROSION CONTROL
 PLAN

Sheet
 reference
 number:
C-222
 Sheet 21 of 188

MATCHLINE SHEET C-222



UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS, RECORDS AND INFORMATION, AND THEREFORE, DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, NONEXISTENCE, SIZE, TYPE NUMBER OF OR LOCATION OF THESE FACILITIES, STRUCTURES, AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE DRAWINGS. THE UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES SHALL BE LOCATED IN THE FIELD PRIOR TO ANY GRADING, EXCAVATION OR CONSTRUCTION OF IMPROVEMENTS.

EROSION CONTROL NOTES:

1. SEE SHEET C-221 FOR ADDITIONAL EROSION CONTROL PLAN NOTES.



STATE OF MISSOURI
RICHARD R. BAUM
LICENSE NUMBER 24320
REGISTERED PROFESSIONAL ENGINEER

Mark	Description	Action	Date
Δ2	REMOVED & RELOCATED 2 INLET PROTECTIONS		AM 0001 3/25/08

Designed by: R.BAUM	Date: 02/08/08	Rev.
Drawn by: M.MCPHAK	Soil. no.	
Reviewed by: J.JONAS	Contr. No.	
Submitted by: Chief	File name: EBF-C-224	
	No. date: 09/20/10	
	No. issue: 1/1	

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

U.S. ARMY VENDOR
JE JACOBS/HUITT-ZOLLARS
300 NORTH BROADWAY
FACILITY ENGINEERING DIVISION
FACILITY ENGINEERING DIVISION
TEL: (817) 335-4800
FAX: (817) 335-2926

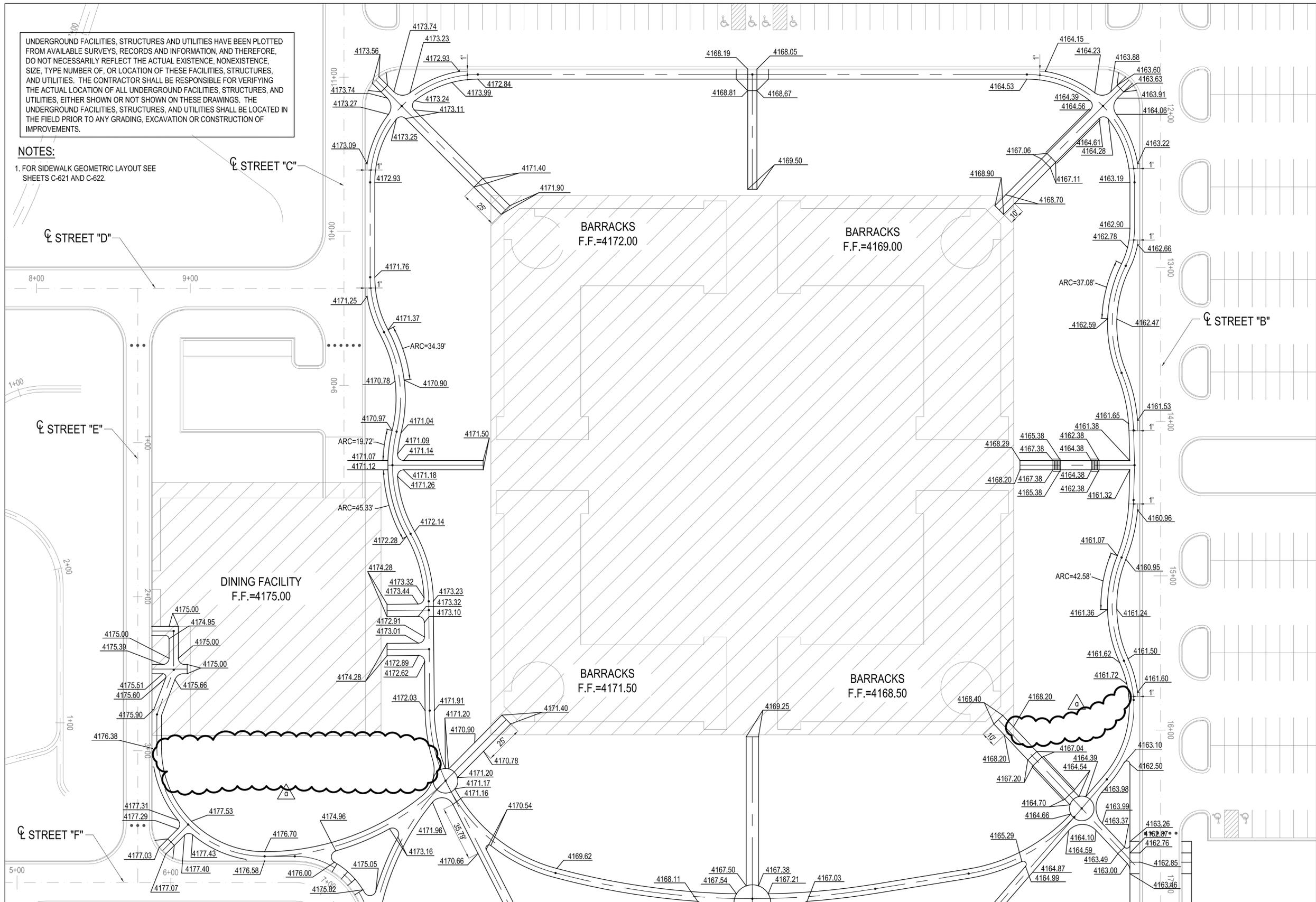
ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITY RANGE
WHITE SANDS MISSILE RANGE
NEW MEXICO

EROSION CONTROL
PLAN

Sheet
reference
number:
C-224
Sheet 23 of 188

UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS, RECORDS AND INFORMATION, AND THEREFORE, DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, NONEXISTENCE, SIZE, TYPE NUMBER OF, OR LOCATION OF THESE FACILITIES, STRUCTURES, AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE DRAWINGS. THE UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES SHALL BE LOCATED IN THE FIELD PRIOR TO ANY GRADING, EXCAVATION OR CONSTRUCTION OF IMPROVEMENTS.

NOTES:
 1. FOR SIDEWALK GEOMETRIC LAYOUT SEE SHEETS C-621 AND C-622.



US Army Corps of Engineers
 Fort Worth District



REVISIONS
 Attachment to this work is not shown or filed with the original drawings. It is the responsibility of the user to verify the accuracy of the information shown in this revision.

Rev.	Date	By	Description
1	03/20/10	J.JONAS	REMOVED SIDEWALKS

Designed by:	C.SPREDDO	Checked by:	J.JONAS
Drawn by:	M.MCPHEAK	Reviewed by:	
Submitted by:		Chief:	

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
 CORPS OF ENGINEERS
 FORT WORTH, TEXAS

PROJECT NUMBER: **JE JACOBS/HUITT-ZOLLARS**

501 NORTH BROADWAY
 FORT WORTH, TEXAS 76102
 TEL: (817) 335-4800
 FAX: (817) 335-2929

ENGINEERS BATTALION GTF
 UNIT OPERATIONS FACILITIES
 WHITE SANDS MISSILE RANGE
 NEW MEXICO

SIDEWALK GRADING PLAN

Sheet reference number:
C-231
 Sheet 29 of 188

UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS, RECORDS AND INFORMATION, AND THEREFORE, DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, NONEXISTENCE, SIZE, TYPE NUMBER OF, OR LOCATION OF THESE FACILITIES, STRUCTURES, AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE DRAWINGS. THE UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES SHALL BE LOCATED IN THE FIELD PRIOR TO ANY GRADING, EXCAVATION OR CONSTRUCTION OF IMPROVEMENTS.

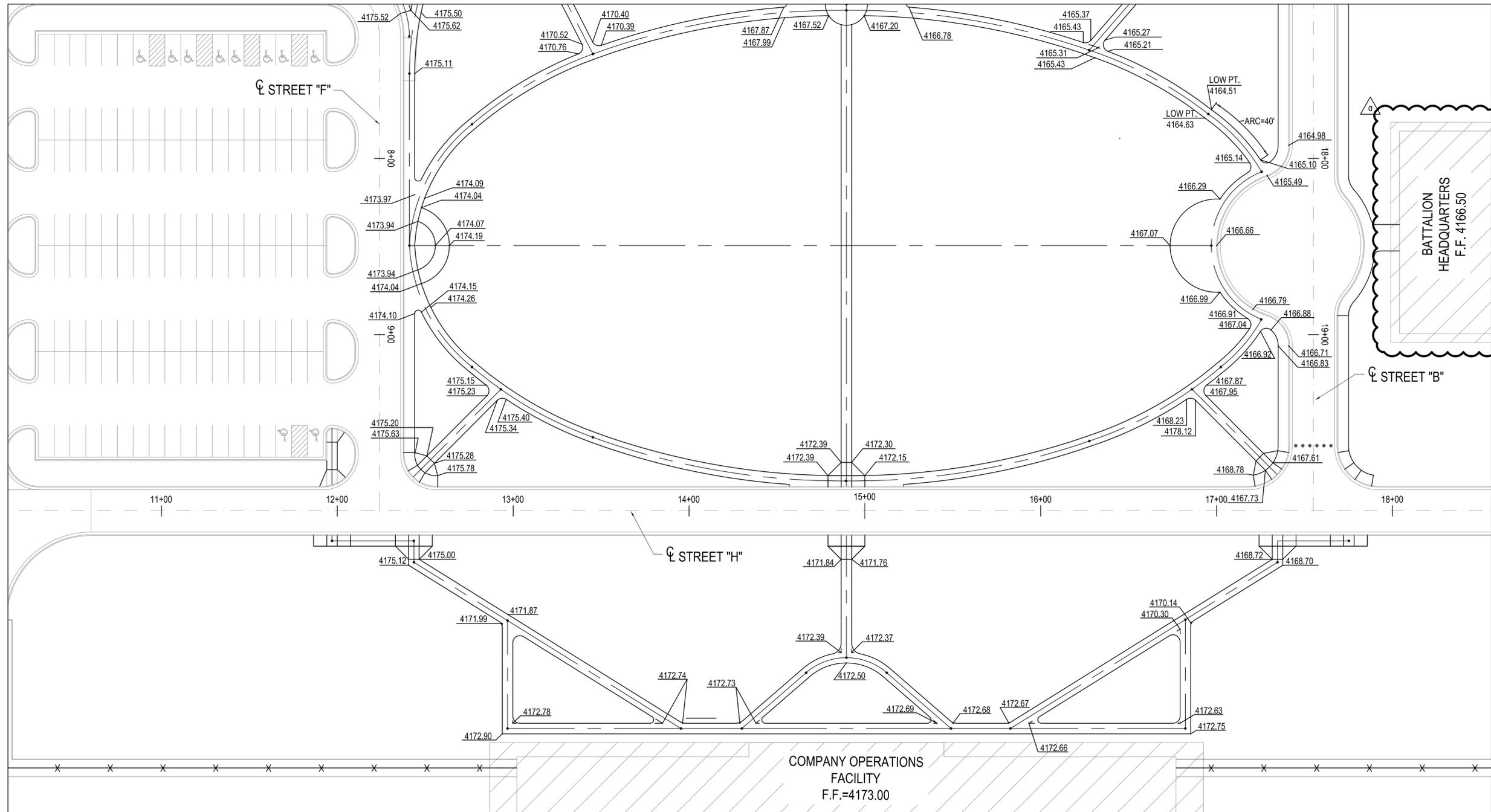
NOTES:

1. FOR SIDEWALK GEOMETRIC LAYOUT SEE SHEETS C-621 AND C-622.



Attachment of this seal to this drawing is not valid unless the seal is stamped in accordance with the provisions of the Missouri Professional Engineer Act, Chapter 330, R.S.Mo., and the rules of the Board of Professional Engineers, State of Missouri.

MATCHLINE SHEET C-231



Mark	Description	Date
Δ1	REVISED HQ BUILDING	03/25/08

Designed by:	C. SPREDDO	Date:	03/08/08
Drawn by:	M. MCPHEAK	Soil. no.:	
Reviewed by:	J. JONES	Contr. No.:	
Submitted by:		File name:	EBF-C-232
Chief:		Revised:	03/20/10
		Revised:	03/25/08

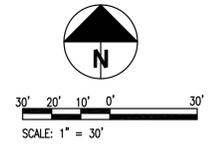
U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

ALBERT VENTURE
JE JACOBS/HUITZ-ZOLLARS
200 NORTH BROADWAY
FLOOR 1000
FORT WORTH, TEXAS 76102
TEL: (817) 335-4000
FAX: (817) 335-2525

ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

SIDEWALK GRADING PLAN

Sheet
reference
number:
C-232
Sheet 30 of 188





DISCLAIMER
Attachment of this seal to this document is made only for the purpose of authenticating this document. Responsibility for all other documents relating to this project is disclaimed.

Rev.	Date	Description
1	10/07/08	REVISED UNDERGROUND UTILITIES

Designed by: R. BAUM	Checked by: M.C.H.
Drawn by: M.M.C.P.E.A.K.	Reviewed by: M.C.H.
Submitted by: M.C.H.	Chief:

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

PROJECT NUMBER:
JE JACOBS/HUITZ-ZOLLARS

2010 NORTH MEADOWS DRIVE
FORT WORTH, TEXAS 76107
TEL: 817-343-3000
FAX: 817-343-3005

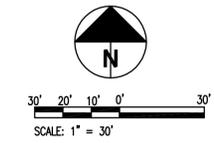
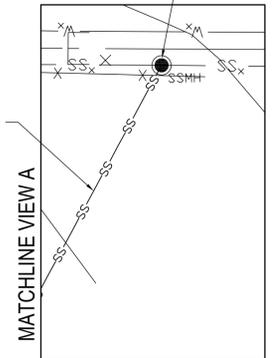
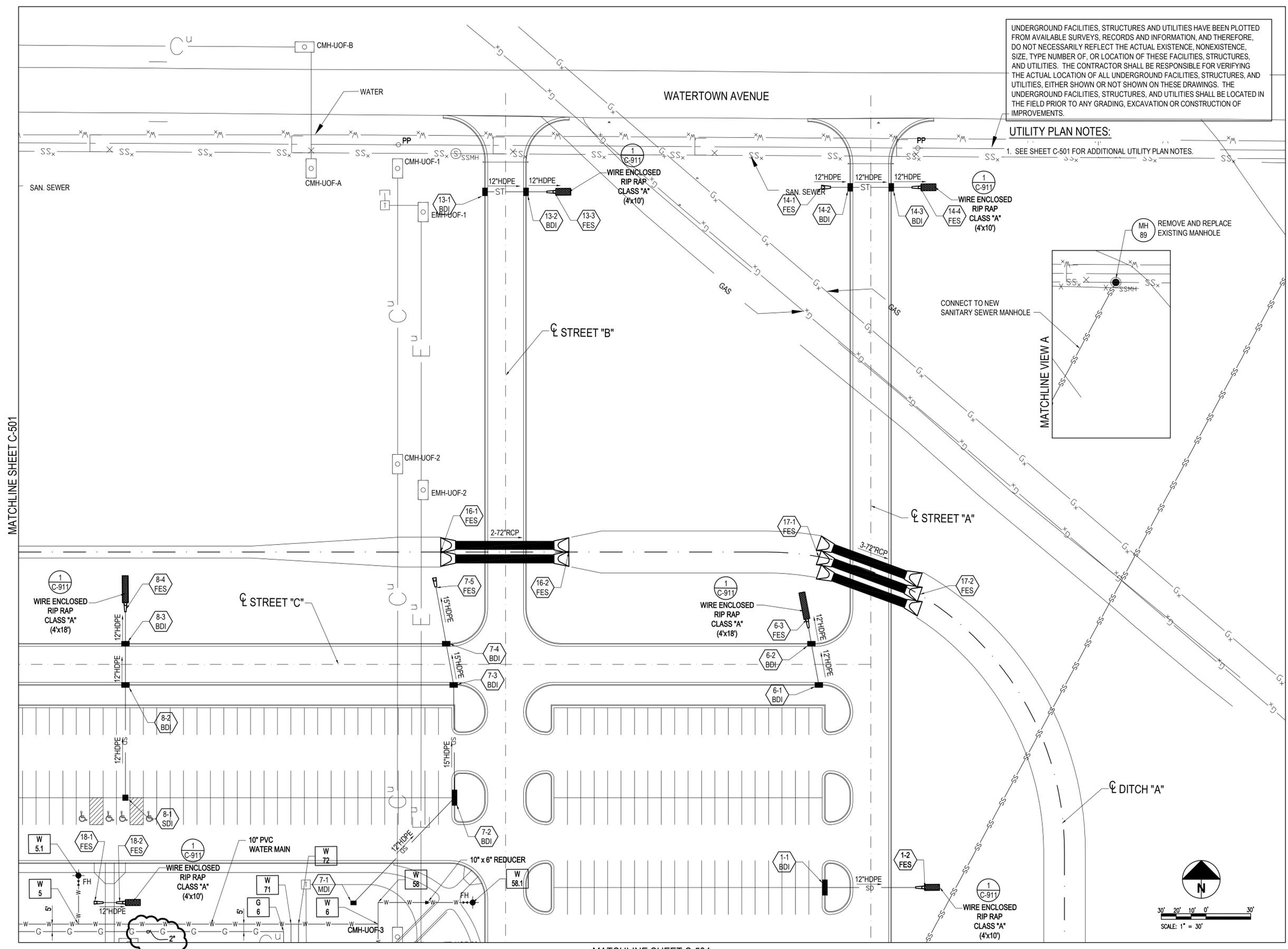
ENGINEERS BATTALION/CITE
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

SITE UTILITY PLAN

Sheet reference number:
C-502
Sheet 34 of 188

UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS, RECORDS AND INFORMATION, AND THEREFORE, DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, NONEXISTENCE, SIZE, TYPE NUMBER OF, OR LOCATION OF THESE FACILITIES, STRUCTURES, AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE DRAWINGS. THE UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES SHALL BE LOCATED IN THE FIELD PRIOR TO ANY GRADING, EXCAVATION OR CONSTRUCTION OF IMPROVEMENTS.

UTILITY PLAN NOTES:
1. SEE SHEET C-501 FOR ADDITIONAL UTILITY PLAN NOTES.



MATCHLINE SHEET C-501

MATCHLINE SHEET C-504

MATCHLINE VIEW A

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DISCLAIMER
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Rev.	Date	Description
1	10/20/09	REVISED UNDERGROUND UTILITIES

Designed by:	R. BAUM
Drawn by:	M. MCPHEAK
Checked by:	M. C. H.
Reviewed by:	
Submitted by:	
Chief:	

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

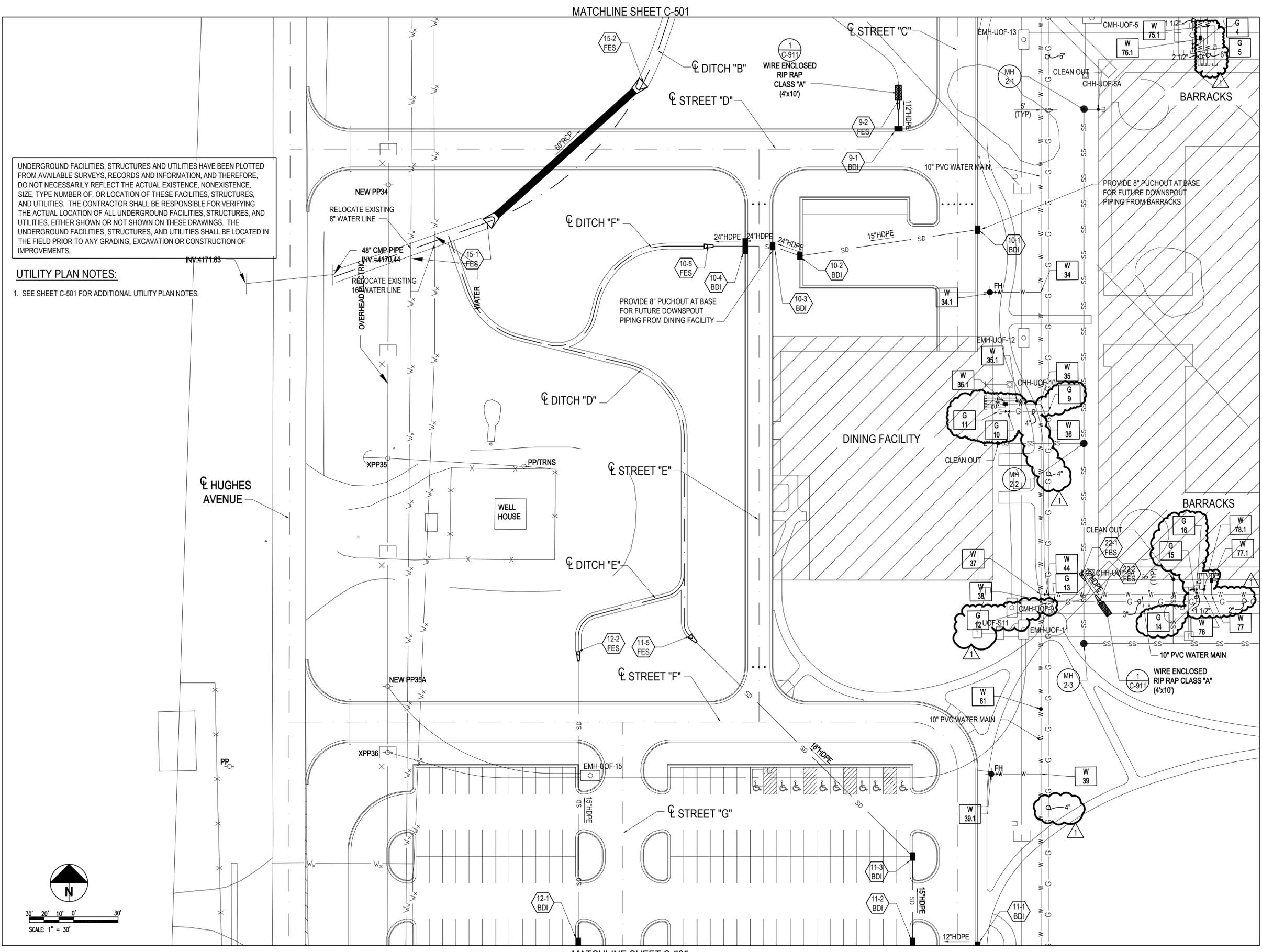
PROJECT NUMBER:
JE JACOBS/HUITZ-ZOLLARS

DATE: 11/19/08
FILE NAME: EEPF-C-503
PROJECT: TASK ORDER 0003

ENGINEERS BATTALION/CIE
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

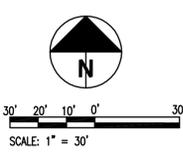
SITE UTILITY PLAN

Sheet reference number:
C-503
Sheet 35 of 188



UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS, RECORDS AND INFORMATION, AND THEREFORE, DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, NONEXISTENCE, SIZE, TYPE NUMBER OF, OR LOCATION OF THESE FACILITIES, STRUCTURES, AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE DRAWINGS. THE UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES SHALL BE LOCATED IN THE FIELD PRIOR TO ANY GRADING, EXCAVATION OR CONSTRUCTION OF IMPROVEMENTS.

- UTILITY PLAN NOTES:**
- SEE SHEET C-501 FOR ADDITIONAL UTILITY PLAN NOTES.

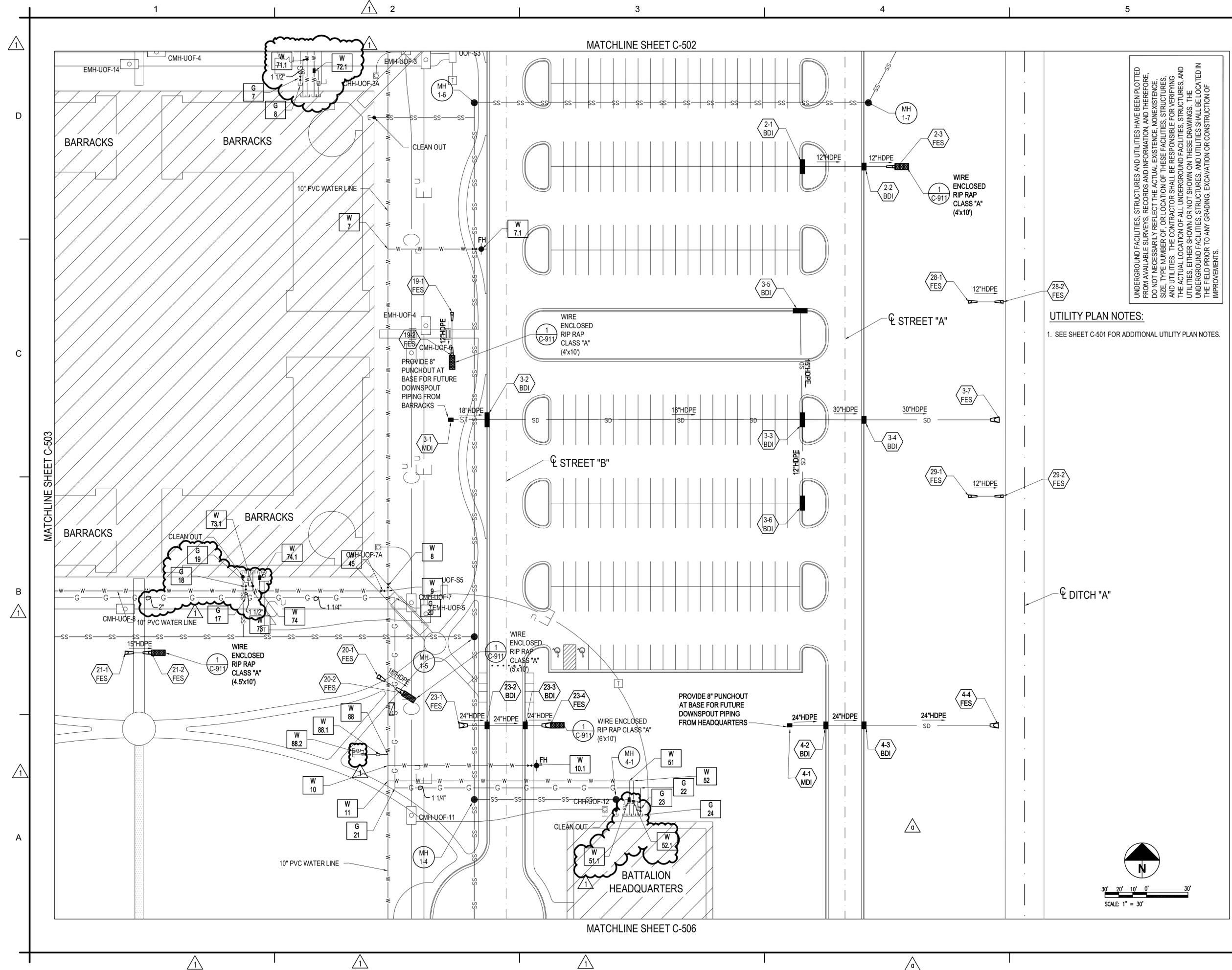


MATCHLINE SHEET C-501

MATCHLINE SHEET C-505

MATCHLINE SHEET C-504



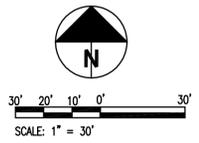


MATCHLINE SHEET C-502

MATCHLINE SHEET C-506

UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS, RECORDS AND INFORMATION, AND THEREFORE, DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, NONEXISTENCE, SIZE, TYPE NUMBER OF OR LOCATION OF THESE FACILITIES, STRUCTURES, AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE DRAWINGS. THE UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES SHALL BE LOCATED IN THE FIELD PRIOR TO ANY GRADING, EXCAVATION OR CONSTRUCTION OF IMPROVEMENTS.

UTILITY PLAN NOTES:
1. SEE SHEET C-501 FOR ADDITIONAL UTILITY PLAN NOTES.



DISCLAIMER
Attachment of this seal to this document is made only for the purpose of authenticating this document. Responsibility for all other documents relating to this project is disclaimed.

Rev.	Date	Description
1	10/25/04	ISSUE FOR CONSTRUCTION
2	03/29/04	REVISED LOCATION OF BUILDING AND UTILITIES

Designed by: J. BAUM	Checked by: M.C.H.
Dwn by: M.M.C.F.A.K.	Reviewed by: M.C.H.
Submitted by: M.C.H.	Chief:

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

JACOBSON/HUITZ-ZOLLARS
A COMPANY OF
JACOBS GROUP
201 NORTH WOODWAY
SUITE 200
FORT WORTH, TEXAS 76102
TEL: 817.335.4000
FAX: 817.335.2525

ENGINEERS BATTALION/CIE
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

SITE UTILITY PLAN

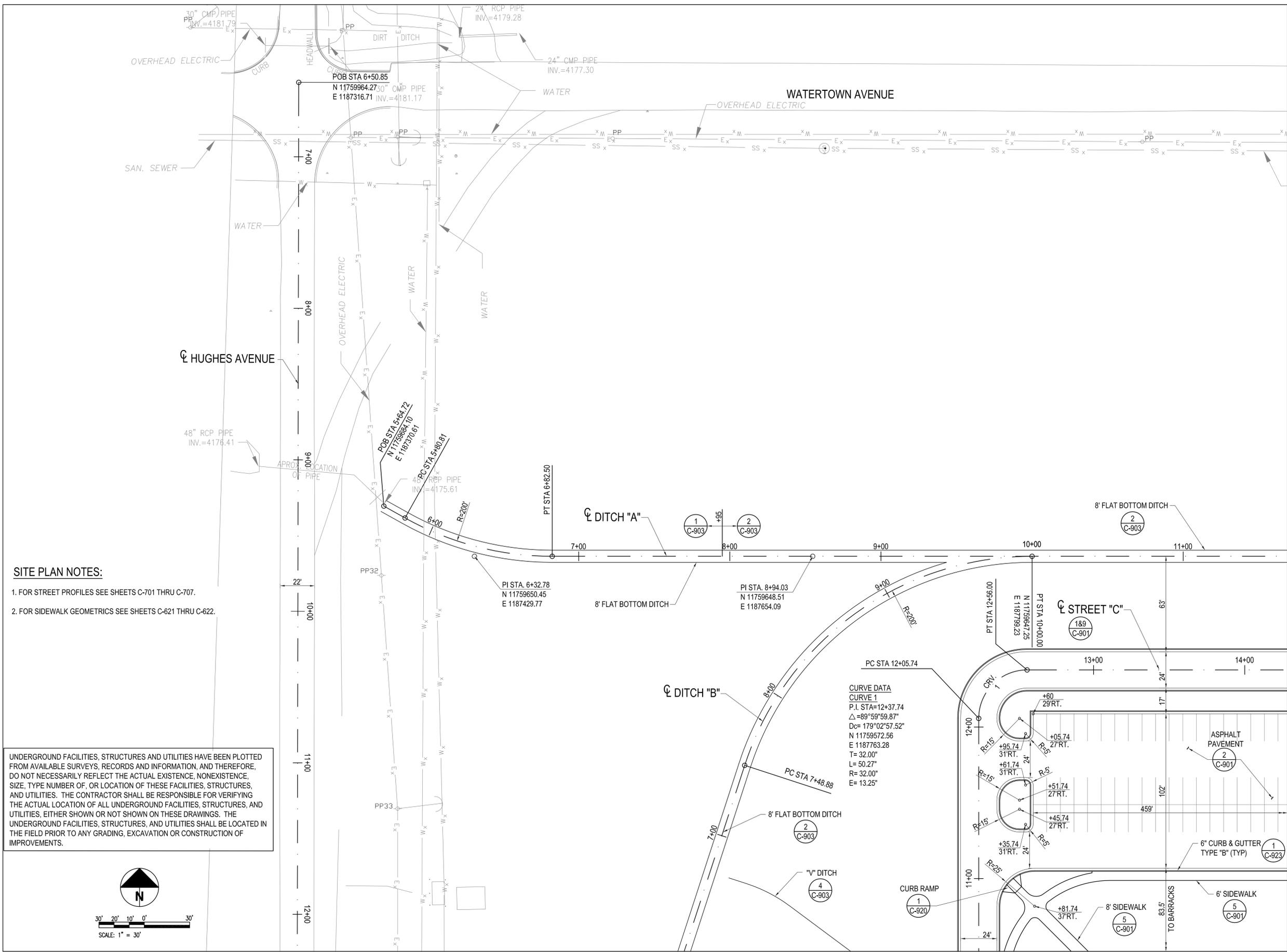
Sheet reference number:
C-504
Sheet 36 of 188

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C

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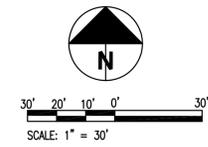
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SITE PLAN NOTES:

- FOR STREET PROFILES SEE SHEETS C-701 THRU C-707.
- FOR SIDEWALK GEOMETRICS SEE SHEETS C-621 THRU C-622.

UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS, RECORDS AND INFORMATION, AND THEREFORE, DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, NONEXISTENCE, SIZE, TYPE NUMBER OF, OR LOCATION OF THESE FACILITIES, STRUCTURES, AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE DRAWINGS. THE UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES SHALL BE LOCATED IN THE FIELD PRIOR TO ANY GRADING, EXCAVATION OR CONSTRUCTION OF IMPROVEMENTS.



CURVE DATA
 CURVE 1
 P.I. STA=12+37.74
 $\Delta = 89^{\circ}59'59.87''$
 $D_c = 179^{\circ}02'57.52''$
 N 11759572.56
 E 1187763.28
 T = 32.00"
 L = 50.27"
 R = 32.00"
 E = 13.25"

MATCHLINE SHEET C-603

MATCHLINE SHEET C-602



Attachment of this seal to any drawing is proof that the holder is a duly licensed Professional Engineer, registered in the State of Missouri, and is practicing in the field of Mechanical Engineering.

Mark	Description	Date	Appr.

Date: 03/08/08	Rev.
Sol. no.	
Drawn by: J. LONAS	
Reviewed by:	
Submitted by:	
Contract No.	
File name: EBF-C-601	
Plot date: 03/20/10	
Plot scale: 1:1	

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
 CORPS OF ENGINEERS
 FORT WORTH, TEXAS

REGISTERED PROFESSIONAL ENGINEER
JACOB HUIT-ZOLLARS
 501 NORTH BROADWAY
 FORT WORTH, TEXAS 76102
 TEL: (817) 335-4800
 FAX: (817) 335-2928

ENGINEERS BATTALION GTF
 UNIT OPERATIONS FACILITIES
 WHITE SANDS MISSILE RANGE
 NEW MEXICO

SITE PLAN

Sheet reference number:
C-601
 Sheet 47 of 188

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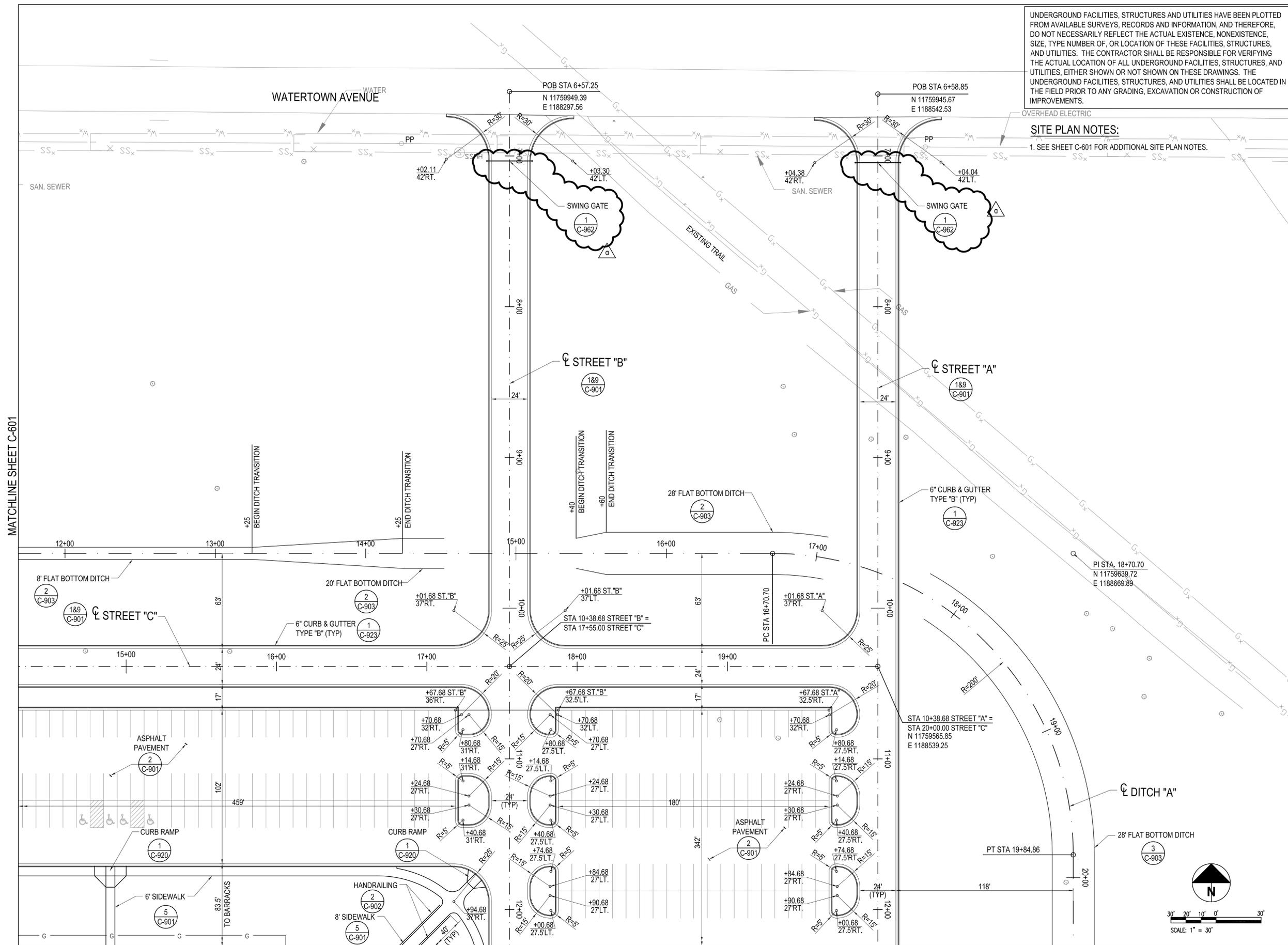
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UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS, RECORDS AND INFORMATION, AND THEREFORE, DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, NONEXISTENCE, SIZE, TYPE NUMBER OF, OR LOCATION OF THESE FACILITIES, STRUCTURES, AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE DRAWINGS. THE UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES SHALL BE LOCATED IN THE FIELD PRIOR TO ANY GRADING, EXCAVATION OR CONSTRUCTION OF IMPROVEMENTS.

SITE PLAN NOTES:
1. SEE SHEET C-601 FOR ADDITIONAL SITE PLAN NOTES.



REVISION
1. See sheet C-601 for additional site plan notes.

Mark	Description	Date	Author
Δ2	CHANGED DATES	AM 0001	3/25/08

Designed by: R. BAUM	Date: 02/03/08	Rev.
Drawn by: M. MCPHEAK	Sol. no.	
Reviewed by: J. COLLINS	Contr. No.	
Submitted by:	File name: EBF-C-602	
Chief:	No. date: 03/20/10	
	No. issue: 1.1	

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS
CONSULTANT:
JE JACOBS/HUITT-ZOLLARS
300 NORTH BROADWAY
FAC 1513 335-8400
FAC 1513 335-2525

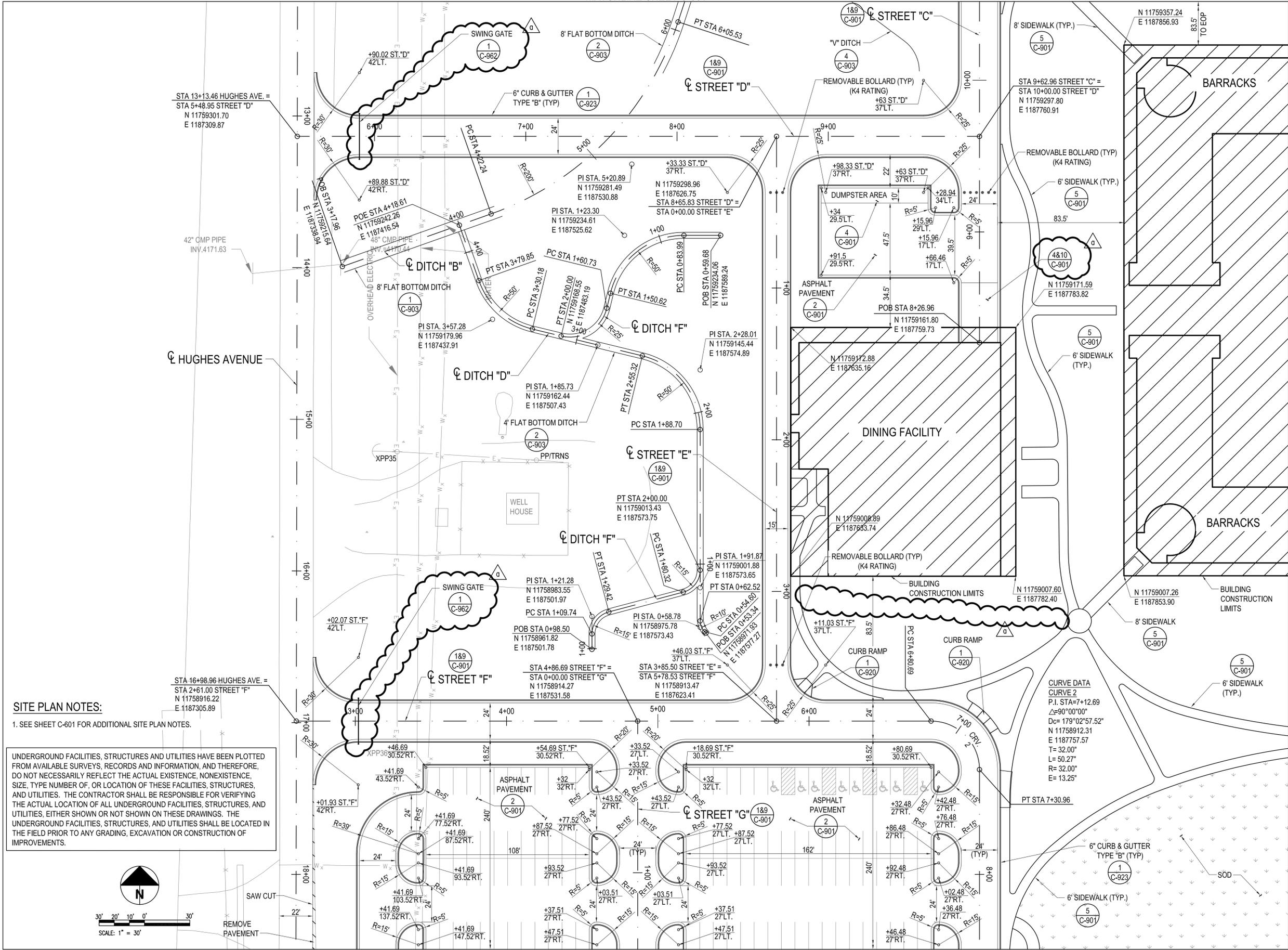
ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO
SITE PLAN

Sheet
reference
number:
C-602
Sheet 48 of 188

MATCHLINE SHEET C-601

MATCHLINE SHEET C-604

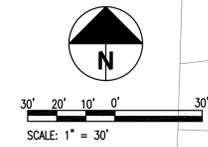
MATCHLINE SHEET C-601



SITE PLAN NOTES:

1. SEE SHEET C-601 FOR ADDITIONAL SITE PLAN NOTES.

UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS, RECORDS AND INFORMATION, AND THEREFORE, DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, NONEXISTENCE, SIZE, TYPE NUMBER OF, OR LOCATION OF THESE FACILITIES, STRUCTURES, AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE DRAWINGS. THE UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES SHALL BE LOCATED IN THE FIELD PRIOR TO ANY GRADING, EXCAVATION OR CONSTRUCTION OF IMPROVEMENTS.



MATCHLINE SHEET C-605



REVISIONS

No.	Description	Date
1	CHANGED DATES, DETAIL CHANGE, REMOVED SIDEWALK	JAN 0001 3/25/08

Rev.	Date	By	Check	Appr.
1	03/20/10	J. GOMAS	J. GOMAS	

Designed by:	R. BAUM
Drawn by:	M. MCPHEAK
Checked by:	J. GOMAS
Reviewed by:	
Submitted by:	
Chief:	

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

CLIENT: JACOBS/HUITT-ZOLLARS

PROJECT: ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

SITE PLAN

Sheet reference number:
C-603
Sheet 49 of 188

1

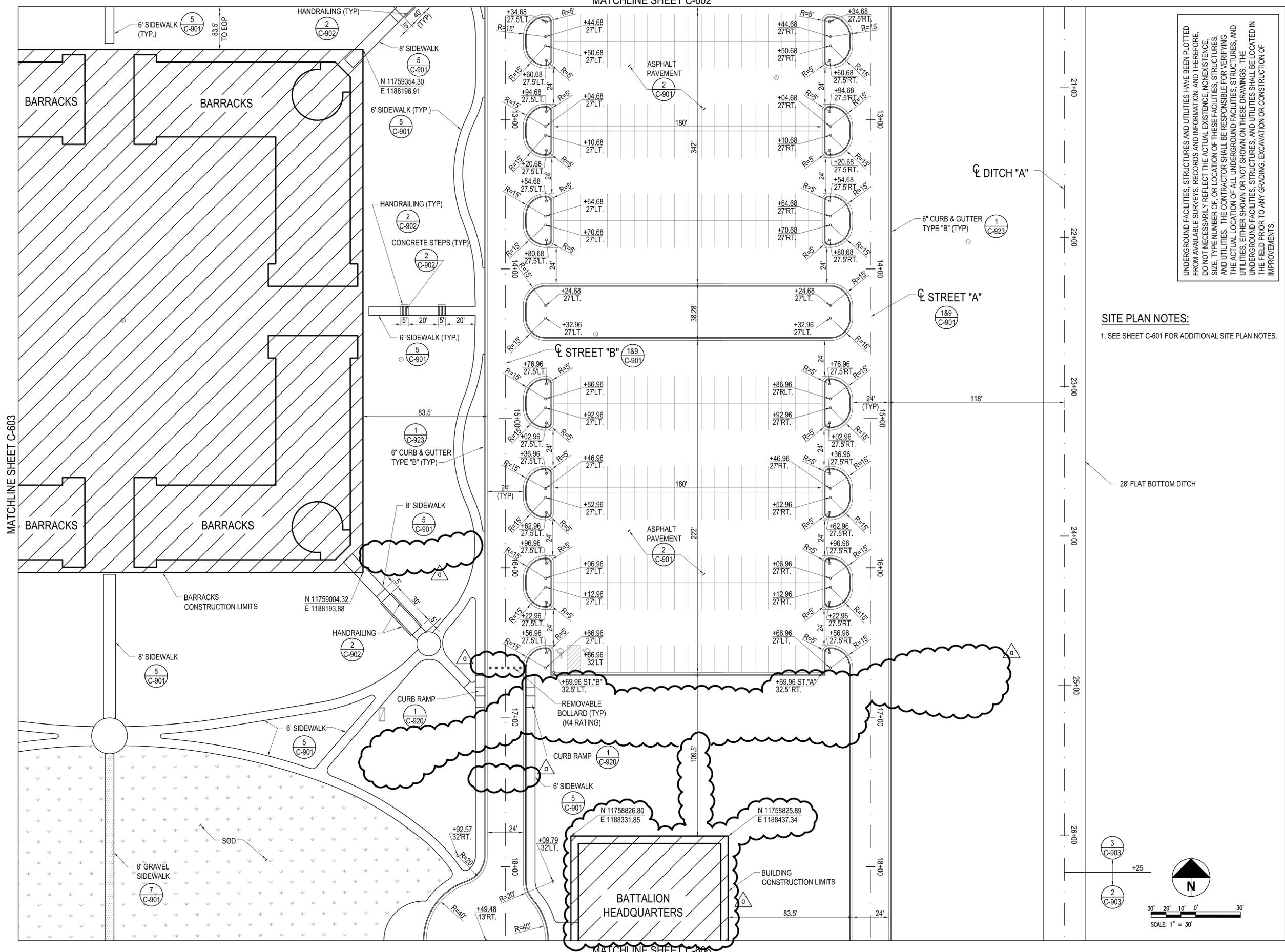
2

3

4

5

MATCHLINE SHEET C-602



UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS, RECORDS AND INFORMATION, AND THEREFORE, DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, NON-EXISTENCE, SIZE, TYPE NUMBER OF OR LOCATION OF THESE FACILITIES, STRUCTURES AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE DRAWINGS. THE UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES SHALL BE LOCATED IN THE FIELD PRIOR TO ANY GRADING, EXCAVATION OR CONSTRUCTION OF IMPROVEMENTS.

SITE PLAN NOTES:
 1. SEE SHEET C-601 FOR ADDITIONAL SITE PLAN NOTES.



STATE OF MISSOURI
 RICHARD R. BAUM
 No. 24320
 REGISTERED PROFESSIONAL ENGINEER

Rev.	Date	Description
1	03/20/10	RELOC. HO. BLDG. REMOVED ST. T. BOLLARDS, SIDEWALK.

Drawn by: R. BAUM	Checked by: J. JONES	Contract No. EBF-C-604
Designed by: M. MCPHEAK	Reviewed by: M. MCPHEAK	File name: 03/20/10
Submitted by: M. MCPHEAK	Chief: M. MCPHEAK	Project No. 151

ARMY ENGINEER DISTRICT, FORT WORTH
 CORPS OF ENGINEERS
 FORT WORTH, TEXAS

CONSULTANT:
JE JACOBS/HUITT-ZOLLARS
 200 NORTH BROADWAY
 FORT WORTH, TEXAS 76102
 TEL: (817) 335-4800
 FAX: (817) 335-2525

ENGINEERS BATTALION GTF
 UNIT OPERATIONS FACILITIES
 WHITE SANDS MISSILE RANGE
 NEW MEXICO

SITE PLAN

Sheet reference number:
C-604
 Sheet 50 of 188

1

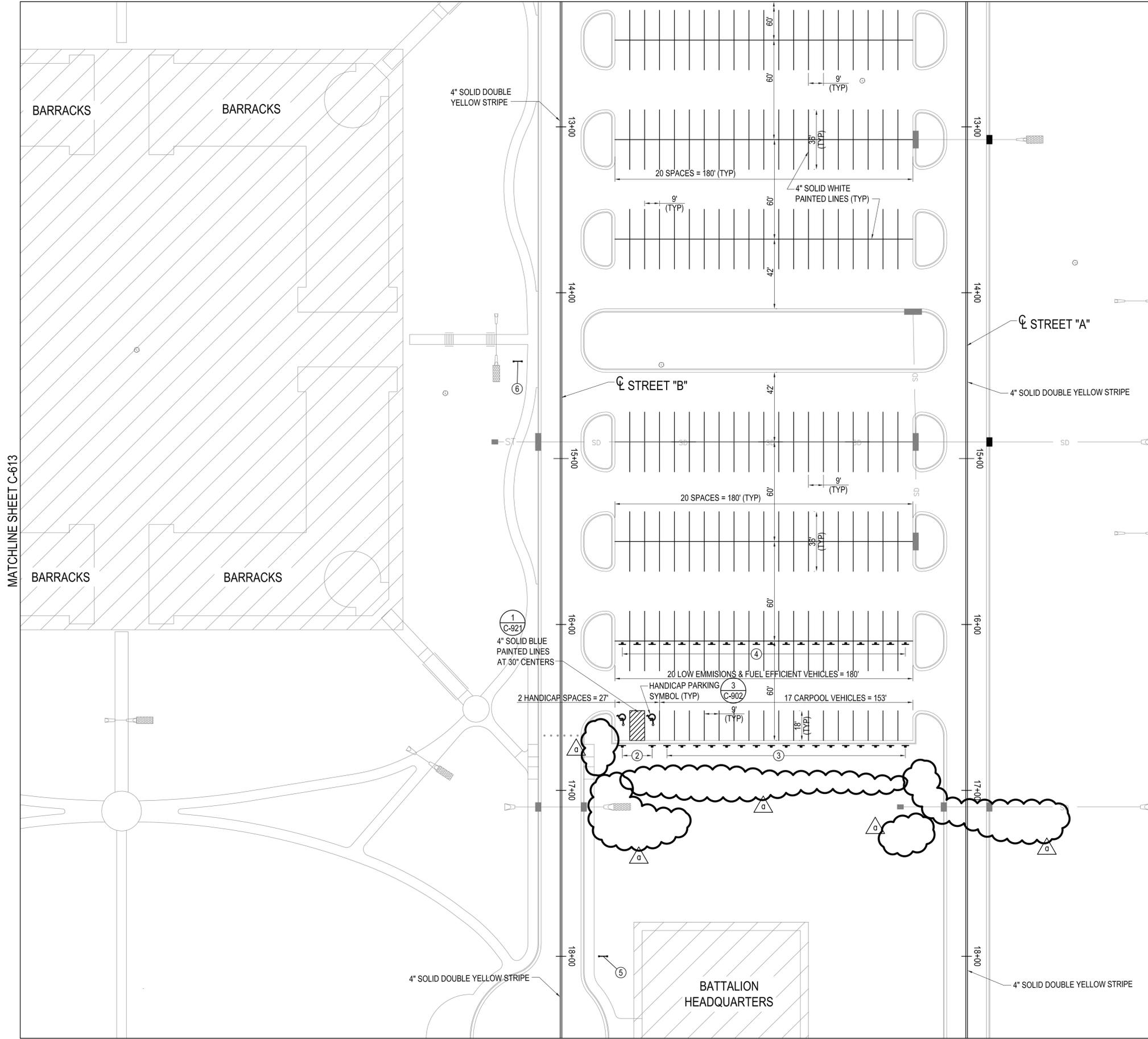
2

3

4

5

MATCHLINE SHEET C-612

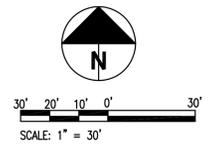
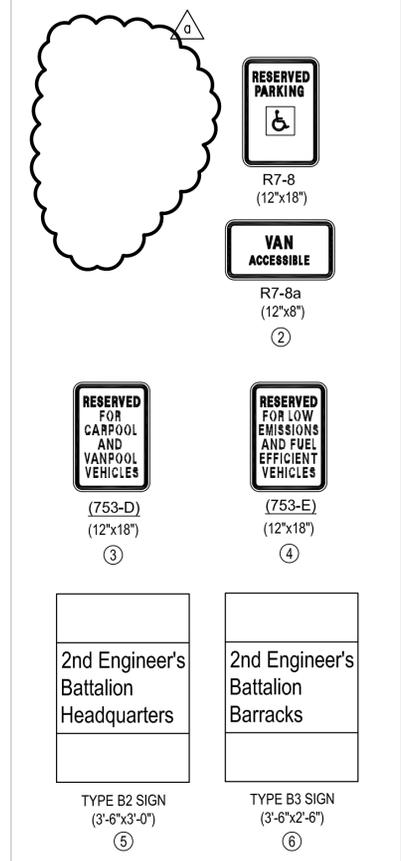


MATCHLINE SHEET C-616

UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS, RECORDS AND INFORMATION, AND THEREFORE, DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, NONEXISTENCE, SIZE, TYPE NUMBER OF, OR LOCATION OF THESE FACILITIES, STRUCTURES, AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE DRAWINGS. THE UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES SHALL BE LOCATED IN THE FIELD PRIOR TO ANY GRADING, EXCAVATION OR CONSTRUCTION OF IMPROVEMENTS.

SIGNING & PAVEMENT MARKING NOTES:

1. SEE SHEET C-611 FOR ADDITIONAL SIGNING AND PAVEMENT MARKING NOTES.



Attachment to this work is not shown in this drawing. If the contractor is to be responsible for verifying the actual location of all underground facilities, structures, and utilities, either shown or not shown on these drawings, the contractor shall be responsible for verifying the actual location of all underground facilities, structures, and utilities, either shown or not shown on these drawings.

Rev.	Date	Description
1	03/20/10	REMOVED YELLOW STRIPE, STOP BAR, STOP SIGNS, STOP SIGN DETAIL

Designed by:	R. BAUM	Checked by:	J. JONES
Drawn by:	M. MCPHEAK	Reviewed by:	
Submitted by:		Chief:	

ARMY ENGINEER DISTRICT, FORT WORTH, TEXAS
 CORPS OF ENGINEERS
 FORT WORTH, TEXAS
JE JACOBS/HUITT-ZOLLARS
 LICENSED PROFESSIONAL ENGINEER
 200 NORTH BROADWAY
 FORT WORTH, TEXAS 76102
 TEL: (817) 335-8800
 FAX: (817) 335-9399

ENGINEERS BATTALION GTF
 UNIT OPERATIONS FACILITIES
 WHITE SANDS MISSILE RANGE
 NEW MEXICO
 SIGNING AND PAVEMENT
 MARKING PLAN

Sheet reference number:
C-614
 Sheet 59 of 188



Attachment to this work is not shown or noted on the drawings. It is the responsibility of the Engineer, Professional Engineer, to verify the accuracy of the information provided to the Engineer.

Rev.	Date	Description
1	03/20/10	REMOVED DIMENSIONS AND DIMENSIONS, REVISED NOTE 2

Designed by:	J. HIGER
Drawn by:	L. WEAVER
Reviewed by:	J. JONES
Submitted by:	J. JONES
Chief:	

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

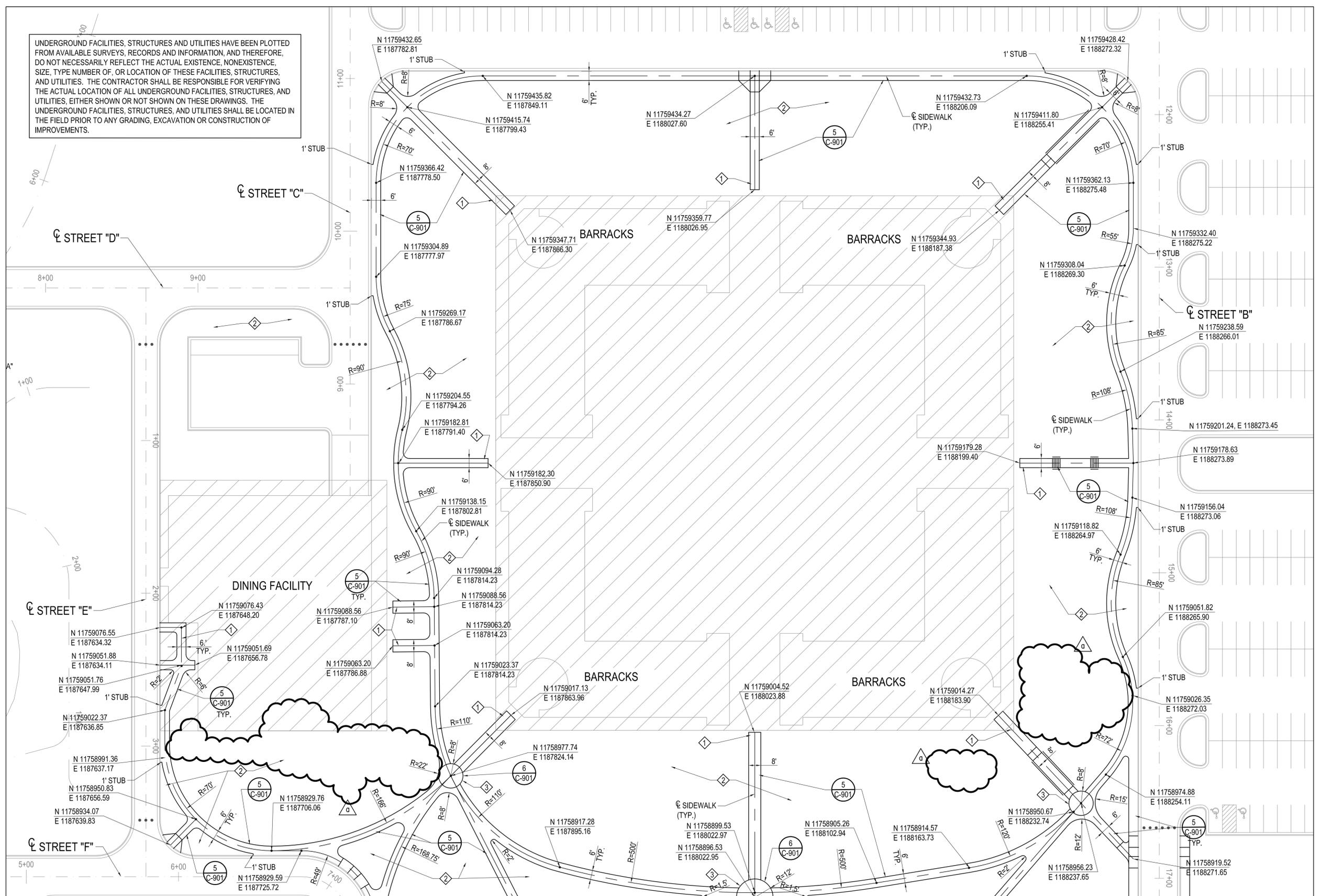
PROJECT VENDOR:
JACOBUS/HUIT-ZOLLARS
200 NORTH BROADWAY
SUITE 100
FAC 1001 250250

ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

SIDEWALK GEOMETRIC PLAN

Sheet
reference
number:
C-621
Sheet 64 of 188

UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS, RECORDS AND INFORMATION, AND THEREFORE, DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, NONEXISTENCE, SIZE, TYPE NUMBER OF, OR LOCATION OF THESE FACILITIES, STRUCTURES, AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE DRAWINGS. THE UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES SHALL BE LOCATED IN THE FIELD PRIOR TO ANY GRADING, EXCAVATION OR CONSTRUCTION OF IMPROVEMENTS.

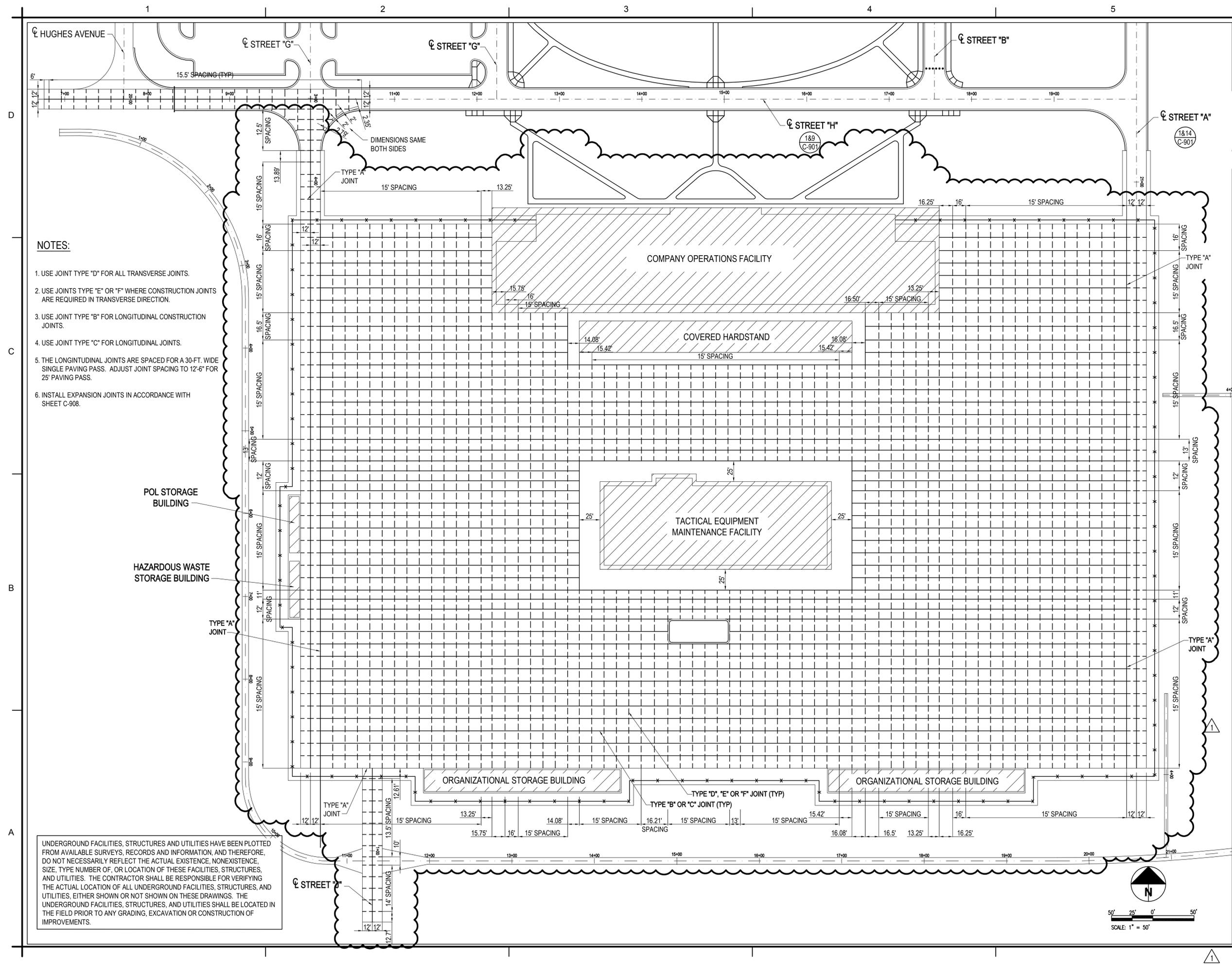


- KEYED NOTES:**
- FIELD ADJUSTMENTS OF WALKWAYS LEADING TO FUTURE BUILDING LOCATIONS MAY BE REQUIRED. VERIFY LOCATION PRIOR TO LAYOUT.
 - ALL DISTURBED, UNPAVED AREAS SHALL RECEIVE A MINIMUM OF A 2" LAYER OF AGGREGATE.
 - 4" REINFORCED SCORED CONCRETE PAD, POURED IN PLACE, ON COMPACTED GRAVEL BASE WITH 8" THICKENED EDGES.

MATCHLINE SHEET C-622

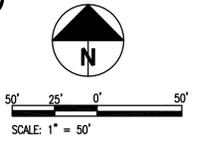
SIDEWALK GEOMETRIC PLAN NOTES:

- RADIAT AT INTERSECTING WALKS ARE 4 FEET UNLESS OTHERWISE NOTED.
- DIMENSIONS OF WALKS ADJACENT TO CURBS ARE FROM BACK OF CURB.
- CONTRACTION JOINTS ARE 6 FEET ON CENTER AND PREMOLDED EXPANSION JOINTS SHOULD BE PLACED AT EVERY THIRD JOINT AND AT WALKWAY INTERSECTIONS.



- NOTES:**
1. USE JOINT TYPE "D" FOR ALL TRANSVERSE JOINTS.
 2. USE JOINTS TYPE "E" OR "F" WHERE CONSTRUCTION JOINTS ARE REQUIRED IN TRANSVERSE DIRECTION.
 3. USE JOINT TYPE "B" FOR LONGITUDINAL CONSTRUCTION JOINTS.
 4. USE JOINT TYPE "C" FOR LONGITUDINAL JOINTS.
 5. THE LONGITUDINAL JOINTS ARE SPACED FOR A 30-FT. WIDE SINGLE PAVING PASS. ADJUST JOINT SPACING TO 12'-6" FOR 25' PAVING PASS.
 6. INSTALL EXPANSION JOINTS IN ACCORDANCE WITH SHEET C-908.

UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS, RECORDS AND INFORMATION, AND THEREFORE, DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, NONEXISTENCE, SIZE, TYPE NUMBER OF, OR LOCATION OF THESE FACILITIES, STRUCTURES, AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE DRAWINGS. THE UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES SHALL BE LOCATED IN THE FIELD PRIOR TO ANY GRADING, EXCAVATION OR CONSTRUCTION OF IMPROVEMENTS.



DISCLAIMER
Attachment of this seal to this document is made only for the purpose of authenticating this document. Responsibility for all other documents relating to this project is disclaimed.

Rev.	Date	Description
1	10/20/08	NEW DRAWING

Designed by: A. HASAN	Checked by: R. BAUM	Reviewed by: M. MCPEAK	Submitted by: [Signature]
Date: 03/03/08	Soil no.:	Contr. No. W9126G-06-D-005	File name: EFP-C-623
		TASK ORDER 003	Plot date: 11/19/08
			Plot scale: As shown, 1:1

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

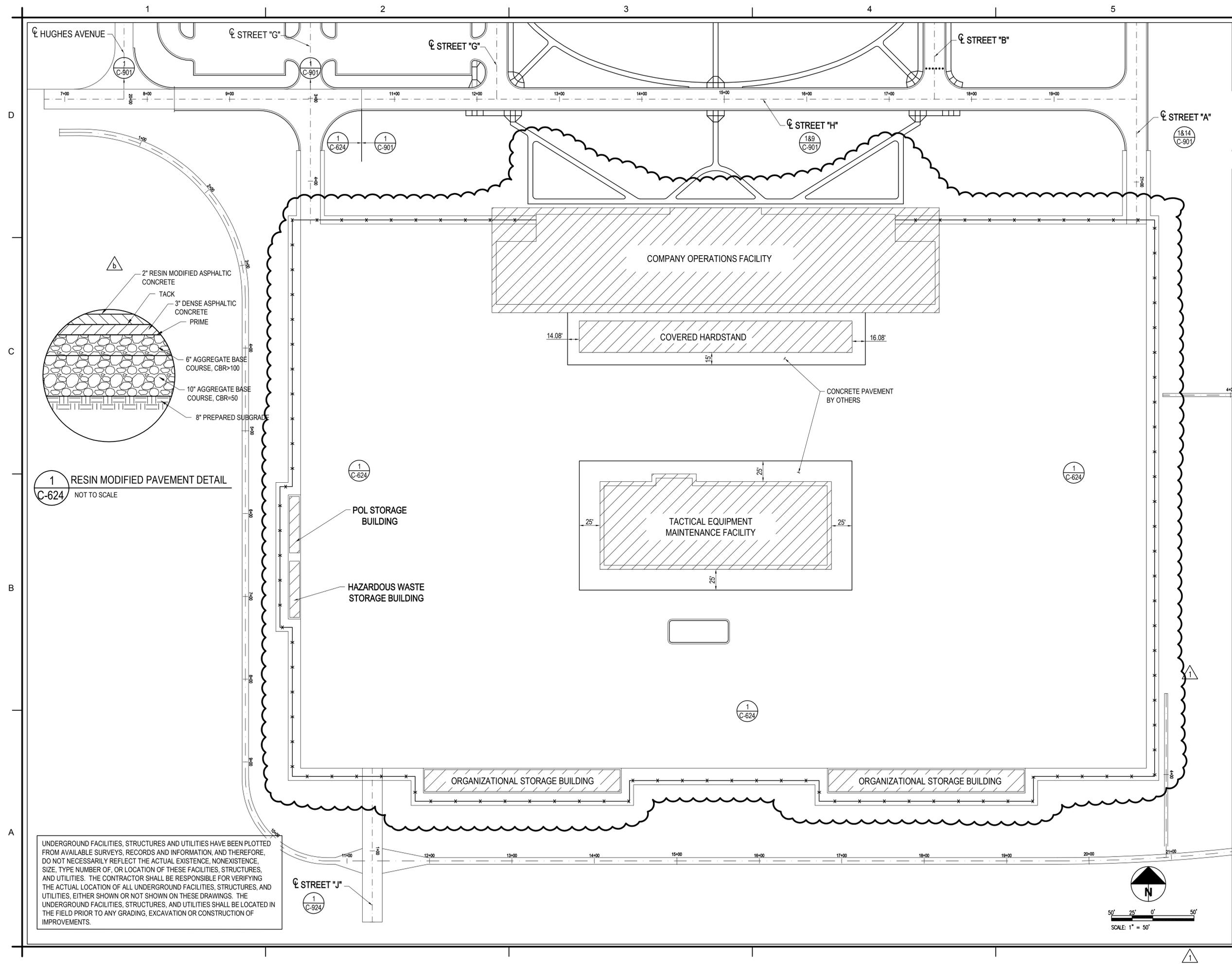
PROJECT NUMBER:
JACOBSON/HUITZ-ZOLLARS

201 NORTH WOODWAY
FORT WORTH, TEXAS 76104
TEL: 817-335-4000
FACSIMILE: 817-335-2525

ENGINEERS BATTALION/CIE
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

HARDSTAND JOINT DETAILS

Sheet reference number:
C-623
Sheet 65A of 188



DISCLAIMER
Attachment of this seal to this document is made only for the purpose of authenticating this document. Responsibility for all other documents relating to this project is disclaimed.

Rev.	Date	Description
1	10/03/08	NEW DRAWING
2	10/03/08	REVISED SHEET TITLE, AND PAVEMENT THICKNESS
3	10/03/08	REVISED SHEET TITLE, AND PAVEMENT THICKNESS
4	10/03/08	REVISED SHEET TITLE, AND PAVEMENT THICKNESS
5	10/03/08	REVISED SHEET TITLE, AND PAVEMENT THICKNESS

Designed by: A. HASAN	Checked by: R. BAUM	Submitted by: Chief
Drawn by: M. MCPHEAK	Reviewed by:	
Date: 03/03/08	Soil no.:	File name: EERF-C-624
Contract: No. W9126G-06-D-0055	Task order: 0003	Revision: 11/19/08
Revision: 1.1		

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

PROJECT NUMBER:
JE JACOBS/HUITT-ZOLLARS

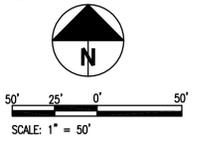
2010 LYNCH ROAD
SUITE 100
FORT WORTH, TEXAS 76104
TEL: 817-335-4000
FAX: 817-335-2525

ENGINEERS BATTALION/CITE
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

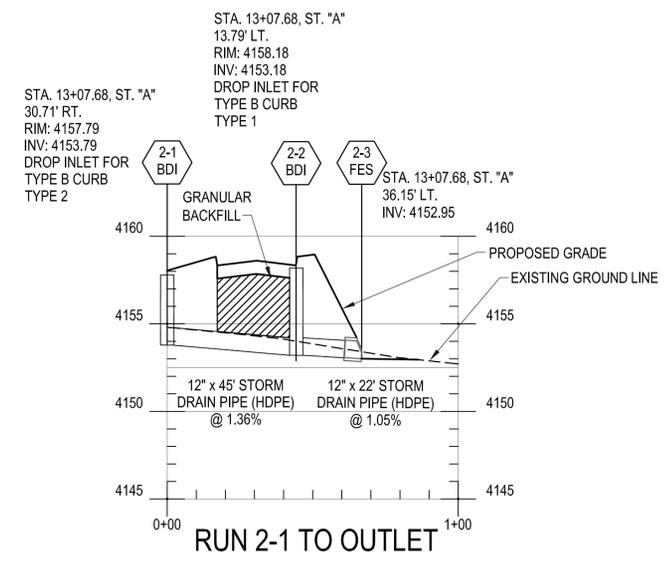
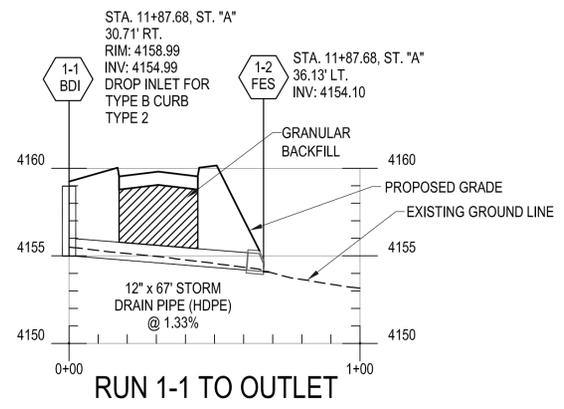
RESIN MODIFIED PAVEMENT OPTION

Sheet reference number:
C-624
Sheet 65B of 188

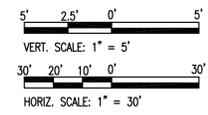
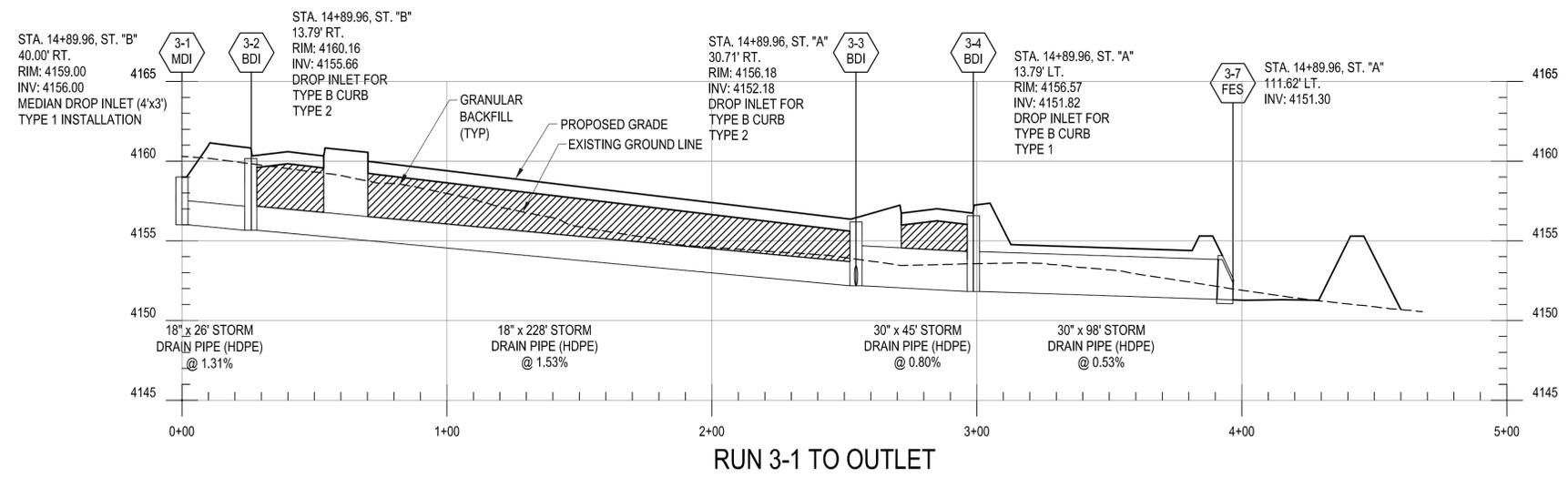
UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS, RECORDS AND INFORMATION, AND THEREFORE, DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, NONEXISTENCE, SIZE, TYPE NUMBER OF, OR LOCATION OF THESE FACILITIES, STRUCTURES, AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE DRAWINGS. THE UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES SHALL BE LOCATED IN THE FIELD PRIOR TO ANY GRADING, EXCAVATION OR CONSTRUCTION OF IMPROVEMENTS.



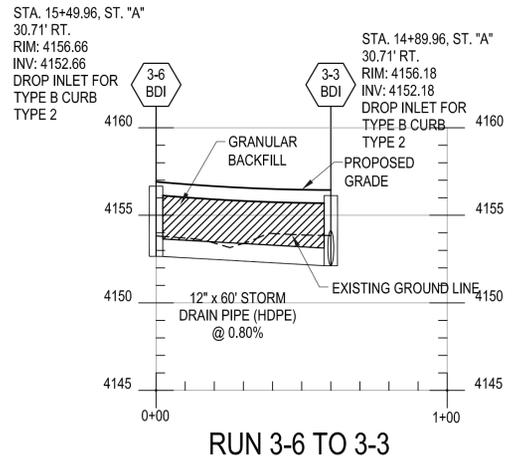
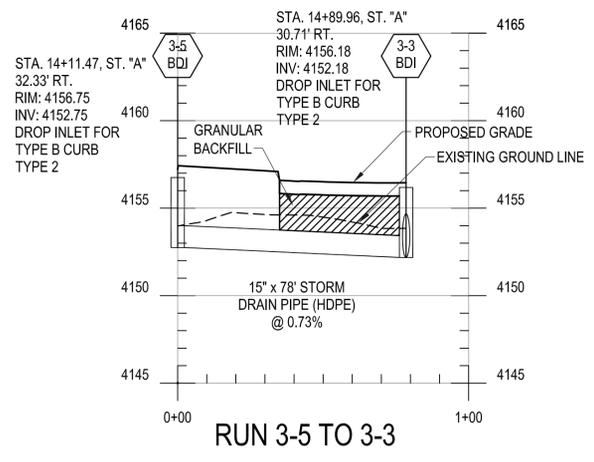
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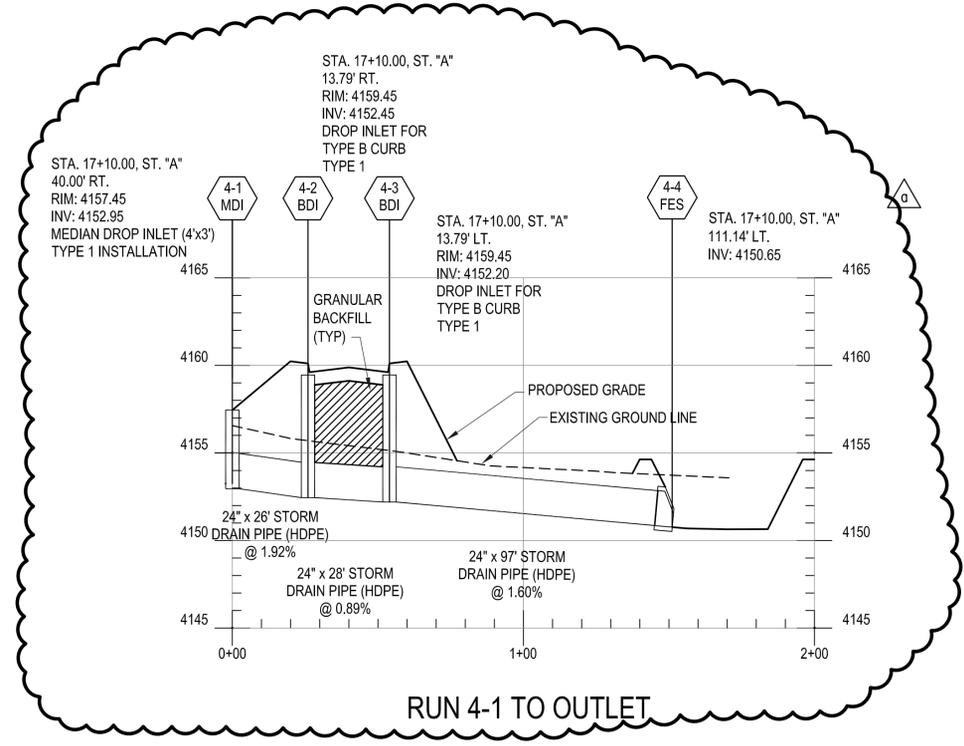
C



B



A



GENERAL NOTES:

- PIPE SLOPE IS CALCULATED BASED ON LENGTHS FROM CENTER OF STRUCTURE TO CENTER OF STRUCTURE, OR CENTER OF STRUCTURE TO OUTLET END OF FES.
- PIPE LENGTHS SHOWN ON PLANS ARE FROM CENTER OF STRUCTURE TO CENTER OF STRUCTURE, OR FROM CENTER OF STRUCTURE TO DOWNSTREAM END OF FES.
- ALL STORM SEWER STRUCTURES SHALL BE PRECAST.
- ALL HDPE PIPE SHALL BE N-12 SMOOTH WALL INTERIOR PIPE OR APPROVED EQUAL.
- ALL STORM DRAIN PIPES AND STRUCTURES SHALL BE JOINED WITH CLOSED CELL PREFORMED GASKETS AND SHALL CONFORM TO THE REQUIREMENTS OR ASTM D 1056 AND AASHTO M 198, TYPE B.
- ALL STORM DRAIN PIPE (HDPE) AND STRUCTURES SHALL BE JOINED WITH A WATERTIGHT JOINT PER THE MANUFACTURER'S RECOMMENDATION.
- FOR STORM SEWER DETAILS SEE SHEETS C-907 THRU C-909 AND SHEETS C-919 THRU C-928.
- UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS, RECORDS AND INFORMATION, AND THEREFORE, DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, NONEXISTENCE, SIZE, TYPE NUMBER OF, OR LOCATION OF THESE FACILITIES, STRUCTURES, AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE DRAWINGS. THE UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES SHALL BE LOCATED IN THE FIELD PRIOR TO ANY GRADING, EXCAVATION OR CONSTRUCTION OF IMPROVEMENTS.



REVISION: Attachment to this work is not shown as a final design. The design is preliminary and subject to change. It is the responsibility of the contractor to verify the location of all utilities and structures in the field prior to any construction.

Rev.	Date	Description
1	03/20/10	REVISED PROFILE

Designed by:	R.B.UM	Checked by:	M.C.H.
Drawn by:	M.M.PEAK	Reviewed by:	
Submitted by:		Chief:	
Date:	03/20/10	Contract No.:	EBF-C-711
Sheet No.:		Revision:	03/20/10
Project No.:		Scale:	1:1

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

REGISTERED PROFESSIONAL ENGINEER
JE JACOBS/HUITT-ZOLLARS
301 NORTH BROADWAY
FAC 151335-4400
FAC 151335-2525

ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

STORM SEWER PROFILES

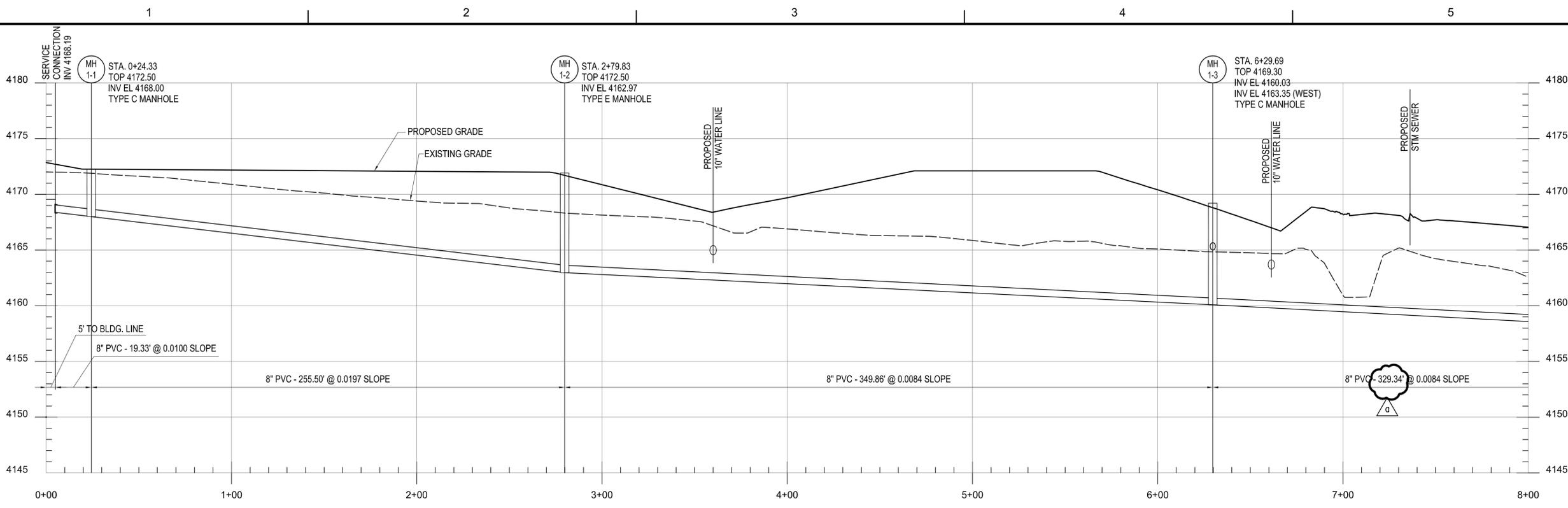
Sheet reference number:
C-711
Sheet 73 of 188

D

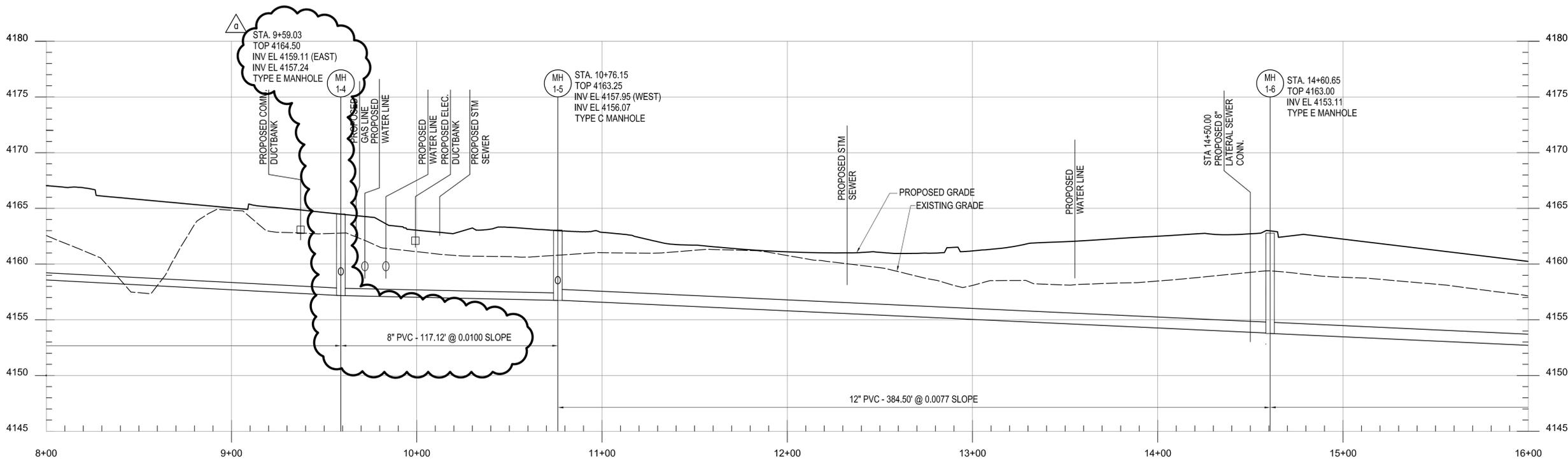
C

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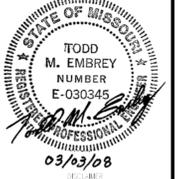
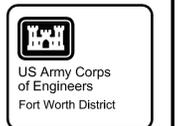
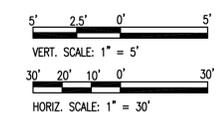


SANITARY SEWER CONNECTION TO EX. MH 89



SANITARY SEWER CONNECTION TO EX. MH 89 (CONT.)

NOTES:
 1. CAP END OF SANITARY SEWER PIPE AT ALL SERVICE CONNECTIONS POINTS.



Attachment of this work to any document is void unless the seal appears in accordance with the Engineering Regulations of the State of Texas. Nothing in this permit is to be construed as...

Mark	REVISION PROFILE	Description
AM 001	03/29/08	Action

Designed by: T. EMBREY	Date: 03/03/08	Rev.
Drawn by: J. WINGELMANN	Soil. no.	
Reviewed by: R. DARNER	Contr. No.	
Submitted by:	File name: EBF-C-721	
Chief:	Revised: 03/20/10	

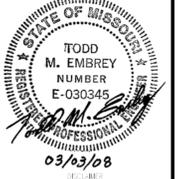
U.S. ARMY ENGINEER DISTRICT, FORT WORTH
 CORPS OF ENGINEERS
 FORT WORTH, TEXAS

CLIENT VENDOR
JE JACOBS/HUIT-ZOLLARS
 201 NORTH BROADWAY
 FORT WORTH, TEXAS 76102
 TEL: (817) 335-4400
 FAX: (817) 335-2525

ENGINEERS BATTALION GTF
 UNIT OPERATIONS FACILITIES
 WHITE SANDS MISSILE RANGE
 NEW MEXICO

SANITARY SEWER PROFILES

Sheet
 reference
 number:
C-721
 Sheet 77 of 188



Attachment of this work to any document is void unless the design is administered by the Engineer, registered in the State of Texas, and the Engineer is not a partner or shareholder.

Rev.	Date	Description
1	03/25/08	REVISION PROFILE

Designed by: T. EMBREY	Checked by: J. WINGELMANN	Reviewed by: J. WINGELMANN	Submitted by: J. WINGELMANN
Date: 03/03/08	Scale: AS SHOWN	Contract No.:	File name: EBF-C-722
			Revision: 03/20/10
			Revision: 03/20/10

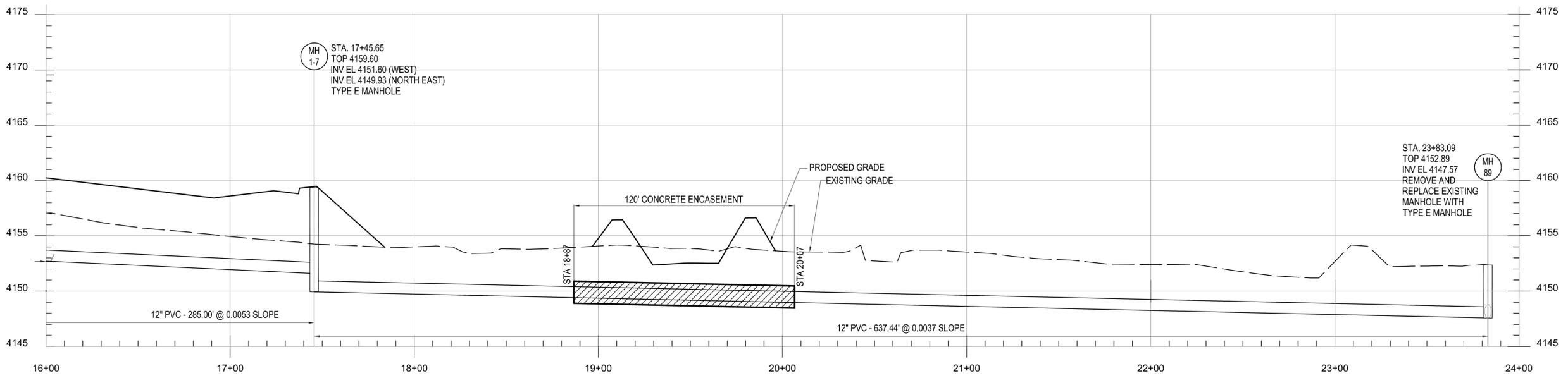
U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

PROJECT VENTURE
JACOBUS/HUITT-ZOLLARS
500 NORTH BROADWAY
FACILITY DESIGN GROUP
FACILITY DESIGN GROUP

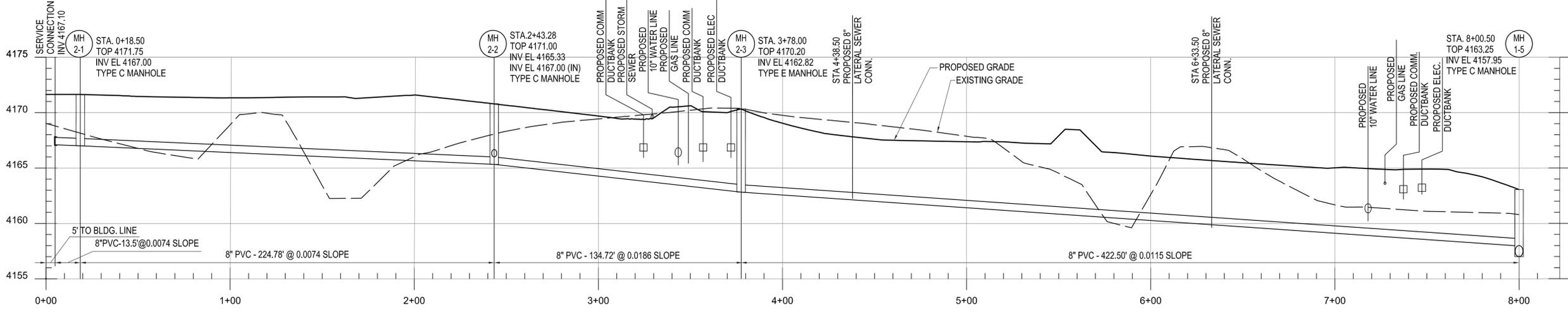
ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

SANITARY SEWER PROFILES

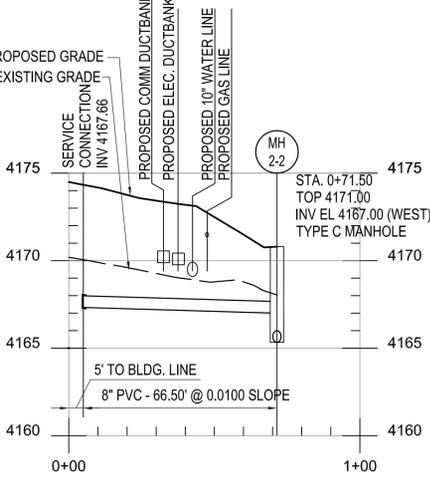
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reference
number:
C-722
Sheet 78 of 188



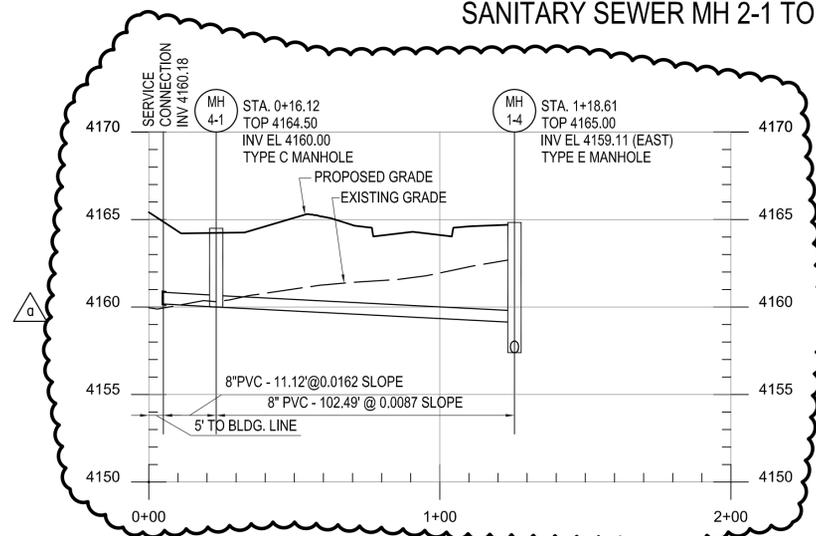
SANITARY SEWER CONNECTION TO EX. MH 89



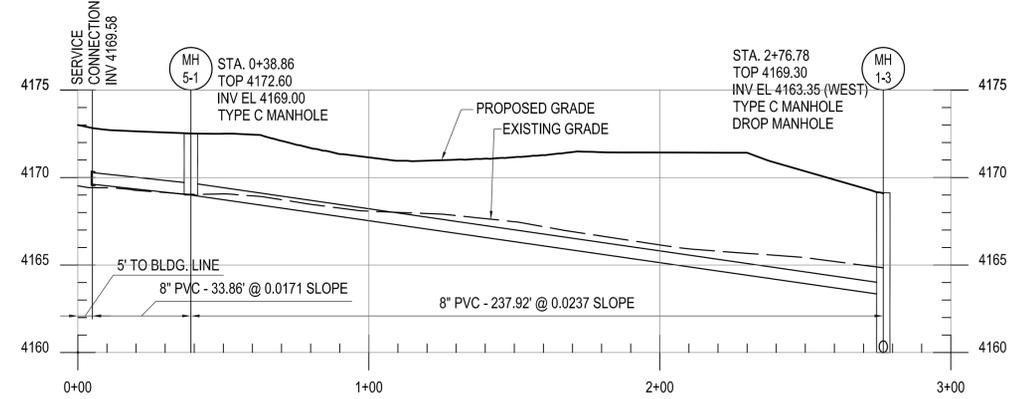
SANITARY SEWER MH 2-1 TO MH 1-5



SANITARY SEWER PROFILE CONNECTION TO MH 2-2

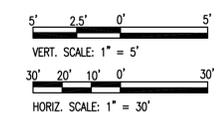


SANITARY SEWER PROFILE CONNECTION TO MH 1-4



SANITARY SEWER PROFILE CONNECTION TO MH 1-3

NOTES:
1. CAP END OF SANITARY SEWER PIPE AT ALL SERVICE CONNECTIONS POINTS.



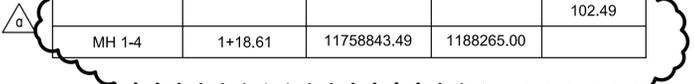
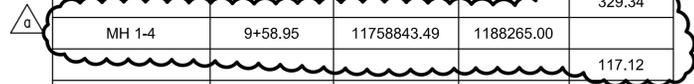
D

C

B

A

POINT	STATION (ft)	NORTHING (ft)	EASTING (ft)	LENGTH (ft)
BUILDING WALL	0+00.00	11758142.28	1188003.42	
				5.00
SERVICE CONN.	0+05.00	11758147.28	1188003.42	
				19.33
MH 1-1	0+24.33	11758166.61	1188003.63	
				255.50
MH 1-2	2+79.83	11758164.4	1188259.12	
				349.86
MH1-3	6+29.69	11758514.25	1188262.15	
				329.34
MH 1-4	9+58.95	11758843.49	1188265.00	
				117.12
MH 1-5	10+76.15	11758960.69	1188266.01	
				373.85
LATERAL CONN.	14+50.00	11759334.53	1188269.24	
				10.65
MH 1-6	14+60.65	11759345.18	1188269.33	
				285.00
MH 1-7	17+45.65	11759342.71	1188554.32	
				637.44
EX MH 89	23+83.09	11759900.35	1188863.14	

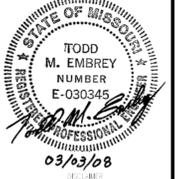


POINT	STATION (ft)	NORTHING (ft)	EASTING (ft)	LENGTH (ft)
BUILDING WALL	0+00.00	11758811.54	1188367.26	
				5.00
SERVICE CONN.	0+05.00	11758816.54	1188367.26	
				11.12
MH 4-1	0+16.12	11758842.60	1188367.48	
				102.49
MH 1-4	1+18.61	11758843.49	1188265.00	

POINT	STATION (ft)	NORTHING (ft)	EASTING (ft)	LENGTH (ft)
BUILDING WALL	0+00.00	11759323.74	1187865.14	
				5.00
SERVICE CONN.	0+05.00	11759323.72	1187860.14	
				13.50
MH 2-1	0+18.50	11759323.83	1187846.64	
				224.78
MH 2-2	2+43.28	11759099.07	1187844.69	
				134.72
MH 2-3	3+78.00	11758964.35	1187843.53	
				60.50
LATERAL CONN.	4+38.50	11758963.82	1187904.02	
				195.00
LATERAL CONN.	6+33.50	11758962.14	1188099.02	
				167.00
MH 1-5	8+00.50	11758960.69	1188266.01	

POINT	STATION (ft)	NORTHING (ft)	EASTING (ft)	LENGTH (ft)
BUILDING WALL	0+00.00	11758477.45	1188023.90	
				5.00
SERVICE CONN.	0+05.00	11758482.45	1188023.90	
				33.86
MH 5-1	0+38.86	11758516.31	1188024.24	
				237.92
MH 1-3	2+76.78	11758514.25	1188262.15	

POINT	STATION	NORTHING (ft)	EASTING (ft)	LENGTH (ft)
BUILDING WALL	0+00.00	11759099.68	1187773.19	
				5.00
SERVICE CONN.	0+05.00	11759099.68	1187778.19	
				66.50
MH 2-2	0+71.50	11759099.07	1187844.69	



Attachment of this work to any document is void unless the seal appears on the document. The Engineer is responsible for all work performed. Nothing in this permit is to be construed as an endorsement of any product or service.

Rev.	Date	Description
1	03/25/08	REKISED COORDINATES

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY: T. EMBREY
DRAWN BY: J. WINGELMANN
CHECKED BY: R. D. HARRIS
REVIEWED BY:
SUBMITTED BY: J. H. HARRIS

DATE: 03/20/08
SOL. NO.:
CONF. NO.:
FILE NAME: R. D. HARRIS

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

CLIENT VENTURE
JE JACOBS/HUITT-ZOLLARS
201 NORTH BROADWAY
FLOOR 1000
FORT WORTH, TEXAS 76102
TEL: (817) 335-4000
FAX: (817) 335-2500

ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

SANITARY SEWER COORDINATE TABLES

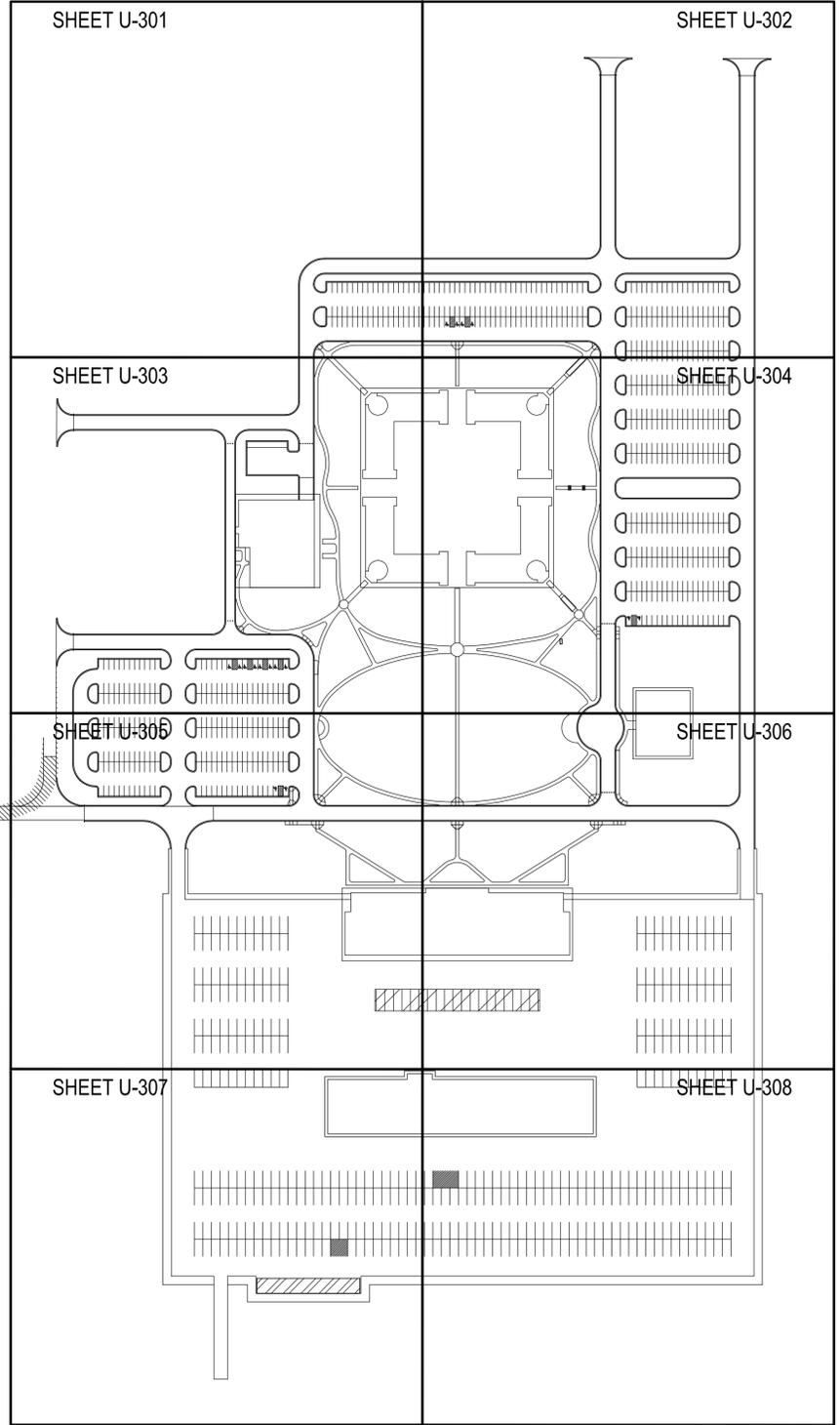
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OVERHEAD GENERAL NOTES:

1. PRIMARY SYSTEM IS RATED AT 15 KV FOR OPERATION AT 12.47 KV, THREE PHASE, FOUR WIRE, SOLIDLY GROUND. THIS PRIMARY REVISION PROJECT SHALL BE PERFORMED LIVE FOLLOWING ACCEPTED INDUSTRY STANDARDS FOR SAFETY.
2. REUSE EXISTING CONDUCTORS IN PLACE FROM POLE 33 TO POLE 40.
3. FROM POLE 40 TO POLE 44, USE JACKETED, #4/0 AA CABLE, 15 KV 6201-T81 ALLOY, RATED 4237 POUNDS BREAKING STRENGTH BY HENDRIX WIRE & CABLE, (603) 249-1252 OR APPROVED EQUAL. JACKETED CABLE WILL BE ATTACHED TO POLES USING VISETOP INSULATORS, HENDRIX #HP1-15VTP. CONFORM WITH MANUFACTURERS RECOMMENDATIONS FOR CONDUCTOR DEADENDS. SAG AND TENSION IN ACCORDANCE WITH TABLE.
4. MATCH EXISTING NEUTRAL/STATIC WIRE FOR NEUTRAL.
5. BIRD NOTE: POLES 34, 35A, 36, 37, 40 AND 44 SHALL INCLUDE DISTRIBUTION LINE PROTECTION ON LIVE PARTS FOR LARGE BIRDS, ITEMS, AS MANUFACTURED BY TYCO ELECTRONICS, (888) 264-1722 (OR APPROVED EQUAL) SHALL INCLUDE:
 - a. FUSED CUTOUT - TYCO #BCAC-G-CUTOUT-100
 - b. DOUBLE PIN COVER - TYCO #DCIC-G-PIN
 - c. PIN INSULATOR COVER - TYCO #BCIC-G-PIN-795
 - d. LIGHTNING ARRESTOR COVER - TYCO #BCAC-G-AR-5D-2 (OHIO)
 - e. POLYMERIC TERMINATION COVER - TYCO #BCAC-4D/13-2
 - f. CONDUCTOR COVER - TYCO #MVLCO-OVERHEAD-OLIT
 - g. ITEMS AS RECOMMENDED BY MANUFACTURER
6. POLES TO BE REMOVED SHALL BE PULLED. BACK FILL HOLE USING LEFTOVER SOIL FROM INSTALLED POLES.
7. GUYS TO BE REMOVED SHALL BE CUT AT 12 INCHES BELOW GRADE. INCLUDE PLASTIC SURFACE MARKER TO IDENTIFY GUY LOCATION.
8. LOCATE NEW POLES SO LINE IS STRAIGHT AND TRUE FROM ANGLE POLE TO ANGLE POLE.
9. INSTALL NEW POLES AT 6 FEET BELOW GRADE. POLES SHALL BE VERTICAL, STRAIGHT AND TRUE.
10. INCLUDE GROUNDING ON POLES 34, 35A, 40 AND 44 USING #2 COPPER CONDUCTORS FROM NEUTRAL WIRE AND LIGHTNING GROUND TO TWO GROUND RODS. POLES 34 AND 35A WILL HAVE A SECOND #2 COPPER CONDUCTOR TO TWO GROUND RODS FOR UNDERGROUND CABLE TERMINATION DRAINS.
11. ON NEW POLES 35A, 36, 37, 41, 42, 43 AND 43A, INCLUDE ONE #2 COPPER CONDUCTOR FROM NEUTRAL CONDUCTOR TO GROUND RODS AND POLE GROUND PLATE.
12. INCLUDE VERTICAL GROUND COVERS OVER POLE GROUNDING CONDUCTORS FROM GRADE TO TOP OF CONDUCTOR ATTACHMENT TO POLE. EACH GROUND CONDUCTOR SHALL BE ISOLATED FROM THE OTHER GROUND CONDUCTOR - INTERCONNECT GROUNDING CONDUCTORS AT GRADE.
13. USING NUMBERS ONLY, TAG NEW POLES IN SEQUENCE AND STYLE TO MATCH EXISTING SYSTEM.
14. AT WHITE SANDS MISSILE RANGE SUBSTATION, REPLACE FOUR EXISTING RELAYS FOR FEEDER 7 WESTINGHOUSE TYPE: CO-9, USING ABB #1456C05A05 (800) 435-7365. SET RELAYS AS FOLLOWS.

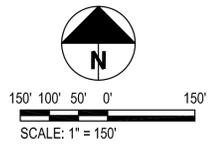
FEEDER	TAP SETTING	TIME DIAL	TIME OVERCURRENT STATIONARY CONTACT	INSTANTANEOUS UNIT PICKUP ADJUSTMENT	CT RATIO	INDICATING CONTACTOR SWITCH TAP
PHASES A,B,C	12	3	TIME: NONE	120	400:5	1.0
GROUND	10	1.5	TIME: NONE	110	400:5	1.0

15. DELIVER REMOVED RELAYS TO CONTRACTING ENGINEER. OBTAIN RECEIPT.
16. REMOVED POLES SHALL NOT BE REUSED. MOVE REMOVED POLES TO STORAGE SITE ON BASE AS SELECTED BY CONTRACTING ENGINEER. IN A LEGAL MANNER, SCRAP OFF BASE THE OTHER REMOVED POLE RELATED ITEMS TO INCLUDE CROSS ARMS, CONDUCTORS, INSULATORS, GUYING MATERIAL, ETC.

LEGEND

- NEW POWER MANHOLE
- MANHOLE IDENTIFICATION
- EXISTING POWER MANHOLE
- 12.47KV PAD MOUNTED SWITCH
- SWITCH IDENTIFICATION
- 12.47KV PAD MOUNTED TRANSFORMER.
- NEW 12.47KV UNDERGROUND DUCTBANK (PRIMARY)
- EXISTING UNDERGROUND DUCTBANK (PRIMARY)
- NEW OVERHEAD LINE
- EXISTING OVERHEAD LINE
- NEW UNDERGROUND DUCTBANK (SECONDARY)
- EXISTING UNDERGROUND DUCTBANK (SECONDARY)
- EXISTING TO BE REMOVED
- NEW LIGHT FIXTURE (BASE BID)
- FIXTURE IDENTIFICATION
- NEW SOLAR LIGHT FIXTURE (OPTION)
- NEW UTILITY POLE
- POLE IDENTIFICATION
- EXISTING UTILITY POLE
- GUY WIRES

EXISTING	ADDITIONS
<ul style="list-style-type: none"> • DADE • SOURCE • (3) PHASE 4/O, NEUTRAL 	<ul style="list-style-type: none"> • DADE • (3) COVERED 4/O CONDUCTOR WITH DEAD END. NEUTRAL WITH DEAD END • (3) LIGHTNING ARRESTORS • (2) GROUND RODS • (4) GUY (5/16") • FUSED CUTOUT - 200T • POLE GROUND TO NEUTRAL AND LIGHTNING ARRESTOR. • SEE DETAILS
<ul style="list-style-type: none"> • LOAD • DADE TAKEOFF • (3) PHASE 4/O, NEUTRAL • (4) GUYS 	<ul style="list-style-type: none"> • XPP40
<p>EXISTING COMPONENTS TO REMAIN</p> <p>EXISTING COMPONENTS TO BE REMOVED</p>	<p>NEW COMPONENTS TO BE ADDED</p>



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Rev.	Date	Description
1	03/25/08	AM 0001 03/25/08

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY: L. CANNELL
DRAWN BY: K. PATTERSON
CHECKED BY: [Blank]
REVIEWED BY: [Blank]
SUBMITTED BY: [Blank]

FILE NAME: EBF-U300-Key
NO. DATE: 03/20/10
NO. REV. DATE: 03/25/08

PROJECT VENDOR: JE JACOBS/HUITT-ZOLLARS
1501 NORTH BROADWAY
FORT WORTH, TEXAS 76102
TEL: (817) 335-4800
FAX: (817) 335-2525

ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

ELECTRICAL SITE
PLAN OVERALL
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number:
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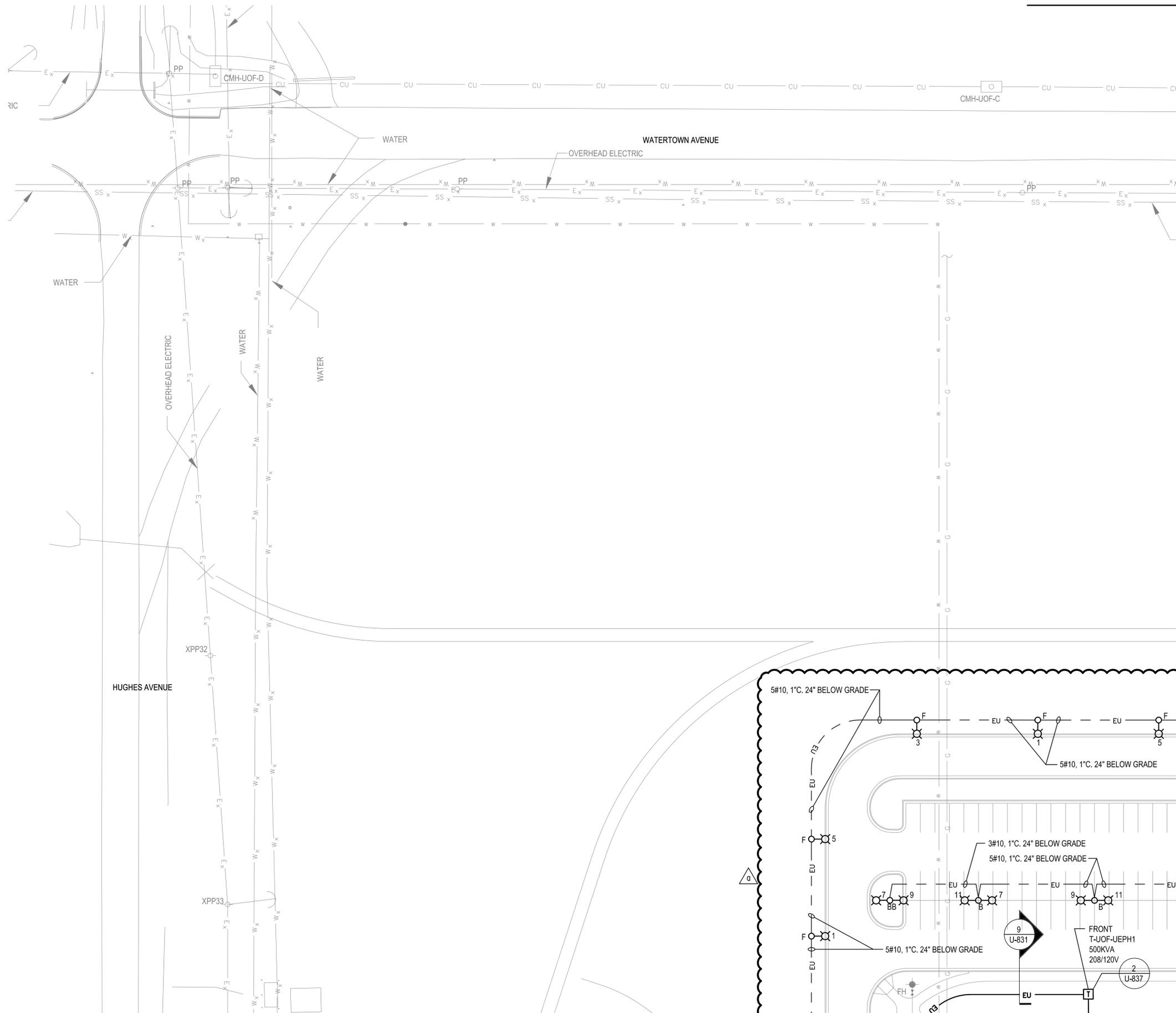
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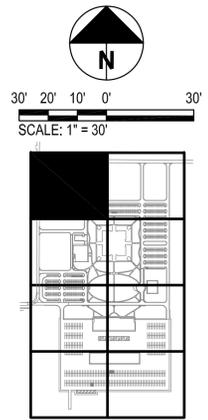
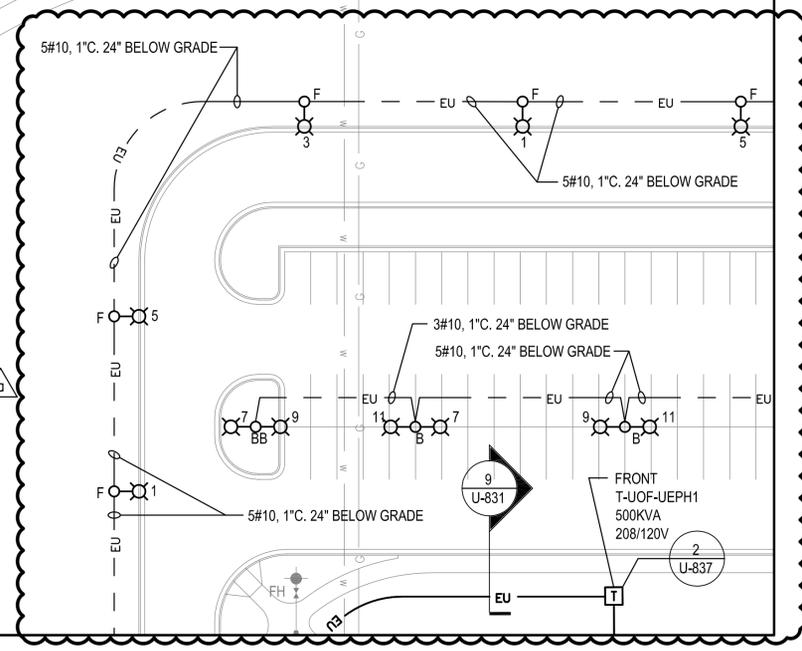
GENERAL NOTES

- FOR LEGEND REFER TO SHEET U-300.
- COORDINATE TRANSFORMER SIZE AND LOCATION WITH CONTRACTING OFFICER PRIOR TO ORDERING OR INSTALLING TRANSFORMER.
- UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS, RECORDS AND INFORMATION, AND THEREFORE, DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, NONEXISTENCE, SIZE, TYPE, NUMBER OF, OR LOCATION OF THESE FACILITIES, STRUCTURES, AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE DRAWINGS. THE UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES SHALL BE LOCATED IN THE FIELD PRIOR TO ANY GRADING, EXCAVATION OR CONSTRUCTION OF IMPROVEMENTS.
- DUCTBANK SHALL EXIT MANHOLES AT 4% MAXIMUM GRADE.
- DUCTBANKS SHALL DRAIN TO MANHOLE AT MINIMUM SLOPE OF 4 INCHES PER 100 FEET.
- CONTRACTOR SHALL USE LARGE RADIUS CONDUIT BENDS.
- CONTRACTOR SHALL DETERMINE LOCATION OF EXISTING UTILITIES.



MATCHLINE SHEET U-302

MATCHLINE SHEET U-303



KEY PLAN



DISCLAIMER
 Attachment of this seal to this document is made only for the purpose of authenticating this document. Responsibility for all other documents relating to this project is disclaimed.

Mark	Description	Date
AM 0001	REM. NOTE, LIGHT EXHAUST, CALLOUTS, AND NEW LOG.	03/25/08

Designed by: C. DEATON	Date: 02/08/08	Rev. a
Drawn by: B. WOSLEY, JR.	Soil. no.	
Reviewed by:	Contr. No.	
Submitted by:	File name: EEB-U301.dgn	
Chief:	No. date: 03/20/10	
	No. sheet: 1 of 1	

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
 CORPS OF ENGINEERS
 FORT WORTH, TEXAS

PROJECT VENDOR:
JE JACOBS/HUITT-ZOLLARS
 201 NORTH BROADWAY
 FORT WORTH, TEXAS 76102
 TEL: (817) 335-4800
 FAX: (817) 335-2525

ENGINEERS BATTALION GTF
 UNIT OPERATIONS FACILITIES
 WHITE SANDS MISSILE RANGE
 NEW MEXICO

ELECTRICAL SITE
 POWER AND LIGHTING PLAN

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GENERAL NOTES

- FOR LEGEND REFER TO SHEET U-300.
- COORDINATE TRANSFORMER SIZE AND LOCATION WITH CONTRACTING OFFICER PRIOR TO ORDERING OR INSTALLING TRANSFORMER.
- UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS, RECORDS AND INFORMATION, AND THEREFORE, DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, NONEXISTENCE, SIZE, TYPE, NUMBER OF, OR LOCATION OF THESE FACILITIES, STRUCTURES, AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE DRAWINGS. THE UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES SHALL BE LOCATED IN THE FIELD PRIOR TO ANY GRADING, EXCAVATION OR CONSTRUCTION OF IMPROVEMENTS.
- DUCTBANK SHALL EXIT MANHOLES AT 4% MAXIMUM GRADE.
- DUCTBANKS SHALL DRAIN TO MANHOLE AT MINIMUM SLOPE OF 4 INCHES PER 100 FEET.
- CONTRACTOR SHALL USE LARGE RADIUS CONDUIT BENDS.
- CONTRACTOR SHALL DETERMINE LOCATION OF EXISTING UTILITIES.

KEYED NOTES

- REINFORCEMENT FOR UNDERNEATH ROADS, HARDSTAND AND PAVEMENT SHALL EXTEND 10 FEET PAST EDGE OF PAVEMENT.



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Rev.	Date	Description
1	03/25/08	REIN. LIGHT FIXTURE DUCTBANKS

Designed by: C. DEANON	Date: 03/20/08	Rev. # 1
Drawn by: S. WOSLEY JR.	Sol. no. 03/20/10	
Reviewed by: S. WOSLEY JR.	Contr. No. EEB-U302-4PH	
Submitted by: S. WOSLEY JR.	File name: EEB-U302-4PH	
	No. date: 03/20/10	
	No. scale: As shown, 1:1	

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

CLIENT VENDOR
JE JACOBS/HUITT-ZOLLARS

ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

ELECTRICAL SITE
POWER AND LIGHTING PLAN

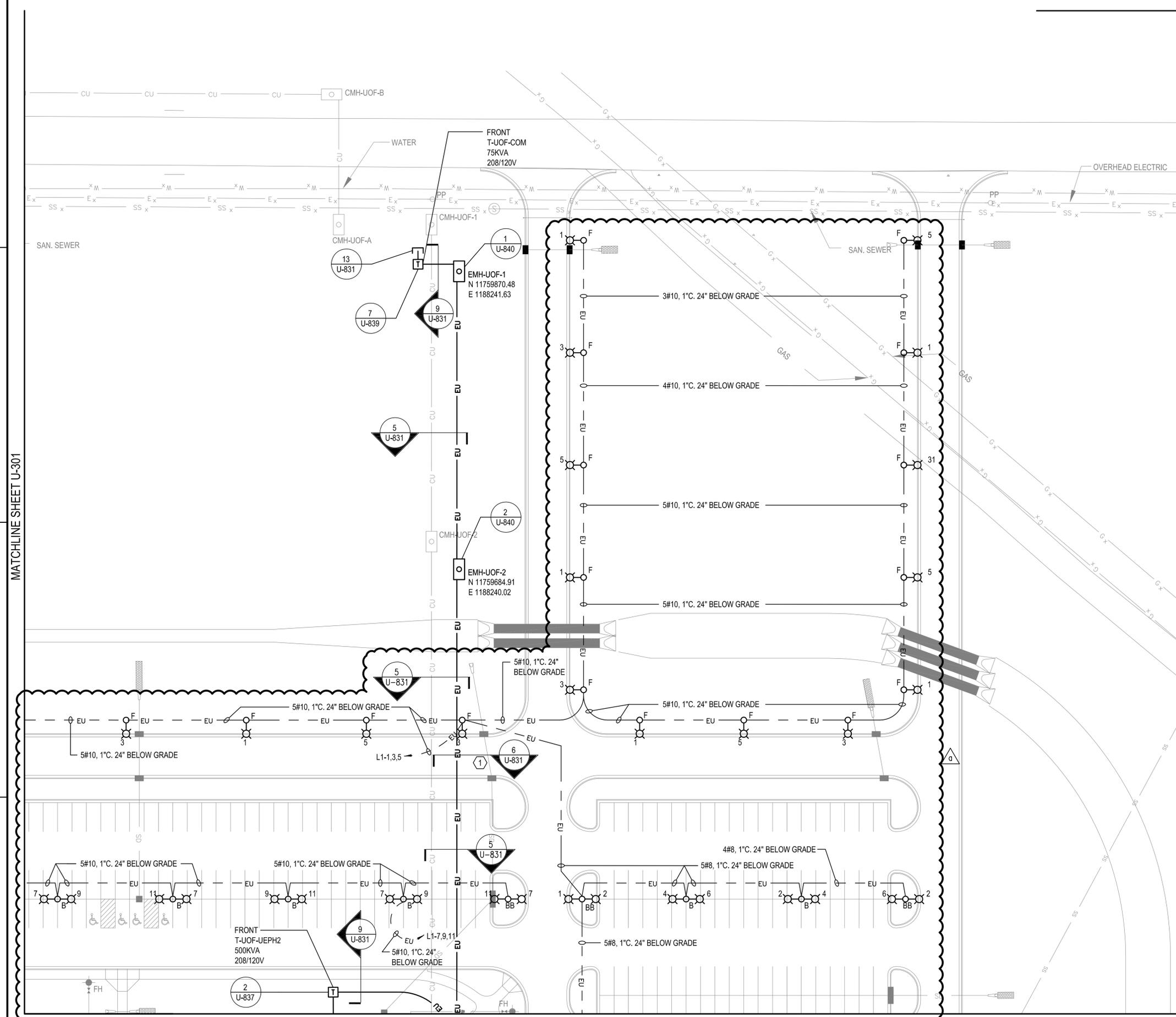
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reference
number:
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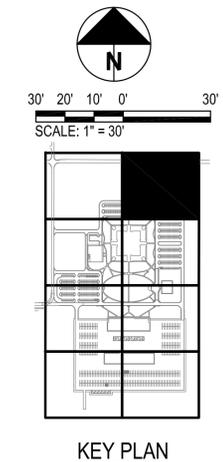
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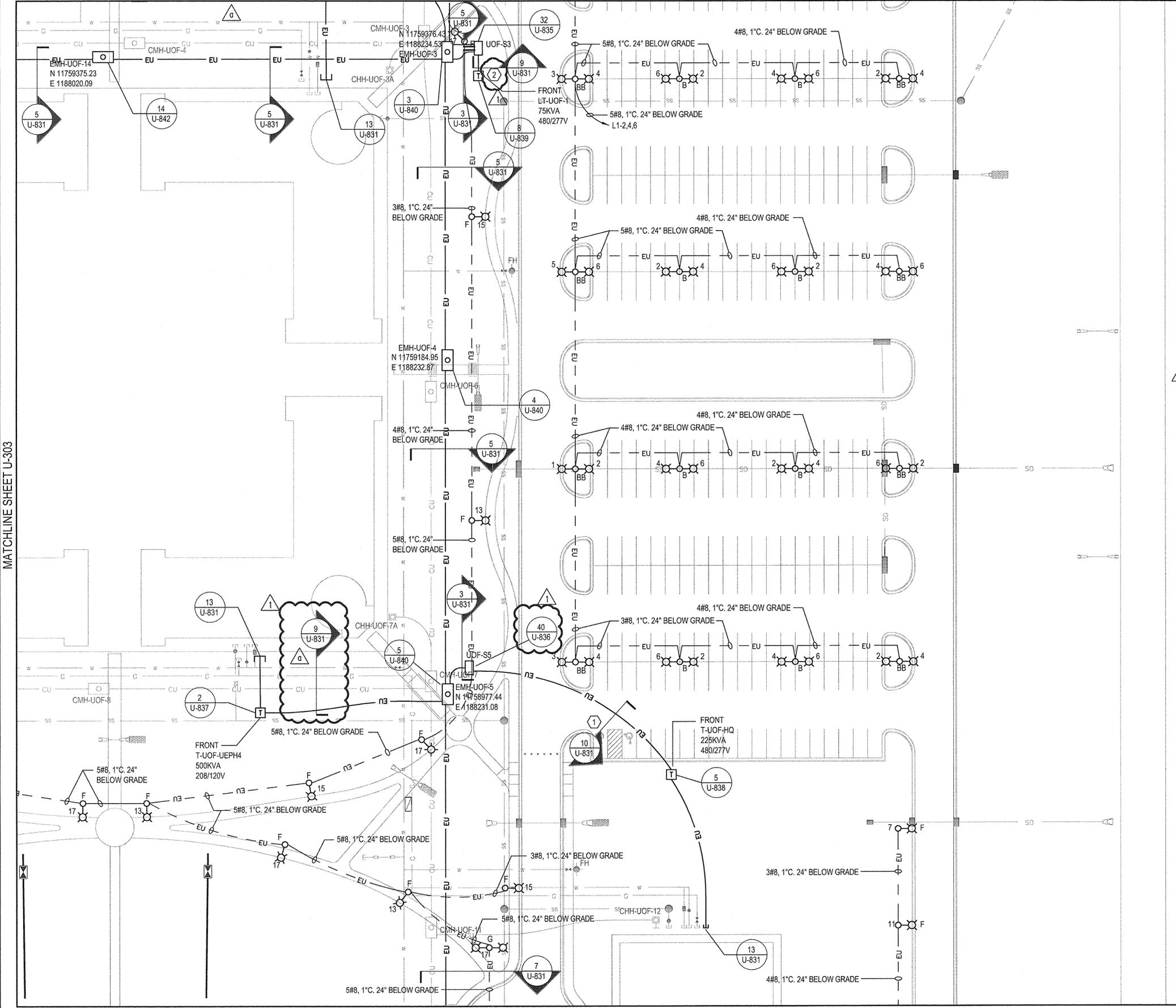
MATCHLINE SHEET U-301

MATCHLINE SHEET U-304



KEY PLAN

MATCHLINE SHEET U-302

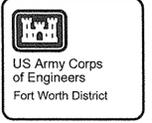


GENERAL NOTES

- FOR LEGEND REFER TO SHEET U-300.
- COORDINATE TRANSFORMER SIZE AND LOCATION WITH CONTRACTING OFFICER PRIOR TO ORDERING OR INSTALLING TRANSFORMER.
- UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS, RECORDS AND INFORMATION, AND THEREFORE, DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, NONEXISTENCE, SIZE, TYPE, NUMBER OF, OR LOCATION OF THESE FACILITIES, STRUCTURES, AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE DRAWINGS. THE UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES SHALL BE LOCATED IN THE FIELD PRIOR TO ANY GRADING, EXCAVATION OR CONSTRUCTION OF IMPROVEMENTS.
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- DUCTBANKS SHALL DRAIN TO MANHOLE AT MINIMUM SLOPE OF 4 INCHES PER 100 FEET.
- CONTRACTOR SHALL USE LARGE RADIUS CONDUIT BENDS.
- CONTRACTOR SHALL DETERMINE LOCATION OF EXISTING UTILITIES.

KEYED NOTES

- REINFORCEMENT FOR UNDERNEATH ROADS, HARDSTAND AND PAVEMENT SHALL EXTEND 10 FEET PAST EDGE OF PAVEMENT.
- LIGHTING PANEL L1 MOUNTED ON EXTERIOR OF TRANSFORMER.



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Date	Revised	Description
10/03/08	1	ISSUED FOR CONSTRUCTION
10/01/08	1	ISSUED FOR CONSTRUCTION

Designed by: C. DEATON	Checked by: B. MOSLEY, JR.	Reviewed by: [Signature]	Submitted by: [Signature]
Date: 03/03/08	Scale: As Shown	Contract No: W9126G-11-R-0057-0005	Task Order: E8F-U304-41n
Project Name: [Blank]		Project Date: 10/06/08	
Sheet No: 148		Scale: 1:1	

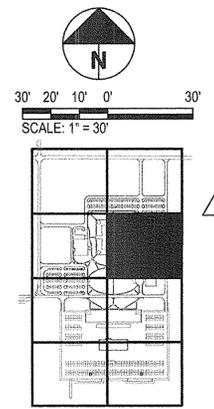
U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

JACOBS HUITT-ZOLLARS
A JOINT VENTURE
3000 GULF DRIVE, SUITE 1000
FORT WORTH, TEXAS 76102
TEL: 817.335.5555

ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES
WHITE SANDS RANGE
NEW MEXICO

ELECTRICAL SITE
POWER AND LIGHTING PLAN

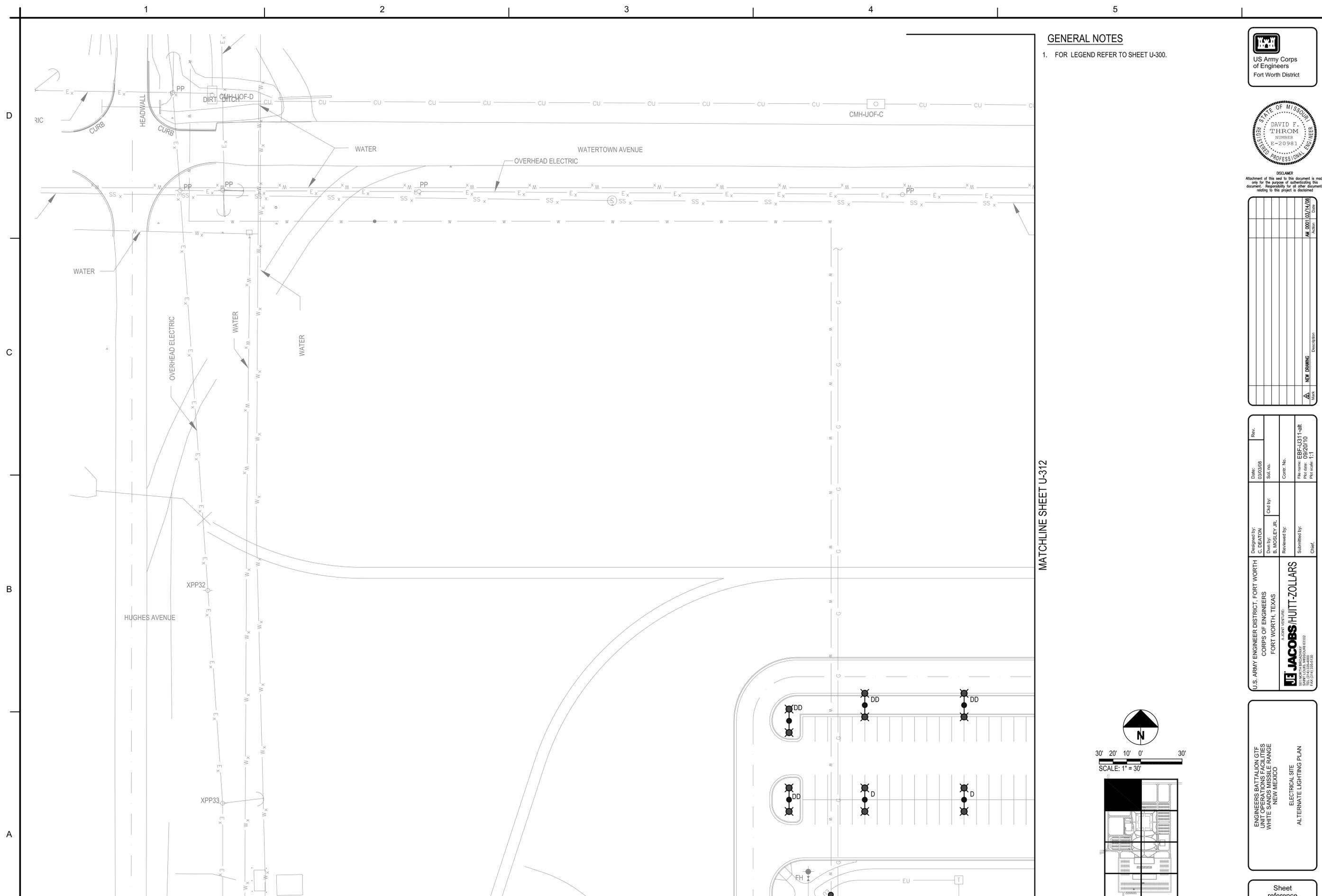
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KEY PLAN

MATCHLINE SHEET U-303

MATCHLINE SHEET U-306



GENERAL NOTES

1. FOR LEGEND REFER TO SHEET U-300.



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Mark	Description	Date
NEW	IRWIN	03/17/08

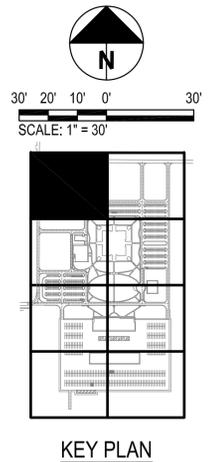
U.S. ARMY ENGINEER DISTRICT, FORT WORTH CORPS OF ENGINEERS FORT WORTH, TEXAS	DESIGNED BY: C. DEATON	DATE: 02/08/08	REV.
JE JACOBS/HUITT-ZOLLARS <small>CLIENT VENTURE</small> 201 NORTH BROADWAY FORT WORTH, TEXAS 76102 TEL: (817) 335-4800 FAX: (817) 335-2528	DRAWN BY: B. WOSLEY, JR.	SOL. NO.	CONTR. NO.
	REVIEWED BY:	FILE NAME:	NO. DATE:
	SUBMITTED BY:	EBF-U311-all	03/20/10

ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO
ELECTRICAL SITE
ALTERNATE LIGHTING PLAN

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MATCHLINE SHEET U-313



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GENERAL NOTES

1. FOR LEGEND REFER TO SHEET U-300.



DISCLAIMER
Attachment of this seal to this document is made only for the purpose of authenticating this document. Responsibility for all other documents relating to this project is disclaimed.

Rev.	Date	Description
1	03/14/08	NEW IRVING

Designed by: C. DEANON	Date: 02/08/08	Rev.
Drawn by: S. WOSLEY JR.	Scale:	
Reviewed by:	Contr. No.:	
Submitted by:	File name: EBF-U312-all	
Chief:	No date: 03/20/10	
	No scale: As shown, 1:1	

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

CLIENT VENTURE
JE JACOBS/HUITT-ZOLLARS
200 NORTH BROADWAY
FORT WORTH, TEXAS 76102
TEL: (817) 335-4800
FAX: (817) 335-2525

ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITY RANGE
WHITE SANDS MISSILE RANGE
NEW MEXICO

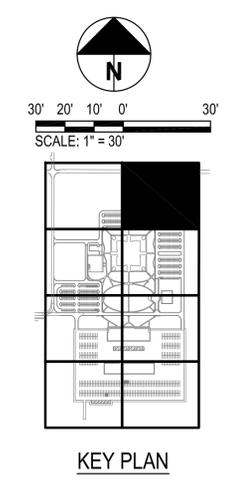
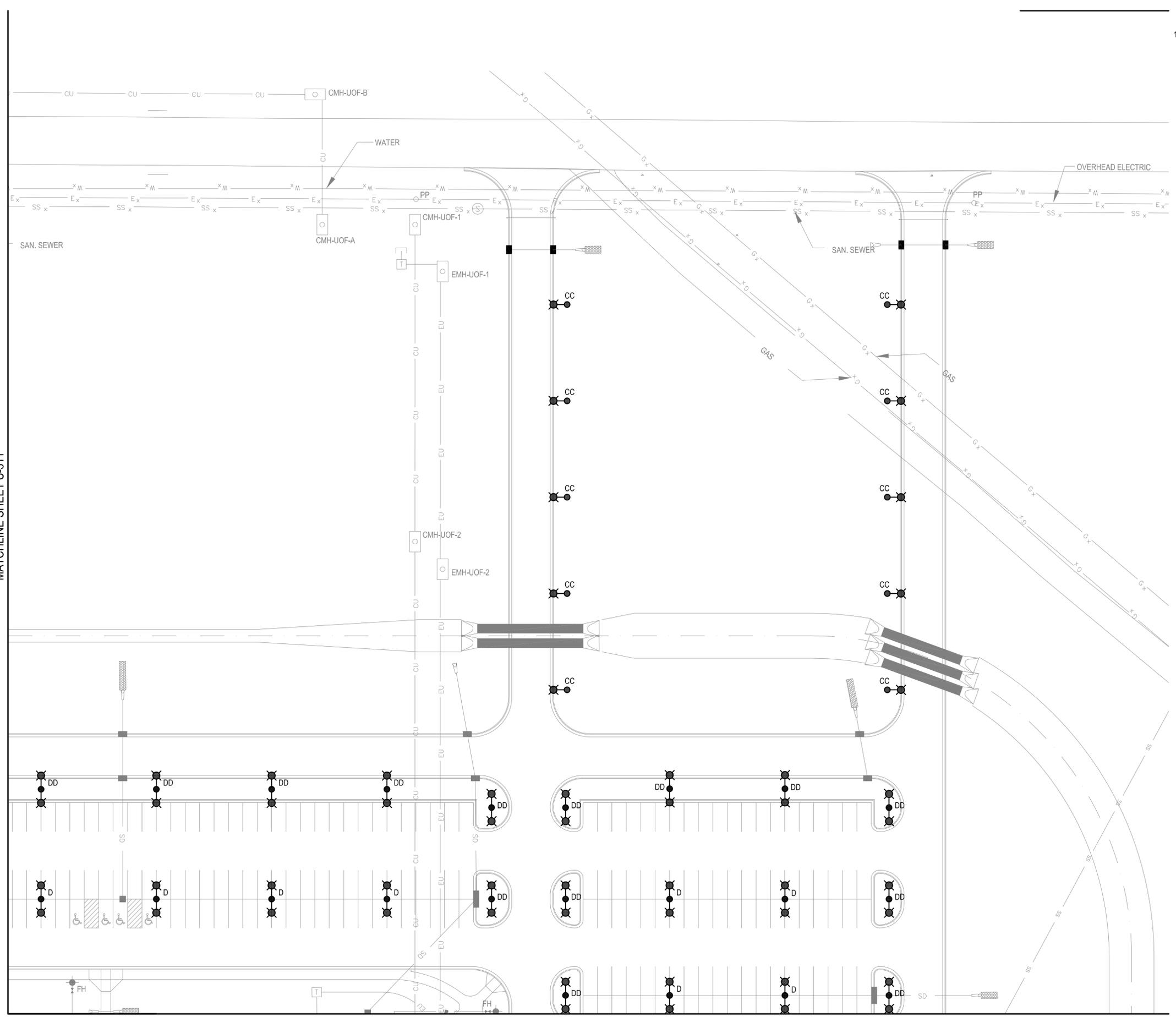
ELECTRICAL SITE
ALTERNATE LIGHTING PLAN

Sheet
reference
number:
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MATCHLINE SHEET U-311

MATCHLINE SHEET U-314



MATCHLINE SHEET U-311

MATCHLINE SHEET U-315

GENERAL NOTES

- 1. FOR LEGEND REFER TO SHEET U-300.



DISCLAIMER
 Attachment of this seal to this document is made only for the purpose of authenticating the document. Responsibility for all other documents relating to this project is disclaimed.

Mark	Description	Date
NEW	IRWIN	03/17/08

Designed by: C. DEATON	Date: 02/08/08	Rev.
Drawn by: B. MOSLEY, JR.	Scale: As Shown	
Reviewed by:	Contract No.:	
Submitted by:	File name: EBF-U313-all	
Chief:	No. date: 03/20/10	

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
 CORPS OF ENGINEERS
 FORT WORTH, TEXAS

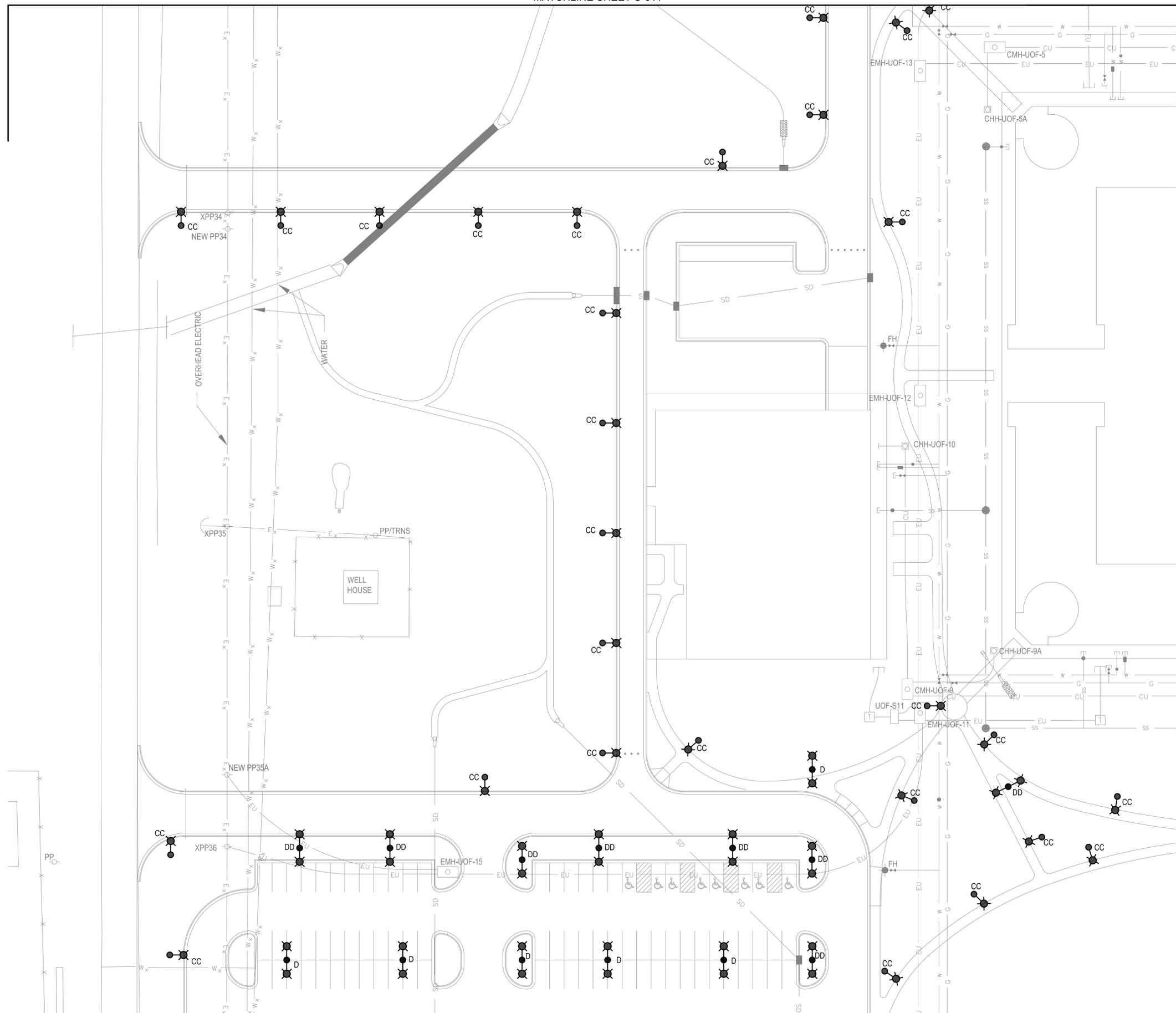
CLIENT VENDOR
JE JACOBS/HUITT-ZOLLARS
 201 NORTH BROADWAY
 FORT WORTH, TEXAS 76102
 TEL: (817) 335-4800
 FAX: (817) 335-2525

ENGINEERS BATTALION GTF
 UNIT OPERATIONS FACILITIES
 WHITE SANDS MISSILE RANGE
 NEW MEXICO

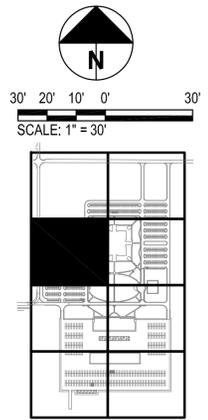
ELECTRICAL SITE
 ALTERNATE LIGHTING PLAN

Sheet
 reference
 number:
U-313
 Sheet 152c of 188

A
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MATCHLINE SHEET U-314



KEY PLAN

GENERAL NOTES

1. FOR LEGEND REFER TO SHEET U-300.



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Rev.	Date	Description
1	03/14/08	NEW IRWIN

Designed by:	C. DEATON	Date:	03/08/08
Drawn by:	B. MOSLEY, JR.	Scale:	AS SHOWN
Reviewed by:		Contract No.:	EBF-U314-all
Submitted by:		File name:	03/20/10
Chief:		No. date:	03/20/10
		No. scale:	1:1

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

ALTERNATIVE
JE JACOBS/HUITT-ZOLLARS
200 NORTH BROADWAY
FLOOR 1000
FAC 1000 355-4000
FAC 1000 355-2500

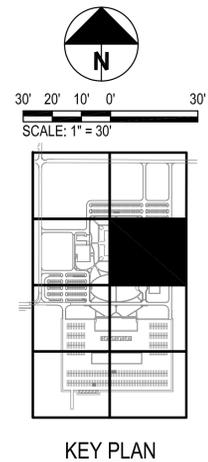
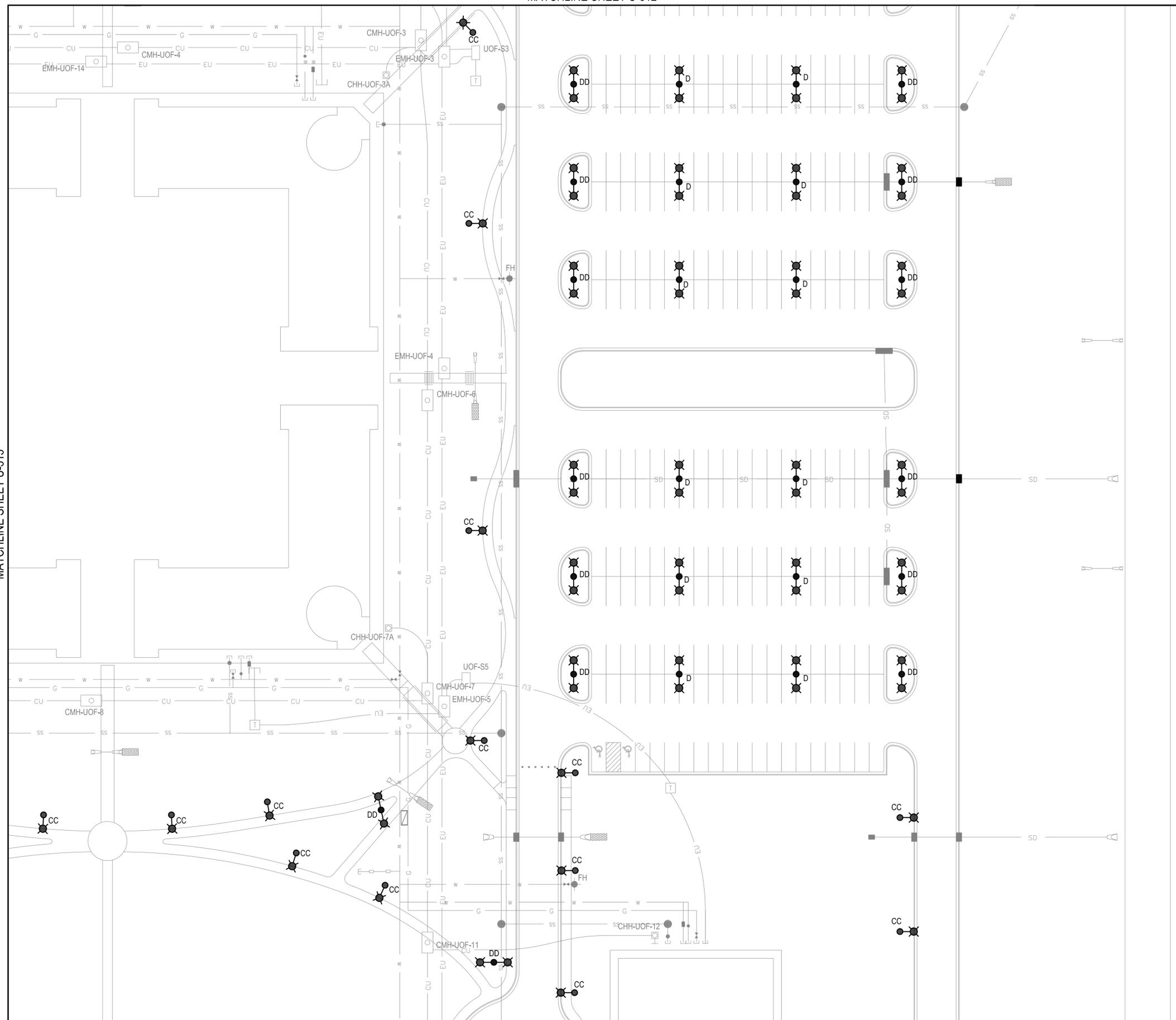
ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

ELECTRICAL SITE
ALTERNATE LIGHTING PLAN

Sheet
reference
number:
U-314
Sheet 152d of 188

MATCHLINE SHEET U-313

MATCHLINE SHEET U-316

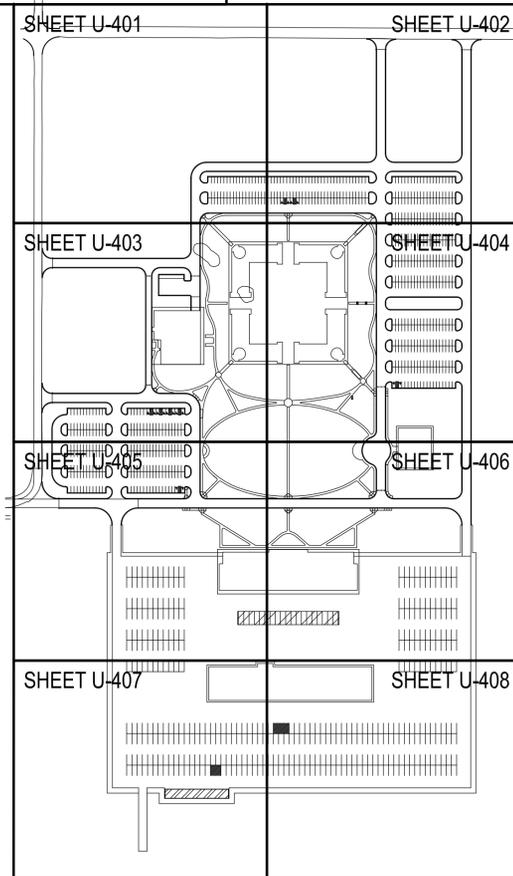
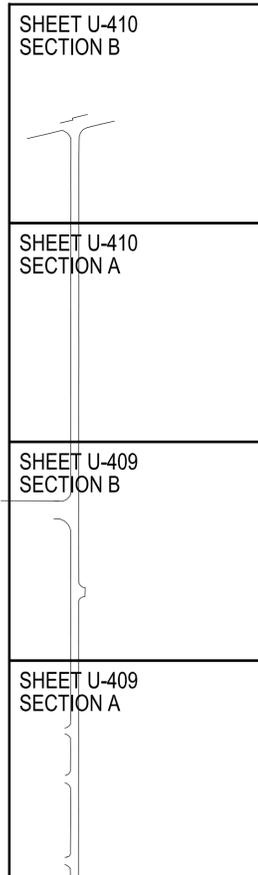


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LEGEND

- NEW COMMUNICATIONS MANHOLE
CMH-UOF-1 COMMUNICATIONS MANHOLE IDENTIFICATION
- EXISTING COMMUNICATIONS MANHOLE
- NEW COMMUNICATIONS HANDHOLE.
- CU NEW UNDERGROUND COMM. DUCTBANK
- CU_x EXISTING UNDERGROUND COMM. DUCTBANK
- CU FUTURE UNDERGROUND COMM. DUCTBANK
- C_x EXISTING CABLES.



US Army Corps of Engineers
Fort Worth District



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Mark	Description	Date
AM 0001 <td>Action <td>03/25/08 </td></td>	Action <td>03/25/08 </td>	03/25/08

Designed by: R. HOLDER	Date: 02/03/08	Rev. a
Drawn by: R. PATTERSON	Sol. no.	
Reviewed by:	Contr. No.	
Submitted by: Chief	File name: EBF-U400-Key	
	No date: 03/20/10	
	No issue: 1:1	

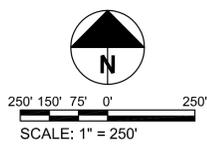
U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

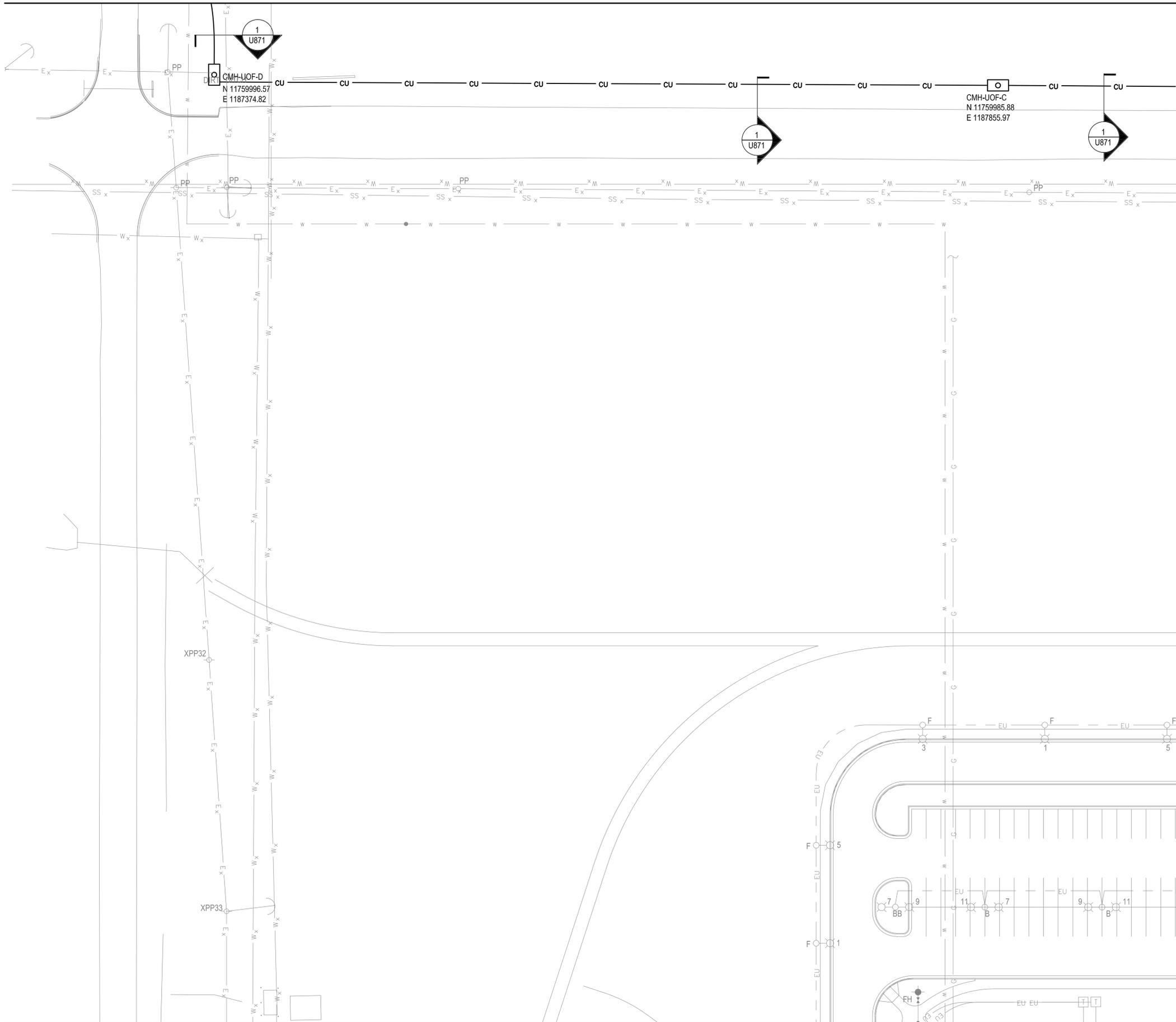
CLIENT VENTURE
JE JACOBS/HUITT-ZOLLARS
201 NORTH BROADWAY
FLOOR 1000
FAC 041 332-5900
FAC 041 332-5920

ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

COMMUNICATIONS
SITE PLAN
OVERALL INDEX

Sheet
reference
number:
U-400
Sheet 153 of 188





GENERAL NOTES

- FOR LEGEND REFER TO SHEET U-400.
- UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS, RECORDS AND INFORMATION, AND THEREFORE, DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, NONEXISTENCE, SIZE, TYPE, NUMBER OF, OR LOCATION OF THESE FACILITIES, STRUCTURES, AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE DRAWINGS. THE UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES SHALL BE LOCATED IN THE FIELD PRIOR TO ANY GRADING, EXCAVATION OR CONSTRUCTION OF IMPROVEMENTS.
- INSTALL DUCTBANKS PER PROFILE DRAWINGS.
- DUCTBANKS SHALL EXIT MANHOLES AT 4% MAXIMUM GRADE. UNDERGROUND CONDUIT SHALL BE SUCH THAT A SLOPE EXISTS AT ALL POINTS OF THE RUN TO ALLOW DRAINAGE AND PREVENT ACCUMULATION OF WATER IN THE DUCTS. A DRAIN SLOPE (MINIMUM) OF NO LESS THAN 4 INCHES OF 100 FEET IS REQUIRED WHEN EXTENDING CONDUIT AWAY FROM BUILDING STRUCTURES AND FROM THE MIDDLE OF THE SPAN TO EACH MANHOLE.
- COORDINATE WITH BUILDING CONTRACTOR. ALIGN AND CONNECT TO BUILDING CONDUIT STUBOUTS PER DETAIL 13/U-871. IF THE BUILDING CONDUITS ARE NOT INSTALLED, RUN DUCTBANKS TO WITHIN 5 FEET OF THE BUILDINGS STUBOUT LOCATION, OR APRON OF THE TEMF BUILDING'S STUBOUT LOCATION AND CAP PER DETAIL 11/U-871.

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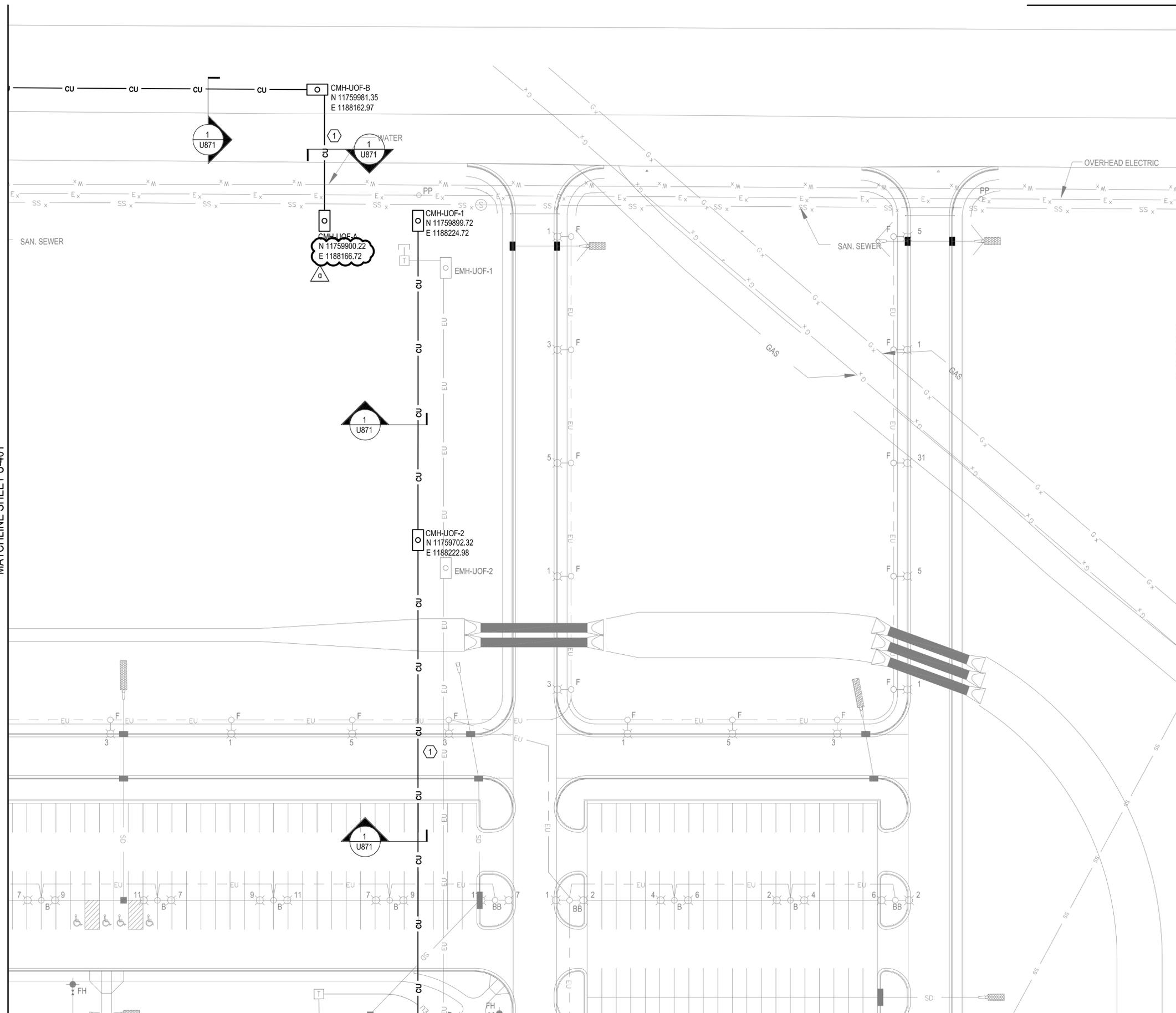
C

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MATCHLINE SHEET U-401

MATCHLINE SHEET U-404



GENERAL NOTES

- FOR LEGEND REFER TO SHEET U-400.
- UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS, RECORDS AND INFORMATION, AND THEREFORE, DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, NONEXISTENCE, SIZE, TYPE, NUMBER OF, OR LOCATION OF THESE FACILITIES, STRUCTURES, AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE DRAWINGS. THE UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES SHALL BE LOCATED IN THE FIELD PRIOR TO ANY GRADING, EXCAVATION OR CONSTRUCTION OF IMPROVEMENTS.
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KEYED NOTES

- DUCTBANK PASSING UNDER ROADS OR HARD STAND AREAS SHALL BE REINFORCED PER DETAIL 10/U-871 EXTEND REINFORCEMENT 10 FEET BEYOND EDGE OF ROADS.



US Army Corps of Engineers
Fort Worth District



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Rev.	Date	By	Description
1	03/20/10	B. MOSLEY, JR.	REV. NOTE & COORDINATES FOR MH

Designed by: R. HOLDER	Checked by: B. MOSLEY, JR.	Reviewed by: B. MOSLEY, JR.	Submitted by: B. MOSLEY, JR.
Date: 03/20/10	Scale: As Shown	Contract No. E-20981	File Name: E-20981-03/20/10

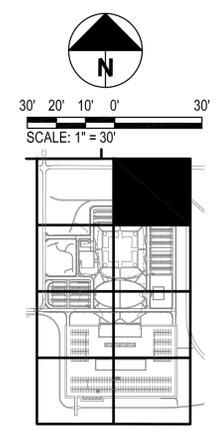
U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

CLIENT VENDOR
JE JACOBS/HUITT-ZOLLARS
201 NORTH BROADWAY
FLOOR 1000
DALLAS, TEXAS 75201
TEL: (214) 355-4800
FAX: (214) 355-2525

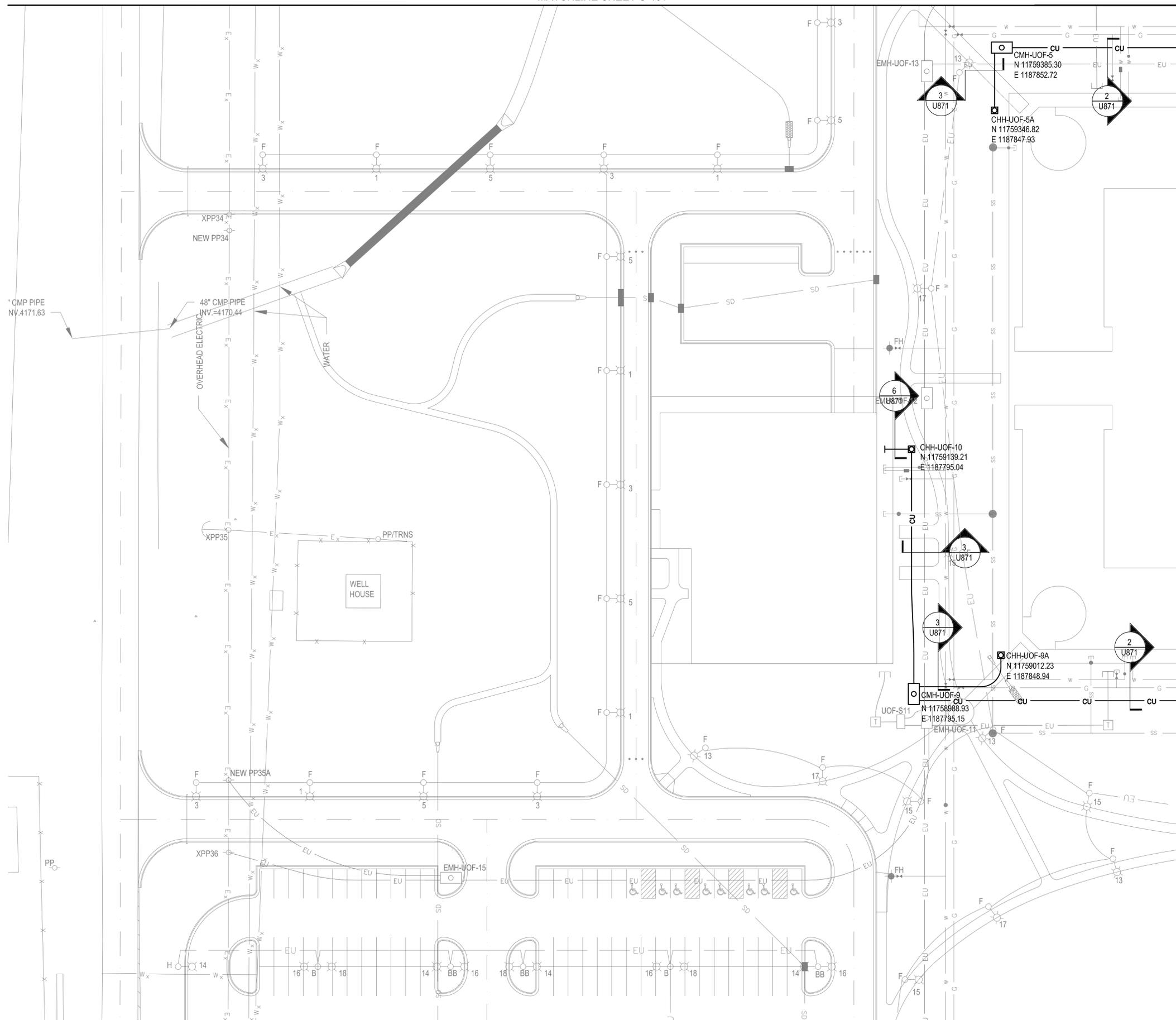
ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

COMMUNICATIONS
SITE PLAN

Sheet
reference
number:
U-402
Sheet 155 of 188



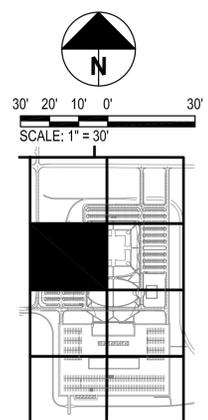
KEY PLAN



GENERAL NOTES

- FOR LEGEND REFER TO SHEET U-400.
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MATCHLINE SHEET U-404



KEY PLAN



OWNER
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Rev.	Mark	REV. NOTE	Description
1			

Designed by: R. HOLDER	Checked by: B. WOSLEY, JR.	Reviewed by: Submittal by: Chief
Date: 02/08/08	File name: EBF-U403-jph	No. date: 03/20/10
Soil. no.	Contr. No.	No. sheets: 1/1

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
 CORPS OF ENGINEERS
 FORT WORTH, TEXAS

REGISTERED PROFESSIONAL ENGINEER
JE JACOBS/HUITZ-ZOLLARS

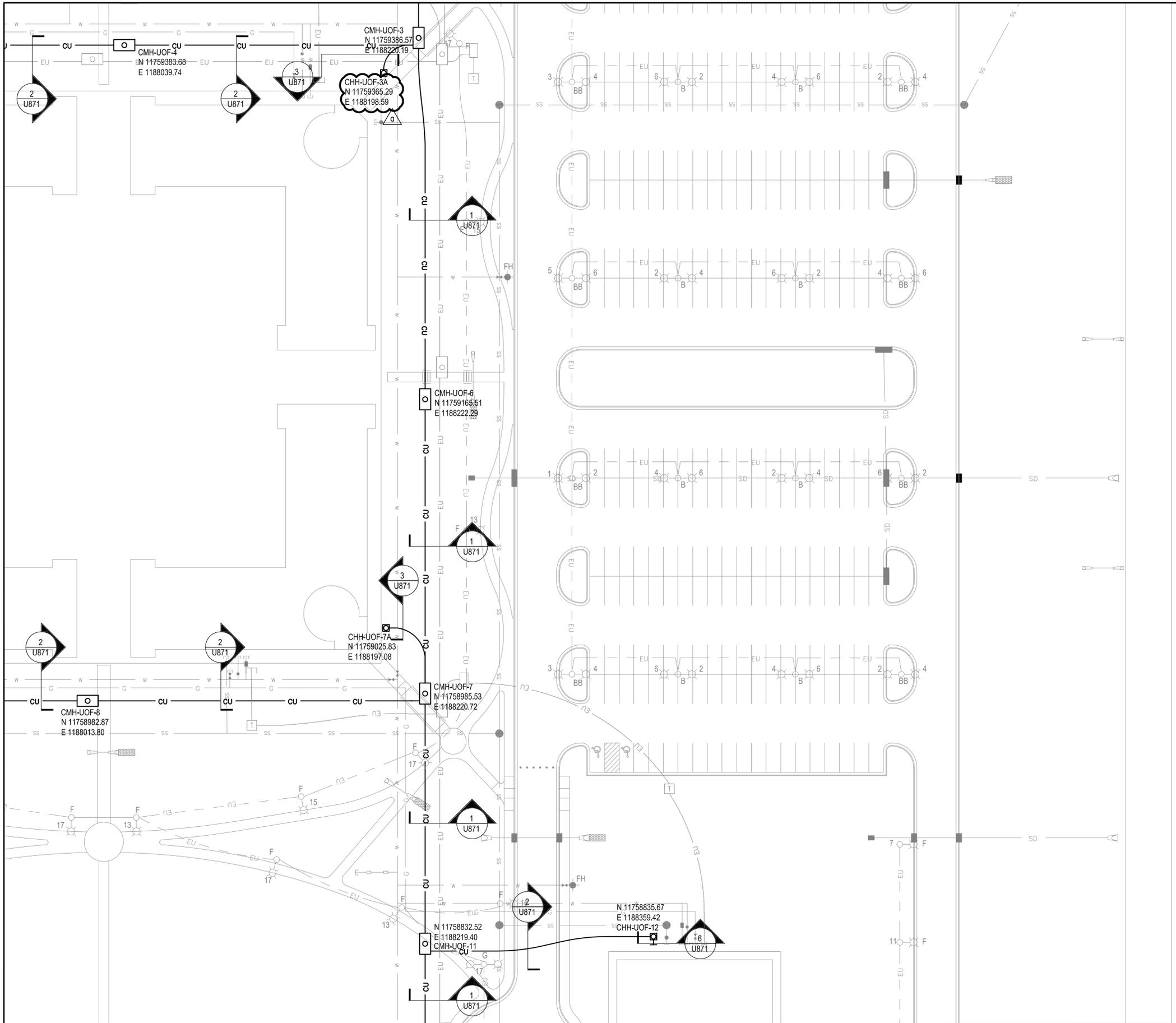
501 NORTH BROADWAY
 FORT WORTH, TEXAS 76102
 TEL: (817) 335-4800
 FAX: (817) 335-2525

ENGINEERS BATTALION GTF
 UNIT OPERATIONS FACILITIES
 WHITE SANDS MISSILE RANGE
 NEW MEXICO

COMMUNICATIONS
 SITE PLAN

Sheet
 reference
 number:
U-403
 Sheet 156 of 188

MATCHLINE SHEET U-402



GENERAL NOTES

- FOR LEGEND REFER TO SHEET U-400.
- UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS, RECORDS AND INFORMATION, AND THEREFORE, DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, NONEXISTENCE, SIZE, TYPE, NUMBER OF, OR LOCATION OF THESE FACILITIES, STRUCTURES, AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE DRAWINGS. THE UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES SHALL BE LOCATED IN THE FIELD PRIOR TO ANY GRADING, EXCAVATION OR CONSTRUCTION OF IMPROVEMENTS.
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US Army Corps of Engineers
Fort Worth District



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Rev.	Mark	REV. NOTE	Date
1			03/25/08

Designed by: R. HOLDER	Drawn by: B. WOSLEY, JR.	Reviewed by: [Signature]	Submitted by: [Signature]
Date: 02/08/08	Scale: As shown	Contract No. E-20981	File name: E-20981-03/25/08

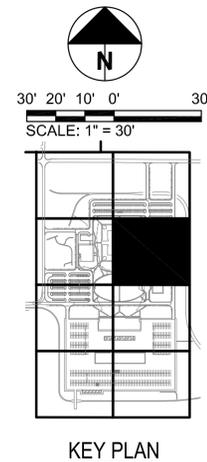
U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

CONSULTANT
JE JACOBS/HUITZ-ZOLLARS
200 NORTH BROADWAY
FLOOR 1000
DALLAS, TEXAS 75201
TEL: (214) 355-4000
FAX: (214) 355-2525

ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

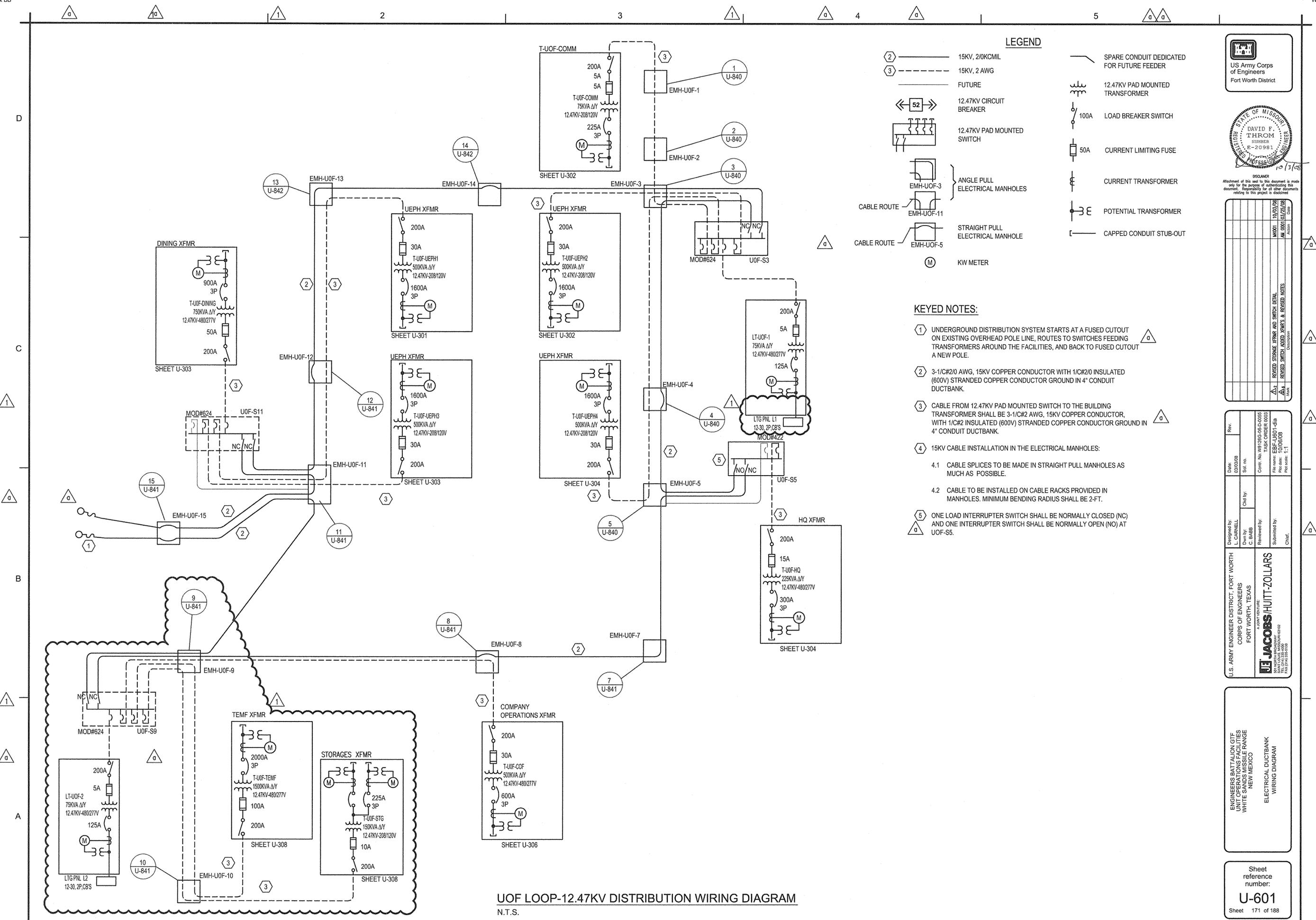
COMMUNICATIONS
SITE PLAN

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reference
number:
U-404
Sheet 157 of 188



KEY PLAN

MATCHLINE SHEET U-406



LEGEND

- ② ——— 15KV, 2/0KCMIL
- ③ - - - - 15KV, 2 AWG
- FUTURE
- ⏏ 12.47KV CIRCUIT BREAKER
- ⏏ 12.47KV PAD MOUNTED SWITCH
- ⏏ 12.47KV PAD MOUNTED SWITCH
- ⏏ 100A LOAD BREAKER SWITCH
- ⏏ 50A CURRENT LIMITING FUSE
- ⏏ CURRENT TRANSFORMER
- ⏏ POTENTIAL TRANSFORMER
- ⏏ CAPPED CONDUIT STUB-OUT
- ⏏ SPARE CONDUIT DEDICATED FOR FUTURE FEEDER
- ⏏ 12.47KV PAD MOUNTED TRANSFORMER
- ⏏ ANGLE PULL ELECTRICAL MANHOLES
- ⏏ STRAIGHT PULL ELECTRICAL MANHOLE
- ⏏ KW METER

KEYED NOTES:

- ① UNDERGROUND DISTRIBUTION SYSTEM STARTS AT A FUSED CUTOUT ON EXISTING OVERHEAD POLE LINE, ROUTES TO SWITCHES FEEDING TRANSFORMERS AROUND THE FACILITIES, AND BACK TO FEEDING CUTOUT A NEW POLE.
- ② 3-1/2"Ø 15KV, 15KV COPPER CONDUCTOR WITH 1/2"Ø INSULATED (600V) STRANDED COPPER CONDUCTOR GROUND IN 4" CONDUIT DUCTBANK.
- ③ CABLE FROM 12.47KV PAD MOUNTED SWITCH TO THE BUILDING TRANSFORMER SHALL BE 3-1/2"Ø 15KV, 15KV COPPER CONDUCTOR, WITH 1/2"Ø INSULATED (600V) STRANDED COPPER CONDUCTOR GROUND IN 4" CONDUIT DUCTBANK.
- ④ 15KV CABLE INSTALLATION IN THE ELECTRICAL MANHOLES:
 - 4.1 CABLE SPLICES TO BE MADE IN STRAIGHT PULL MANHOLES AS MUCH AS POSSIBLE.
 - 4.2 CABLE TO BE INSTALLED ON CABLE RACKS PROVIDED IN MANHOLES. MINIMUM BENDING RADIUS SHALL BE 2-FT.
- ⑤ ONE LOAD INTERRUPTER SWITCH SHALL BE NORMALLY CLOSED (NC) AND ONE INTERRUPTER SWITCH SHALL BE NORMALLY OPEN (NO) AT UOF-S5.

UOF LOOP-12.47KV DISTRIBUTION WIRING DIAGRAM
N.T.S.



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NO. 10/03/05	REVISION	REVISION
NO. 09/01/05	REVISION	REVISION
NO. 08/01/05	REVISION	REVISION
NO. 07/01/05	REVISION	REVISION
NO. 06/01/05	REVISION	REVISION
NO. 05/01/05	REVISION	REVISION
NO. 04/01/05	REVISION	REVISION
NO. 03/01/05	REVISION	REVISION
NO. 02/01/05	REVISION	REVISION
NO. 01/01/05	REVISION	REVISION

Designed by: C. Grewell	Checked by: C. R. B. B.	Reviewed by: C. R. B. B.	Submitted by: C. R. B. B.
Date: 03/03/08	Scale: As Shown	Conf. No. UOF-12.47KV-0005	Proj. No. UOF-12.47KV-0005
U.S. ARMY ENGINEER DISTRICT, FORT WORTH CORPS OF ENGINEERS FORT WORTH, TEXAS		A. JACOBS HUITT-ZOLLARS A JACOBS COMPANY SANTA FE, TEXAS 76707-0332 P.O. BOX 1111 P.O. BOX 1111	

ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES
WHITE SANDS RANGE
NEW MEXICO
ELECTRICAL DUCTBANK
WIRING DIAGRAM

Sheet reference number:
U-601
Sheet 171 of 188

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Attachment of this work to any document or project shall be the designee's administrative responsibility. Engineering projects shall be approved by the designee before being prepared for construction.

Rev.	Date	Description
1	03/25/09	REVISED PROFILE

Designed by: A. NEWELL	Date: 03/20/10	Rev.
Drawn by: S. RAUH	Soil no.	03/20/10
Reviewed by:	Contr. No.	EBF-UJ-731
Submitted by:	File name:	03/20/10
Chief:	No. sheets:	1/1

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

CLIENT VENDOR
JE JACOBS/HUITT-ZOLLARS

ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES RANGE
WHITE SANDS MISSILE RANGE
NEW MEXICO

ELECTRICAL DUCT BANK PROFILE

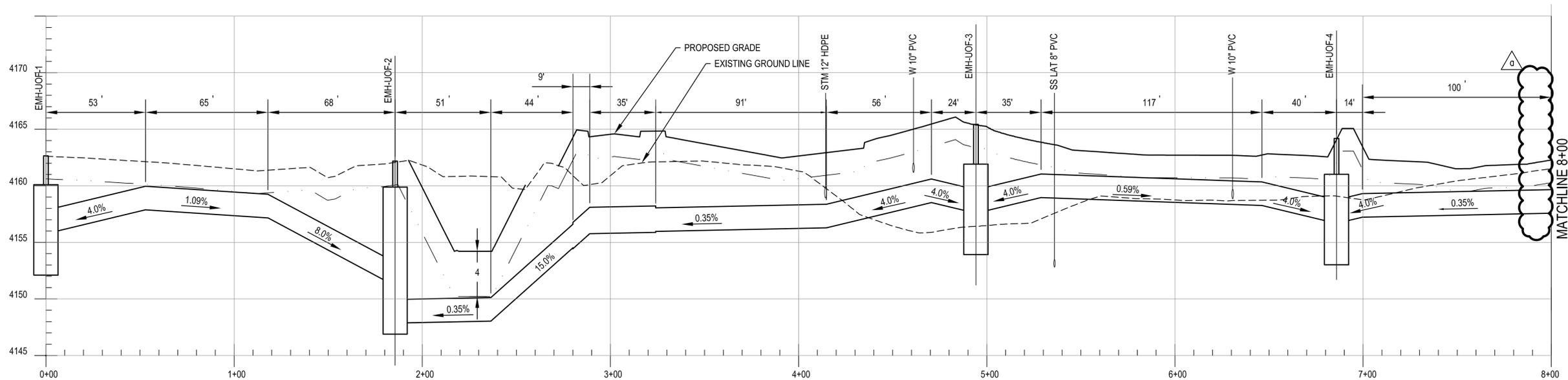
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number:
U-731
Sheet 164 of 188

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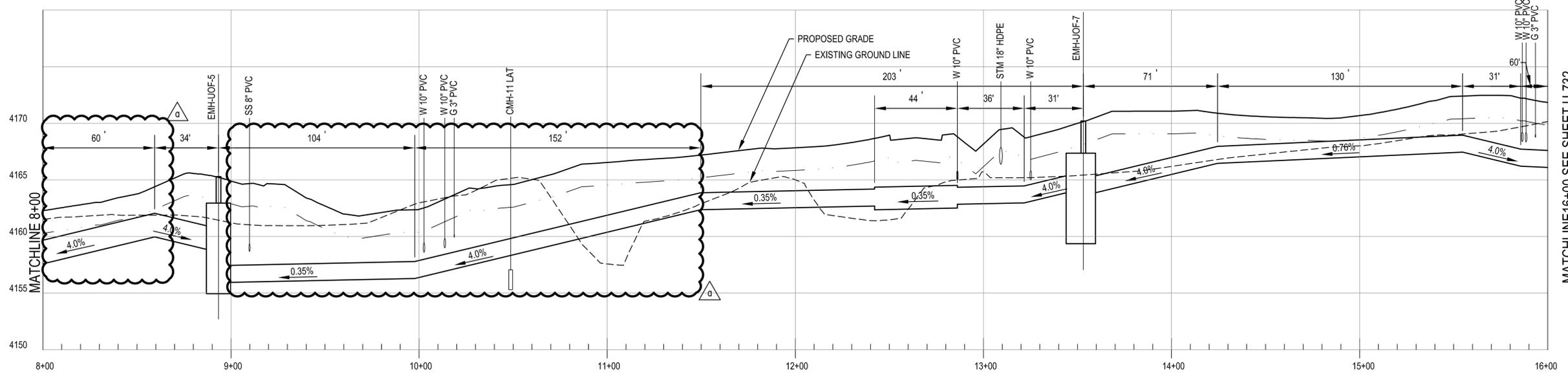
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UOF-1 TO UOF-9

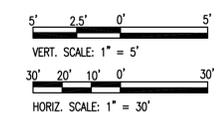


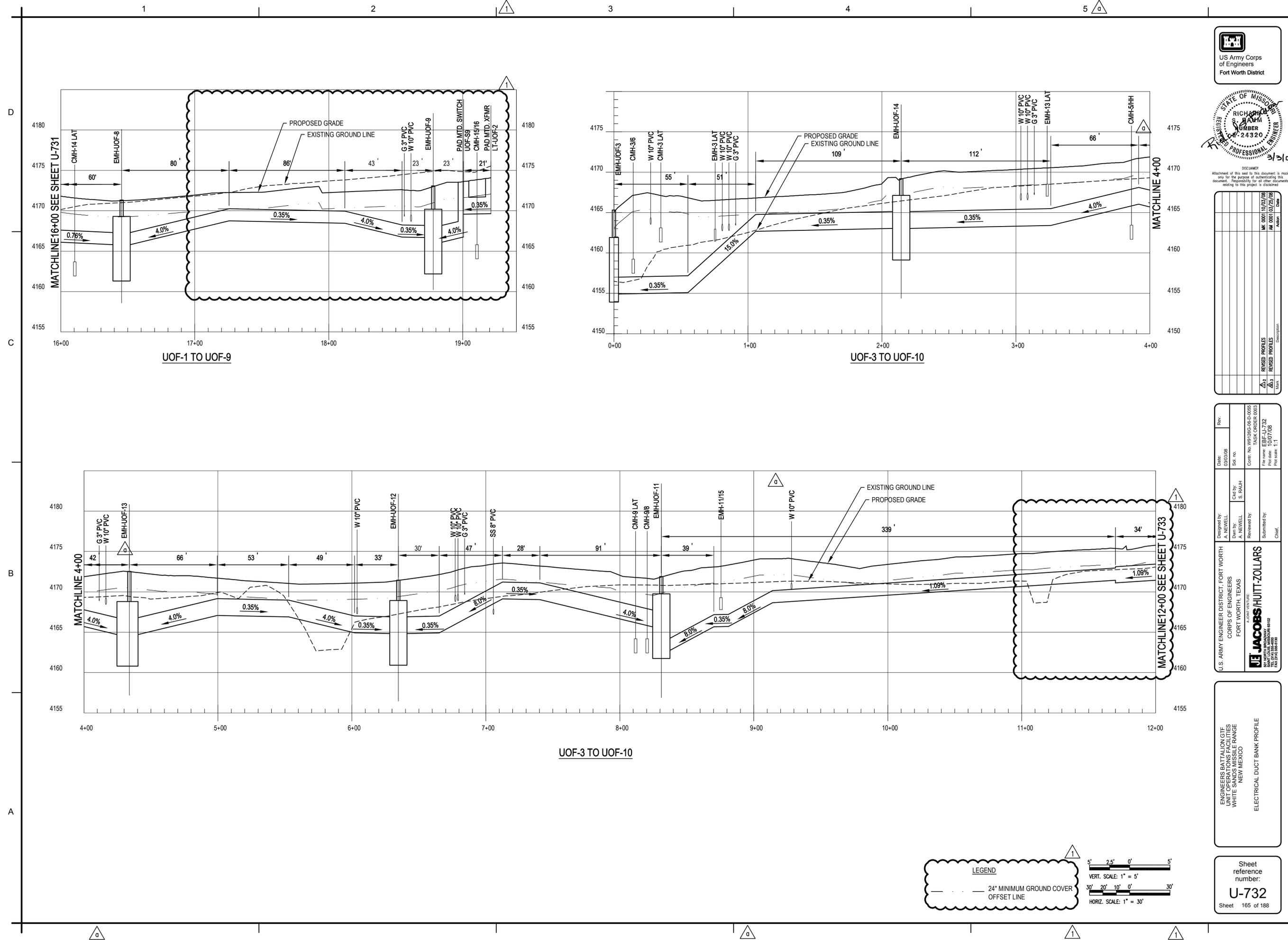
UOF-1 TO UOF-9

GENERAL NOTES:

- FOR ELECTRICAL DUCT BANK DETAILS SEE SHEET U-831.
- FOR ELECTRICAL MANHOLE DETAILS SEE SHEET U-833.
- FOR PAD MOUNTED SWITCH DETAILS SEE SHEETS U-834 AND U-835.
- FOR PAD MOUNTED TRANSFORMER DETAILS SEE SHEETS U-836 THRU U-839.
- FOR ELECTRICAL MANHOLE FOLD-OUT DETAILS SEE SHEETS U-840 THRU U-842.
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LEGEND





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Rev.	Date	Description
1	03/03/08	REVISION PROFILES
2	03/03/08	REVISION PROFILES

Designed by: A. NEWELL	Checked by: S. RAUB
Drawn by: A. NEWELL	Reviewed by: S. RAUB
Submitted by: S. RAUB	Chief:

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

JACOBSON/HUITZ-ZOLLARS
A CONSULTING FIRM
2010 W. UNIVERSITY AVENUE
SUITE 100
FORT WORTH, TEXAS 76104
TEL: 817.335.4000
FAX: 817.335.2525

ENGINEERS BATTALION, CTE
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

ELECTRICAL DUCT BANK PROFILE

Sheet reference number:
U-732
Sheet 165 of 188





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Rev.	Date	Description
1	03/03/09	REVISED PROFILES
2	03/03/09	REVISED PROFILES

Designed by:	A. NEWELL
Drawn by:	A. NEWELL
Checked by:	S. RAUH
Reviewed by:	
Submitted by:	
Chief:	

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

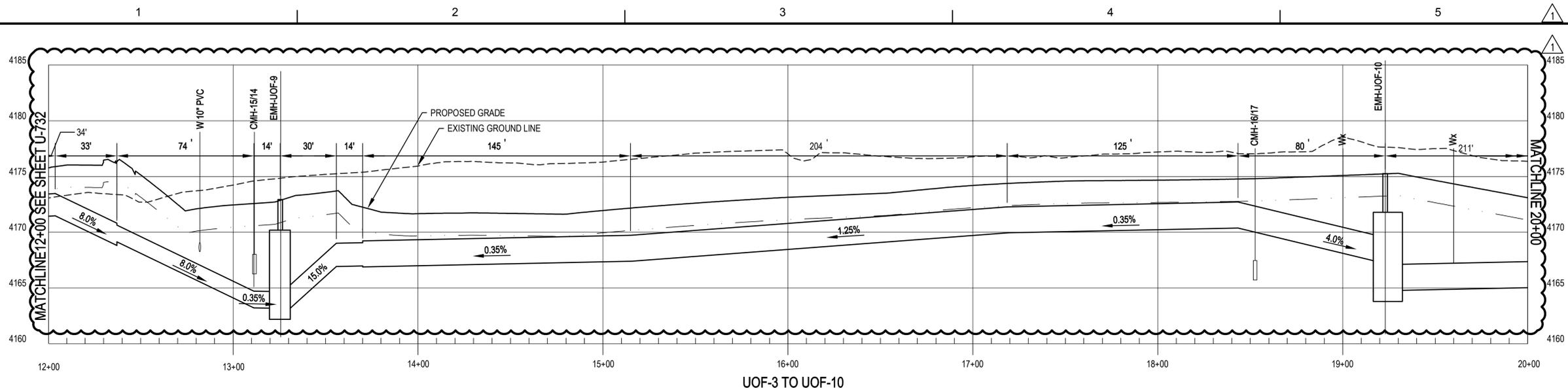
PROJECT NUMBER:
JACOBSON/HUITZ-ZOLLARS

DATE: 03/03/09
SHEET NO.: 166 OF 188
CONTRACT NO.: W9126G-06-D-0055
TASK ORDER: 0003
FILE NAME: EEPF-U7-33
PROJECT DATE: 11/19/06
REVISED: 1, 1

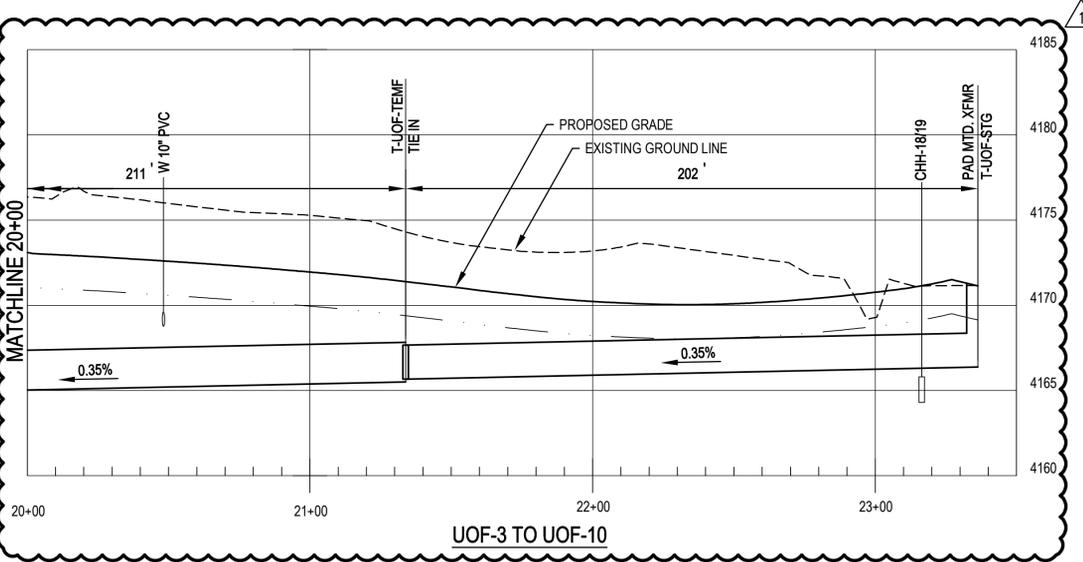
ENGINEERS BATTALION/CIE
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

ELECTRICAL DUCT BANK PROFILE

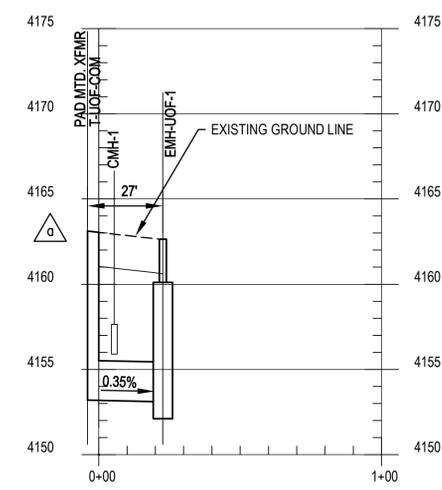
Sheet reference number:
U-733
Sheet 166 of 188



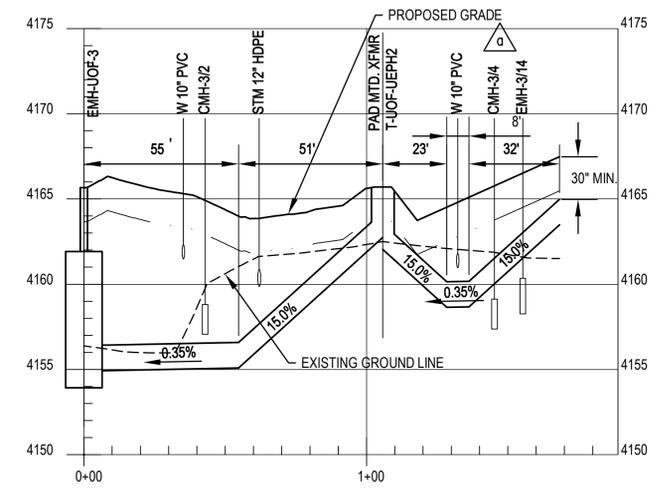
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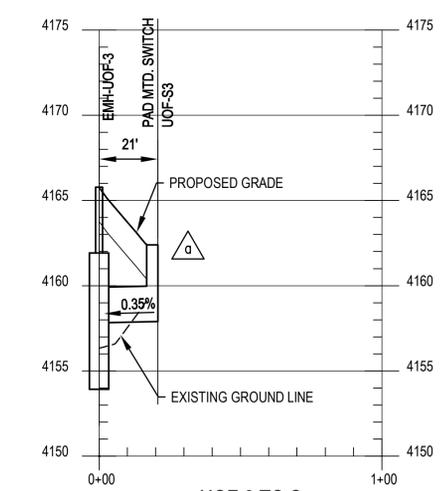
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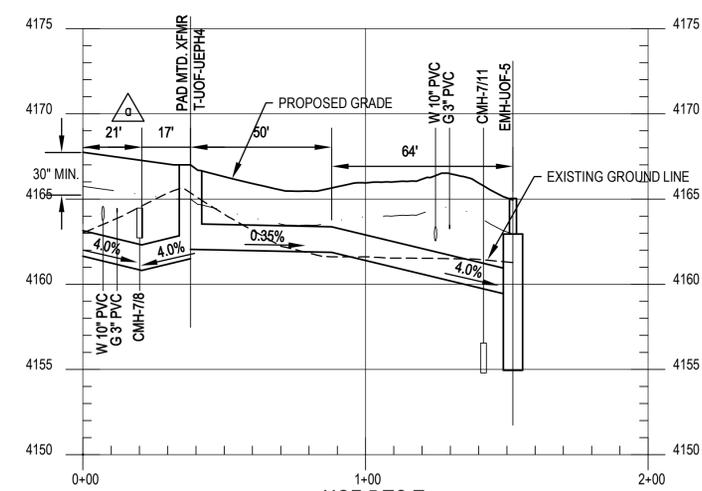
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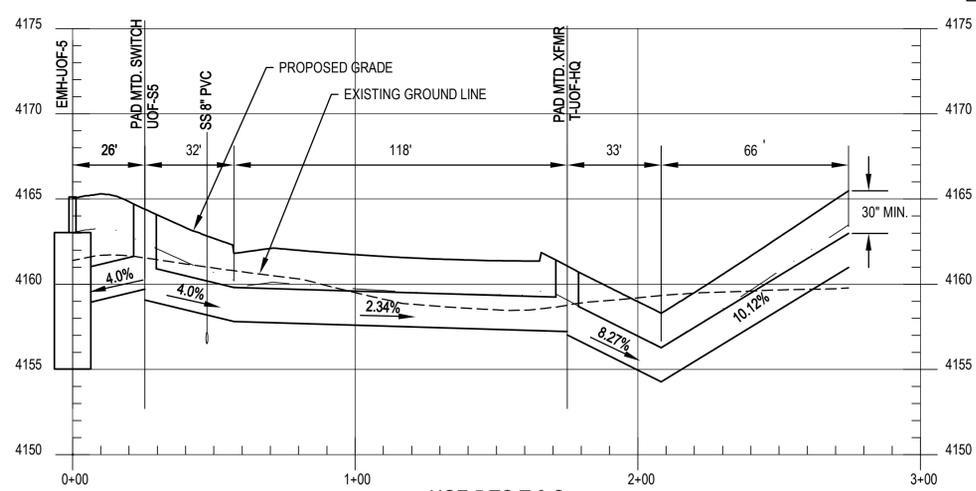
UOF-3 TO T



UOF-3 TO S

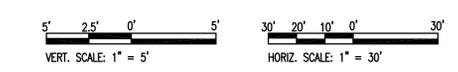


UOF-5 TO T



UOF-5 TO T & S

LEGEND
--- 24" MINIMUM GROUND COVER
--- OFFSET LINE





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Rev.	Date	By	Description
1	03/03/08	A. NEWELL	DESIGNED
2	05/25/08	A. NEWELL	REVISED/ADDED PROFILES
3	05/25/08	A. NEWELL	REVISED/ADDED/REMOVED PROFILES

Designed by:	A. NEWELL
Drawn by:	S. RAUH
Reviewed by:	A. NEWELL
Submitted by:	
Chief:	

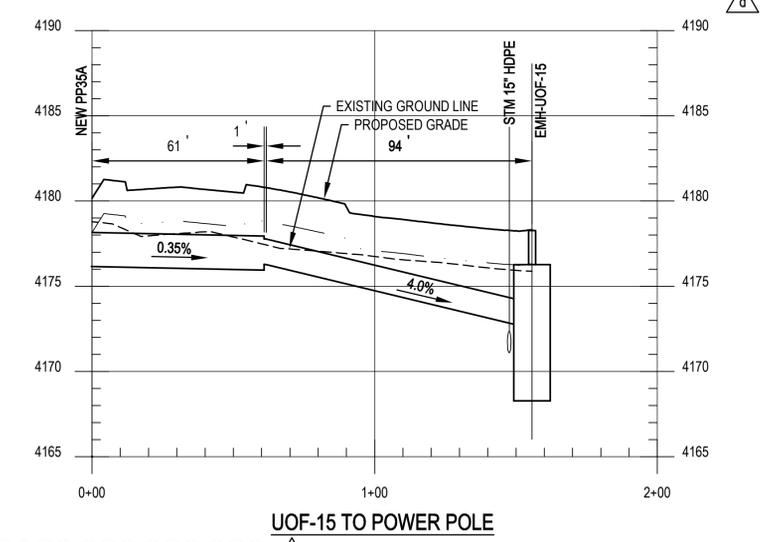
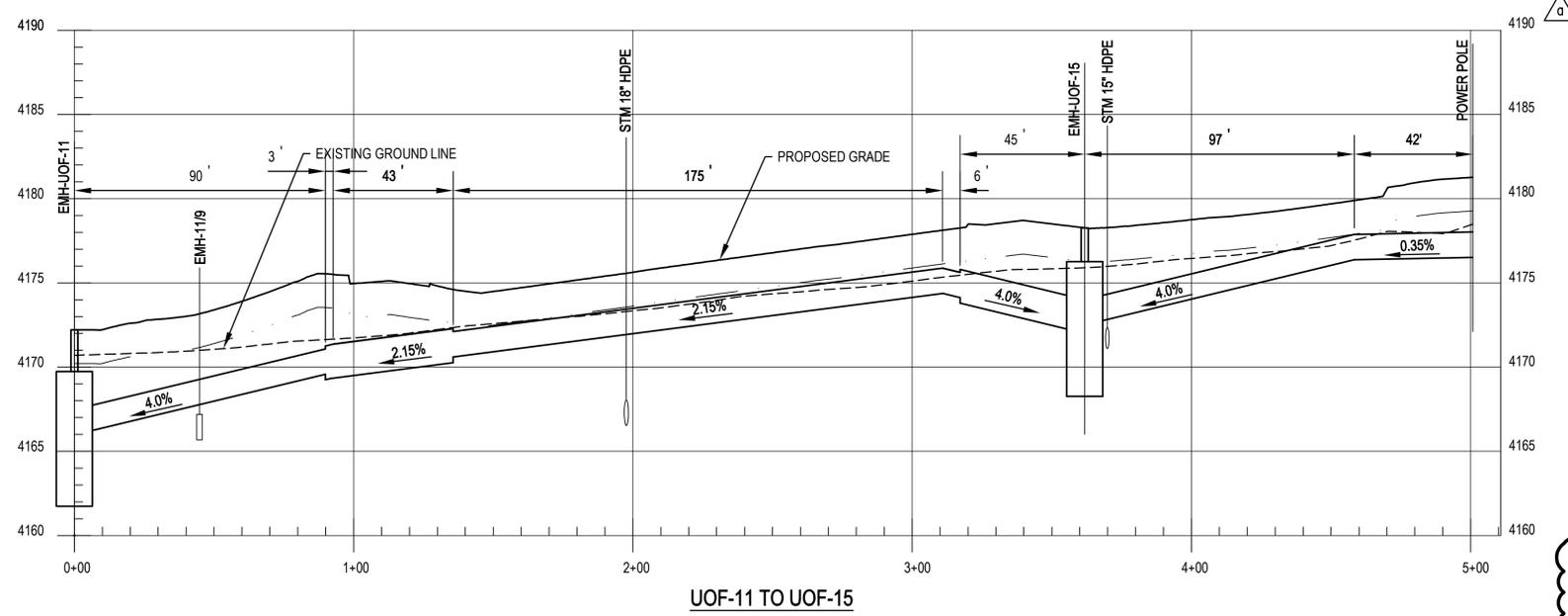
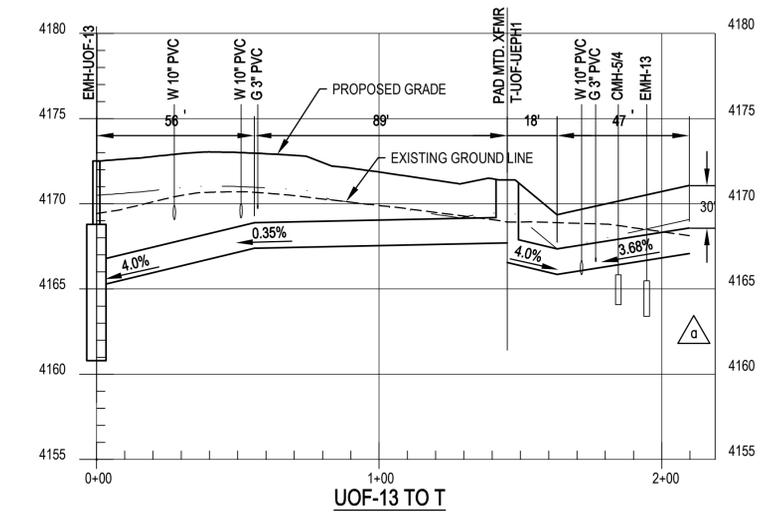
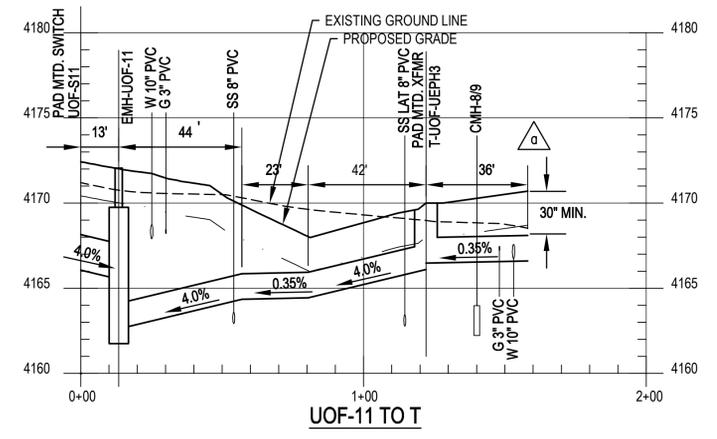
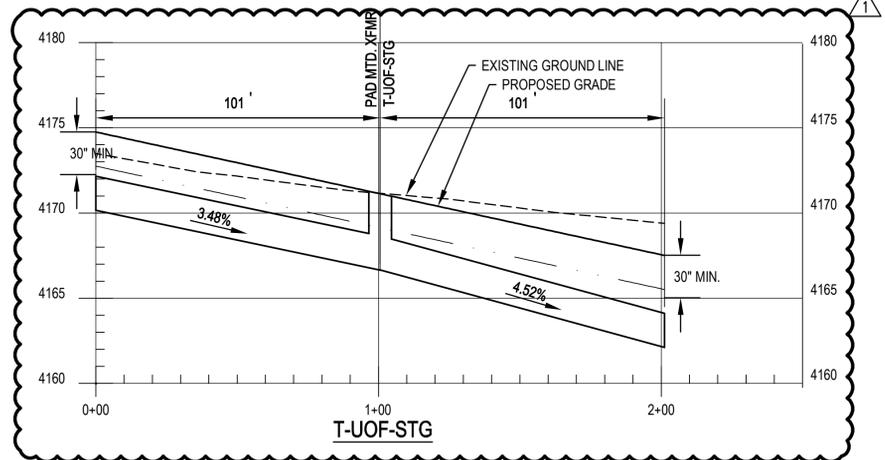
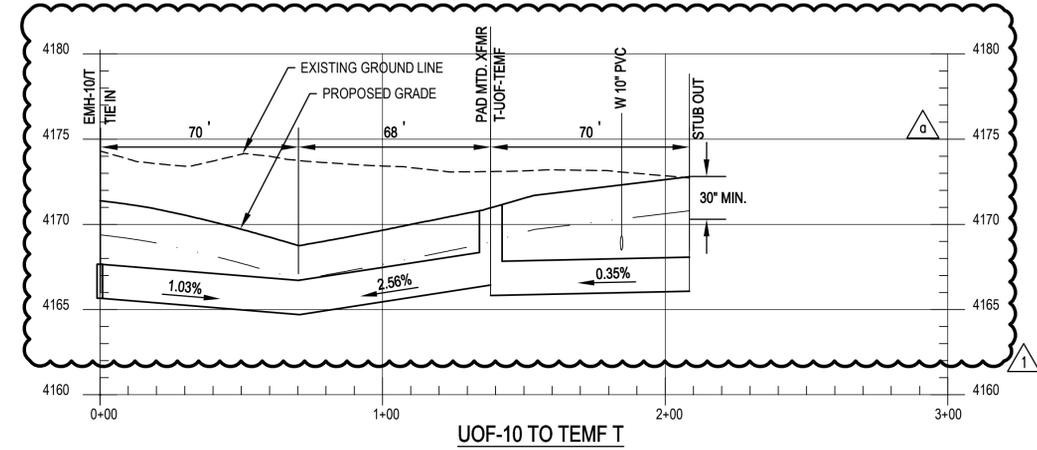
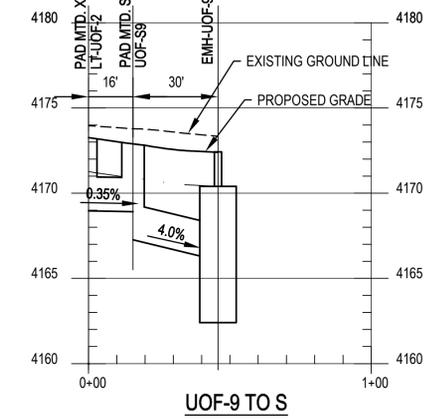
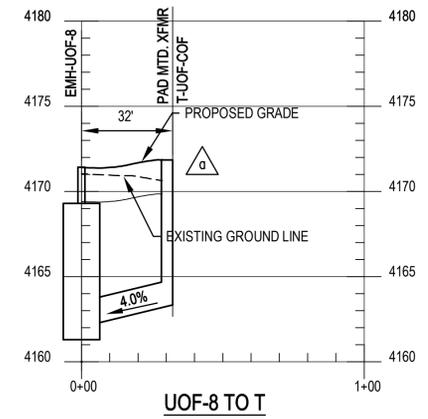
U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

JACOBSON/HUITZ-ZOLLARS
A CONSULTING FIRM
200 WORTH AVENUE, SUITE 2000
FORT WORTH, TEXAS 76102
TEL: 817.335.4000
FAX: 817.335.2525

ENGINEERS BATTALION/CITE
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

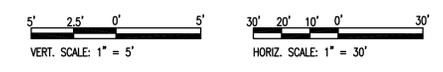
ELECTRICAL DUCT BANK PROFILE

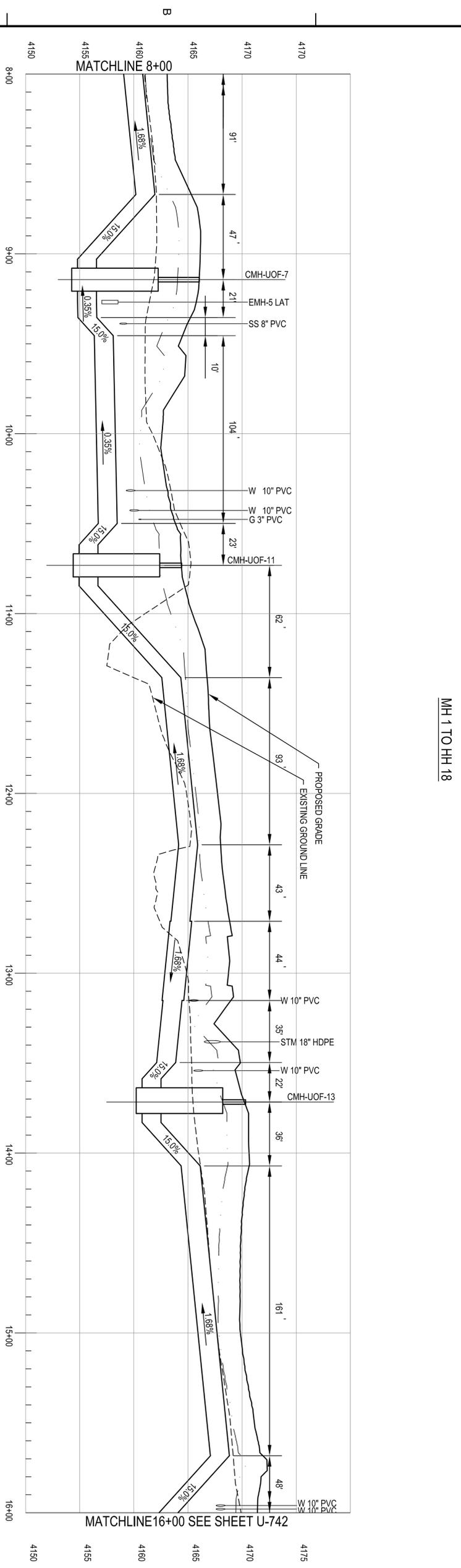
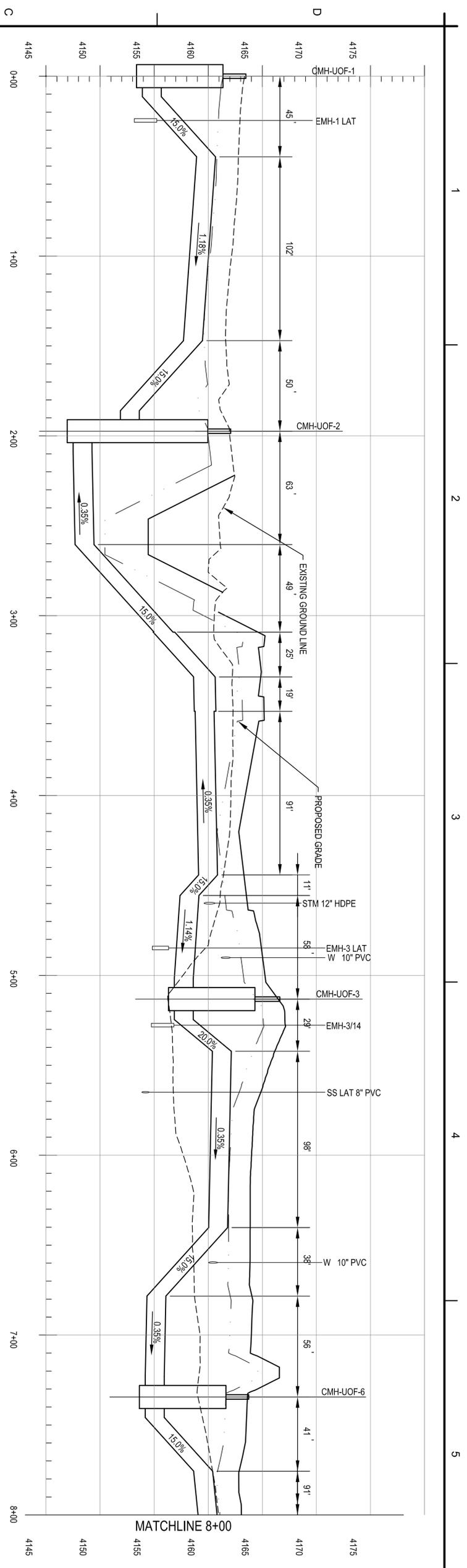
Sheet reference number:
U-734
Sheet 167 of 188



LEGEND

--- 24" MINIMUM GROUND COVER OFFSET LINE





- GENERAL NOTES:**
1. FOR COMMUNICATION DUCT BANK DETAILS SEE SHEET U-871.
 2. FOR COMMUNICATION HANDHOLE AND MANHOLE DETAILS SEE SHEETS U-872 AND U-873.
 3. FOR COMMUNICATION FOLD-OUT DETAILS SEE SHEET U-874.
 4. UNDERGROUND FACILITIES, STRUCTURES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS, RECORDS AND INFORMATION, AND THEREFORE, DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, NONEXISTENCE, SIZE, TYPE NUMBER OF, OR LOCATION OF THESE FACILITIES, STRUCTURES, AND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE DRAWINGS. THE UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES SHALL BE LOCATED IN THE FIELD PRIOR TO ANY GRADING, EXCAVATION OR CONSTRUCTION OF IMPROVEMENTS.



Sheet reference number:
U-741
Sheet 168 of 188

ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

COMMUNICATION DUCT BANK PROFILE

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

A JOINT VENTURE:
JACOBS/HUITT-ZOLLARS

501 NORTH BROADWAY
SANT FE, NEW MEXICO 87501
TEL (512) 335-4000
FAX (512) 335-9130

Designed by: A. NEWELL	Date: 03/03/08	Rev.
Drawn by: A. NEWELL	Sol. no.	
Reviewed by: S. RAUH	Contr. No.	
Submitted by:	File name: EBF-U-741	
Chief:	Plot date: 09/20/10	
	Plot scale: 1:1	

Mark	Description	Date	Appr.





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Rev.	Date	Description
1	10/03/08	REVISED PROFILE

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Dwn by: A. NEWELL	Reviewed by: S. RAUB
Submitted by: S. RAUB	Chief:

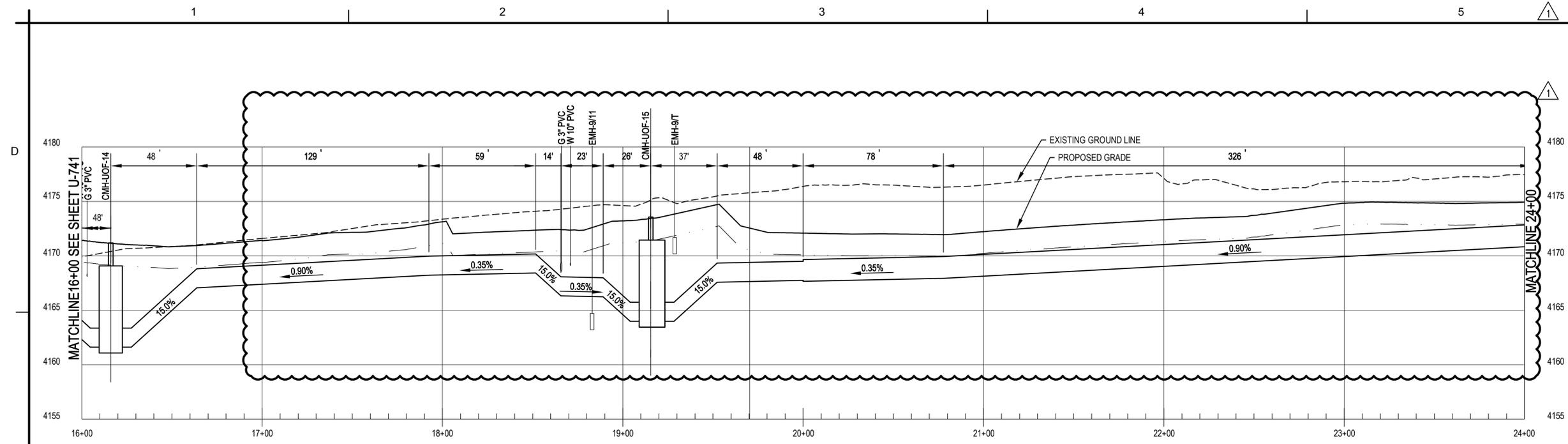
U.S. ARMY ENGINEER DISTRICT, FORT WORTH, TEXAS
CORPS OF ENGINEERS
FORT WORTH, TEXAS

PROJECT NUMBER: U-742
TASK ORDER 003
File name: EBF-U-742
Print date: 10/07/08
Print scale: 1:1

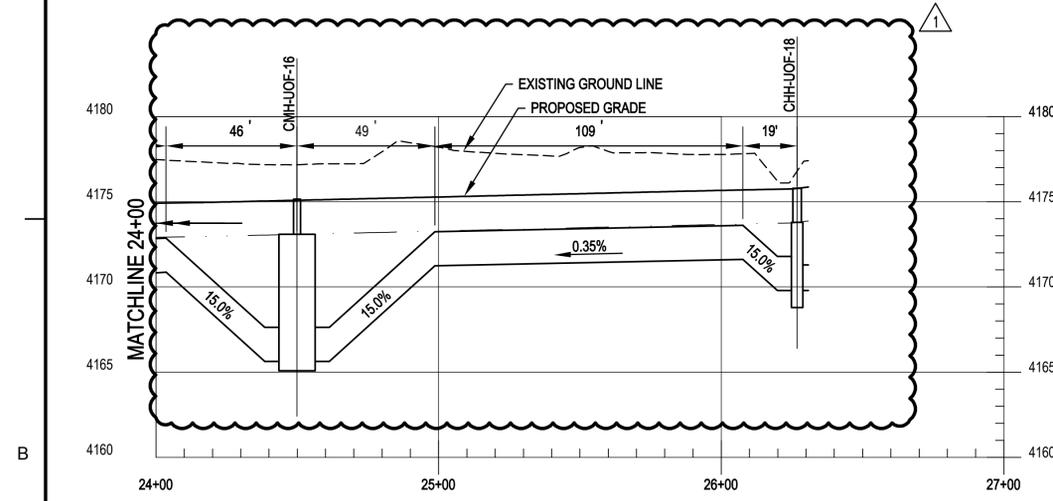
JE JACOBS/HUITZOLLARS
A FORT WORTH COMPANY
201 NORTH WOODWAY
SUITE 1000
FORT WORTH, TEXAS 76102
TEL: 817-335-8000
FAX: 817-335-2525

ENGINEERS BATTALION/CITE
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO
COMMUNICATION DUCT BANK PROFILE

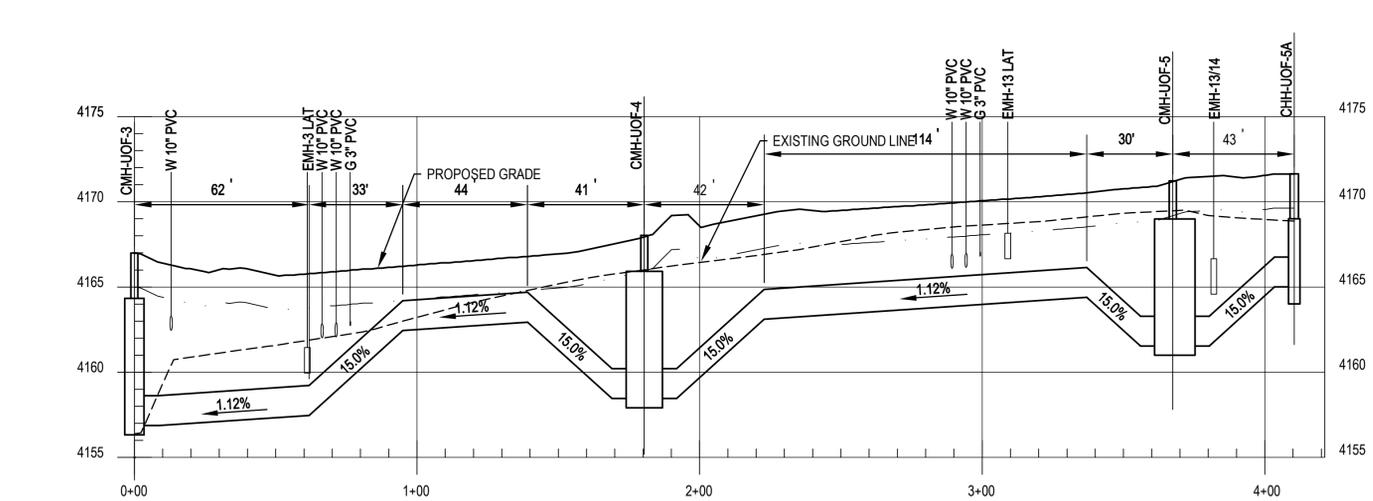
Sheet reference number:
U-742
Sheet 169 of 188



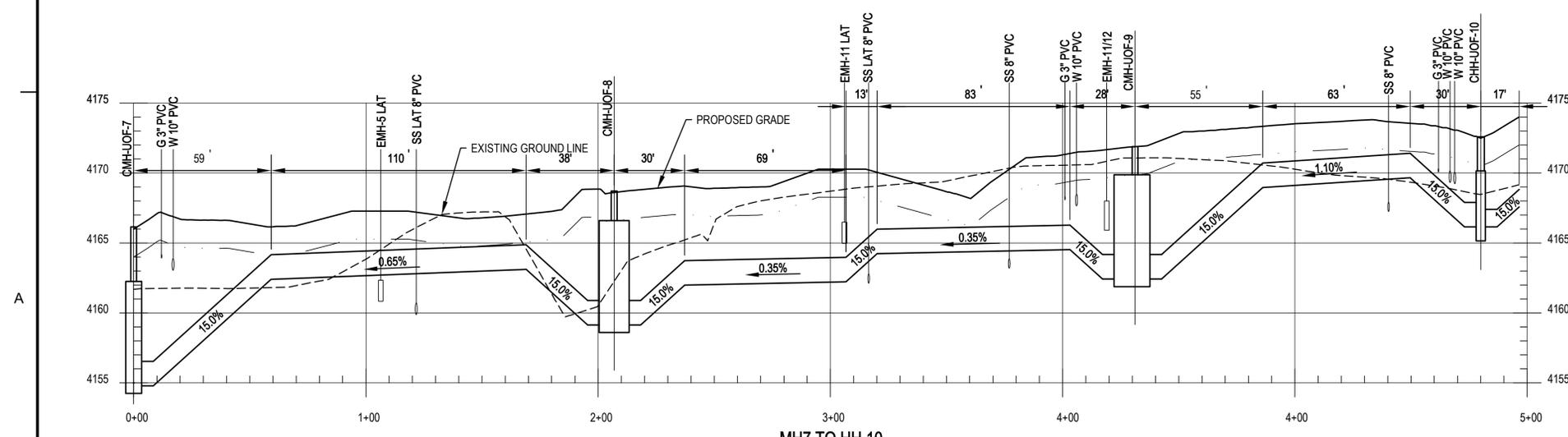
MH 1 TO HH 18



MH 1 TO HH 18



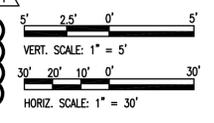
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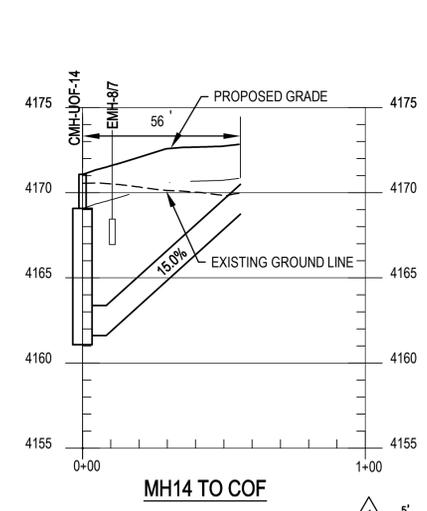
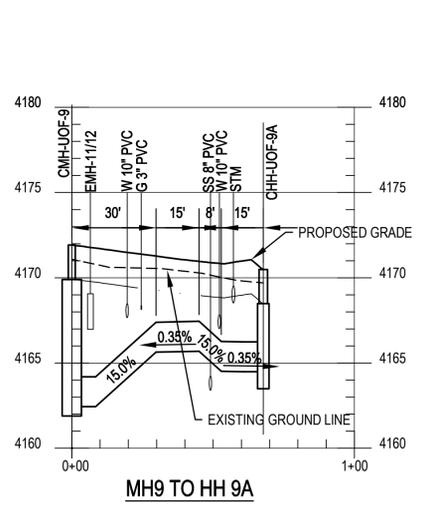
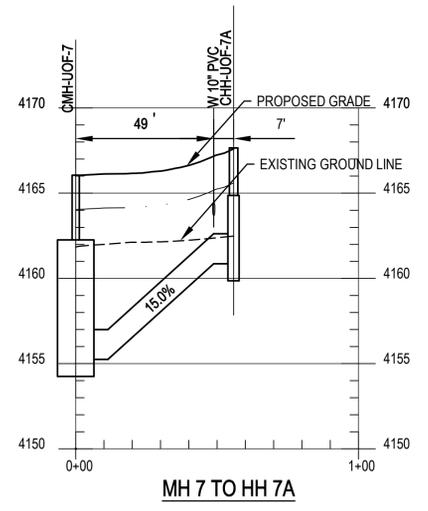
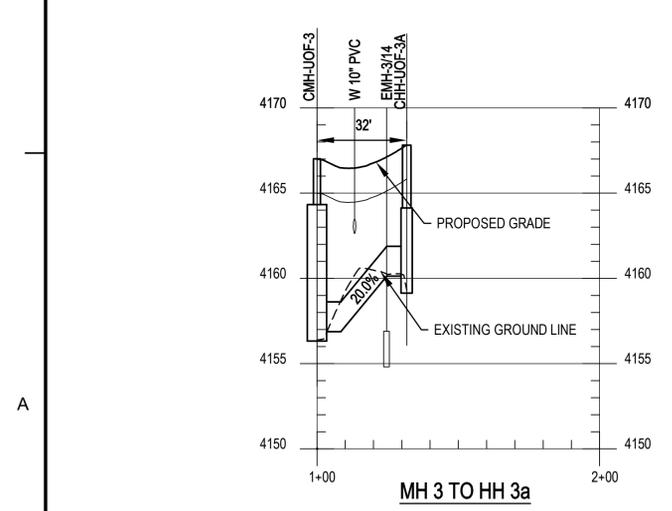
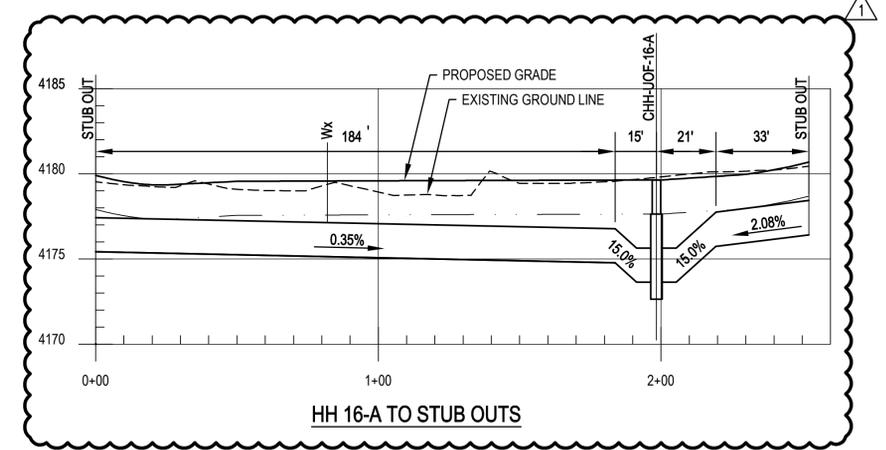
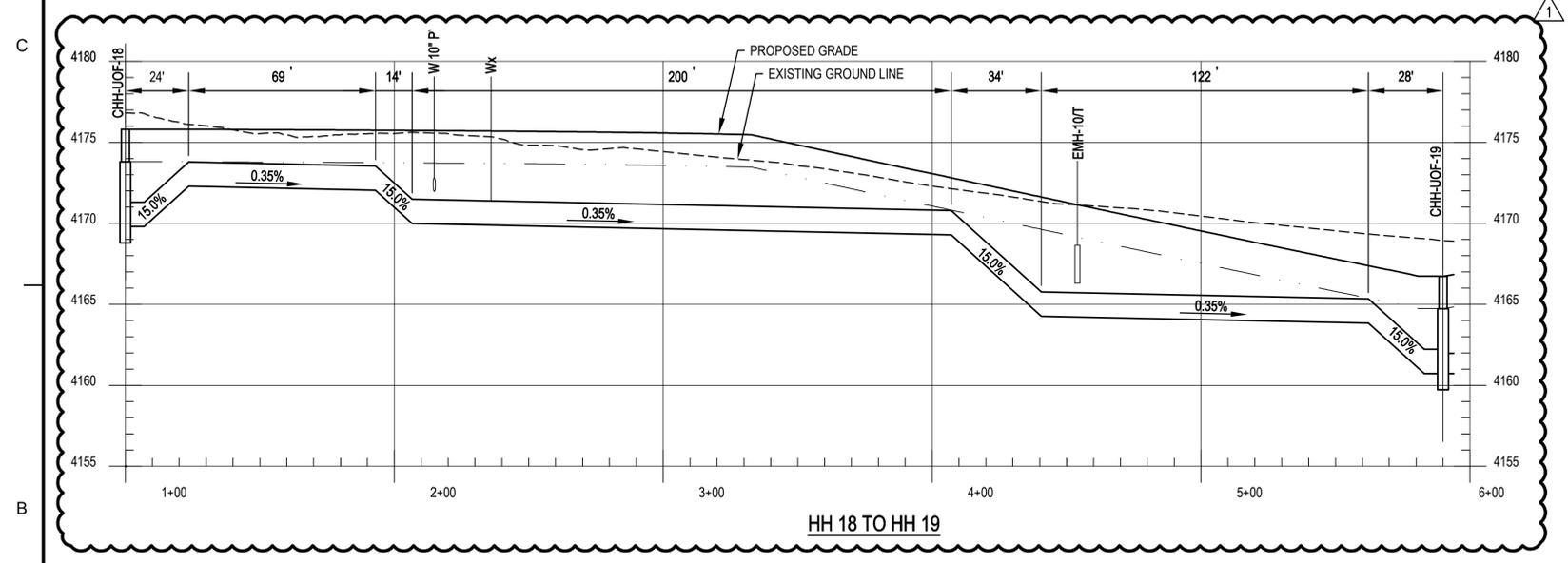
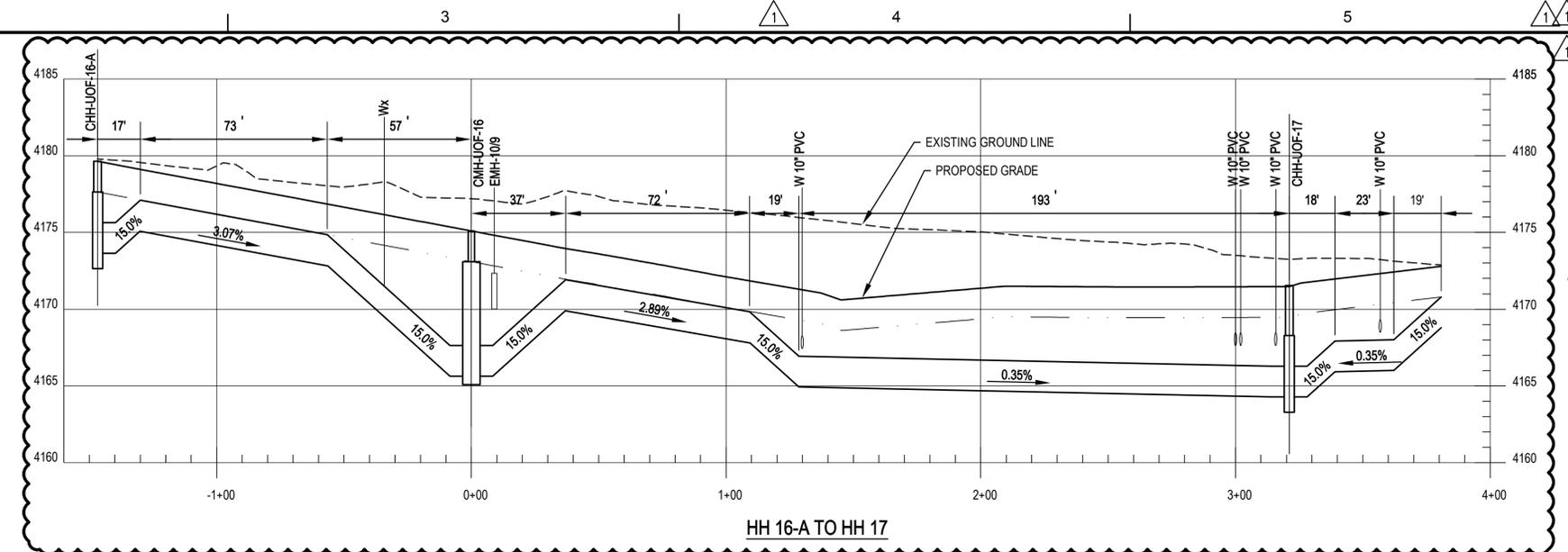
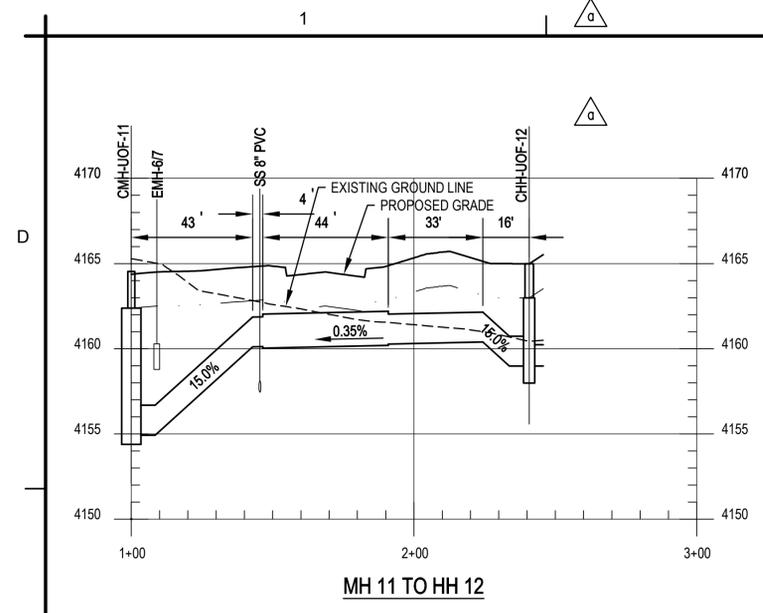


MH7 TO HH 10

LEGEND

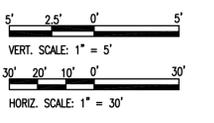
--- 24\"/>





LEGEND

--- 24\"/>



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Rev.	Date	Description
1	03/03/08	REVISED PROFILES
2	03/10/08	REVISED PROFILE
3	03/13/08	REVISED PROFILE
4	03/25/08	REVISED PROFILE

Designed by:	A. NEWELL
Drawn by:	A. NEWELL
Checked by:	S. RAUH
Reviewed by:	
Submitted by:	
Chief:	

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

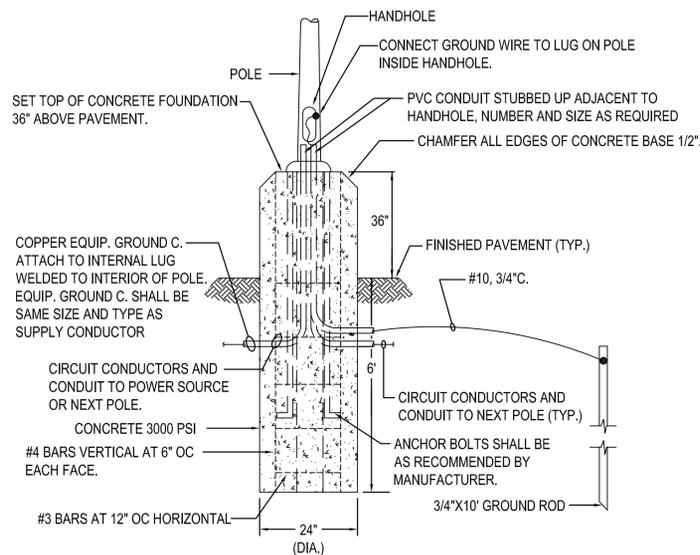
JACOBS/HUITT-ZOLLARS

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TASK ORDER 003
EET-L743
File name: 1171908
No date: 11/19/08
No issue: 1,1

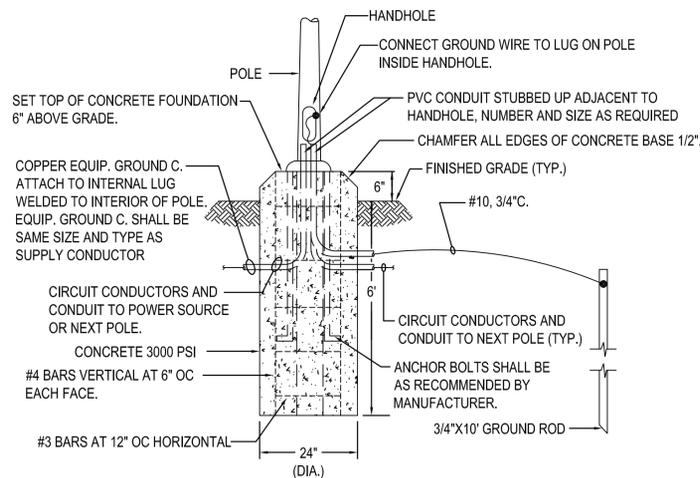
ENGINEERS BATTALION/CTE
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

COMMUNICATION DUCT BANK PROFILE

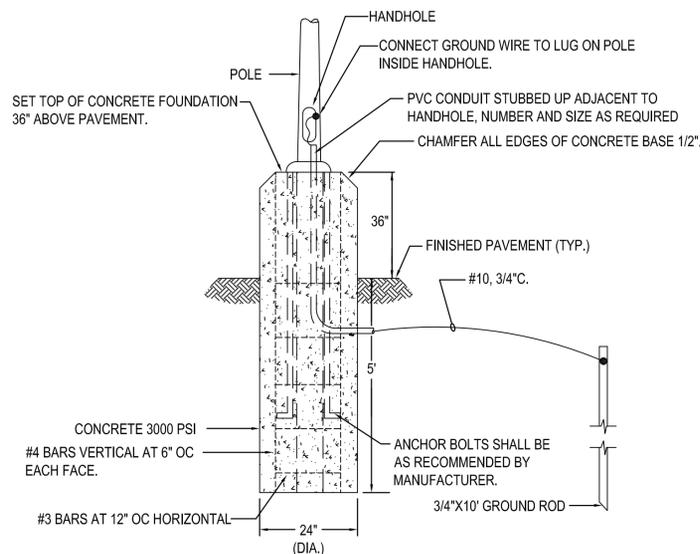
Sheet reference number:
U-743
Sheet 170 of 188



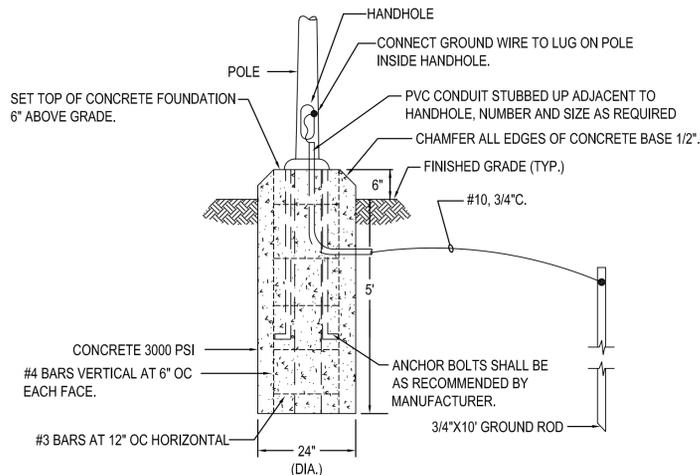
1 LIGHT POLE FOUNDATION DETAIL
N.T.S.



2 LIGHT POLE FOUNDATION DETAIL
N.T.S.



3 LIGHT POLE FOUNDATION DETAIL
N.T.S.



4 LIGHT POLE FOUNDATION DETAIL
N.T.S.

LIGHT FIXTURE SCHEDULE					
TYPE	DESCRIPTION	LAMPS	MANUFACTURER	DISTRIBUTION	
A	SQUARE 27'-0" STEEL POLE W/(2) LIGHT FIXT. INSTALL POLE ON CONCRETE BASE, SEE DETAIL 1, THIS SHEET	2-250 W METAL HALIDE HIGH OUTPUT	GARDCO #H14-2-3-250MH-277-BRP POLE: #SSS-30-5-7-D2-BRP	TYPE III CLEAR FLAT GLASS OPTICS	
AA	SQUARE 30'-0" STEEL POLE W/(2) LIGHT FIXT. INSTALL POLE ON CONCRETE BASE, SEE DETAIL 2, THIS SHEET	2-250 W METAL HALIDE HIGH OUTPUT	GARDCO #H14-2-3-250MH-277-BRP POLE: #SSS-30-5-7-D2-BRP	TYPE III CLEAR FLAT GLASS OPTICS	
B	SQUARE 22'-0" STEEL POLE W/(2) LIGHT FIXT. INSTALL POLE ON CONCRETE BASE, SEE DETAIL 2, THIS SHEET	2-250 W METAL HALIDE HIGH OUTPUT	GARDCO #H14-2-3-175MH-277-BRP POLE: #SSS-22-5-7-D2-BRP	TYPE III CLEAR FLAT GLASS OPTICS	
BB	SQUARE 25'-0" STEEL POLE W/(1) LIGHT FIXT. INSTALL POLE ON CONCRETE BASE, SEE DETAIL 2, THIS SHEET	2-175 W METAL HALIDE HIGH OUTPUT	GARDCO #H14-2-3-175MH-277-BRP POLE: #SSS-25-5-7-D2-BRP	TYPE III CLEAR FLAT GLASS OPTICS	
C	5" DIA. STRAIGHT STEEL POLE W/(1) LIGHT FXT, SOLAR PNL, BATTERIES, CONTROLLER ETC., SEE DETAIL 3 THIS SHEET	1-39W T6 CERAMIC METAL HALIDE PULSE START	SELUX #SDS2-3T-HO39T6-SM1425 POLE: #S50-18-BZ-BC3	TYPE III CLEAR FLAT GLASS OPTICS SOLAR POWERED	
CC	5" DIA. STRAIGHT STEEL POLE W/(1) LIGHT FXT, SOLAR PNL, BATTERIES, CONTROLLER ETC., SEE DETAIL 4 THIS SHEET	1-39W T6 CERAMIC METAL HALIDE PULSE START	SELUX #SDS2-3T-2-HO39T6-SM1425 POLE: #S50-18-BZ-BC3	TYPE III CLEAR FLAT GLASS OPTICS SOLAR POWERED	
D	5" DIA. STRAIGHT STEEL POLE W/(2) LIGHT FXT, SOLAR PNL, BATTERIES, CONTROLLER ETC., SEE DETAIL 4 THIS SHEET	2-39W T6 CERAMIC METAL HALIDE PULSE START	SELUX #SDS2-3T-HO39T6-SM1425 POLE: #S50-18-BZ-BC3	TYPE III CLEAR FLAT GLASS OPTICS SOLAR POWERED	
DD	5" DIA. STRAIGHT STEEL POLE W/(2) LIGHT FXT, SOLAR PNL, BATTERIES, CONTROLLER ETC., SEE DETAIL 4 THIS SHEET	2-39W T6 CERAMIC METAL HALIDE PULSE START	SELUX #SDS2-3T-2-HO39T6-SM1425 POLE: #S50-18-BZ-BC3	TYPE III CLEAR FLAT GLASS OPTICS SOLAR POWERED	
F	SQUARE 15' STEEL POLE W/(1) LIGHT FIXTURE INSTALL ON CONCRETE BASE, SEE DETAIL 2, THIS SHEET	1-100 W PULSE START METAL HALIDE MEDIUM BASE	GARDCO #H14-1-3-100MH-277-BRP POLE: #SSS-15-5-7-D1-BRP	TYPE III CLEAR FLAT GLASS OPTICS	
G	SQUARE 15' STEEL POLE W/(2) LIGHT FIXTURE INSTALL ON CONCRETE BASE, SEE DETAIL 2, THIS SHEET	2-100 W PULSE START METAL HALIDE MEDIUM BASE	GARDCO #H14-2-3-100MH-277-BRP POLE: #SSS-15-5-7-D2-BRP	TYPE III CLEAR FLAT GLASS OPTICS	

① HOURS OF OPERATION SHALL BE (6) HOURS ON, OFF, (2) HOURS ON. ALL SOLAR LIGHT ASSEMBLIES SHALL BE CAPABLE OF BEING TURNED OFF FROM A SINGLE LOCATION. INDIVIDUAL SOLAR LIGHT ASSEMBLIES SHALL BE CAPABLE OF ON/OFF TIME ADJUSTMENTS.

PANEL NO: L1		MAINS: 125A MCB	
VOLTAGE: 480/277V, 3Ø, 4W		LOCATION: ON TRANSFORMER	
MOUNTING: SURFACE-3R			
DIRECTORY	LOAD V A	PHASE ABC	DIRECTORY
OUTDOOR LIGHTING	1800	1	OUTDOOR LIGHTING
OUTDOOR LIGHTING	1800	3	OUTDOOR LIGHTING
OUTDOOR LIGHTING	1800	5	OUTDOOR LIGHTING
OUTDOOR LIGHTING	1120	7	SPARE
OUTDOOR LIGHTING	1120	9	SPARE
OUTDOOR LIGHTING	1120	11	SPARE
SPARE		13	SPARE
SPARE		15	SPARE
SPARE		17	SPARE
SPARE		19	SPARE
		21	
		23	
		25	
		27	
		29	
		31	
		33	
		35	
		37	
		39	
		41	

BREAKERS ARE 1P, 20A, UNLESS OTHERWISE NOTED. LK INDICATES LOCK-ON DEVICE. GF INDICATES GROUND FAULT BREAKER. ST INDICATES SHUNT TRIP DEVICE.

PANEL NO: L2		MAINS: 125A MCB	
VOLTAGE: 480/277V, 3Ø, 4W		LOCATION: ON TRANSFORMER	
MOUNTING: SURFACE-3R			
DIRECTORY	LOAD V A	PHASE ABC	DIRECTORY
OUTDOOR LIGHTING	3300	1	OUTDOOR LIGHTING
OUTDOOR LIGHTING	3300	3	OUTDOOR LIGHTING
OUTDOOR LIGHTING	3300	5	OUTDOOR LIGHTING
OUTDOOR LIGHTING	1100	7	OUTDOOR LIGHTING
OUTDOOR LIGHTING	1100	9	OUTDOOR LIGHTING
OUTDOOR LIGHTING	1100	11	OUTDOOR LIGHTING
WALKWAY LIGHTING	1250	13	OUTDOOR LIGHTING
WALKWAY LIGHTING	1250	15	OUTDOOR LIGHTING
WALKWAY LIGHTING	1250	17	OUTDOOR LIGHTING
SPARE		19	SPARE
SPARE		21	SPARE
SPARE		23	SPARE
		25	
		27	
		29	
		31	
		33	
		35	
		37	
		39	
		41	

BREAKERS ARE 1P, 20A, UNLESS OTHERWISE NOTED. LK INDICATES LOCK-ON DEVICE. GF INDICATES GROUND FAULT BREAKER. ST INDICATES SHUNT TRIP DEVICE.



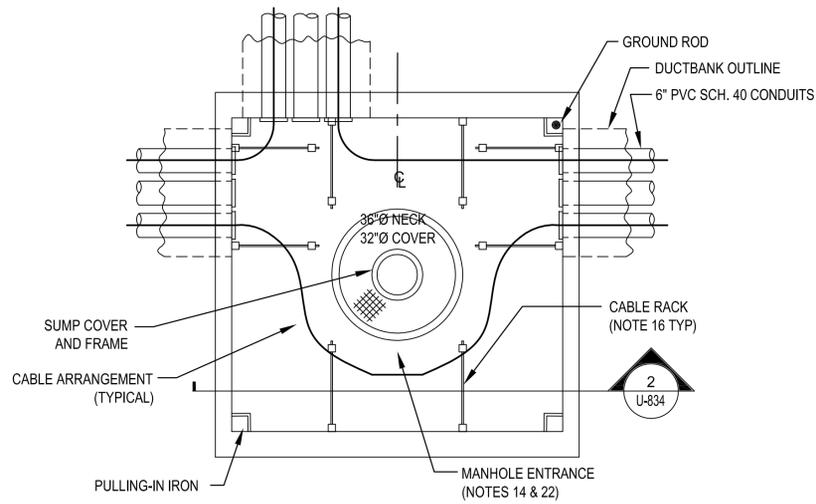
Attachment of this seal to this document is made only for the purpose of authenticating this document. Responsibility for all other documents relating to this project is disclaimed.

Rev.	Date	Description
1	03/25/08	NEW DRAWING

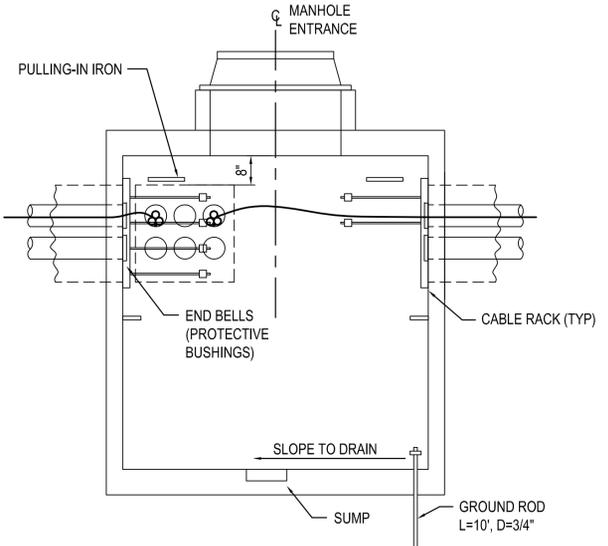
Designed by:	L. CANNELL
Drawn by:	C. BOBB
Reviewed by:	
Submittal by:	
Date:	03/08/08
Scale:	
Contract No.:	EEF-UR32-dll
File name:	03/20/10
Project No.:	1-1

U.S. ARMY ENGINEER DISTRICT, FORT WORTH, TEXAS
CORPS OF ENGINEERS
FORT WORTH, TEXAS
CONSULTING ENGINEER
JACOBSON HUITZ-ZOLLARS
500 NORTH BROADWAY
FLOOR 1000
DALLAS, TEXAS 75201
TEL: (214) 355-4800
FAC: (214) 355-2929

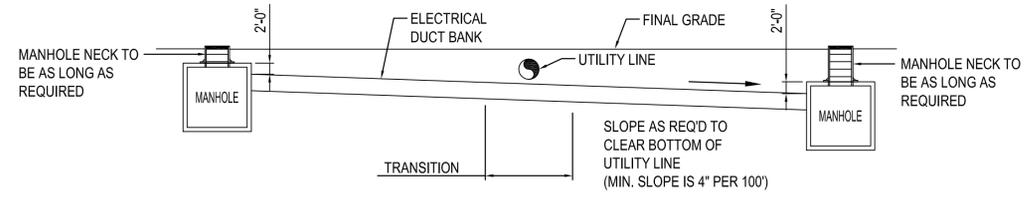
ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO
ELECTRICAL DETAILS
LIGHTING



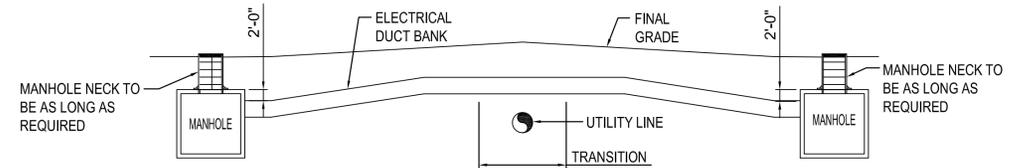
1 TYPICAL MANHOLE PLAN
N.T.S.



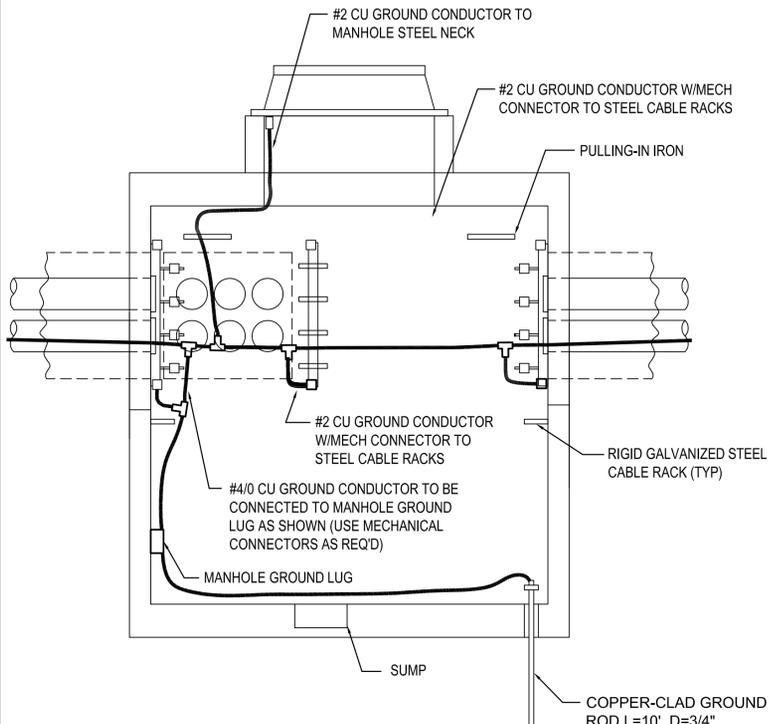
2 TYPICAL MANHOLE SECTION
N.T.S.



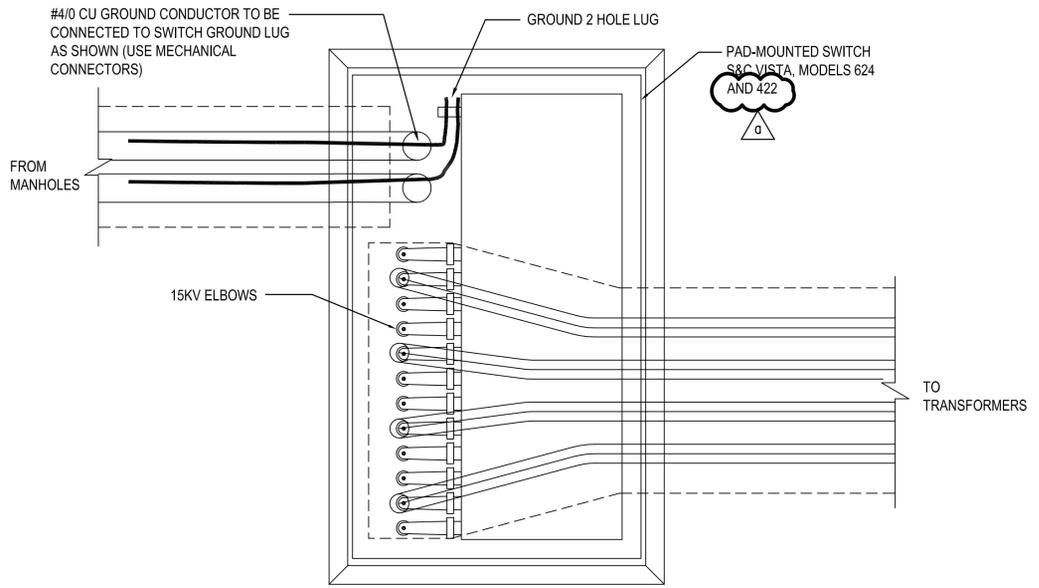
3 DUCT LINE ELEVATION (CASE 1)
N.T.S.



4 DUCT LINE ELEVATION (CASE 2)
N.T.S.



5 TYPICAL ELECTRICAL MANHOLE GROUNDING
N.T.S.



6 TYPICAL PAD MOUNTED SWITCH GROUNDING
N.T.S.

NOTES:

1. ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL PRECAST CONCRETE MANHOLES AS SHOWN ON DISTRIBUTION PLAN DRAWINGS AND MANHOLE DETAIL DRAWINGS.
2. MANHOLES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE FOLLOWING STANDARDS:
 - 2.1 AMERICAN CONCRETE INSTITUTE (ACI) 318 "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE"
 - 2.2 AMERICAN WELDING SOCIETY (AWS)
 - 2.3 ASTM C478
3. RAW MATERIAL FOR CONCRETE SHALL MEET THE FOLLOWING STANDARD:
 - 3.1 PORTLAND CEMENT: ASTM C150, TYPE I, II, III OR V WITH 6000 PSI COMPRESSIVE STRENGTH.
4. ALL ITEMS IMBEDDED IN CONCRETE SHALL BE OF THE TYPE REQUIRED FOR THE INTENDED TASK AND MEET THE FOLLOWING STANDARD:
 - 4.1 STRUCTURAL STEEL PLATES, ANGLES, ETC. ASTM A36.
 - 4.2 PROPRIETY ITEMS: IN ACCORDANCE WITH THE MANUFACTURERS PUBLISHED LITERATURE
 - 4.3 WELDED STUDS: AWS D1.1
5. THE PRECAST MANUFACTURER SHALL PROVIDE LADDERS WITH A DETACHABLE HOOK FOR EACH PRECAST MANHOLE. THE LADDER SHALL BE HOT DIPPED GALVANIZED.
6. THE PRECAST MANUFACTURER SHALL PREPARE AND SUBMIT TO THE ENGINEER THE FOLLOWING DOCUMENTS FOR APPROVAL AND SHALL NOT PROCEED WITH MANUFACTURE PRIOR TO APPROVAL:
 - 6.1 SHOP DRAWINGS:
 - 6.1.1 SHOP DRAWINGS SHALL BE COMPLETE AND INCLUDE THE FOLLOWING:
 - 6.1.1.1 DIMENSIONS AND GEOMETRY FOR EACH STRUCTURE.
 - 6.1.1.2 A LAYOUT PLAN AND LOCATION OF CABLE HANDLING INSERTS.
 - 6.1.1.3 LOCATION OF ALL IMBEDDED ITEMS
 - 6.1.1.4 DETAILS OF MANHOLE COVER
 - 6.2 STRUCTURAL CALCULATIONS
7. ELECTRIC MANHOLE WALLS, TOP, AND FLOOR SHALL HAVE 8" (MINIMUM) CONCRETE THICKNESS.
8. ONE CORNER OF EACH ELECTRIC MANHOLE SHALL CONTAIN ONE GROUND ROD.
9. THE TRAFFIC COVER AND FRAME SHALL BE SUITABLE FOR AASHTO H20 WHEEL LOADINGS.
10. THE MINIMUM STEEL BARS REINFORCING SHALL BE WITH OF NO. 4 ROUND DEFORMED AND THAT SHALL BE INCREASED AS NECESSARY.
11. THE WALLS AND FLOOR SHALL HAVE BARS AT 12" MINIMUM ON CENTERS WITH A MINIMUM 12" HOOK AT CORNERS AND INTERSECTIONS.
12. THE TOP SHALL HAVE BARS INSTALLED 4" TO CENTER ON CENTER MINIMUM LATERALLY AND LONGITUDINALLY AS APPROPRIATE, EXCEPT AT OPENINGS. AN ADDITIONAL BAR AT 2" SPACING AND TWO DIAGONAL BARS, EACH WAY AT 45 DEG TO AND LOCATED ABOVE LATERAL OR LONGITUDINAL BARS. THE TOP SHALL BE SUITABLE FOR AASHTO H20 WHEEL LOADINGS.
13. THE NECK OF ENTRY OPENING SHALL BE ROUND, 36" IN DIAMETER LOCATED IN THE CENTER OF THE MANHOLE.
14. PULLING-IN IRONS WILL BE PROVIDED OPPOSITE EACH DUCT BANK ENTRANCE OR WHERE PROVISIONS FOR FUTURE DUCT BANK ENTRANCES.
15. SUFFICIENT CABLE RACKS SHALL BE USED ALONG THE MANHOLE WALLS, TO PROPERLY SUPPORT THE 3-1/C #2/0 AWG (15KV) CU CABLES (MINIMUM RADIUS BEND = 18 INCHES) AND 1/C #2 AWG (600V) CU STRANDED GROUND CONDUCTOR AND ANY CABLE SPLICES AS NEEDED. THE CABLE RACKS SHALL NOT BE MORE THAN 3' APART HORIZONTALLY. CABLE RACKS SHALL BE HOT DIPPED GALVANIZED STEEL.
16. EACH CONDUIT AT THE DUCT BANK ENTRANCE INTO ELECTRIC MANHOLE SHALL HAVE ONE END BELL.
17. THE FLOOR SHALL BE SLOPED 1" TOWARD THE SUMP TO DRAIN.
18. THE SUMP WALLS AND FLOOR SHALL HAVE 4" THICKNESS.
19. THE SUMP SHALL BE FRAMED AND PROVIDED WITH COVER.
20. CONTRACTOR TO KEEP MANHOLE ENTRANCES CLEAR OF CABLE FOR SAFE ACCESS INTO THE MANHOLE.



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Rev.	Date	Description
1	03/25/08	Issue
2	03/25/08	Issue
3	03/25/08	Issue
4	03/25/08	Issue
5	03/25/08	Issue
6	03/25/08	Issue
7	03/25/08	Issue
8	03/25/08	Issue
9	03/25/08	Issue
10	03/25/08	Issue
11	03/25/08	Issue
12	03/25/08	Issue
13	03/25/08	Issue
14	03/25/08	Issue
15	03/25/08	Issue
16	03/25/08	Issue
17	03/25/08	Issue
18	03/25/08	Issue
19	03/25/08	Issue
20	03/25/08	Issue

Designed by:	L. CANNELL
Drawn by:	C. BOBB
Reviewed by:	
Submitted by:	
Date:	03/20/10
File name:	EEF-U834-dtl
Project No.:	03/20/10
Revision:	1:1

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

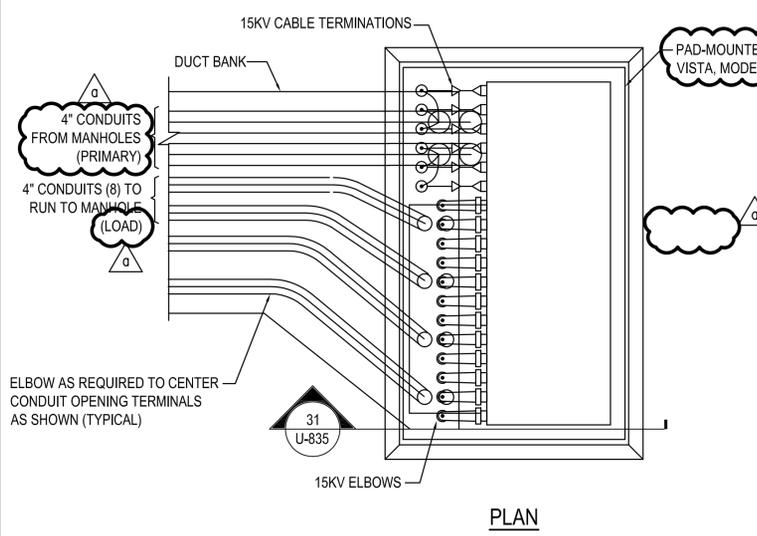
ALSO KNOWN AS:
JACOBSON/HUITT-ZOLLARS

500 NORTH BRIDGEMANWAY
FORT WORTH, TEXAS 76104
TEL: (817) 335-4800
FAX: (817) 335-2525

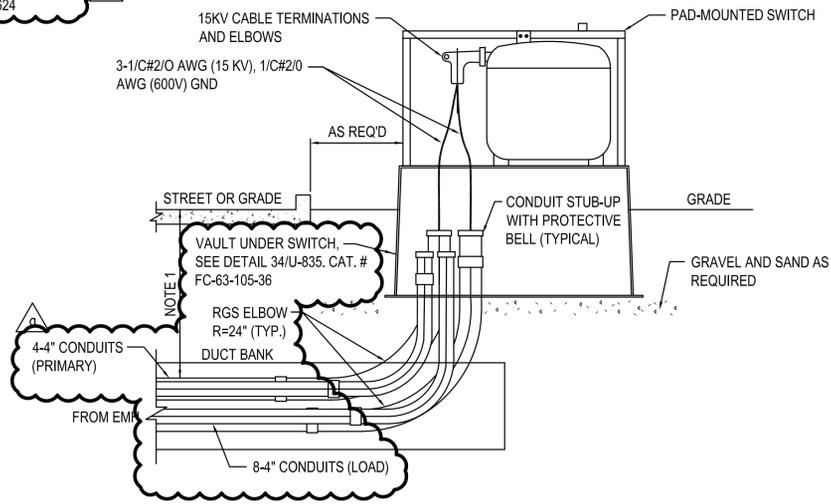
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UNIT OPERATIONS FACILITIES RANGE
WHITE SANDS MISSILE RANGE
NEW MEXICO

ELECTRICAL DETAILS
PAD MOUNTED SWITCHES

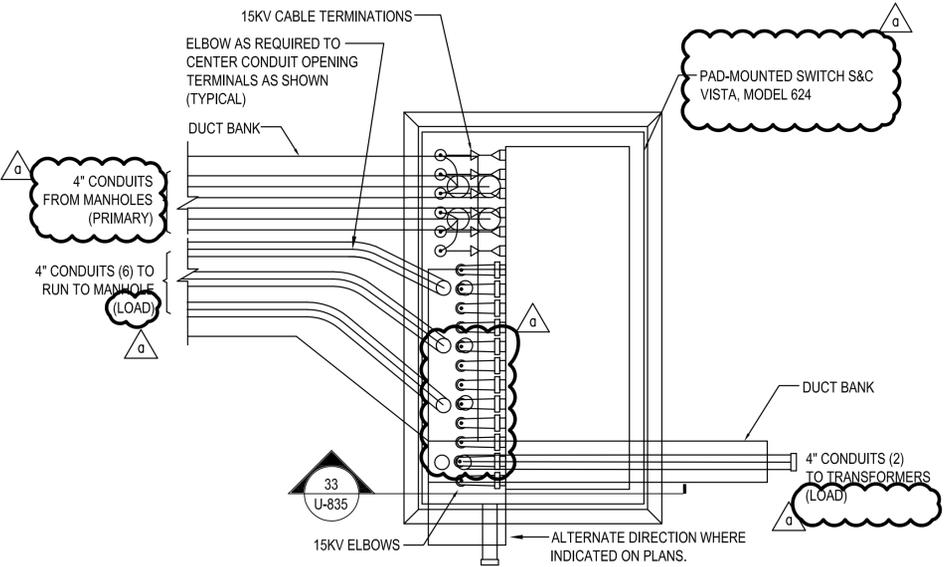
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30 PAD MOUNTED SWITCH DETAIL
N.T.S.

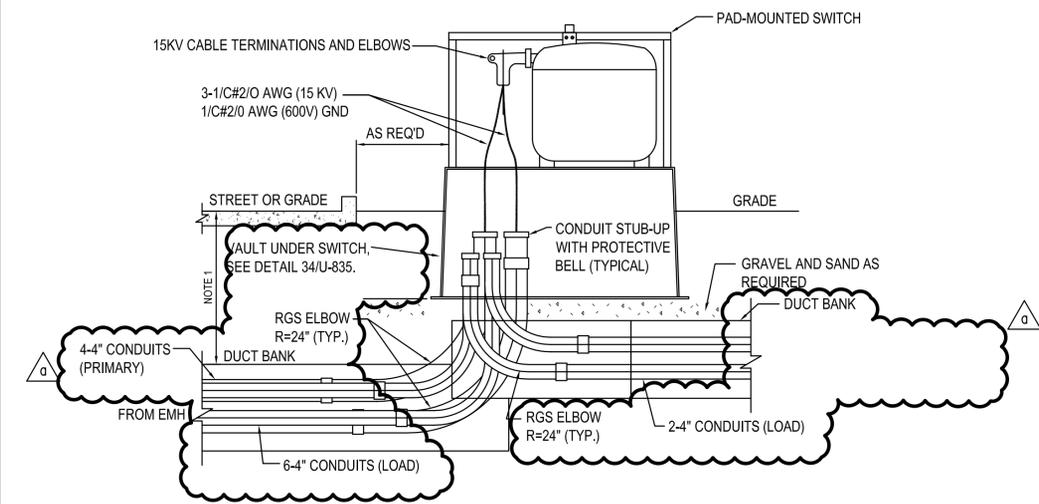


31 SECTION
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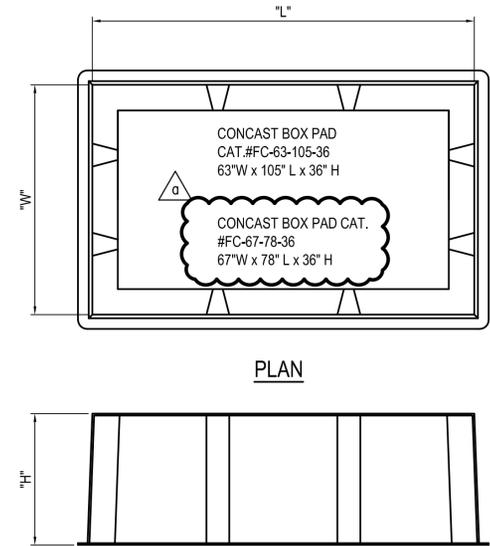


32 PAD MOUNTED SWITCH DETAIL
N.T.S.

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33 SECTION
N.T.S.



34 CONCAST BOX PAD DETAIL
N.T.S.

- NOTES:**
- DUCT BANK DEPTH VARIES WITH MANHOLE DEPTH. SEE DUCT BANK PROFILE SHEETS
- 15KV PAD-MOUNTED SWITCH MODEL 422 SPECIFICATION**
- PAD MOUNTED SWITCH STYLE S&C VISTA, MODEL 422, CATALOG NO.
 - 854222-V4-P16-S-F12-L2-M1-N-O-R2-X2-Z5-TA-2367.
 - MAXIMUM VOLTAGE 15.5 KV.
 - SHORT CIRCUIT AMPERES: 25KA RMS SYM.
 - WET-VAULT MOUNTED STYLE WITH SF6-INSULATED STAINLESS-STEEL TANK.
 - SIX-WAY UNIT IN STAINLESS-STEEL OUTER ENCLOSURE, OLIVE GREEN FINISH.
 - VIEWING WINDOW IN PAD MOUNTED OUTER ENCLOSURE.
 - POTENTIAL INDICATION WITH TEST FEATURE WITH PROVISION FOR LOW VOLTAGE PHASING.
 - TWO-WAYS 600 AMP THREE-POLE LOAD INTERRUPTER SWITCH.
 - TWO-WAYS 600 AMP THREE-POLE FAULT INTERRUPTER.
 - REMOTE LOW PRESSURE ALARM.
 - KEY INTERLOCK ON LOAD INTERRUPTER SWITCH.
 - 600A COPPER BUS.
 - POTENTIAL INDICATION.
- 15KV PAD-MOUNTED SWITCH MODEL 624 SPECIFICATION**
- PAD-MOUNTED STYLE S&C VISTA, MODEL 624, CATALOG NO. 856242-V4-P16-S-F12-L2-M1-N-O-R2-X2-Z5-TA-2367.
 - MAXIMUM VOLTAGE: 15.5KV
 - SHORT-CIRCUIT AMPERES: 25KA RMS SYM.
 - WET-VAULT MOUNTED STYLE WITH SF6-INSULATED STAINLESS-STEEL TANK.
 - SIX-WAY UNIT IN STAINLESS-STEEL OUTER ENCLOSURE, OLIVE GREEN FINISH.
 - VIEWING WINDOW IN PAD-MOUNTED ENCLOSURE.
 - POTENTIAL INDICATION WITH TEST FEATURE WITH PROVISION FOR LOW-VOLTAGE PHASING.
 - TWO WAYS-600AMP THREE-POLE LOAD INTERRUPTER SWITCH.
 - FOUR WAYS-600AMP THREE-POLE FAULT INTERRUPTER.
 - TWO-HOLE GROUND PAD, ONE PER WAY LOCATED BELOW BUSHINGS.
 - REMOTE LOW-PRESSURE ALARM.
 - KEY INTERLOCK ON LOAD-INTERRUPTER SWITCHES.
 - 600A COPPER BUS.
 - POTENTIAL INDICATION.



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Rev.	Date	By	Description
1	03/20/10	C. BOBB	REVISIONS, SWITCH DETAILS, SECTIONS & ADDED SPECIFICATIONS

Designed by: L. CHARNELL	Date: 03/20/08	Rev.
Drawn by: C. BOBB	Sol. no.	020008
Reviewed by:	Contr. No.	
Submitted by:	File name:	EEB-U835-dtl
Chief:	Proj. date:	03/20/10
	Proj. name:	177

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

CLIENT VENDOR
JE JACOBS/HUITT-ZOLLARS
300 NORTH BRIDGEMANWAY
SUITE 1114 | FORT WORTH, TEXAS 76104
TEL: (817) 335-4800 | FAX: (817) 335-2926

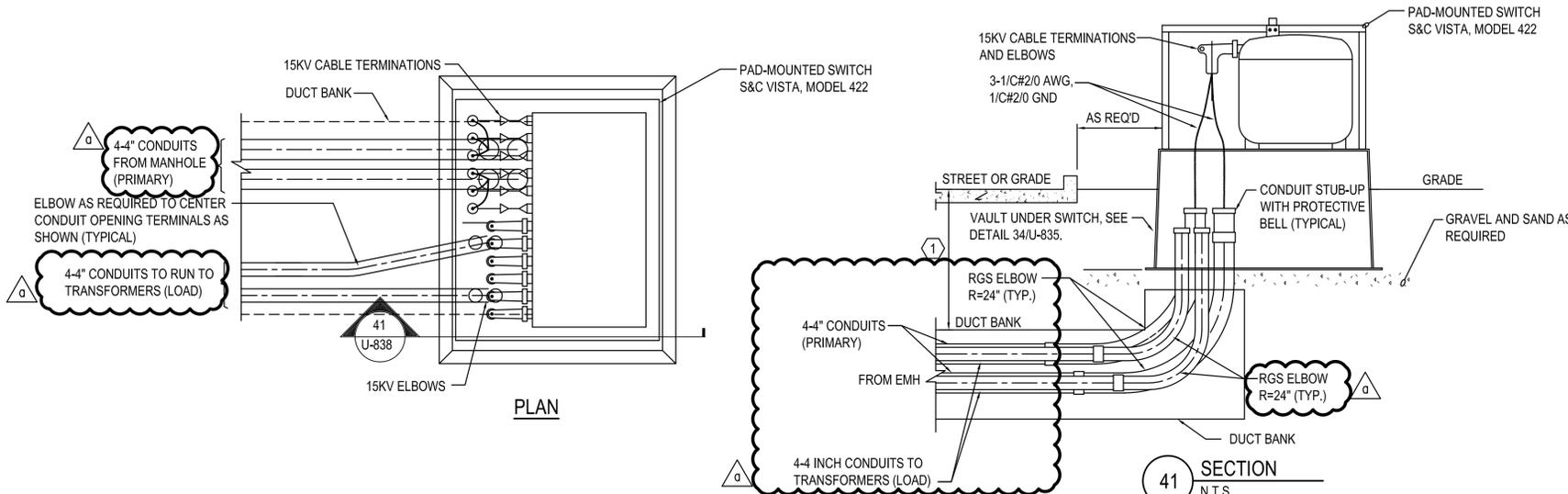
ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

ELECTRICAL DETAILS
PAD MOUNTED SWITCHES

Sheet
reference
number:
U-835
Sheet 177 of 188

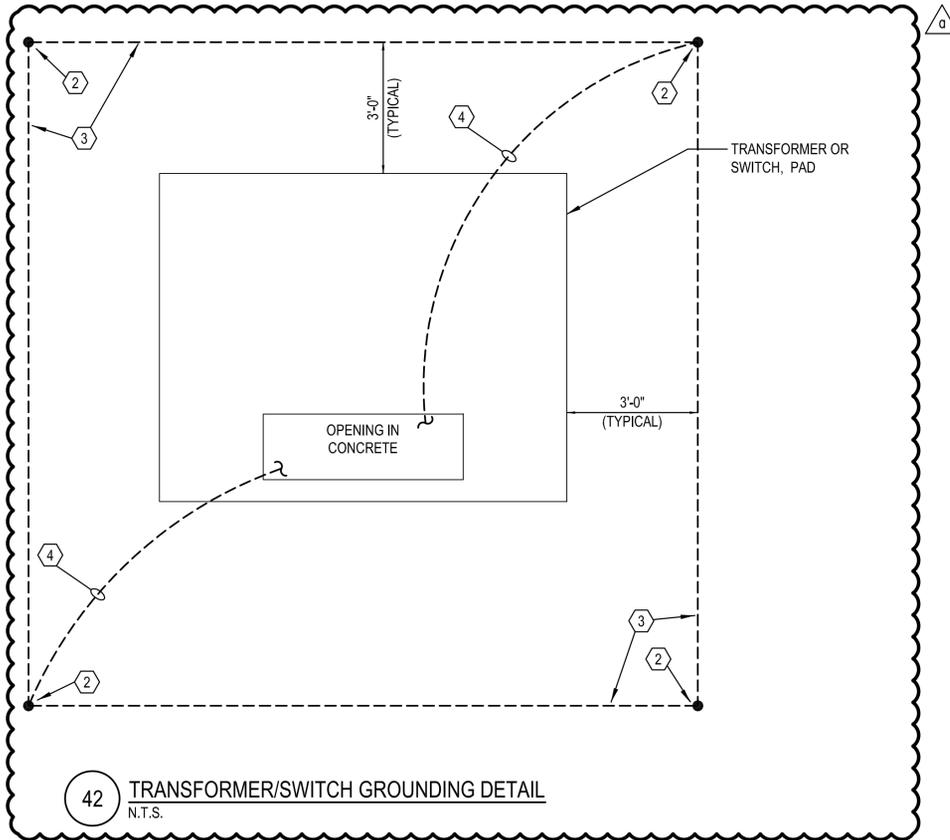
KEYED NOTES:

- 1 DUCTBANK DEPTH VARIES WITH MANHOLE DEPTH, SEE DUCTBANK PROFILE SHEETS.
- 2 GROUND RODS, TYPICAL FOR FOUR (4), SHALL BE DRIVEN INTO GROUND TO 24" BELOW GRADE.
- 3 #4/0 BARE TINNED COPPER CONDUCTOR BETWEEN GROUND RODS. INSTALL CONDUCTOR 24" BELOW GRADE AND EXOTHERMICALLY WELD TO GROUND RODS.
- 4 #4/0 BARE TINNED COPPER CONDUCTOR FROM GROUND ROD TO TRANSFORMER OR SWITCH ENCLOSURE. EXOTHERMICALLY WELD TO GROUND ROD AND MECHANICALLY CONNECT TO EQUIPMENT.

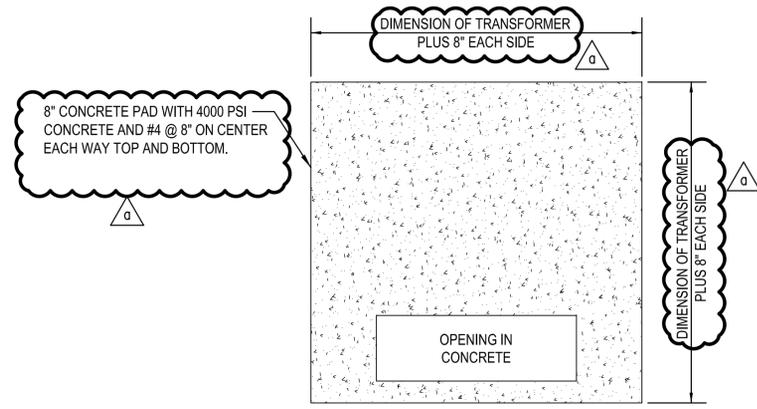


40 PAD MOUNTED SWITCH DETAIL N.T.S.

41 SECTION N.T.S.



42 TRANSFORMER/SWITCH GROUNDING DETAIL N.T.S.



43 TRANSFORMER PAD DETAIL N.T.S.



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Rev.	Date	Description
1	03/25/08	Initial Issue
2		
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Designed by: L. CHANNELL	Checked by: C. BOBB	Reviewed by:	Submitted by: Chief
Date: 02/08/08	Soil. no.:	Contr. No.:	File name: EBF-U836-dtl
U.S. ARMY ENGINEER DISTRICT, FORT WORTH CORPS OF ENGINEERS FORT WORTH, TEXAS			
CONSULTING ENGINEER JE JACOBS/HUITT-ZOLLARS 201 NORTH BROADWAY FLOOR 1000 DALLAS, TEXAS 75201 TEL: (214) 355-4000 FAX: (214) 355-2525			

ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO
ELECTRICAL DETAILS
PAD MOUNTED TRANSFORMERS

Sheet reference number:
U-836
Sheet 178 of 188

1

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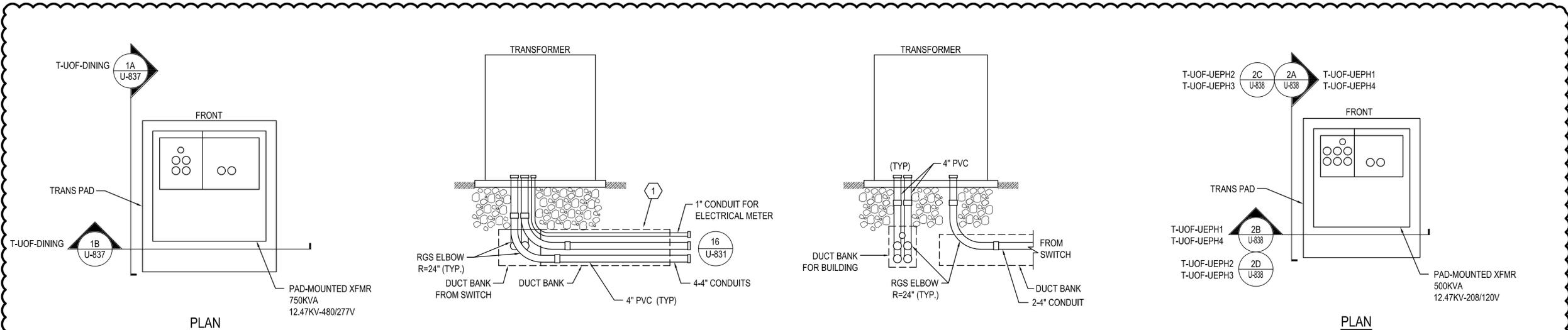
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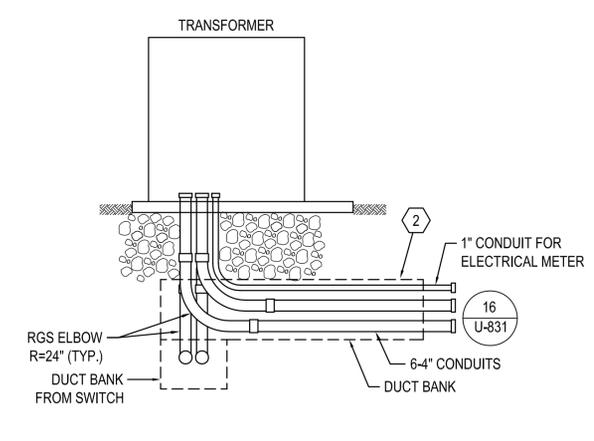


1 750KVA PAD MOUNTED XFMR DETAIL
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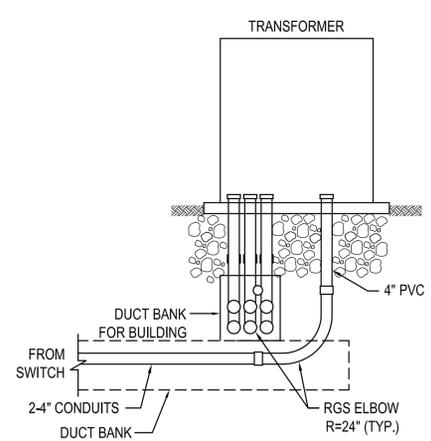
1A SECTION
N.T.S.

1B SECTION
N.T.S.

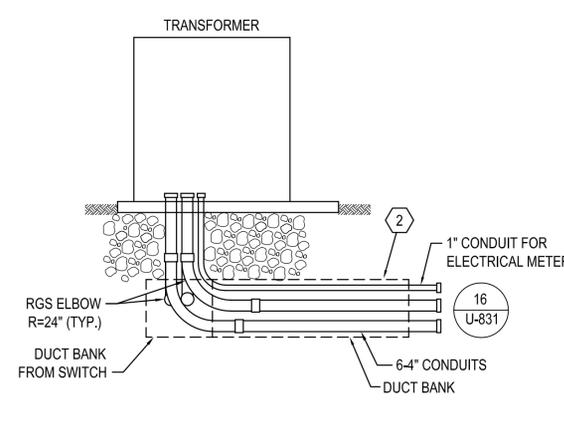
2 500KVA PAD MOUNTED XFMR DETAIL
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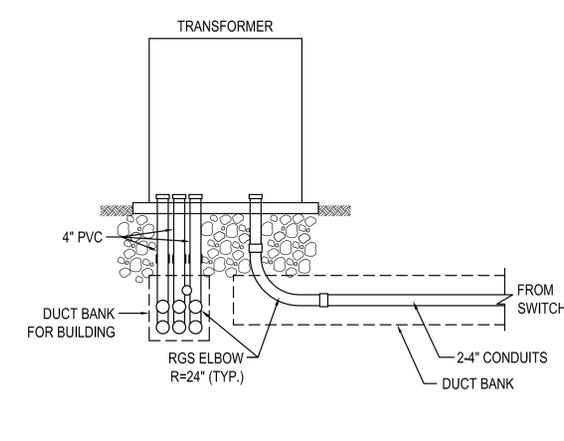
2A SECTION
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2B SECTION
N.T.S.



2C SECTION
N.T.S.



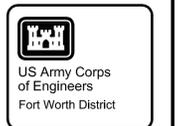
2D SECTION
N.T.S.

KEYED NOTES:

- ① SIMILAR TO DETAIL 5/U-831 WITH THE ADDITION OF ONE (1) 1" CONDUIT.
- ② SIMILAR TO DETAIL 3/U-831 WITH THE ADDITION OF ONE (1) 1" CONDUIT.

GENERAL NOTES:

- 1. EACH CONDUIT AT THE ENTRANCE TO PAD MOUNTED TRANSFORMER AND PAD MOUNTED SWITCH SHALL HAVE END BELLS OR BUSHINGS.
- 2. ALL CONDUITS AND FITTINGS TO BE 4" PVC, SCH 40 AND ELBOWS AT TRANSFORMERS SHALL BE RGS 24" RADIUS UNLESS NOTED OTHERWISE.
- 3. ALL DIMENSION ARE IN INCHES.
- 4. SEE TRANSFORMER/SWITCH GROUNDING DETAIL, 42/U-836.



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Rev.	Date	Description
1	03/25/08	REV. DETAILS, DELETED DETAIL NO. 3

Designed by: L. CHANNELL	Date: 03/20/10	Rev. by: C. BOBB	File name: EBF-U837-dtl
Drawn by: C. BOBB	Scale: As shown	Reviewed by: C. BOBB	Project No.:
Submitted by:	Contract No.:	Checked by:	Revision:
JE JACOBS/HUITT-ZOLLARS A SCIENTIFIC CORPORATION 200 NORTH BROADWAY FORT WORTH, TEXAS 76102 TEL: (817) 335-4800 FAX: (817) 335-2525			

ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO
ELECTRICAL DETAILS
PAD MOUNTED TRANSFORMERS

Sheet reference number:
U-837
Sheet 179 of 188

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Rev.	Date	Description
1	03/25/08	Issue

Designed by:	L. CHARNELL
Drawn by:	C. BOBB
Reviewed by:	
Submittal by:	
Chief:	

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

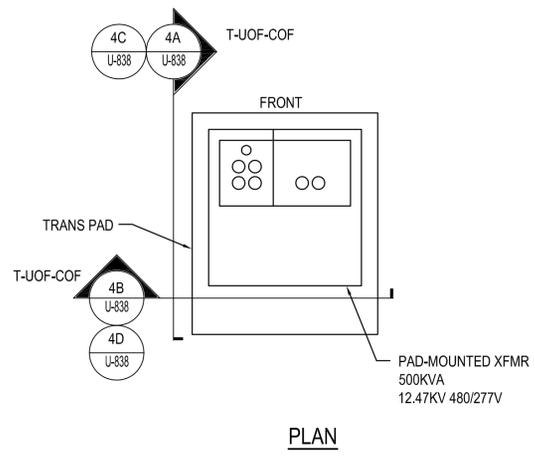
CLIENT VENDOR
JE JACOBS/HUITT-ZOLLARS

File name: EBF-U838-dtl
No date: 03/20/10
No scale: 1:1

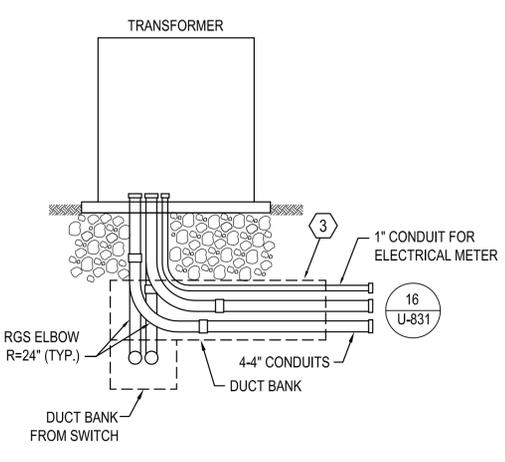
ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

ELECTRICAL DETAILS
PAD MOUNTED TRANSFORMERS

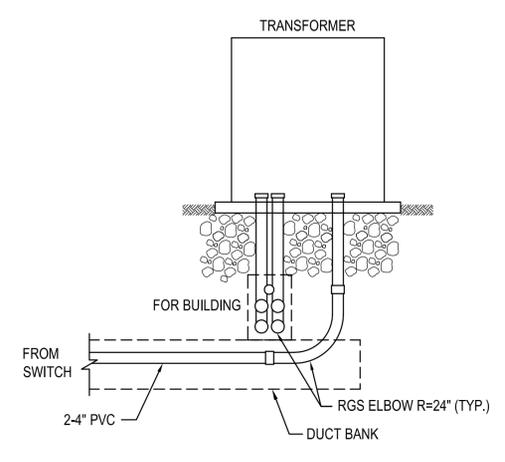
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reference
number:
U-838
Sheet 180 of 188



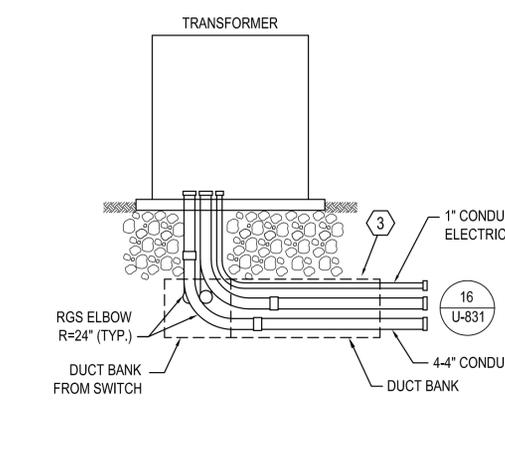
4 500KVA PAD MOUNTED XFMR DETAIL
N.T.S.



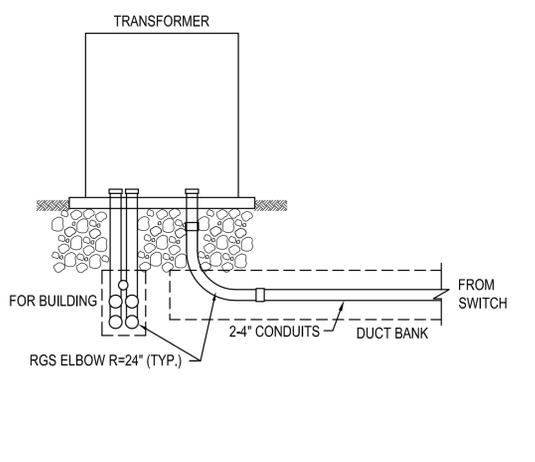
4A SECTION
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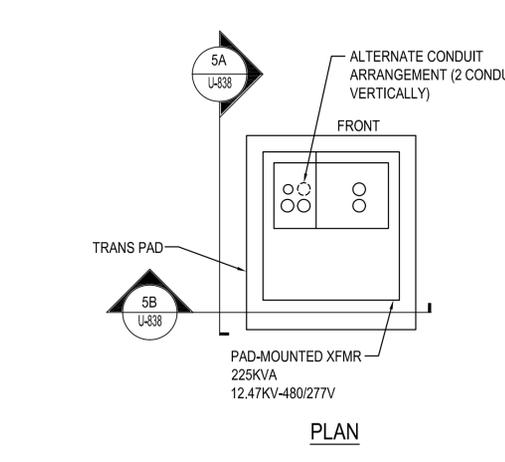
4B SECTION
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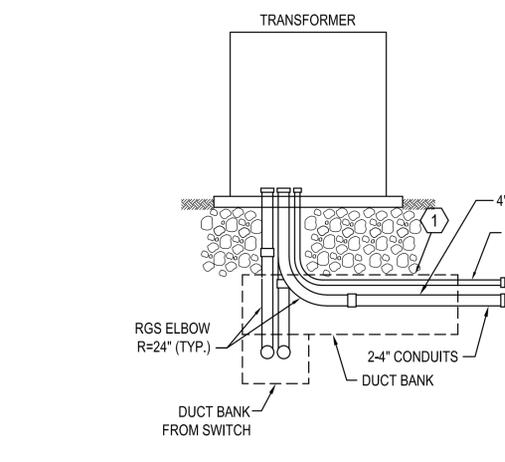
4C SECTION
N.T.S.



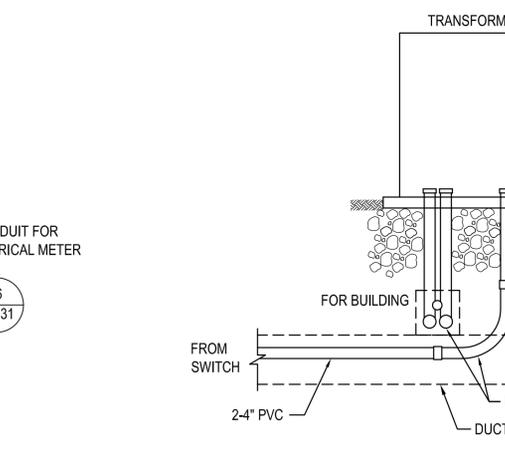
4D SECTION
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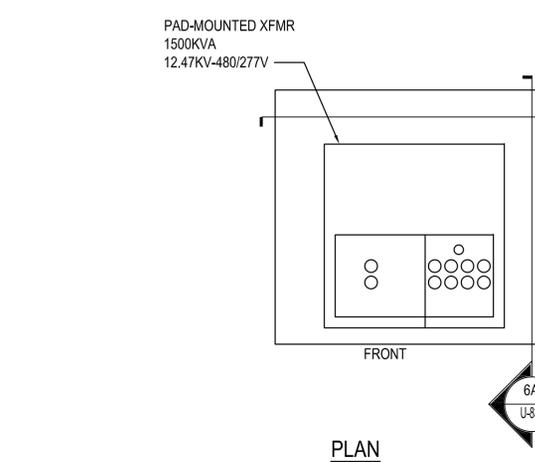
5 225KVA PAD MOUNTED XFMR DETAIL
N.T.S.



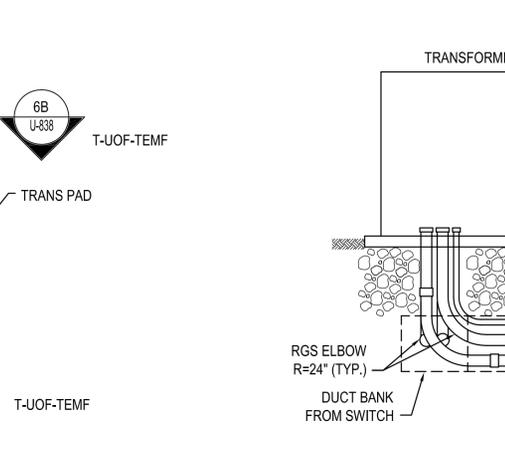
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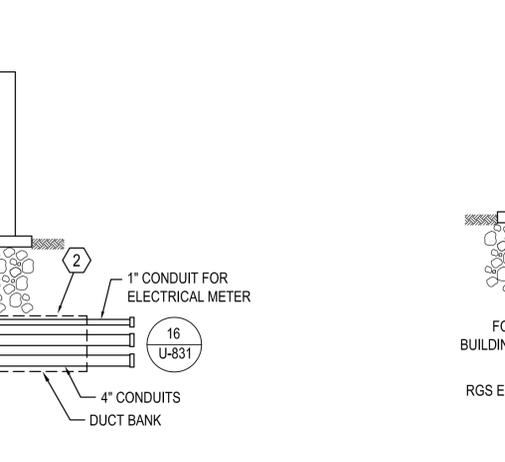
5B SECTION
N.T.S.



6 1500KVA PAD MOUNTED XFMR DETAIL
N.T.S.



6A SECTION
N.T.S.



6B SECTION
N.T.S.

KEYED NOTES:

- 1 SIMILAR TO DETAIL 9/U-831 WITH THE ADDITION OF ONE (1) 1" CONDUIT.
- 2 SIMILAR TO DETAIL 1/U-831 WITH THE ADDITION OF ONE (1) 1" CONDUIT.
- 3 SIMILAR TO DETAIL 5/U-831 WITH THE ADDITION OF ONE (1) 1" CONDUIT.

GENERAL NOTES:

- 1. EACH CONDUIT AT THE ENTRANCE TO PAD MOUNTED TRANSFORMER AND PAD MOUNTED SWITCH SHALL HAVE END BELLS OR BUSHINGS.
- 2. ALL CONDUITS AND FITTINGS TO BE 4" PVC, SCH 40 AND ELBOWS AT TRANSFORMERS SHALL BE RGS 24" RADIUS UNLESS NOTED OTHERWISE.
- 3. ALL DIMENSION ARE IN INCHES.
- 4. SEE TRANSFORMER/SWITCH DETAIL, 42/U-836.

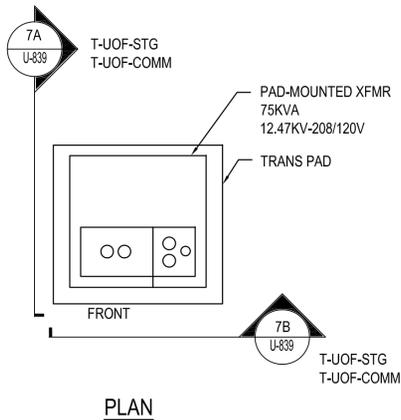
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Rev.	Date	Description
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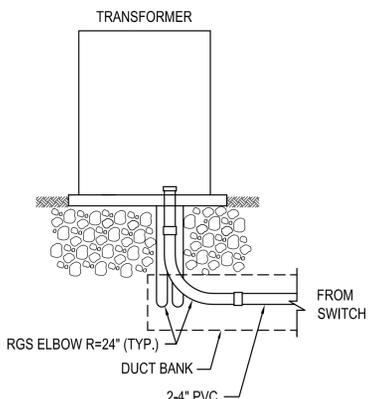
Designed by: L. CANNELL	Date: 03/08/08	Rev. a
Drawn by: C. BOBB	Scale: As Shown	File name: EBF-U839-dtl
Reviewed by:	Contract No.:	Project No.:
Submitted by:	Contract No.:	Project No.:
U.S. ARMY ENGINEER DISTRICT, FORT WORTH CORPS OF ENGINEERS FORT WORTH, TEXAS JE JACOBS/HUITT-ZOLLARS A JOINT VENTURE 200 NORTH BROADWAY FORT WORTH, TEXAS 76102 TEL: (817) 335-4800 FAX: (817) 335-2525		

ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO
ELECTRICAL DETAILS
PAD MOUNTED TRANSFORMERS

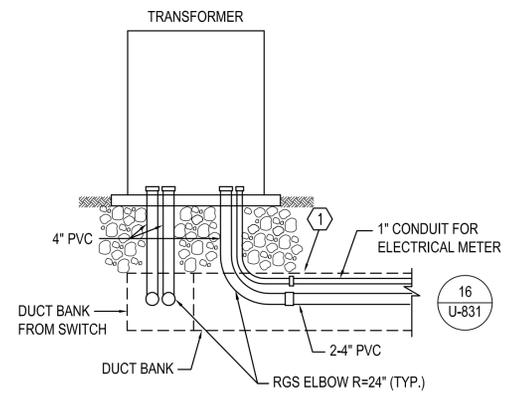
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number:
U-839
Sheet 181 of 188



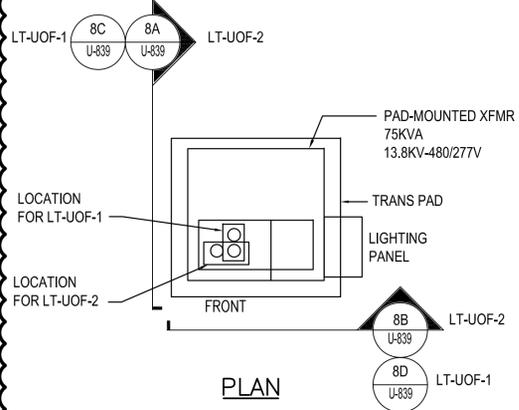
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75KVA PAD MOUNTED
XFMR DETAIL
N.T.S.



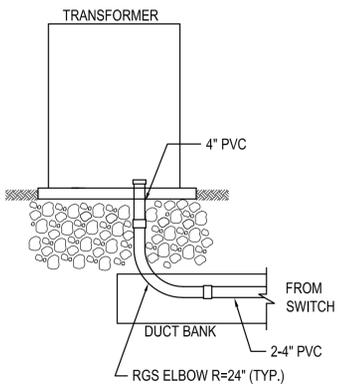
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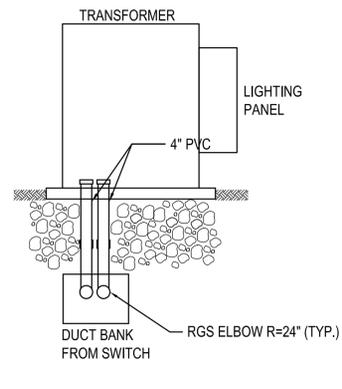
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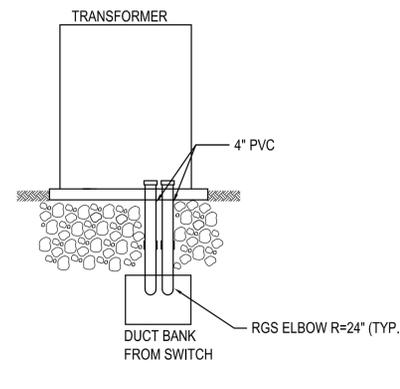
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75KVA PAD MOUNTED
LIGHTING XFMR DETAIL
N.T.S.



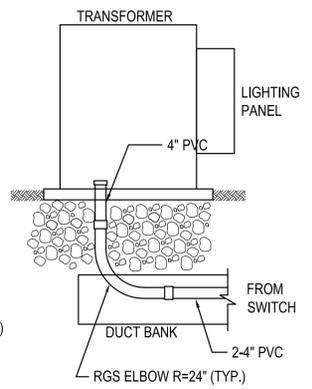
8A SECTION
N.T.S.



8B SECTION
N.T.S.



8C SECTION
N.T.S.



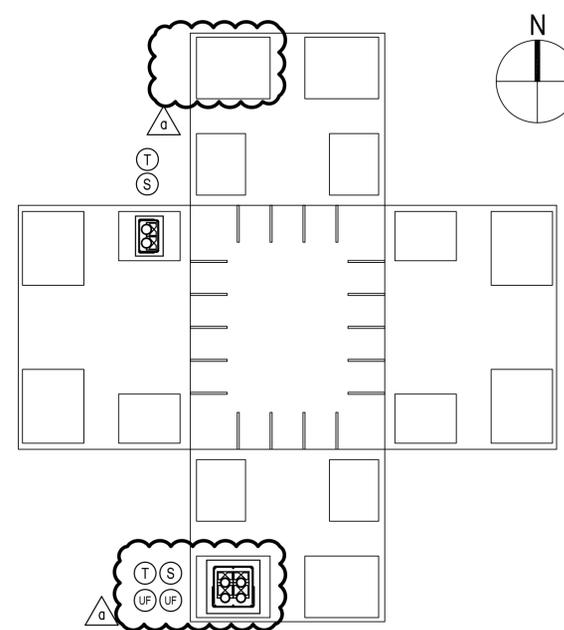
8D SECTION
N.T.S.

KEYED NOTES

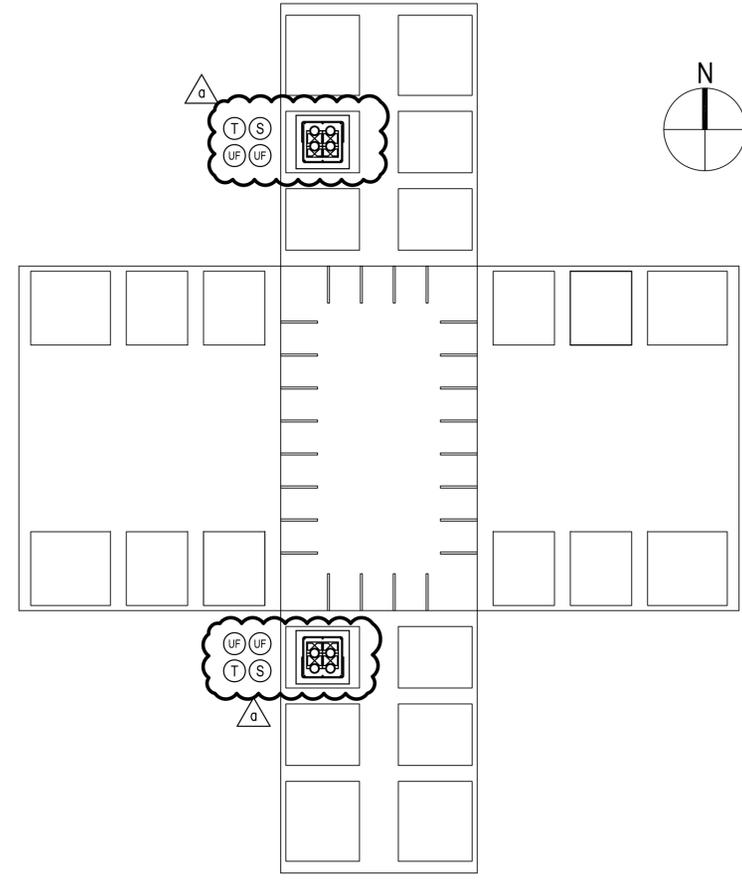
- ① SIMILAR TO DETAIL 9/U-831 WITH THE ADDITION OF ONE (1) 1" CONDUIT.
- ② SIMILAR TO DETAIL 1/U-831 WITH THE ADDITION OF ONE (1) 1" CONDUIT.

GENERAL NOTES:

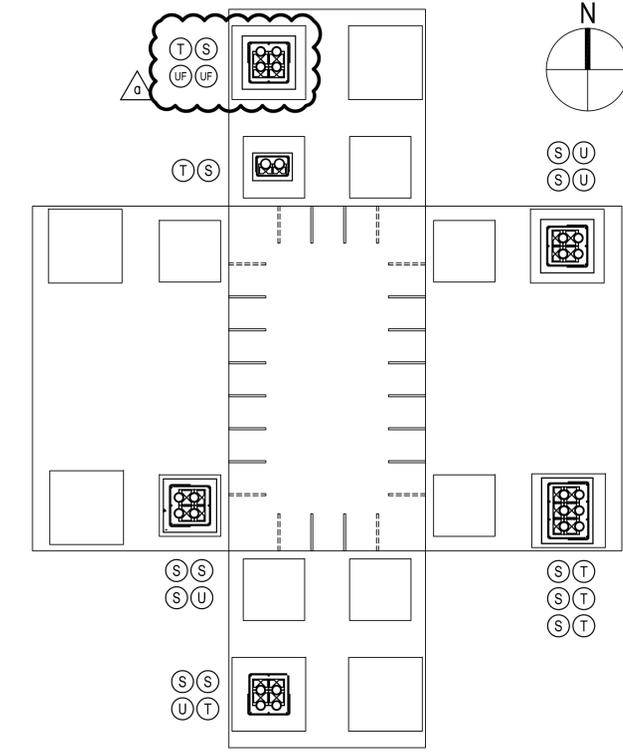
- 1. EACH CONDUIT AT THE ENTRANCE TO PAD MOUNTED TRANSFORMER AND PAD MOUNTED SWITCH SHALL HAVE END BELLS OR BUSHINGS.
- 2. ALL CONDUITS AND FITTINGS TO BE 4" PVC, SCH 40 AND ELBOWS AT TRANSFORMERS SHALL BE RGS 24" RADIUS UNLESS NOTED OTHERWISE.
- 3. ALL DIMENSION ARE IN INCHES.
- 4. SEE TRANSFORMER/SWITCH DETAIL, 42/U-836.



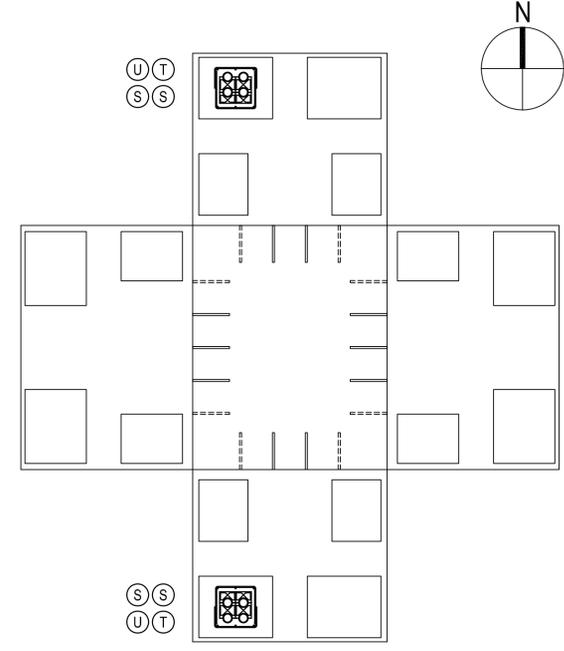
REF U-302 **1** EMH-UOF-1
N.T.S.
SIZE: 8'x10'x7' H



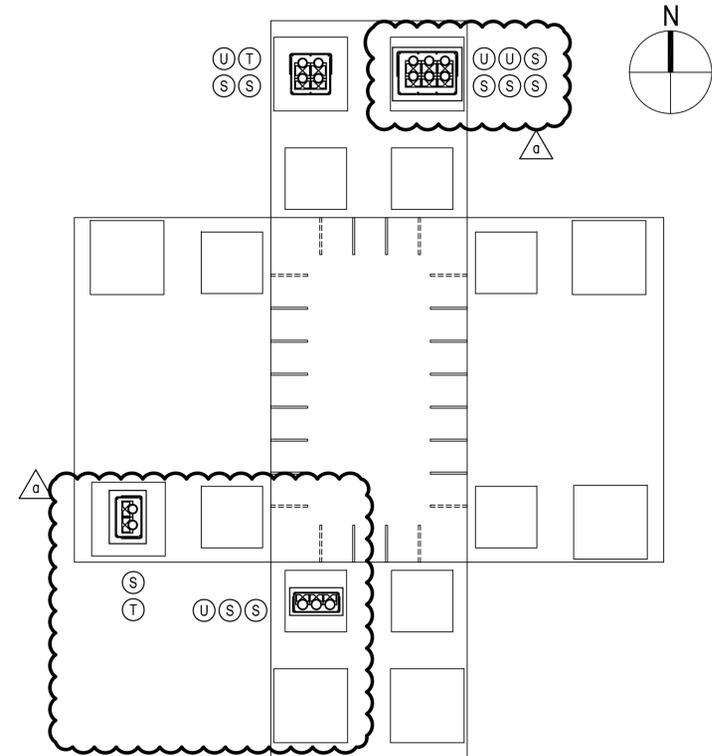
REF U-302 **2** EMH-UOF-2
N.T.S.
SIZE: 8'x14'x11' H



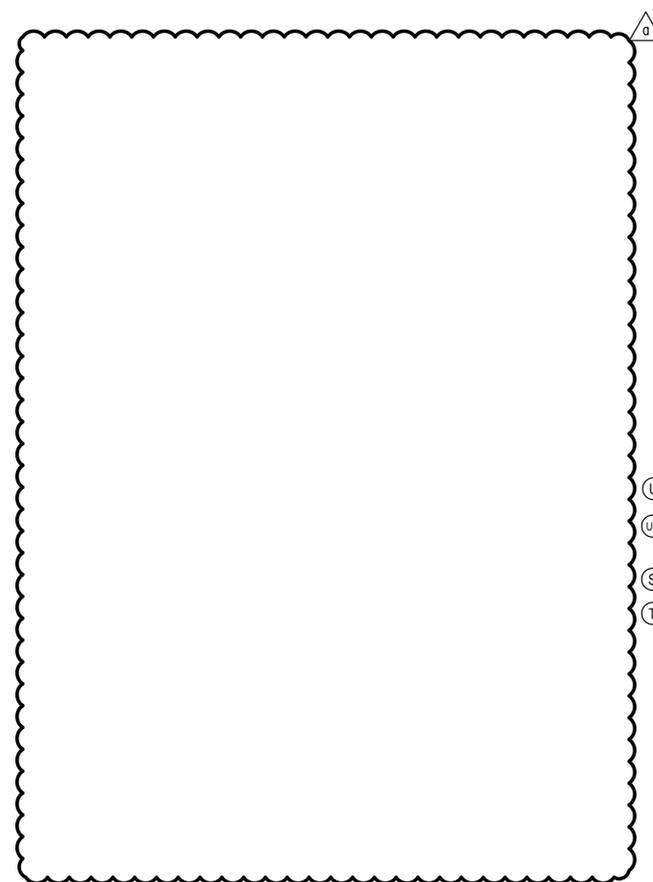
REF U-304 **3** EMH-UOF-3
N.T.S.
SIZE: 8'x14'x7' H



REF U-304 **4** EMH-UOF-4
N.T.S.
SIZE: 8'x10'x7' H



REF U-304 **5** EMH-UOF-5
N.T.S.
SIZE: 8'x14'x7' H



- LEGEND**
- (U) CABLE FOR UOF
 - (UF) FUTURE CABLE FOR UOF
 - (S) SPARE CONDUIT
 - (T) CABLE (OR FUTURE) FOR TRANSFORMER



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Rev.	Date	By	Description
1	03/25/08	L. CANNELL	REV. DETAILS AND REMOVED DETAIL

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

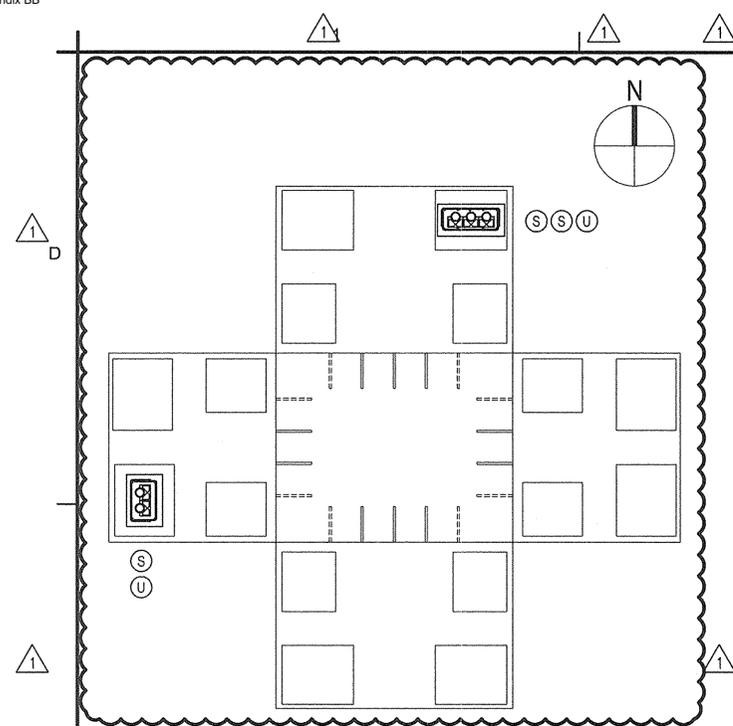
DESIGNED BY: L. CANNELL
DRAWN BY: C. BOBB
REVIEWED BY:
SUBMITTED BY: Chief

DATE: 03/20/10
SHEET NO.:
CONTRACT NO.: EBF-UB40-dll
PROJECT NO.: 03/20/10
SCALE: 1:1

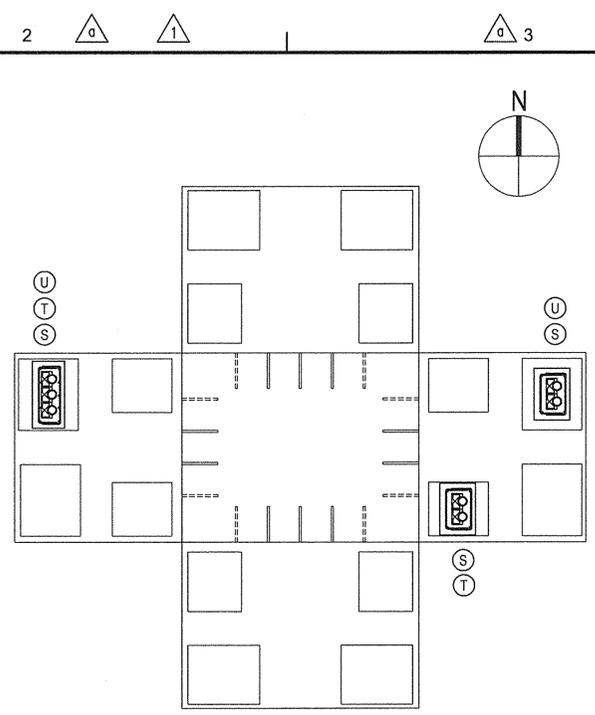
CLIENT VENDOR:
JE JACOBS/HUITT-ZOLLARS
201 NORTH BROADWAY
FORT WORTH, TEXAS 76102
TEL: (817) 335-4800
FAX: (817) 335-2525

ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

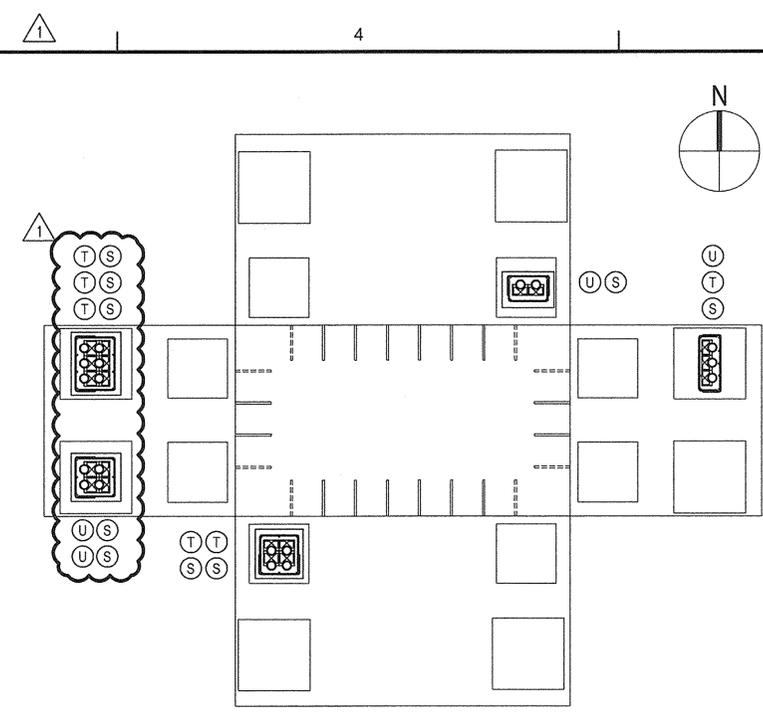
ELECTRICAL MANHOLE
FOLD-OUT DETAILS



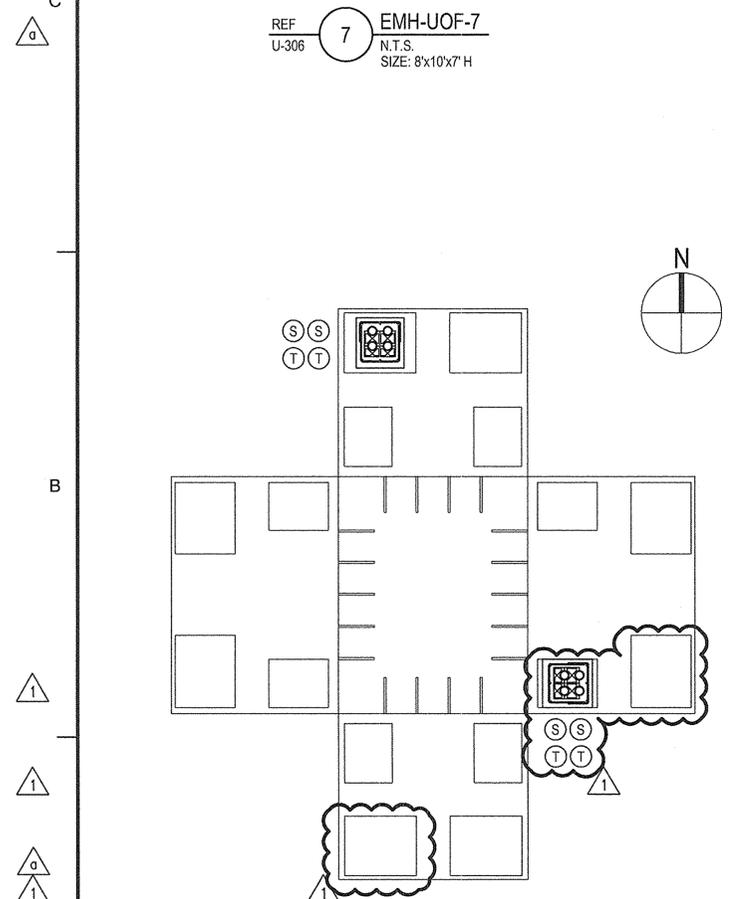
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N.T.S.
SIZE: 8'x10'x7' H



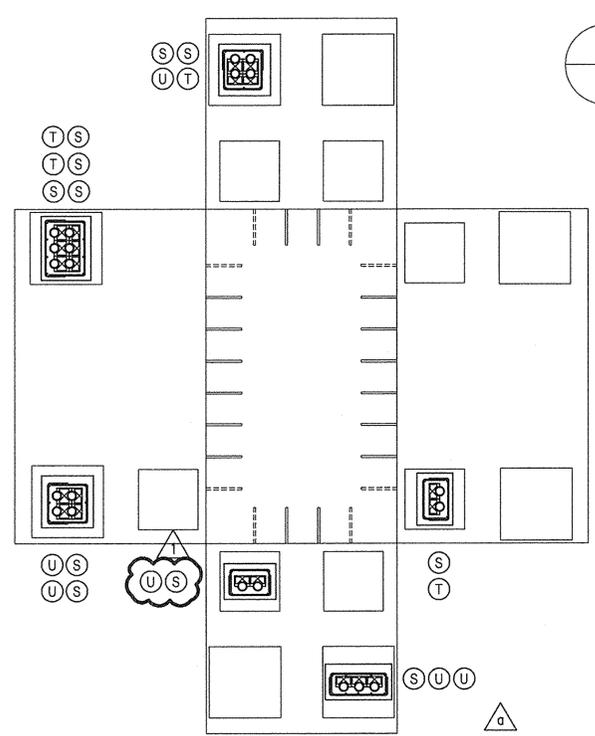
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N.T.S.
SIZE: 8'x10'x7' H



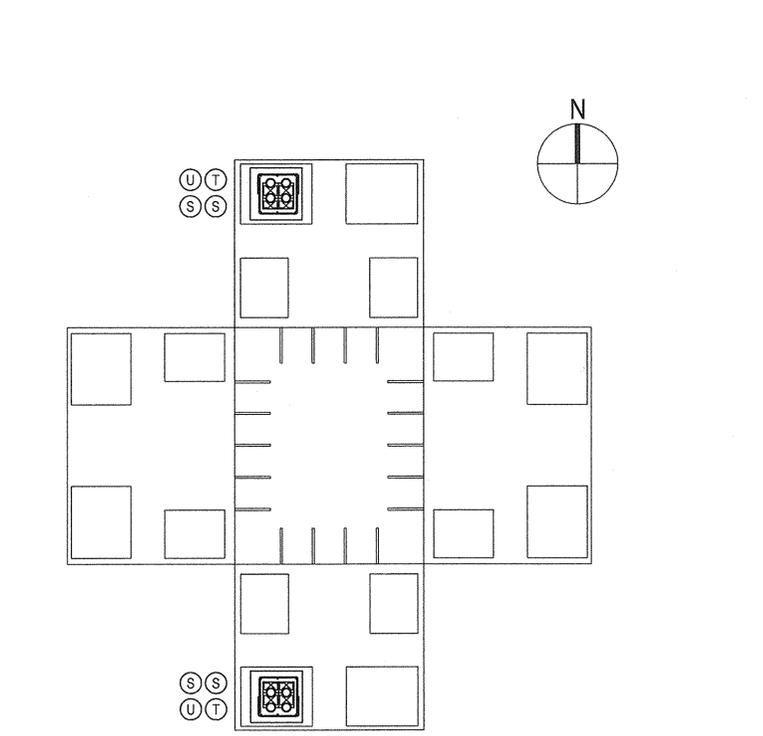
REF U-305 **9** EMH-UOF-9
N.T.S.
SIZE: 8'x14'x7' H



REF U-307 **10** EMH-UOF-10
N.T.S.
SIZE: 8'x10'x7' H



REF U-303 **11** EMH-UOF-11
N.T.S.
SIZE: 8'x14'x7' H



REF U-303 **12** EMH-UOF-12
N.T.S.
SIZE: 8'x10'x7' H

- LEGEND**
- U CABLE FOR UOF
 - S SPARE CONDUIT
 - T CABLE (OR FUTURE) FOR TRANSFORMER



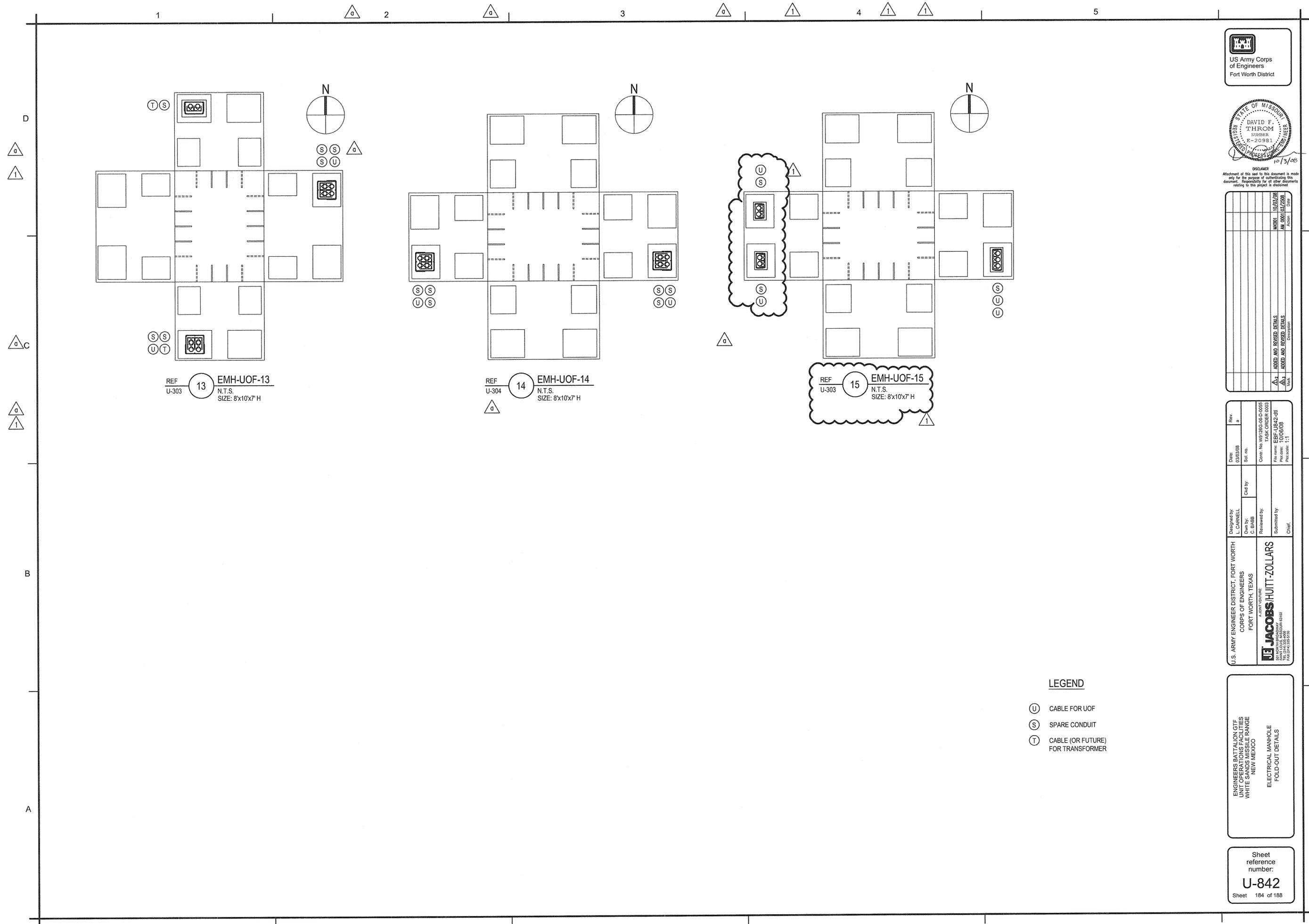
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2	10/03/08	REV. DETAILS
3	10/03/08	REV. DETAILS
4	10/03/08	REV. DETAILS
5	10/03/08	REV. DETAILS
6	10/03/08	REV. DETAILS
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12	10/03/08	REV. DETAILS
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14	10/03/08	REV. DETAILS
15	10/03/08	REV. DETAILS
16	10/03/08	REV. DETAILS
17	10/03/08	REV. DETAILS
18	10/03/08	REV. DETAILS
19	10/03/08	REV. DETAILS
20	10/03/08	REV. DETAILS

U.S. ARMY ENGINEER DISTRICT, FORT WORTH CORPS OF ENGINEERS FORT WORTH, TEXAS A JACOBS/HUITT-ZOLLARS COMPANY JACOBS/HUITT-ZOLLARS 5100 W. BECKLEY BLVD. FORT WORTH, TEXAS 76133-5100 TEL: 817-335-2100 FAX: 817-335-2100	Project No: W9126G-11-R-0057-0005 Task Order: 0003 File Name: ERF-UB41-1.dwg Plot Date: 10/03/08 Plot Scale: 1:1 Chief:
Prepared by: L. CARRELL Checked by: C. BARB	Reviewed by: Submitted by: Chief:
Date: 10/03/08	Rev. #: 1

ENGINEERS BATTALION GTF
 UNIT OPERATIONS FACILITIES
 WHITE SANDS MISSILE RANGE
 NEW MEXICO
 ELECTRICAL MANHOLE
 FOLD-OUT DETAILS

Sheet
 reference
 number:
U-841
 Sheet 183 of 188



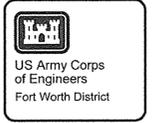
REF U-303 **13** EMH-UOF-13
N.T.S.
SIZE: 8'x10'x7' H

REF U-304 **14** EMH-UOF-14
N.T.S.
SIZE: 8'x10'x7' H

REF U-303 **15** EMH-UOF-15
N.T.S.
SIZE: 8'x10'x7' H

LEGEND

- (U) CABLE FOR UOF
- (S) SPARE CONDUIT
- (T) CABLE (OR FUTURE) FOR TRANSFORMER



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NO.	DATE	DESCRIPTION
1	10/03/06	ADDED AND REISED DETAILS
2	10/03/06	ADDED AND REISED DETAILS

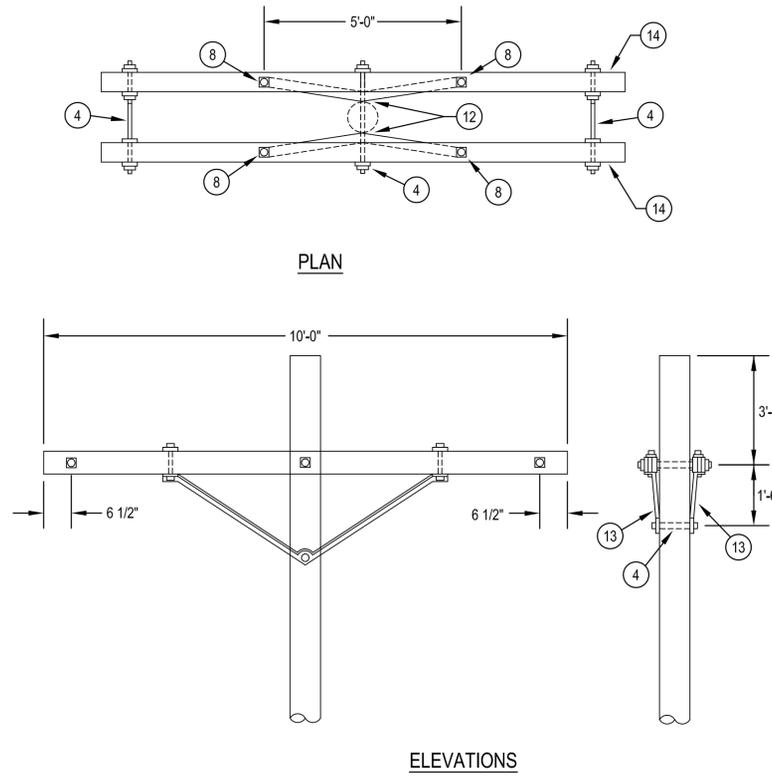
U.S. ARMY ENGINEER DISTRICT, FORT WORTH CORPS OF ENGINEERS FORT WORTH, TEXAS	DESIGNED BY: L. CARRELL	DATE: 03/03/08	REV. a
U.S. ARMY ENGINEER DISTRICT, FORT WORTH CORPS OF ENGINEERS FORT WORTH, TEXAS JACOBS/HUITT-ZOLLARS 204 W. 11TH STREET, SUITE 6302 FORT WORTH, TEXAS 76102 P.O. BOX 1328550 FTS. DTLA 1328550	DRAWN BY: C. BABB	CONTRACT NO.: W9126G-11-R-0057-0005	
	REVIEWED BY: [Signature]	CLIENT: ENGINEER DISTRICT	
	SUBMITTED BY: [Signature]	PROJECT NO.:U-303-211	
	CHIEF:	DATE:10/03/06	

ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO
ELECTRICAL MANHOLE
FOLD-OUT DETAILS

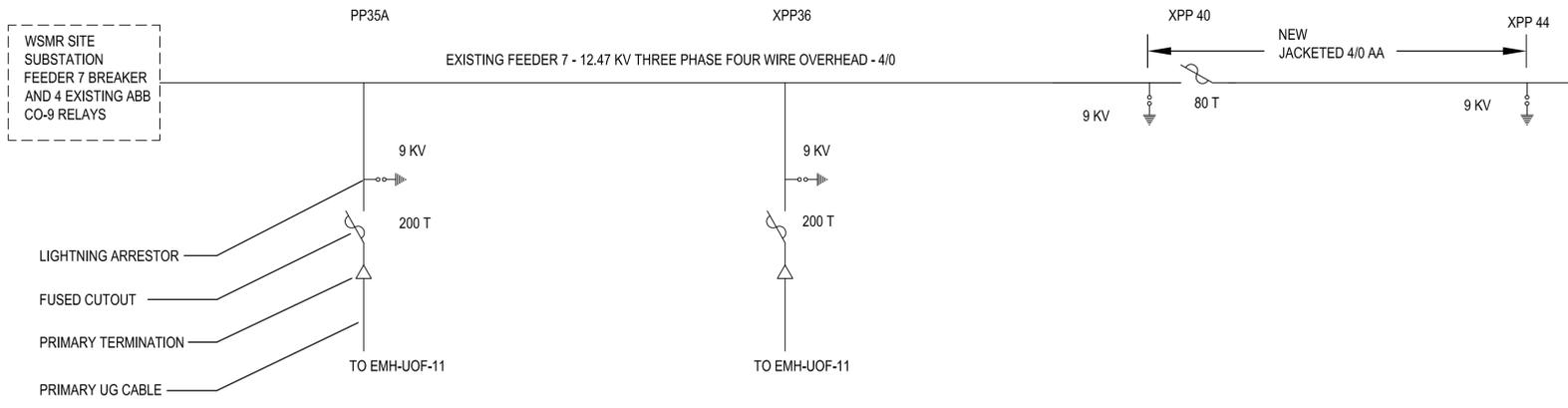
Sheet reference number:
U-842
Sheet 184 of 188

OVERHEAD ELECTRIC POLE DETAIL MATERIAL LIST

- | | |
|---|--|
| <ul style="list-style-type: none"> 1 FLAT STEEL BRACE (TWO PIECES) 2 MACHINE BOLT, 3/8" X LENGTH NEEDED WITH WASHER, NUT AND LOCKWASHER 3 8' WOOD CROSSARM WITH CROSS SECTION DIMENSIONS OF 3 1/2" X 4 1/2" 4 MACHINE BOLT, 5/8" X LENGTH NEEDED WITH WASHER, NUT AND LOCKWASHER 5 TIMBER CONNECTOR 6 LAGSCREW, 1/2" X 4" 7 ANGLE STEEL BRACE (TWO PIECES) 8 MACHINE BOLT, 1/2" X LENGTH NEEDED, WITH WASHER, NUT & LOCKWASHER 9 DEADEND BOX 10 STEEL PIN 11 PIN INSULATOR 12 GRID GAIN, USED ONLY WHEN THERE IS NO POLE GAIN 13 ANGLE STEEL BRACE (ONE PIECE) 14 10' WOOD CROSSARM WITH CROSS SECTION DIMENSIONS OF 3 1/2" X 4 1/2" 15 5/8" EYE NUT 16 5/8" EYE BOLT, LENGTH AS NEEDED, WITH WASHER, NUT & LOCKWASHER 17 EXTENSION LINK 18 BELL TYPE SUSPENSION INSULATOR WITH CONNECTING HARDWARE 19 STRAIN CLAMP 20 STEEL ANGLE PIN 21 CLUSTER MOUNTING BRACKET, STEEL 22 TRANSFORMER GROUNDING CONNECTION 23 STIRRUP 24 SECONDARY LEAD SUPPORT BRACKET 25 ADAPTER PLATE FOR CLUSTER MOUNTING 26 CLEVIS BRACKET FOR SPOOL INSULATOR 27 SPOOL INSULATOR 28 U BOLT CLAMP 29 PREFORMED GUY GRIP 30 GUY HOOK 31 GUY STRAIN INSULATOR 32 GUY WIRE, SIZE AS SPECIFIED 33 #4 WP CU. SOFT DRAWN GROUND WIRE 34 GROUND CLAMP 35 CONDUIT COUPLING 36 CONDUIT BEND 37 INSULATED BUSHING 38 PERFORATED STRAPPING, 1-1/2" WIDE 39 HOT LINE CLAMP 40 FUSED CUTOUT, AS SPECIFIED 41 SURGE ARRESTER, AS SPECIFIED 42 POLE TOP PIN (RIDGE PIN) - 24 INCHES LONG 43 CROSSARM ANGLE PIN 44 ANGLE POLE TOP PIN | <ul style="list-style-type: none"> 45 WEATHERPROOF SOFT DRAWN WIRE-SIZE
(a) TO MATCH OR EXCEED AMPACITY OF CONNECTING CABLE, OR
(b) AT 125% OF TRANSFORMER FULL LOAD CURRENT, BUT NOT LESS THAN NO. 4 AWG 46 TRI-MOUNT BRACKET 47 TERMINATOR 48 MOUNTING BRACKET 49 CABLE GRIP HANGER 50 HOSE CLAMP 51 STUD, 3/4" X 1-3/4" 52 LINE POST INSULATOR 53 TRIPLE INSULATOR BRACKET 54 ANGLE CLAMP 55 INSULATOR, LINE POST CLAMP 56 4" CROSSARM 57 CROSSARM GAIN BRACKET 58 PULLEY BRACKET 59 WEDGE CLAMP 60 MIDSPAN SERVICE CLAMP 61 STUD, 7" 62 SADDLE, ANGLE 63 SADDLE CROSSARM 64 FITTING, POLE TOP 65 CONNECTOR 66 SUSPENSION CLAMP 67 TIE, SERVICE CABLE 68 54" FIBERGLASS STRAIN INSULATOR 69 PVC RISER SHIELD 70 PVC EXTENSION SHIELD 71 PVC BACK PLATE 72 8' WOOD CROSSARM WITH CROSS SECTION DIMENSIONS OF 4 3/4" X 5 3/4" 73 10' WOOD CROSSARM WITH CROSS SECTION DIMENSIONS OF 4 3/4" X 5 3/4" 74 BACK-UP CURRENT LIMITING FUSE 75 GROUND COVER 76 INSULATOR COVER 77 LIGHTNING ARRESTER COVER 78 FUSED CUTOUT COVER 79 TERMINATION COVER 80 BIRD DIVERTER 81 STATIC WIRE ATTACHMENT-TANGENT 82 STATIC WIRE ATTACHMENT-DEADEND |
|---|--|



1 DOUBLE ARM 10' ANGLE BRACKET DETAIL
N.T.S.



OVERHEAD ONE-LINE DIAGRAM
N.T.S.

ACA CONDUCTOR ACCESSORIES, SAG AND TENSION DATA

Hendrix Sag & Tension Data
4/0 AAAC 15 KV Tree Wire

Special Wire Area= .1939 Dia= .893 Wt= .419 lb/ft RTS= 8560

Area= .1939 Sq. in Dia= .893 in Wt= .419 lb/ft RTS= 8560 lb
Data from Chart No. 1-1068
English Units
Using Exact Catenary Equations

Span= 192.0 feet NESC Medium Load Zone		Creep IS a Factor		Design Points		Final		Initial	
Temp	Ice	Wind	K	Weight	Sag	Tension	RTS	Sag	Tension
F	in	psf	lb/ft	lb/ft	ft	lb	%	ft	lb
15.25	4.00	.20	1.103	3.46	1472.172	3.39	1500.175*	32.25	0.00
32.25	0.00	.00	.774	3.78	1047.122	3.59	1101.12.9	0.00	0.00
0.00	0.00	.00	.419	2.17	889.104	1.93	1003.11.7	15.00	0.00
15.00	0.00	.00	.419	2.53	764.89	2.22	870.10.2	30.00	0.00
30.00	0.00	.00	.419	2.89	670.78	2.53	763.8.9	60.00	0.00
60.00	0.00	.00	.419	3.56	544.63	3.16	611.7.1	90.00	0.00
90.00	0.00	.00	.419	4.17	464.54	3.77	514.6.0	120.00	0.00
120.00	0.00	.00	.419	4.72	410.49	4.32	447.5.2	167.00	0.00
167.00	0.00	.00	.419	5.49	353.41	5.12	378.4.4	212.00	0.00
212.00	0.00	.00	.419	6.15	315.37	5.80	334.3.9		

* Design Condition

Span= 202.0 feet NESC Medium Load Zone		Creep IS a Factor		Design Points		Final		Initial	
Temp	Ice	Wind	K	Weight	Sag	Tension	RTS	Sag	Tension
F	in	psf	lb/ft	lb/ft	ft	lb	%	ft	lb
15.25	4.00	.20	1.103	3.82	1474.172	3.76	1500.175*	32.25	0.00
32.25	0.00	.00	.774	3.78	1047.122	3.59	1101.12.9	0.00	0.00
0.00	0.00	.00	.419	2.51	852.10.0	2.23	960.11.2	15.00	0.00
15.00	0.00	.00	.419	2.88	743.87	2.54	841.9.8	30.00	0.00
30.00	0.00	.00	.419	3.24	660.77	2.87	745.8.7	60.00	0.00
60.00	0.00	.00	.419	3.93	545.64	3.52	608.7.1	90.00	0.00
90.00	0.00	.00	.419	4.54	471.55	4.14	518.6.0	120.00	0.00
120.00	0.00	.00	.419	5.11	419.49	4.71	455.5.3	167.00	0.00
167.00	0.00	.00	.419	5.90	363.42	5.52	388.4.5	212.00	0.00
212.00	0.00	.00	.419	6.58	326.38	6.22	345.4.0		

* Design Condition



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Rev.	Date	Description
1	03/25/08	NEW IRWIN

Designed by: R. LEINBACH
 Drawn by: R. DEATON
 Reviewed by: EBF-JURSO-dll
 File name: 03/20/10
 No date: 03/20/10
 No scale: 1:1

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
 CORPS OF ENGINEERS
 FORT WORTH, TEXAS

JE JACOBS/HUIT-ZOLLARS
 CONSULTING ENGINEERS
 501 NORTH BROADWAY
 FORT WORTH, TEXAS 76102
 TEL: (817) 335-4400
 FAX: (817) 335-2525

ENGINEERS BATTALION GTF
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 WHITE SANDS MISSILE RANGE
 NEW MEXICO

ELECTRICAL DETAILS
 OVERHEAD LINES AND POLES

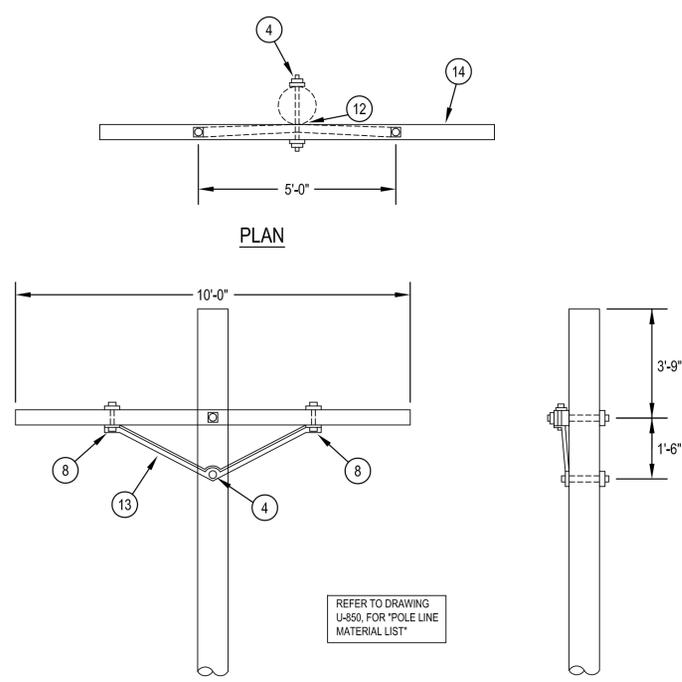
Sheet
 reference
 number:
U-850
 Sheet 184a of 188

D

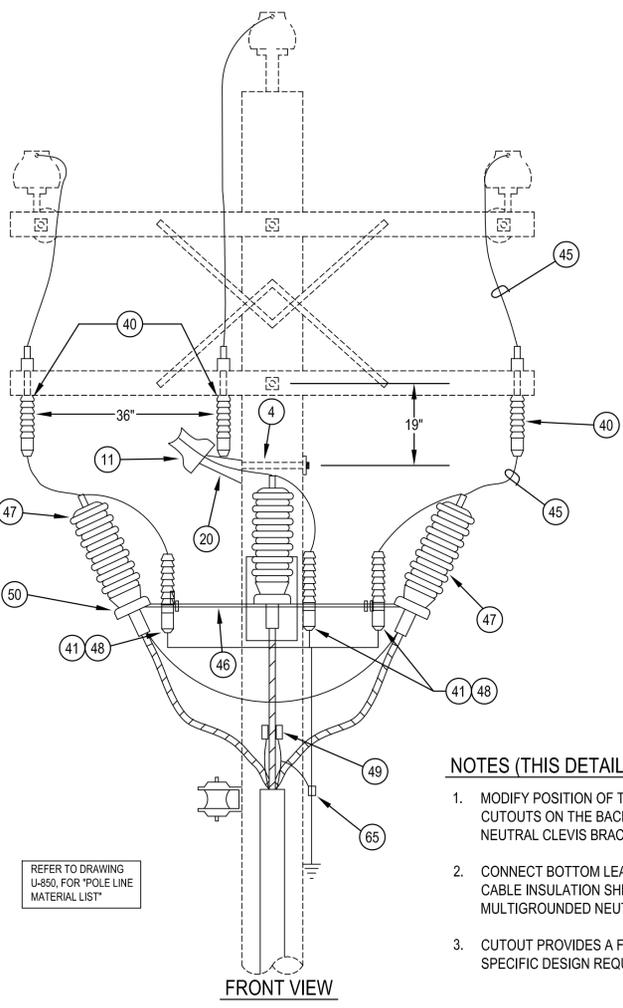
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B

A

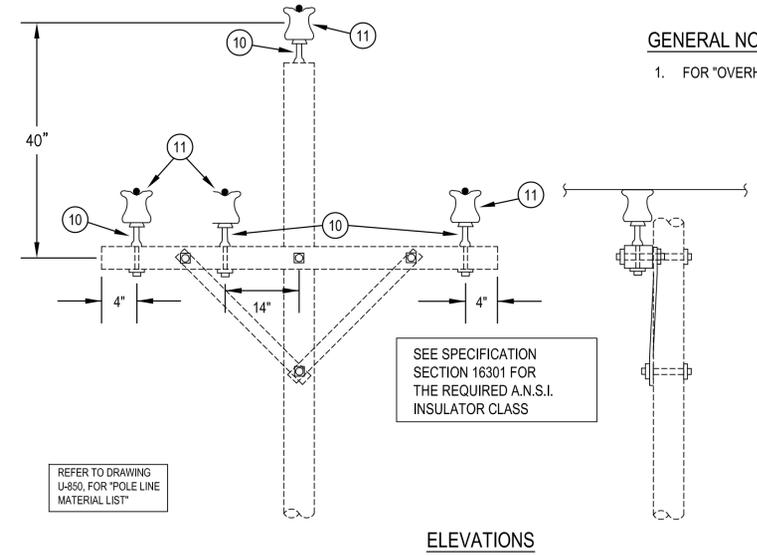


2 SINGLE ARM 10' ANGLE BRACKET DETAIL
N.T.S.



- NOTES (THIS DETAIL ONLY)**
1. MODIFY POSITION OF TERMINAL ON DEADENDS TO BE UNDER THE CONDUCTORS AND THE CUTOUTS ON THE BACKSIDE OF CROSSARM. POLE RISER MUST BE OFFSET TO CLEAR NEUTRAL CLEVIS BRACKET.
 2. CONNECT BOTTOM LEAD OF ARRESTER DIRECTLY TO POLE GROUND. INTERCONNECT CABLE INSULATION SHIELD DRAIN WIRES AND CONDUIT RISER GROUND TO MULTIGROUNDED NEUTRAL (IF EXISTING) AND POLE GROUND.
 3. CUTOUT PROVIDES A FUSE OR A SOLID BLADE (NON-FUSED) OPTION. COORDINATE WITH SPECIFIC DESIGN REQUIREMENTS PROVIDED.

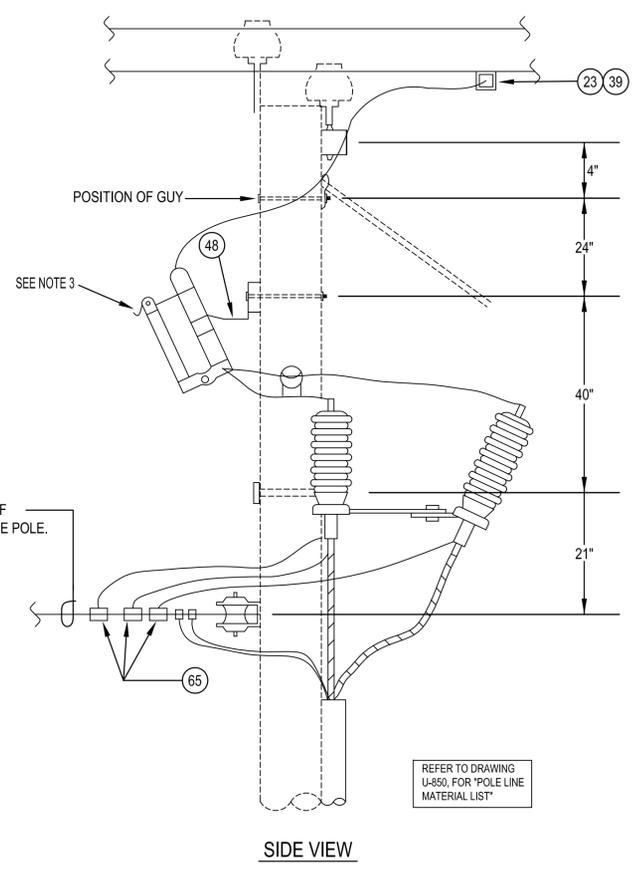
4 U.G. TERMINAL
N.T.S.



3 OVERHEAD ELECTRIC POLE DETAIL
N.T.S.

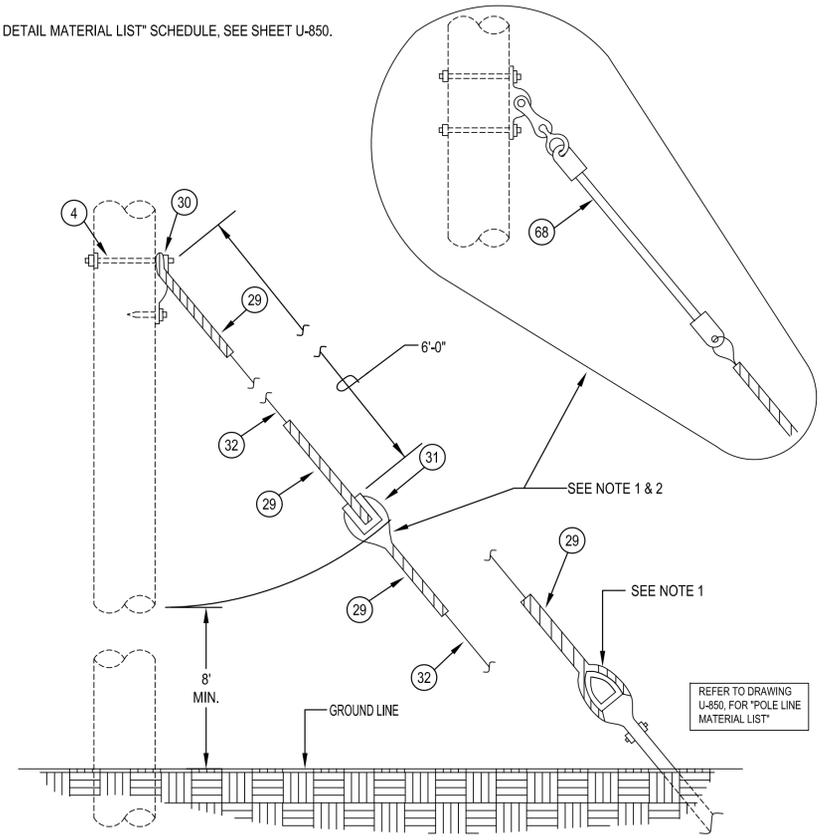
- NOTES**
1. DRAWING REPRESENTS SYMBOL 15F3 PHASE CONDUCTORS.
 2. REFERENCE DETAIL 2/U-851 FOR CROSS ARM.
 3. REFERENCE DETAIL 9/U-852 FOR GROUNDING.
 4. REFERENCE DETAIL 5/U-851 FOR GUYING.

GENERAL NOTE:
1. FOR "OVERHEAD ELECTRIC POLE DETAIL MATERIAL LIST" SCHEDULE, SEE SHEET U-850.



- NOTES (THIS DETAIL ONLY)**
1. COORDINATE INSTALLATION WITH ANCHOR AS SPECIFIED.
 2. UTILIZE ITEM (68) , (8) FOR ALL GUYING APPLICATIONS.
 2. BOND ALL GUYS AND CONNECT TO POLE GROUND AND SYSTEM NEUTRAL.

5 GUY DETAIL
N.T.S.



US Army Corps of Engineers
Fort Worth District



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Rev.	Date	Description
1	03/25/08	NEW IRWIN

Designed by:	R. LEINBACH
Drawn by:	R. DEATON
Reviewed by:	
Submitted by:	
Chief:	

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

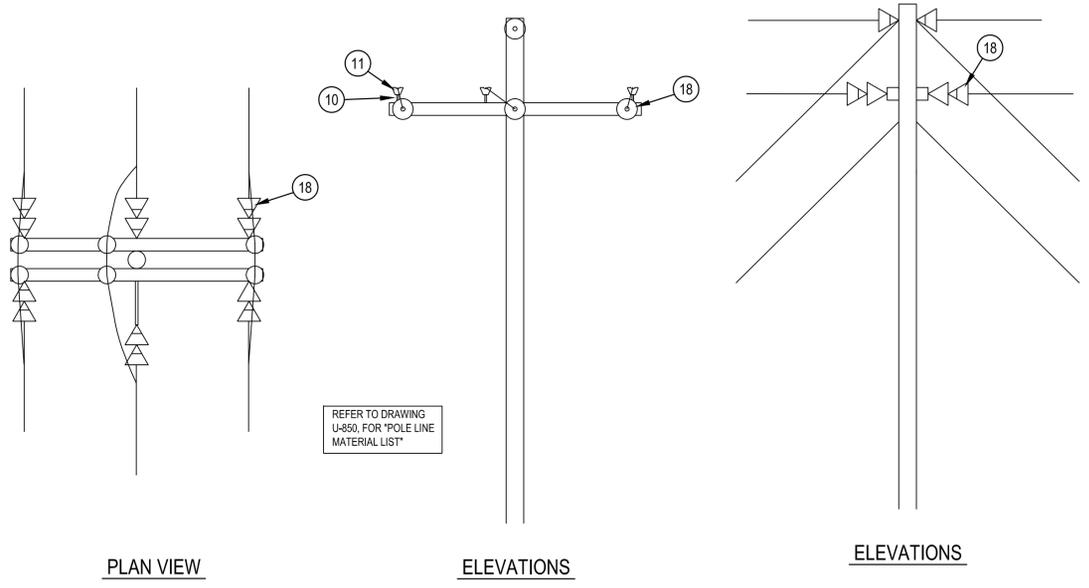
CLIENT VENDOR
JE JACOBS/HUITT-ZOLLARS
200 NORTH BROADWAY
FLOOR 1000
DALLAS, TEXAS 75201
TEL: (214) 355-4800
FAC: (214) 355-2525

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ELECTRICAL DETAILS
OVERHEAD LINES AND POLES

Sheet
reference
number:
U-851
Sheet 184b of 188

D



PLAN VIEW

ELEVATIONS

ELEVATIONS

PLAN VIEW

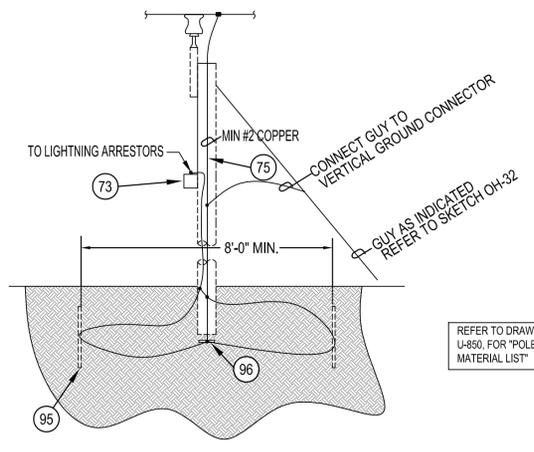
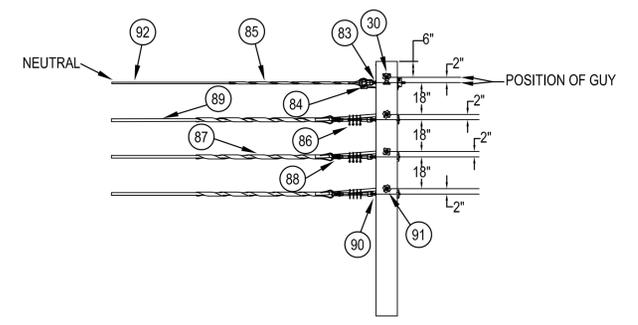
ELEVATIONS

ELEVATIONS

6 DOUBLEARM DEADEND (DADE) - DETAIL
N.T.S.

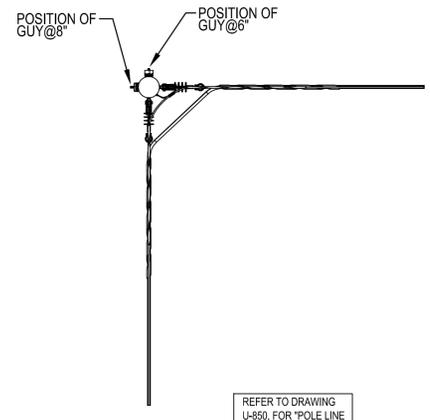
7 TWO DOUBLEARM DEADEND (DADE) - DETAIL
N.T.S.

C

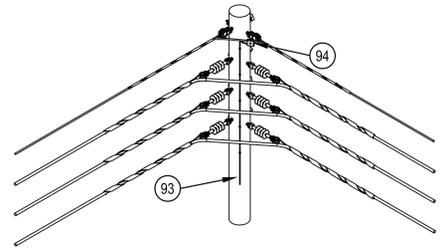


9 GROUNDING DETAIL
N.T.S.

B



REFER TO DRAWING U-850, FOR "POLE LINE MATERIAL LIST"



NOTES
1. REFER TO GROUNDING DETAIL (OH-99)

8 VERTICAL TURN - DETAIL
N.T.S.

A



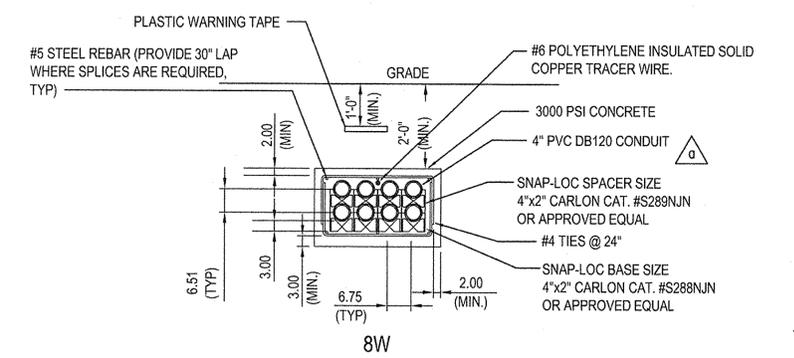
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Rev.	Date	By	Description
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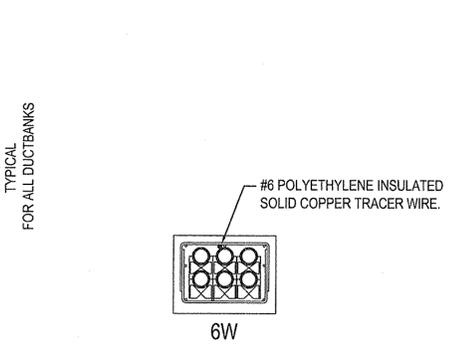
Designed by: R. LEINBACH	Date: 02/08/08	Rev. a
Drawn by: R. DEATON	Scale:	
Reviewed by:	Contract No.:	
Submitted by:	File name:	
Chief:	Project No.:	
U.S. ARMY ENGINEER DISTRICT, FORT WORTH CORPS OF ENGINEERS FORT WORTH, TEXAS PROJECT VENTURE JE JACOBS/HUITT-ZOLLARS 201 NORTH BROADWAY FORT WORTH, TEXAS 76102 TEL: (817) 335-4000 FAX: (817) 335-2525		

ENGINEERS BATTALION GTF
UNIT OPERATIONS FACILITY
WHITE SANDS MISSILE RANGE
NEW MEXICO
ELECTRICAL DETAILS
OVERHEAD LINES AND POLES

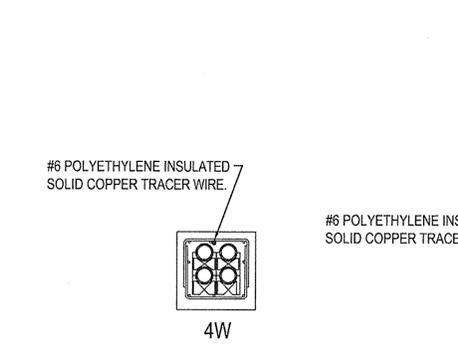
Sheet reference number:
U-852
Sheet 184c of 188



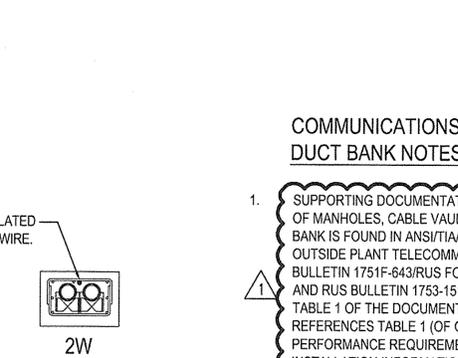
1 COMMUNICATIONS DUCTBANK SECTION
N.T.S.



2 COMMUNICATIONS DUCTBANK SECTION
N.T.S.



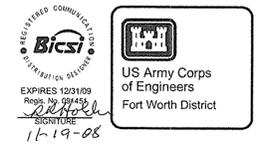
3 COMMUNICATIONS DUCTBANK SECTION
N.T.S.



4 COMMUNICATIONS DUCTBANK SECTION
N.T.S.

COMMUNICATIONS DUCT BANK NOTES

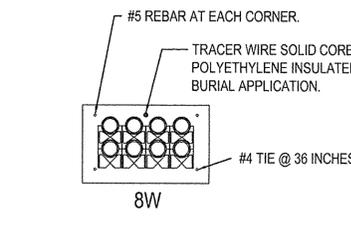
- SUPPORTING DOCUMENTATION FOR DESIGN AND CONSTRUCTION OF MANHOLES, CABLE VAULTS AND COMMUNICATIONS DUCT BANK IS FOUND IN ANSI/TIA/EIA-758, BICSI CUSTOMER OWNED OUTSIDE PLANT TELECOMMUNICATIONS CABLING STANDARD; RUS BULLETIN 1751F-643/RUS FORM 515C; RUS BULLETIN 1751F-644; AND RUS BULLETIN 1753-151. FOR A COMPLETE LISTING SEE TABLE 1 OF THE DOCUMENT TR NO. AMSEL-IE-T109-001-7. 3.2 REFERENCES TABLE 1 (OF OSPDR) OUTSIDE PLANT DESIGN AND PERFORMANCE REQUIREMENTS AND THE TECHNICAL GUIDE FOR INSTALLATION INFORMATION INFRASTRUCTURE ARCHITECTURE (THE ISA).
- COMMUNICATIONS DUCT BANK SHALL ENTER THE LOWEST AVAILABLE WINDOW OF THE MANHOLE.
- OBTAIN THE SIGNATURE OF THE U.S. GOVERNMENT QC/QA REPRESENTATIVE SIGNIFYING THE ACCEPTABILITY OF THE DUCT PLACEMENT AND SPACING PRIOR TO POURING ANY CONCRETE FOR THE DUCT BANK
- INSTALL A PERMANENT TRACER WIRE, MINIMUM 30 MM, POLYETHYLENE INSULATED FOR BURIED APPLICATION, CENTRICALLY LOCATED IN THE TOP CONDUIT FORMATION OF EACH COMMUNICATIONS DUCT BANK AND CORRESPONDING STUB OUTS. THE TRACER WIRE SHALL BE INSTALLED THROUGH THE MANHOLE. COMPRESSION TYPE CONNECTORS SHALL BE USED FOR ALL SPLICES. TEST THE WIRE FOR CONTINUITY AFTER INSTALLATION AND PROVIDE THE TEST RESULTS WITH THE AS BUILT DOCUMENTS.
- JOINTS BETWEEN NON-IDENTICAL DUCT BANK COMPONENTS SHALL USE THE APPROPRIATE CONNECTORS SPECIFICALLY DESIGNED FOR THE PURPOSE.
- DUCT SHALL BE RUN AS STRAIGHT AS POSSIBLE BETWEEN MANHOLES TO MINIMIZE SIDE WALL PRESSURE DURING CABLE INSTALLATION. DO NOT MAKE ANY UNNECESSARY DIRECTION CHANGES. MINIMUM SLOPE DUCT BANKS 4 INCHES PER 100 FEET TOWARD EACH MANHOLE.
- DUCT BANK SHALL HAVE A MINIMUM OF 24 INCHES OF COVER AT FINAL GRADE. DUCT BANK SHALL VERTICALLY CLEAR OTHER UTILITIES BY 6 INCHES.
- CHANGES IN DIRECTION OF RUNS EXCEEDING A TOTAL OF 10 DEGREES, EITHER VERTICALLY OR HORIZONTALLY ARE TO BE ACCOMPLISHED WITH LONG SWEEPING BENDS HAVING A MINIMUM RADIUS OF 25 FEET. BENDS ARE NOT TO CHANGE THE INTERNAL DIAMETER OF THE DUCT. THERE SHALL BE NO MORE THAN THE EQUIVALENT OF TWO 90 DEGREE BENDS TOTALING 180 DEGREES BETWEEN PULL POINTS INCLUDING OFFSETS AND KICKS. BACK TO BACK 90 DEGREE BENDS ARE TO BE AVOIDED.
- THE TRANSITIONING OF DUCTS FROM LOWER MANHOLES DUCT WINDOW TO THE NOMINAL TRENCH DEPTH SHALL BE ACCOMPLISHED NO LESS THAN 30 FEET FROM THE MANHOLES TO REDUCE THE RADIUS OF THE BENDS.
- INSTALL A PULL STRING RATED AT LEAST 200 LBS TENSILE STRENGTH AFTER DUCTS HAVE UNDERGONE CLEANING. VACANT DUCTS SHALL ALSO BE SEALED WITH A MECHANICALLY-EXPANDABLE, REUSABLE RUBBER PLUG.



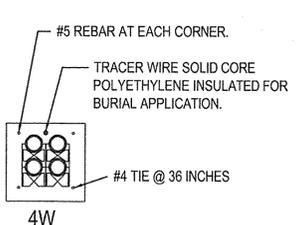
Attachment of this seal to this document is made only for the purpose of substantiating the document. Responsibility for all other documents relating to this project is disclaimed.

Rev.	Date	Description
1	10/03/08	ADD DUCT BANK DETAIL & MODIFIED NOTE
	11/19/08	REV. DETAILS & DUCT BANK SCHEDULE

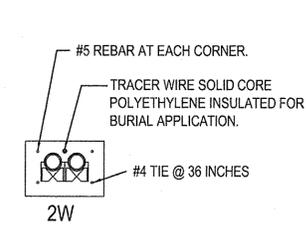
Designed by: R. HOLDER	Checked by: K. DEAYON	Reviewed by: K. DEAYON	Submitted by: K. DEAYON
Date: 03/03/08	Scale: As Shown	Contract No. W9126G-08-D-0005	Task Order No. 0003
U.S. ARMY ENGINEER DISTRICT, FORT WORTH, TEXAS		J. JACOBS/HUITZ-ZOLLARS	



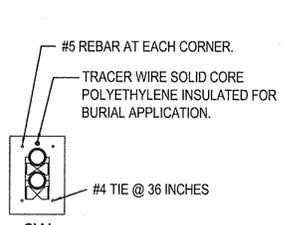
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N.T.S.



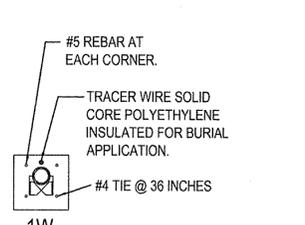
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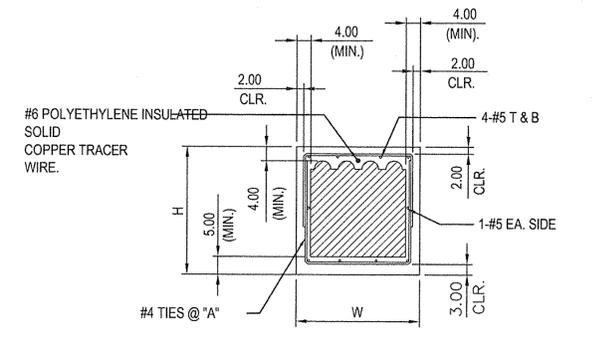
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N.T.S.



8 COMMUNICATIONS DUCTBANK SECTION MINIMUM REINFORCEMENT
N.T.S.



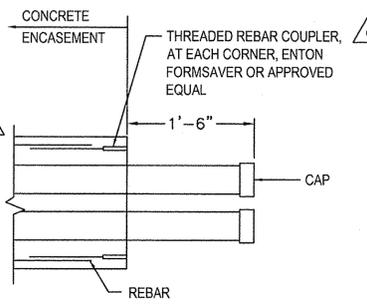
9 COMMUNICATIONS DUCTBANK SECTION MINIMUM REINFORCEMENT
N.T.S.



10 COMMUNICATIONS DUCTBANK REINF. UNDER ROADS & TANK TRAILS
N.T.S.

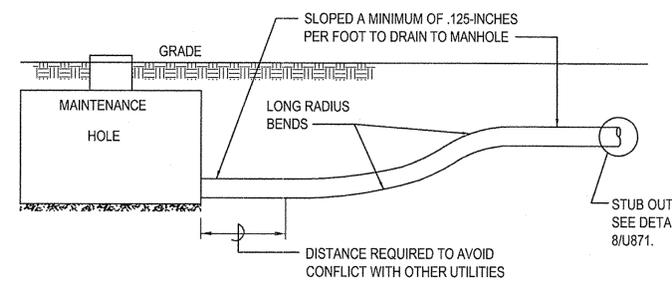
NOTES:

- PROVIDE REINFORCING WHERE DUCTBANKS PASS UNDER ROADS AND TANK TRAILS.
- REINFORCEMENT TO EXTEND 10' PAST EACH SIDE OF ROADWAY AND TANK TRAIL.

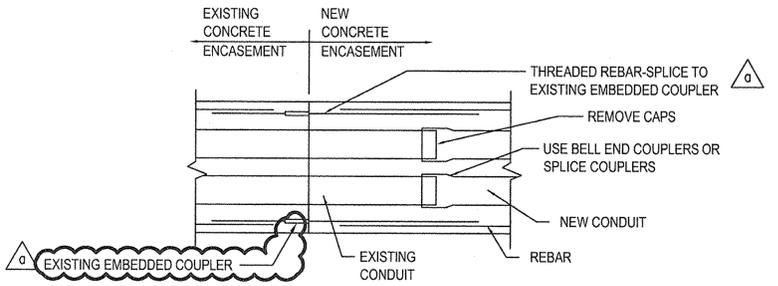


11 TYPICAL DUCTBANK STUB-OUT DETAIL
N.T.S.

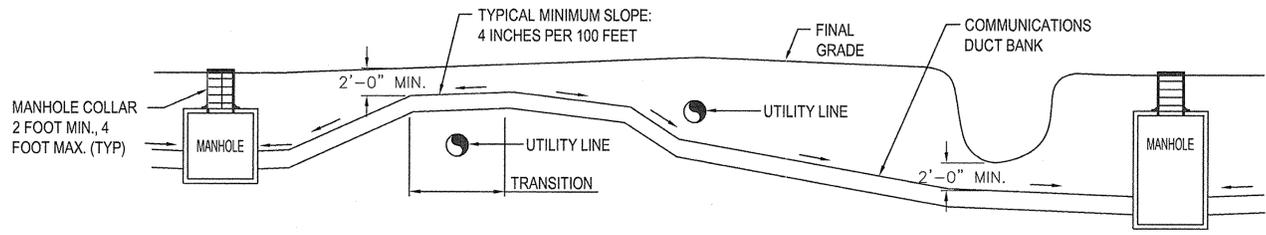
DUCT BANK	W	H	"A"
1	3'-0"	2'-0"	12"
2	2'-6"	2'-0"	9"
3	2'-0"	2'-0"	9"
4	2'-0"	1'-6"	6"



12 TYPICAL DUCTBANK STUB-OUT AT MAINTENANCE HOLE
N.T.S.



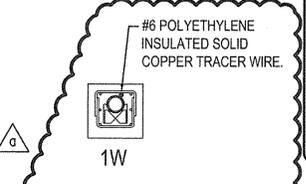
13 TYPICAL DUCTBANK CONNECTION DETAIL
N.T.S.



14 TYPICAL DUCTBANK INSTALLATION
N.T.S.

NOTE:

THE TERMS MANHOLE AND MAINTENANCE HOLE ARE INTERCHANGEABLE.

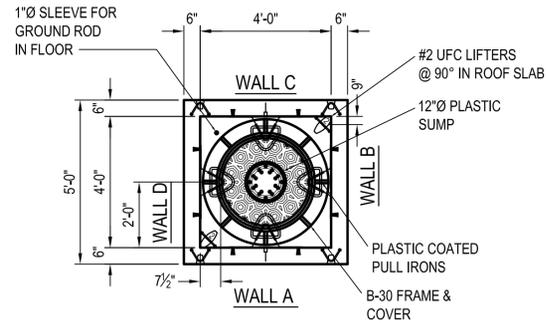


15 COMMUNICATIONS DUCTBANK SECTION
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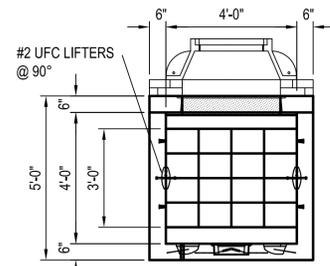
ENGINEERS ATTENTION: QTE UNIT OPERATIONS FACILITIES WHITE SANDS MISSILE RANGE NEW MEXICO

COMMUNICATIONS DETAILS DUCTBANK SECTIONS

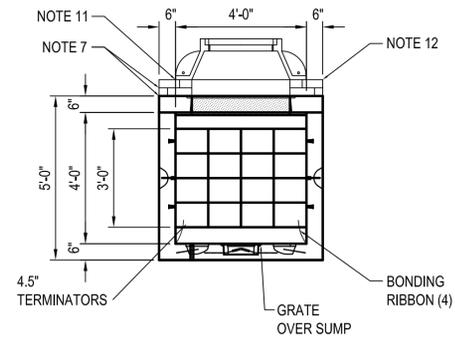
Sheet reference number:
U-871
Sheet 185 of 188



PLAN VIEW



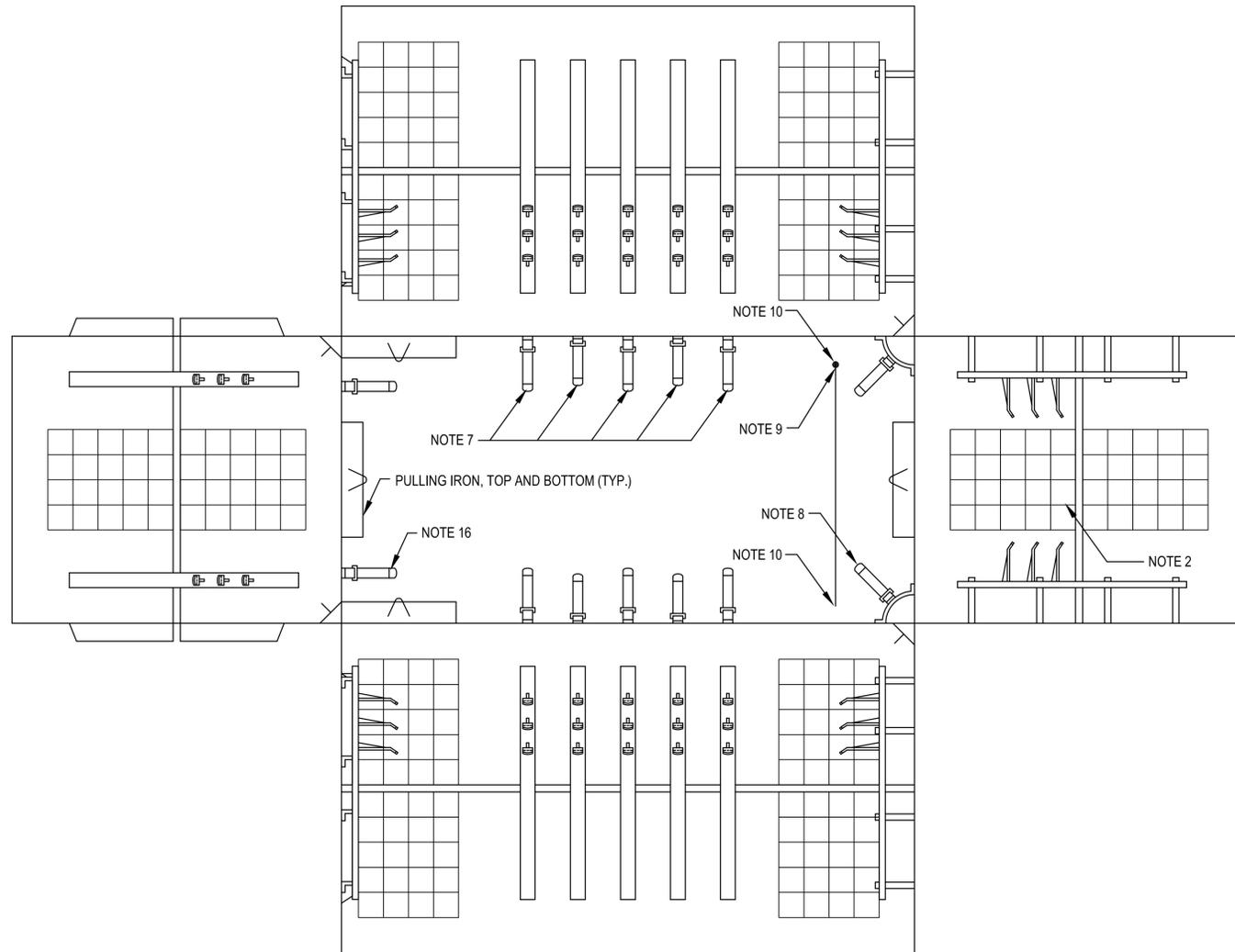
WALL A & C



WALL B & D

STANDARD HANDHOLE (4'W x 4'L x 5'H)

N.T.S.



STANDARD MANHOLE (6'W x 12'L x 7'H)

N.T.S.

SEE GENERAL NOTES SHEET U-873

NOTE:
THE ABBREVIATION HH AND HANDHOLE ARE INTERCHANGEABLE.

COMMUNICATIONS HANDHOLE SYSTEM GENERAL NOTES

1. SUPPORTING DOCUMENTATION FOR DESIGN AND CONSTRUCTION OF MANHOLES/HANDHOLES, CABLE VAULTS, AND COMMUNICATIONS DUCTBANK IS FOUND IN ANSI/TIA/EIA-758, BICSI CUSTOMER OWNED OUTSIDE PLANT TELECOMMUNICATIONS CABLING STANDARD; RUS BULLETIN 1751F-643/RUS FORM 515C; RUS BULLETIN 1751F-644; AND RUS BULLETIN 1753F-151. FOR A COMPLETE LISTING SEE TABLE 1 OF THE DOCUMENT TR NO. AMSEL-IE-TI-06001-7 UNITED STATES ARMY INFORMATION SYSTEMS ENGINEERING COMMAND WORLDWIDE OUTSIDE PLANT DESIGN AND PERFORMANCE REQUIREMENTS (THE "13A"). TECHNICAL GUIDE FOR INSTALLATION FROM INFORMATION INFRASTRUCTURE ARCHITECTURE MARCH 2006.
2. COMMUNICATIONS DUCTBANK SHALL ENTER THE LOWEST AVAILABLE WINDOW OF THE HANDHOLE.
3. HH NUMBERS SHOWN ON THESE DOCUMENTS ARE ACTUAL NUMBERS FOR EACH HH.
4. HH AND COVERS SHALL HAVE AN AASHTO H-20 LOAD RATING.
 - 4.1 HH SHALL BE INSTALLED ON A LEVELED, CRUSHED, WASHED GRAVEL BASE UNDER THE ENTIRE HH. THIS GRAVEL BASE SHALL BE A MINIMUM DEPTH OF 6 INCHES FOR DRAINAGE AND STABILITY. THE HANDHOLE SHALL HAVE 24 INCHES MINIMUM OF COVER.
5. THE MANUFACTURER'S INSTRUCTIONS SHALL BE FOLLOWED FOR INSTALLATION OF THE HHS.
6. A WATER RESISTANT SEAL OR GASKET SHALL BE PLACED BETWEEN THE SECTIONS OF THE HHS, AND BETWEEN THE COVER FRAMES, COLLARS, AND HH TOPS. USE BIDCO C-56 OR APPROVED EQUAL.
7. THE HH COVERS SHALL BE 36" MINIMUM IN DIAMETER EXCEPT WHERE ANOTHER DIAMETER IS SPECIFIED. THE MECHANISM SHALL BE FLUSH WITH THE FRAME.
8. LOCKING COVERS, A LOCKING COVER IS TO BE PROVIDED FOR ALL MAN HOLES/HAND HOLES. THE LOCKING COVERS SHALL USE THE LOCKDOWN-LOCKDRY SECURITY MAN HOLE LID BY BARTONSOUTH OR APPROVED EQUAL. THE SPECIFICATIONS ARE LISTED IN THE I3A FOR LOCKING COVERS.
9. ACCESSORIES WILL BE DESIGNED FOR USE IN A COMMUNICATIONS HANDHOLE. ALL HOOK AND RACKS SHALL BE GALVANIZED METAL. FOUR (4) SLOTTED RACKS AND TWELVE (12) HOOKS PER HANDHOLE.
10. A SUMP (12 INCH DIAMETER MINIMUM) WILL BE CAST INTO THE FLOOR. THE FLOOR IS TO SLOPE TO THE SUMP HOLE FOR DRAINAGE. A COVER IS TO BE PROVIDED FOR SUMP.
11. HANDHOLE FRAME IS TO BE GROUTED TO HANDHOLE OR FLAT TOP LID.
12. COLLAR HEIGHT IS SIZED TO MEET MINIMUM COVER OF 24 INCHES AND LID TO BE AT GRADE.



DISCLAIMER
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Rev.	Date	Description
1	03/25/08	REVISION NOTE 9

Designed by: R. HOLDER	Date: 03/20/08	Rev.
Drawn by: B. WOSLEY, JR.	Scale:	
Reviewed by:	Contr. No.:	
Submittal by:	File name: EBF-U872.dtl	
Chief:	Plot date: 03/20/10	
	Plot scale: As shown, 1:1	

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UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

COMMUNICATIONS
DETAILS MANHOLES
AND HANDHOLES

Sheet
reference
number:
U-872
Sheet 186 of 188

GENERAL NOTES

1. MANHOLES NOTES REFERENCE SHEET U-873.

KEYED NOTES

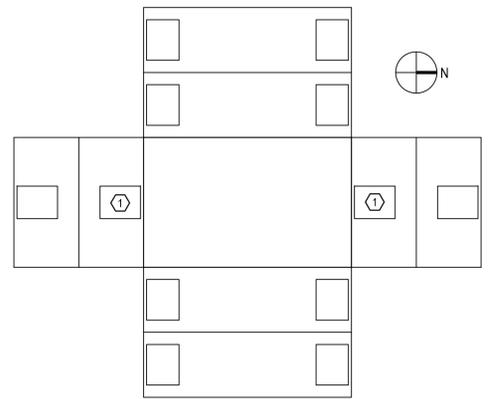
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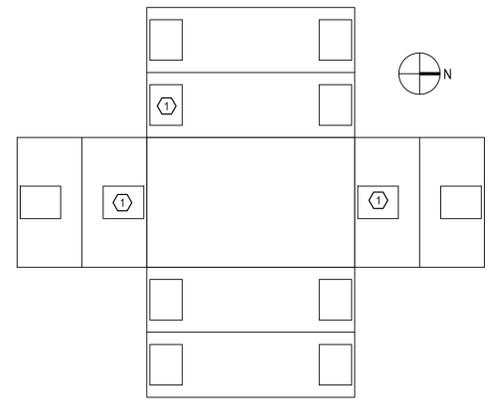
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Reg. No. 091451
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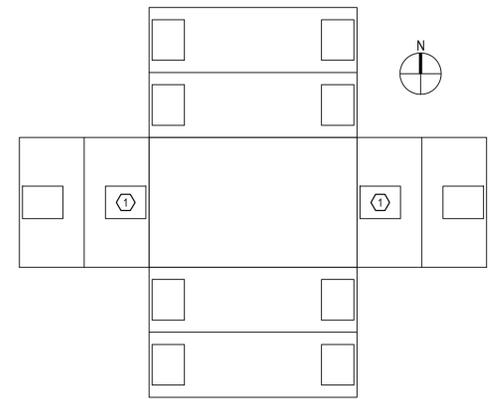
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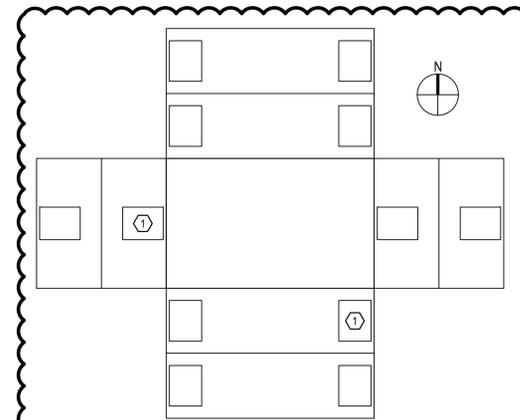
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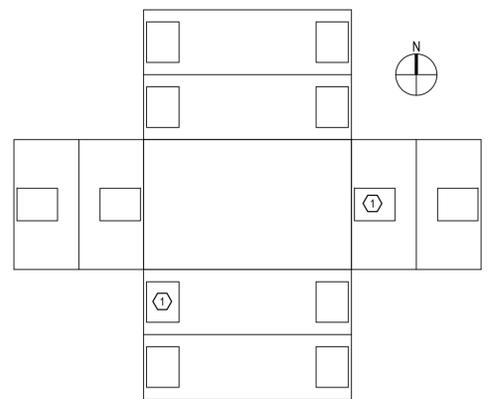
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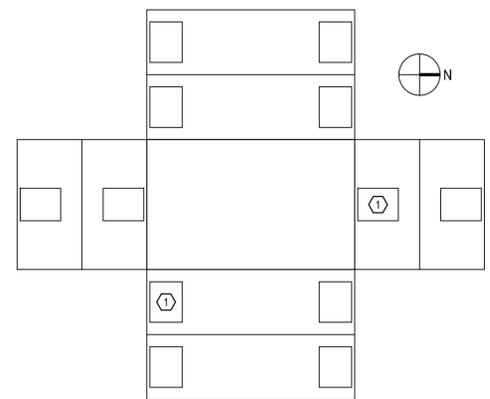
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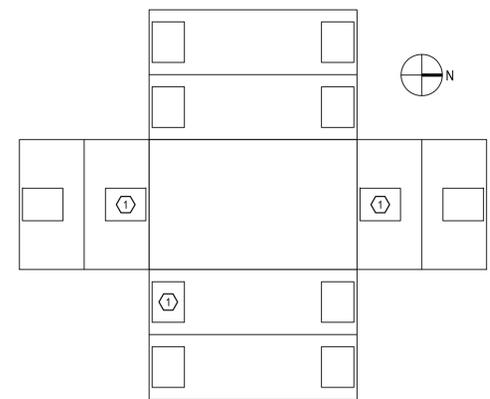
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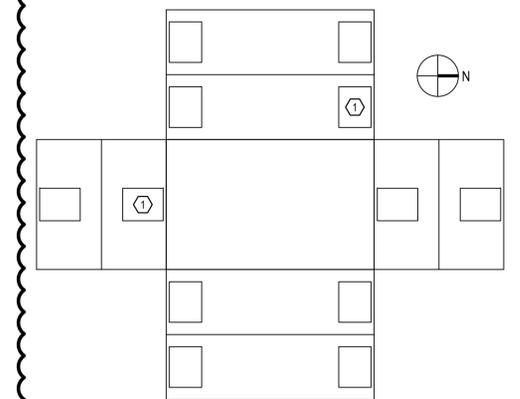
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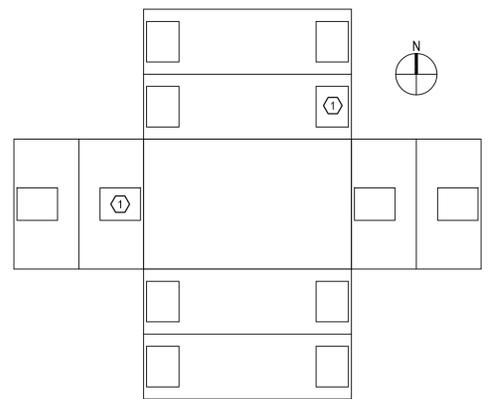
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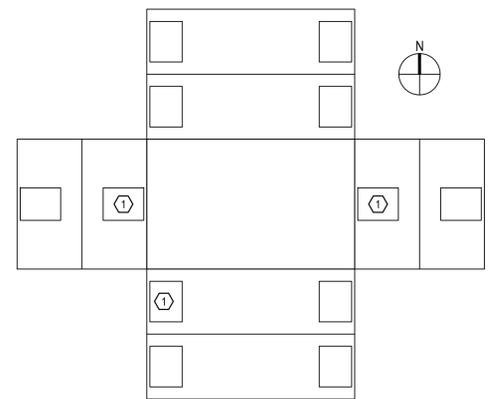
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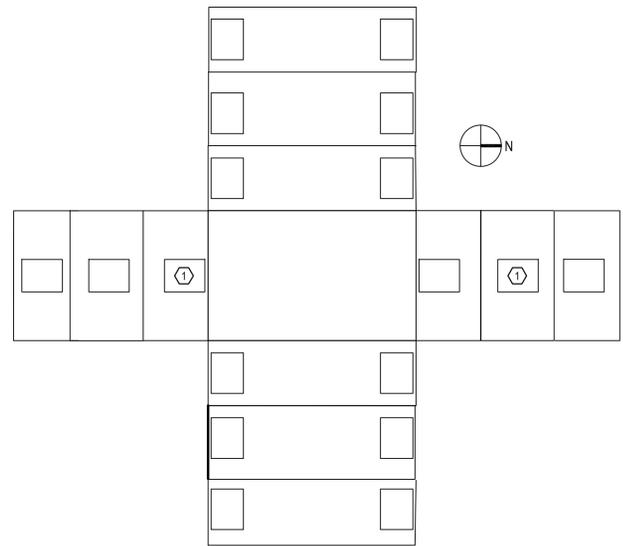
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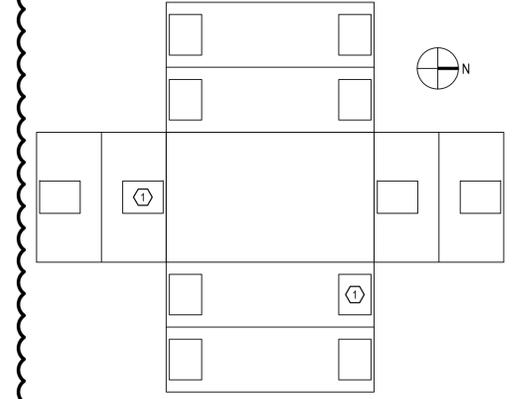
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N.T.S.



U406
REF **8** CMH-UOF-14
N.T.S.



U402
REF **9** CMH-UOF-2
N.T.S.



U402
REF **12** CMH-UOF-A
N.T.S.

Rev.	Date	Description
1	03/25/08	AM 0001

Designed by:	R. HOLDER
Drawn by:	R. DEATON
Reviewed by:	
Submitted by:	
Chief:	

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
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ENGINEERS BATTALION G/TE
UNIT OPERATIONS FACILITIES
WHITE SANDS MISSILE RANGE
NEW MEXICO

COMMUNICATIONS
MANHOLE FOLD-OUT
DETAILS

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reference
number:
U-874
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APPENDIX CC

Waste Management Documents

El Paso and Regional Recyclers

<http://www.yellow.com/>

http://www.cleantexas.org/index.cfm?fuseaction=public.memberprofiles_bymembername_rtolquery1

<http://www.tceq.state.tx.us/assistance/P2Recycle/renew/renew.html>

Company	Address	Phone	Notes
Acoustic Tile			
WeRecycle, Inc.	500 South Broad St., Meriden, CT 06450	203-630-0344	carpet, ceiling tiles, pallets
Cardboard/Paper/Fiber			
Durango McKinley Paper Co	1520 Myrtle Ave., El Paso	915-351-7970	drop off services available
Master Fibers Inc.	1710 East Paisano Dr., El Paso	915-544-2299	drop off services available, top prices paid for cardboard, customized recycling program
Twin Cities Recyclers Co., Inc.	3230 Durazno Ave., El Paso	915-543-3000	top prices paid for paper, industrial plastics, metal, wood pallets, Customized recycling programs available
The UPS Stores	955 North Resler Dr., El Paso	915-842-8075	packing peanuts, cardboard, other packing material
Bryan Drive-In Recycling Center	2202 Briarcrest Dr., Bryan, TX 77802	979-209-5675	
Carpet/Carpet Tile			
Sunshine Padding and Foam	8172 Elder Creek Rd, Sacramento, CA 95824	916-383-5213	accepts carpet, padding, foam, mail in program
WeRecycle, Inc.	500 South Broad St., Meriden, CT 06450	203-630-0344	carpet, ceiling tiles, pallets
Landfill/Hauling/Collection			
Duncan Disposal/Alpine	3001 Old Marathon Hwy., Alpine, TX 79830	432-837-1244	Hauling, Collection, Landfill (approx 200 miles from El Paso)
Charter Landfill	12035 West Murphy St., Odessa, TX 79763	432-381-4722	landfill (approx 240 miles from El Paso)
Duncan Disposal/Midland	8220 West Hwy. 80, Midland, TX 79706	432-563-5060	Hauling, Collection (approx 260 miles from El Paso)
Saguaro Environmental Svcs	5055 South Swan Rd, Tucson, AZ 85706	520-745-8820	Hauling/Collection (approx 260 miles from El Paso)
Duncan Disposal/Lubbock	1408 N. Martin Luther King Blvd., Lubbock, TX 79403	806-762-6464	Hauling, Collection (approx 300 miles from El Paso)

Company	Address	Phone	Notes
San Angelo Landfill	1422 Hughes Ave., San Angelo, TX 76903	325-655-6869	landfill (approx 360 miles from El Paso)
TrashAway Svcs Duncan San Angelo	1422 Hughes Ave., San Angelo, TX 76903	325-653-6957	Hauling, Collection (approx 36 miles from El Paso)
Metal			
American Metal Recycling	11201 Alameda Ave., Socorro, TX	915-859-4916	
Asa Recycling	1042 Eastside Road, El Paso	915-779-3326	drop off services available
Discover Recycling	3845 Durazno Ave., El Paso	915-544-8414	drop off services available
El Paso Iron and Metal	1535 East San Antonio Ave., El Paso	915-532-6981	
Lopez Scap Metal, Inc.	351 North Nevarez Rd., El Paso	915-859-0770	drop off services available
Lucero Scrap	10717 Alameda Ave., Socorro, TX	915-872-9880	pick-up services available, provide containers
M&M Metal Inc.	12751 Pellicano Dr., El Paso	915-852-2080	
Shapiro Sales Co	206 Dodge Rd., El Paso	915-881-1991	drop off services available
Twin Cities Recyclers Co., Inc.	3230 Durazno Ave., El Paso	915-543-3000	top prices paid for paper, industrial plastics, metal, wood pallets, Customized recycling programs available
W Silver Recycling, Inc.	1720 Magoffin Ave., El Paso	915-532-5643	Container and trailer service available
Environmental Center	800 South Piedras, El Paso	915-593-2784	
Bryan Drive-In Recycling Center	2202 Briarcrest Dr., Bryan, TX 77802	979-209-5675	
Plastics			
Discover Recycling	3845 Durazno Ave., El Paso	915-544-8414	drop off services available
National Recycling, Inc.	10400 Griffin Rd., Suite 101, Cooper City, FL, 33328	954-680-8802	buy, sell, offers waste stream solutions,
Twin Cities Recyclers Co., Inc.	3230 Durazno Ave., El Paso	915-543-3000	top prices paid for paper, industrial plastics, metal, wood pallets, Customized recycling programs available
United Plastics Services	12572 Darrington Rd., Suite 10, Horizon City, TX	915-851-9460	
Environmental Center	800 South Piedras, El Paso	915-593-2784	#1, #2
FDA Packaging	2355 Nevada St., Las Cruces, NM 88001	505-524-1997	#6
The UPS Stores	955 North Resler Dr., El Paso	915-842-8075	packing peanuts, cardboard, other packing material
The Alliance of Foam Packaging Recyclers	2128 Esprey Court, Crofton, MD 21114	800-944-8448	packing peanuts, other forms of packing material, foam
Bryan Drive-In Recycling Center	2202 Briarcrest Dr., Bryan, TX 77802	979-209-5675	#1, #2
Diversified Plastics Recycling	7340 State Road 245 East, North Lewisburg, OH 43060	937-747-3040	#1, #2, #4, #5, #6, #7

Company	Address	Phone	Notes
Propoly	Marlboro, NJ 07746	732-431-2200	#1, #2, #3, #4, #5, #6, #7
Wood			
Custom Crates and Pallets	1501 Westway Blvd., Canutillo, TX	915-892-2660	
Forproducts Corp	3624 East Gateway, El Paso	915-532-6710	pulpwood
Kastro's Wood Pallets, Inc.	13781 Davidson Blvd., El Paso	915-855-8011	
Twin Cities Recyclers Co., Inc.	3230 Durazno Ave., El Paso	915-543-3000	top prices paid for paper, industrial plastics, metal, wood pallets, Customized recycling programs available
WeRecycle, Inc.	500 South Broad St., Meriden, CT 06450	203-630-0344	carpet, ceiling tiles, pallets
Unknown Material			
Alpha Recycling	1820 East Mills Ave., El Paso	915-313-0333	drop off services available
Border Trading, Inc.	6940 Commerce Ave., El Paso	915-775-2546	drop off services available
Gandara's Recycling	10721 North Loop Dr., Socorro, TX	915-860-9596	drop off services available
Haro's Company, Inc.	11369 Alameda Ave., Socorro, TX	915-851-2028	drop off services available
Newell Recycling of El Paso	6800 Market Ave., El Paso	915-772-2728	
RG&M	11309 Alameda Ave., Socorro, TX	915-851-0995	drop off services available

Non- Hazardous Waste Management Plan

- a. Name of individuals on the Contractor's staff responsible for waste prevention and management.
- b. Specific actions that will be taken to reduce solid waste generation.
- c. Description of the specific approaches to be used in salvage/reuse/recycling/other diversion of the various materials generated, including the areas and equipment to be used for processing, sorting, and temporary storage of wastes.
- d. Identification of waste streams, including estimated types and quantities, of the waste to be generated.
- e. Identification of local and regional salvage/reuse programs, including non-profit organizations such as schools, local housing agencies, and organizations that accept used materials such as materials exchange networks and Habitat for Humanity.
- f. List of specific waste materials that will be salvaged for resale, salvaged for reuse, or recycled. Recycling facilities that will be used shall be identified. If a recycling facility (public or private) exists within a 50 mile radius of the project site, its use is required for all materials that facility accepts and that cannot be otherwise reused.
- g. Identification of materials that cannot be recycled/reused with an explanation or justification.
- h. Name of landfill and/or incinerator to be used for waste that are not diverted and the estimated costs for disposal.
- i. Anticipated net cost savings determined by subtracting Contractor program management costs and the cost of disposal from the revenue generated by sale of the materials and the incineration and/or landfill cost avoidance.

Hazardous Waste Management Plan (in addition to the requirements above)

- a. Types of wastes anticipated to be managed. This should include a discussion of processes which are generating the waste, the volumes anticipated, and the EPA/state waste codes associated with the waste (40 CFR 261, Subpart C and D).
- b. The regulatory status of the waste. In other words, whether the waste is subject to large quantity generator, small quantity generator, or conditionally exempt small quantity generator standards (40 CFR 262.34).
- c. The locations in which wastes will be accumulated will be discussed. This should discuss whether these are 90/180 day accumulation areas, satellite accumulation points,

or permitted storage areas. Preferably a map indicating the precise location should be included (40 CFR 262.34).

d. Inspection requirements. This should discuss what will be inspected, how often it will be inspected, who will conduct the inspection, what the inspection log will contain, and where the inspection records will be retained (40 CFR 262.34, 40 CFR 265.174, and 40 CFR 265.195).

e. Contingency Planning. Large quantity generators are required to have a contingency plan. Small quantity generators are required to post certain information (40 CFR 262.34 and 40 CFR 265 Subparts C and D).

f. Marking requirements. This should discuss what type of hazardous waste markings are to be utilized during accumulation (40 CFR 262.32).

g. Container types. Types of containers used to accumulate hazardous wastes should be identified. Compatibility with the waste being stored should be considered as well as whether the containers will meet packaging requirements for off-site transport (49 CFR 171.178).

h. Treatment requirements. How will wastes be treated to meet land disposal restrictions (40 CFR 268.40). If elementary neutralization is being performed to render waste non-hazardous, a statement should be included which indicates the activity is being performed under a permit exclusion (40 CFR 270.1(c)(2)(v)).

i. Disposal requirements. This should discuss whether wastes and/or treatment residues will be disposed in a Subtitle C, hazardous waste disposal facility or in a Subtitle D, nonhazardous waste facility.

j. Proposed treatment, storage, or disposal facilities (TSDFs). This should provide the name, address, telephone number, and EPA ID number of the TSDFs proposed to be utilized for the waste.

k. LDR forms. This should provide copies of the LDR forms from the proposed receiving facilities.

l. Recycling Facilities. This should discuss how the waste is to be salvaged, reused, and/or recycled. The name, address, and phone number of the facilities proposed for waste diversion should be provided.

Waste Management Plan Template

Section 1. Company Mission Statement/Company Philosophy and Organization

- a. Philosophy – basic company approach to waste management (i.e.: prevent, reduce, reuse, recycle, dispose)

Section 2. Project Waste Management Goal

- a. Contract required goal.
- b. Specific actions that will be taken to prevent or reduce solid waste generation. This includes identifying those companies providing material and equipment that are willing to accept the return of the resulting waste product after installation (floor tiles, ceiling/acoustical tiles, carpet tiles, etc.). Also identify material/companies willing to send large quantities of items in bulk, rather than individually wrapped (box of 200 door knobs instead of individually wrapped door knobs, pallets of stacked floor tiles instead of box of 12 floor tiles).
- c. Description of the specific approaches to be used in salvage/reuse/recycling/other diversion of the various materials generated, including the areas and equipment to be used for processing, sorting, and temporary storage of wastes.
- d. List of specific waste materials that will be salvaged for resale, salvaged for reuse, or recycled.
- e. Identification of materials that cannot be recycled/reused with an explanation or justification.

Generally, it's better (more resourceful) to reduce, than to reuse, and better to reuse than to recycle. However, it's not realistic to eliminate all waste, or salvage all materials not used on a particular job. Following is our Waste Management Plan.

Reduce means to prevent waste before it happens. You can reduce waste significantly on a construction project by “tweaking” your practices a bit; this means designing in less waste to begin with and minimizing damage and inefficient material use.

Reuse means to reuse materials as much as possible in your construction project. This includes:

- Materials removed during demolition
- Scrap generated on site
- Used materials or scraps from other jobs

Recycle means to separate recyclable materials from non-recyclable materials and supply them to a hauler or business so they can be processed and used to make new products. Another aspect of recycling is to Buy Recycled. Buying building materials with recycled content helps develop a market for the waste materials you recycle from your job site and “closes the loop.”

Section 3. Communication Plan

- a. Name of individuals on the Contractor's staff responsible for waste prevention and management.
- b. Specific actions that will be taken to communicate waste management issues throughout the project.
- c. Specific actions that will be taken to communicate the waste management plan and procedures to new employees/subs.
- d. Specify where containers will be placed, how they will be labeled, how waste management practices will be enforced (acceptable and unacceptable items and practices), and how this information will be communicated to the site staff.
- e. Specific procedures and details on how the waste information (what where, how much, who, how) will be documented, organized, and tracked. This includes all waste streams that are returned, salvaged, reused, recycled, and landfilled.
- f. Specific details on how the waste information will be reported to the government (routinely – weekly? monthly? quarterly? and at project closeout – final total details).

Section 4. Expected Waste Streams, Disposal, and Handling (non-hazardous only)

- a. Identification of waste stream (both diverted and landfilled).
- b. Quantity of each type of waste stream identified.
- c. Receiving facility or entity.
 - o Identification of local and regional salvage/reuse programs, including non-profit organizations such as schools, local housing agencies, and organizations that accept used materials such as materials exchange networks and Habitat for Humanity.
 - o Name of landfill and/or incinerator to be used for waste that are not diverted and the estimated costs for disposal.
- d. Specific site handling procedures.
- e. Identification of transportation method or company.

Example Table Identifying Possible Waste Streams, Quantity, Disposal/Diversion Method, and Handling Procedures

Material	Qty.	Disposal Method (where applicable)	Handling and Transportation Procedure
<i>New Construction</i>			
Concrete	15 cy		Break up concrete onsite with an excavator, load in trucks and haul to Echo Park Recycle
Forming Boards	6 tons	Reused as many times as possible then recycled to Renu Recycling	Stack next to supply of new form boards for reuse. Recycle clean unusable form in "clean wood" recycling dumpster
Clean Wood Scrap	3 tons	Scraps reused for form work, fire-breaks, etc., then recycled by Renu Recycling	Stack reusable pieces next to dumpster for Reuse. Separate unusable clean wood into "clean wood" recycling dumpster (including wood pallets)
CMUs	75 yds	Henson Masonry to recycle and submit report to recycling coordinator	Will request CMUs that contain recycled Content from supplier
Scrap Metal	5 tons	Renu Recycling Service	Deposit all metals in "metal" dumpster
Acoustical Tile			
Floor Tile			
Carpet Tile			
Gypsum/Wall board			
Cardboard			
Plastic			
Etc.			