



**US Army Corps
of Engineers**

Design-Build Request for Proposals

TITLE OF PROJECT:

FY11 MCA PN52267

288 PN UNACCOMPANIED ENLISTED PERSONNEL HOUSING

LOCATION:

SCHOFIELD BARRACKS

OAHU, HAWAII

DATE:

29 Nov 2010

SUBMITTAL TYPE:

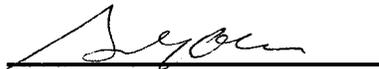
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DESIGN BRANCH

HONOLULU DISTRICT

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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 |

1.0.3 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.

1.0.4 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 228

Maximum gross area 88,464 square feet.

2.2. SITE:

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

Approximate area available 3.00 acres

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

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

The following are also GFGI items: Washers and dryers in Laundry room, refrigerators and electric ranges in the kitchens, vending machines and ice machines are GFGI.

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 ASME A17.1 and ASME A17.2.1 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 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 ATFP 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. Not Used

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 Schlage. Cores shall have not less than seven pins; cylinders shall have key-removable type cores. Disassembly of knob or lockset shall not be required to remove core from lockset. Locksets for mechanical, electrical and communications rooms only shall be keyed to the existing Installation Master Keying System. HVAC terminal units that are accessed from a central corridor shall have a deadbolt to minimize protrusion into corridor. Plastic cores are unacceptable. Provide closers for all exterior doors, all doors opening to corridors and as required by codes. Exit devices shall be installed 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 Kaba Ilco, removable core with key override.. 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: Front Desk Unit FD-4 with Smart Card encoding capability.

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 |
| 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 NOTE 2 |
| 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) | | | | | | | | | | | | | |

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)

3.6. 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.)

In addition, the building shall be designed and constructed to provide 30% of domestic hot water by use of solar hot water system.

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 1A, 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-5 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 | 4-Pipe Fan Coil with central chiller and boiler plus DOAS ⁽⁴⁾ with 14.0 SEER DX coil (3.52 COP) and HHW coil on central boiler |

| | | |
|------------------------------|--------------------|--|
| | | SAT control 55°F – 62°F with OAT 75° – 54°F |
| | Gas Furnace | none |
| | ERV | 70% - 75% sensible effectiveness |
| Economizer | | no |
| 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 | 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 type with an equivalent average flush volume)

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.

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 ductless 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 florescent 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.

3.9. 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] |

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|---|--|
| | 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 |

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| 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 |

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|---|---|
| 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. |

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| 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 |

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|---|---|
| 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 | |

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| 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 |

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| 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 |

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| Projects |
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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 http://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. Pending the publication of the 2010 version of ASHRAE 90.1, the use of painted interior walls is not an acceptable air barrier method.

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

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

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

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

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

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

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

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

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

- 5.5.2.10. Compartmentalize garages under buildings by providing air-tight vestibules at building access points.
- 5.5.2.11. Compartmentalize spaces under negative pressure such as boiler rooms and provide make-up air for combustion.
- 5.5.2.12. Performance Criteria and Substantiation: Submit the qualifications and experience of the testing entity for approval. Demonstrate performance of the continuous air barrier for the opaque building envelope by the following tests:
- (a) Test the completed building and demonstrate that the air leakage rate of the building envelope does not exceed 0.25cfm/ft² at a pressure differential of 0.3" w.g.(75 Pa) in accordance with ASTM's E 779 (2003) or E-1827-96 (2002). Accomplish tests using either pressurization or depressurization or both. Divide the volume of air leakage in cfm @ 0.3" w.g. (L/s @ 75 Pa) by the area of the pressure boundary of the building, including roof or ceiling, walls and floor to produce the air leakage rate in cfm/ft² @ 0.3" w.g. (L/s.m² @ 75 Pa). Do not test the building until verifying that the continuous air barrier is in place and installed without failures in accordance with installation instructions so that repairs to the continuous air barrier, if needed to comply with the required air leakage rate, can be done in a timely manner.
- (b) Test the completed building using Infrared Thermography testing. Use infrared cameras with a resolution of 0.1deg C or better. Perform testing on the building envelope in accordance with ISO 6781:1983 and ASTM C1060-90(1997). Determine air leakage pathways using ASTM E 1186-03 Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems, and perform corrective work as necessary to achieve the whole building air leakage rate specified in (a) above.
- (c) Notify the Government at least three working days prior to the tests to provide the Government the opportunity to witness the tests. Provide the Government written test results confirming the results of all tests.

5.6. PLUMBING

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

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

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

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

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

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

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

proper care and maintenance of the urinal. For complexes, non-water using urinals are not required for barracks type spaces.

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

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

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

5.6.11. 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,(including SIPRNET ROOMS, where applicable for specific facility type). Comply with ANSI/EIA/TIA 569 and the I3A.

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

5.8.3. BUILDING AUTOMATION SYSTEM. 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 Networkiness (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. 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.

5.8.3.6. 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.

5.8.3.7. 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

5.8.3.8. 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.

5.8.3.9. 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.

5.8.3.10. 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.

6.2.1 The requirement in Section 01 10 00, paragraphs 6.3 through 6.18 augment those in Section 01 10 00 Sections 3.0 through 5.0. Information and requirements in paragraph 6.3 through 6.18 shall supersede any conflicting requirement provided in Section 01 10 00, paragraphs 3.0 through 5.0.

6.2.2 Section 01 10 00 Paragraph 4.0 APPLICABLE CRITERIA, Revise to read as follows: "Unless a specific document version or date is indicated, use criteria from the most current references as of the date of the letter which notified an offeror it had been short-listed to compete for the design-build contract in Phase 2 or the effective date of the last amendment to the 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 Request For Proposal."

6.2.3 Section 01 10 00, Paragraphs 6.5.1, 6.5.2.3 and 6.5.2.4: Amend by replacing the word "priority" with "requirement", where occurs.

6.2.4 Section 01 10 00, Paragraph 6.5.2.2 (f) Amend to read "Complies with Energy Conservation Requirements Specified in this RFP and IMCOM Energy and Water Conservation Design Guide (for Sustainment, Restoration and Modernization [SRM] Projects and MILCON Construction), See Appendix PP.

6.2.5 Section 01 10 00, paragraph 5.7.2; amend second sentence to read, "All conductors and busbars shall be copper."

6.2.6 Section 02 22 00 paragraph 5.3.3.2(e); amend second paragraph to read, " Specific examples of desirable features: additional telephone/data/cable TV outlets; ceiling fans in bedrooms of UEPH buildings."

6.3. SITE PLANNING AND DESIGN

6.3.1. General:

For project FY11 MCA PN 52267, Unaccompanied Enlisted Personnel Housing (UEPH), Schofield Barracks, design and construct one 228-Personnel UEPH facility, including, but not limited to, covered bike rack, covered motorcycle shed, trash enclosure, vehicular pavement, sidewalks, curbs, gutter, utilities, grading and drainage, demolition, landscaping, etc. within the limits shown in Appendix J, Drawings. The Contractor's final site and utilities design documents shall be in accordance with Section 01 10 00, Statement of Work and shall be subject to Government acceptance. Any discrepancies and or conflicts which are found in the RFP documents shall be brought to the immediate attention of the Government for clarification.

6.3.1.1 All construction and related activities shall be confined to the limits indicated in Appendix J, Drawings.

6.3.1.2 The final design shall not conflict with the adjacent project FY09 PN 68823, Unaccompanied Enlisted Personnel Housing (UEPH) Schofield Barracks, shown in Appendix HH which is slated for construction beginning in 2010. Appendix HH is based on the FY09 PN 68823, Unaccompanied Enlisted Personnel Housing (UEPH) project Design-Build Contractor's submittal dated 01 March 2010.

The layout of the FY11 UEPH facilities and improvements as indicated in Appendix J shall be incorporated into the Contractor's final design as much as is practicable, to avoid conflict with the adjacent FY09 UEPH project. The final site layout shall be in accordance with Section 01 10 00, Statement of Work, and the layout of the FY11 UEPH facilities relative to the FY09 UEPH facilities shall be subject to Government acceptance.

6.3.1.3 Provide a minimum 6 feet wide planting strip separation between the sidewalk and the curb, where applicable, within the project limits. Sidewalk width shall be minimum 6 feet wide. For landscape plants and turf requirements, see paragraph 6.4.11.

6.3.1.4 Provide 8-inch water line from point of connection at FY09 UEPH water line 8" stub-out and connect to existing 6" water line at Montague Street to the south of the site. See Appendix J, CU-101, Utilities Points of Connection, for approximate water line points of connection. Final layout and points of connection shall be subject to approval by the Government.

6.3.1.5 Provide 8-inch sewer main from FY11 UEPH to existing sewer manhole shown in Appendix J, sheet CU-101, Utilities Points of Connection.

6.3.1.6 Provide a boot wash wastewater pretreatment system(s) (e.g. sand interceptor, sedimentation trap, etc.) to support each boot wash area. The treatment system shall be designed to remove particles larger than No. 100 sieve (0.15 mm) prior to discharge. Boot wash area wastewater pretreatment system shall discharge to the onsite landscape and/or stormwater quantity and treatment control BMP systems (e.g. bioretention, vegetated swale, vegetated buffer strip, infiltration trench). Discharge to the installation sanitary sewer system, stormwater collection system and Hawaii State receiving waters will NOT be allowed. Coordinate with DPW, USAG-HI, Directorate of Public Works, Clean Water Act Program Manager Office to verify acceptability of the pretreatment system location and discharge location; prior to construction.

6.3.2. Site Structures and Amenities

6.3.2.1 Covered Bicycle Rack: Contractor shall provide and furnish one covered bike rack. This provision is based on achieving Sustainable Sites Credit 4.2-Alternative Transportation. The provision accounts for one point toward meeting the minimum requirement of Silver level of Leadership in Energy and Environmental Design (LEED) rating. The facility shall be sized to accommodate the quantity of bikes required to achieve LEED SS Credit 4.2. The exterior shall comply with the Exterior Design Objectives, see 6.5.ARCHITECTURE. Provide covered bicycle rack in accordance with the guidance shown in Appendix CC Landscaping and Trash Dumpster Guidance and in accordance with AT/FP minimum standoff distance requirements. Locate bicycle rack to avoid conflict with future facilities. Contractor shall coordinate with DPW Master Planner to verify acceptability of proposed bicycle rack location prior to construction.

6.3.2.2 Covered Motorcycle shed: Contractor shall provide and furnish one covered motorcycle shed.

(a) The facility shall be sized to accommodate minimum 20 motorcycles.

(b) The exterior shall comply with the Exterior Design Objectives, see paragraph 6.5. Architecture.

(c) Provide above ground anchor security for each motorcycle.

(d) Provide motorcycle shed in an area that can be visually supervised and in close proximity to building entrances, high activity areas, major workplaces, and recreational facilities, while avoiding conflicts with pedestrian circulation, future facilities and comply with AT/FP minimum standoff distance.

(e) Coordinate with DPW Master Planner to verify acceptability of proposed motorcycle shed location prior to construction.

6.3.2.3 Trash Dumpster and Recycling Container Enclosures (Dumpster Screening): D-B contractor shall design one trash and one recyclables enclosure in accordance with paragraph 3.3.2, Site Structures and Amenities and paragraph 5.1, Site Planning & Design.

(a) Trash enclosure shall accommodate self-contained 30 cubic yard (CY) trash compactor with 2 CY charge box.

(b) Recyclables enclosure shall accommodate eight (8) 96-gallon recycling flip-top containers. (c) Contractor shall provide screen block wall enclosure around three sides of the trash dumpster & recyclables containers.

(d) Recyclables enclosure shall be provided with a roofing structure and chain link fence gate with padlock at the entrance. Minimum height of roofing structure shall be 8 feet.

- (e) Incorporate plantings to buffer the visual impact of enclosure screen walls.
- (f) Provide two wheel stops at back of each trash dumpster to prevent the dumpster from rolling into the back end of the wall. The enclosure shall include a concrete slab and access aprons large enough to encompass the bearing points of the service vehicle.
- (g) The enclosure shall be designed for the trash and recycling center trucks to directly access both dumpsters and for facility occupants to directly access all recycling containers. Locate enclosure to avoid conflict with future facilities.
- (h) The enclosure shall be designed in accordance with trash dumpster requirements shown in Appendix CC Landscaping and Trash Dumpster Guidance and meet applicable AT/FP requirements.
- (I) Contact DPW-Environmental Division, 808-656-2429 or 808-656-5411 for additional information regarding the recycling container requirements.
- (J) Coordinate with the DPW Master Planner to verify acceptability of proposed trash dumpster and recycling container enclosure location prior to construction.

6.3.2.4 Outdoor Basketball Court: Provide one (1) complete outdoor basketball within the project limits. The basketball court shall include but is not limited to asphalt pavement structure, concrete header, finish surface, backboard, backstop, court markings, field goal net, etc.

- (a) The basketball court marking and goal dimension shall be designed to meet NCAA standards.
- (b) Basketball court backboard and backstop details shall comply with City and County of Honolulu Parks & Recreation, Parks Construction Detail P-2. The basketball court concrete header shall comply with City and County of Honolulu Parks & and Recreation, Parks Standard Detail P-13. Parks Standard Details are available for download via the internet from the following City and County of Honolulu website: [HYPERLINK "http://www.co.honolulu.hi.us/csd/lrmb/pricelist.htm"](http://www.co.honolulu.hi.us/csd/lrmb/pricelist.htm)<http://www.co.honolulu.hi.us/csd/lrmb/pricelist.htm>
- (c) Pavement section, sub grade preparation, AC mix, and compaction of AC shall be as recommended by Contractor's civil/geotechnical engineer.
- (d) Locate basketball court to avoid conflict with future facilities and comply with applicable AT/FP design requirements. Contractor shall coordinate with the DPW Master Planner to verify acceptability of proposed basketball court location prior to construction.

6.3.3. Site Functional Requirements:

6.3.3.1. Stormwater Management (SWM) Systems.

(a) Design Codes and Criteria. Provide storm water management systems (SWMS) in accordance with Federal, State and Local codes and design criteria. In cases where conflicts between codes and criteria exist, the more stringent shall apply. Unless otherwise augmented by in this section, applicable codes and criteria include but are not limited to the following:

(1) Energy Independence and Security Act (EISA), Section 438 (Title 42, US Code, Section 17094), which states:

"The sponsor of any development or redevelopment project involving a Federal facility with a footprint that exceeds 5,000 square feet shall use site planning, design, construction, and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow."

(2) EPA Technical Guidance on Implementing the Storm Water Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act (EPA 841-B-09-001). For more information and to download EPA 841-B-09-001, go to: [HYPERLINK "www.epa.gov/owow/nps/lid/section438"](http://www.epa.gov/owow/nps/lid/section438)www.epa.gov/owow/nps/lid/section438.

- (3) DOD Unified Facilities Criteria on Low Impact Development (LID) (UFC 3-210-10). For more information and to download UFC 3-210-10, go to: HYPERLINK "www.wbdg.org"www.wbdg.org
- (4) U.S. Army Garrison (USAG-HI) HI NPDES Separate Storm Sewer System MS 4 Permit conditions (MS4 permit No. HI S000090). A copy of the MS 4 Permit and conditions is provided in Appendix DD, U.S. Army Garrison Hawaii NPDES Permit No. HIS000090 MS 4 Permit.
- (5) City and County of Honolulu, Department Planning and Permitting; Rules Relating to Storm Drainage Standards.
- (6) City and County of Honolulu, Department of Public Works; Standard Specifications.
- (7) City and County of Honolulu, Department of Public Works; Standard Details.
- (8) See paragraph 5.1.2.6 Stormwater Management for additional SWM system requirements.
- (b) The "predevelopment hydrology" is defined as the pre-project hydrologic conditions of temperature, rate, volume, and duration of the storm water flow from the project site. The analysis of the predevelopment hydrology must include site-specific factors (such as soil type, groundcover, and ground slope) and use modeling or other recognized tools to establish the design objective for the water volume to be managed from the project site.
- (c) The project footprint consists of all horizontal hard surfaces and disturbed areas associated with the project development, including both building area and pavements (such as roads, parking, and sidewalks). These requirements do not apply to internal renovations, maintenance, or resurfacing of existing pavements.
- (d) The "maximum extent technical feasible" (METF) criterion requires full employment of accepted and reasonable storm water retention and reuse technologies subject to site and applicable regulatory constraints (e.g., site size, soil types, vegetation, demand for recycled water, existing structural limitations, state or local prohibitions on water collection). All site-specific technical constraints that limit the full attainment of the design objective shall be documented.
- (e) Design drainage collection and conveyance systems to accommodate the peak rainfall runoff flow rate generate by a 10-year frequency, 1-hour design storm.
- (f) The onsite storm water management system shall connect to the existing 24" storm drain pipe along Sutton Street. See Appendix J, Drawings for location of storm drainage point of connection.
- (g) Employ Low Impact Design (LID) systems or source control and treatment BMPs to the METF to augment centralized end-of-pipe controls (e.g. underground structural water quality treatment and underground detention/retention vaults).
- (1) Source control BMPs include: preserve site vegetation, minimize impervious surfaces, disconnect impervious surfaces, grade site to encourage sheet flow to vegetated areas, minimize development on well-infiltrating soils, and phase construction so as to minimize soil compaction.
- (2) Quantity and Treatment control BMPs include: bio-retention, vegetated swale, vegetated buffer strip, infiltration trench, permeable paving, etc.
- (3) Use native or locally adapted vegetation to reduce water demand and maintenance requirements after plants are established in vegetated BMPs.
- (4) The following treatment control BMPs are best used in combination with other BMPs as a part of a treatment train: structural storm water storm water treatment system, drain insert, and water quality inlet. Except that drain insert, water quality inlet or similar type water quality treatment system shall not be used without prior approval by USAG-HI, Directorate of Public Works, Clean Water Act Program Manager, Environmental Division. For additional stormwater management treatment information, contact Mr. James C. Rice; email: james.c.rice1@us.army.mil; Phone: 808-656-3105, ext 1060.
- (5) If permeable pavements are employed, use only in the POV parking stalls

(h) Structural Storm Water Treatment system (SSWTS) shall comply with the following requirements:

(1) SSWTS shall be structurally designed for HS-20 (minimum) traffic loading at the surface. The SSWTS shall be a proven and documented (3rd party testing documented) pollution prevention technology device that removes oil and sediment from storm water runoff, and retains the contaminants for safe and easy removal by way of vacuum truck (e.g. Vactor truck). SSWTS that require the use of filter cartridges and/or media are not allowed. The chosen device shall possess design features to prevent re-suspension of previously collected contaminants and materials. The selected storm water quality device shall also contain an internal built-in by-pass structure to divert intense runoff events and prevent scouring of the previously collected contaminants, or be installed off-line with a high-flow bypass system.

(2) The SSWTS shall be able to pass the 10-year, 1-hour design storm peak flow without re-entraining captured pollutants. The selected device shall also be able to operate effectively in back water conditions, such as floodplains and tidal areas.

(3) The SSWTS shall be capable of containing spills of floatable substances such as free oil and not be compromised by temporary backwater conditions (i.e. trapped pollutants shall not be re-suspended and scoured from the SSWTS during backwater conditions).

(4) The SSWTS shall remove a minimum of 80% of Total Suspended Solids (TSS) based on 100 micron particle size at the water quality design flow rate specified. A specific gravity of 2.65 shall be used for the 100 micron particle size.

(5) The SSWTS supplier shall provide data (scientific studies and reports, test data, calculations, etc.) demonstrating the capabilities of the selected SSWTS to meet these requirements.

(6) The water quality flow rate shall be determined in accordance with the City & County of Honolulu standard "Rules relating to Storm Drainage Standards."

(i) Above ground storm water detention/retention ponds are not permitted within the project site.

(j) Post development infiltration of storm water in excess of predevelopment infiltration of storm water is acceptable or restoring the project site to the natural hydrological conditions of the project site, to the METF, is acceptable and encouraged.

(k) Underground Detention/Retention Systems:

(1) General. Underground Detention/Retention system shall consist of a reinforced concrete vault or a corrugated HDPE pipe system. HDPE detention/retention chamber (half pipe) or similar type chamber system will not be allowed.

(2) Locate underground detention/retention system within the project limits. Do NOT locate detention/retention systems under proposed future facilities (i.e. buildings footprints).

(3) HDPE detention/retention pipe system joints. Provide water tight gasket joints conforming to ASTM F2306. All pipe joints (factory or field) shall be wrapped with an external permanent pipe seal. The external permanent pipe seal shall serve as a coupler for assurance against infiltration and exfiltration at the joint. The pipe seal shall be made of high-strength, shear and puncture resistant internal reinforcing fabric with an impervious; chemical resistant cross-laminated polyethylene outer cover; and also have specially formulated bonding mastic for polyethylene pipe along with high strength securing straps engineered within the coupler.

(4) HDPE detention/retention pipe system installation. Installation, including placement and compaction of bedding and backfill materials, shall be per manufacturer instructions and recommendations from the Contractor's geotechnical engineer. The manufacturer's representative and Contractor's geotechnical engineer shall be onsite to monitor installation of the pipe system, bedding materials, and backfill materials. The monitoring shall be on a full-time basis. The manufacturer's representative and Contractor's geotechnical engineer shall provide a certification letter conforming that the pipe systems, bedding, and backfill are constructed in accordance with the manufacturer's installation instructions and geotechnical recommendations.

(l) Storm water management (including but not limited to finish grades) design shall consider potential impacts to adjacent existing and/or future facilities. Grading and drainage plans shall accommodate these adjacent existing and/or future facilities without causing grading, drainage and potential flooding problems/issues for the future projects.

(m) Roof runoff from downspouts shall be piped below grade and discharged to grassed surfaces or bio swales located at least 10 feet laterally from foundations of buildings and structures or to a distance recommended by the Contractor's geotechnical engineer, whichever is further. Where discharge to grassed surfaces or bio swales is not feasible, connect downspouts to the new storm drainage system.

6.3.3.2. Erosion and Sediment Control

(a) Provide Best Management Practices (BMPs) to reduce the discharge of pollutants during construction in accordance with City and County of Honolulu, Department of Environmental Services; Best Management Practices Manual for Construction Sites in Honolulu or as approved by the Contracting Officer's Representative.

(b) Provide permanent BMPs and Low Impact Design systems to the maximum extent feasible. See paragraph 6.3.3.1(g), for additional requirements.

(c) Perform all work in accordance with Section 01 10 00, Statement of Work, and the Contractor-prepared NPDES permit and Erosion Control plans for this project.

6.3.3.3. Vehicular Circulation.

Site planning and design of on-site vehicular circulation and parking shall be in accordance with UFC 3-320-06A, Site Planning and Design; and as augmented in this section.

(a) Vehicle Site Access Requirements. Provide new vehicle entrances off of Montague Street, and the parking lot being provided by FY09 PN 68823, Unaccompanied Enlisted Personnel Housing (UEPH), as indicated in Appendix J, Drawings to provide non-organizational-privately owned vehicle (POV), emergency and service vehicle access to the FY11 UEPH and FY09 UEPH parking lot. Provide stop signs and stop lines at each new driveway. See paragraph 3 and 5 for additional vehicle circulation requirements

(b) Parking Requirements. Provide required number of Privately Owned Vehicle (POV) spaces in the area indicated in Appendix J, Drawings. Note the FY09 UEPH project provides approximately 15 extra stalls to be used to make up any shortfall in the FY11 UEPH POV requirements. Contractor shall verify the number of extra stalls available to be used towards the FY11 UEPH POV requirement and design the parking area accordingly. Provide two ADA and ABA accessible parking spaces as specified in paragraph 3. A preferred minimum gradient of 1.0 percent shall be used for temporary parking area. 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 2 ½ percent. See paragraph 3 and 5 for additional parking and vehicle pavement requirements.

(c) Drop-off Area. Provide AC-paved, concrete curbed vehicular drop-off area fronting the UEPH main entrance on Sutton Street. Drop-off lane shall comply with ATRP requirements and be located out of the existing traffic lanes. Drop-off area shall be designated as a drop-off only and no parking zone.

6.4. SITE ENGINEERING

6.4.1. Existing Topographical Conditions

A topographic survey is available upon request, however, this survey is likely to be superseded by the design and construction of the FY09 UEPH project shown in Appendix HH, immediately adjacent to the FY11 UEPH project site. Contractor shall be provided with the most current version of the construction drawings for the FY09 UEPH project, if available, for use in their final design. Contractor shall also supplement original topographic survey with additional data if practicable, to aid in the final site and utility design.

Both the FY09 and FY11 UEPH projects are located in a single 6.6 acre block bound by Menoher Road to the northwest, Sutton Street to the northeast, and Montague Street to the south. The FY11 UEPH project is L-shaped

and encompasses approximately 3 acres of this total area and is generally sloping from west to east at 2% with some existing cut slopes up to 25%.

Currently there are 11 abandoned family housing units located on the project site, as well covered parking shelters, asphalt pavement, concrete curbs, concrete sidewalks, utility poles and chain-link fencing. The majority of demolition & removal of all above ground structures, improvements, and vegetation are to be performed under the FY09 UEPH D-B RFP. It is anticipated the site for the FY11 UEPH project will be cleared of all structures and improvements, graded to a certain extent, and grassed. Site preparation should entail clearing and grubbing, the removal of existing underground utilities, and removal of certain FY09 UEPH improvements as required such as curbing for installation of the FY11 UEPH driveway connection to the FY09 UEPH POV parking lot.

See the RFP Appendix J, Drawings for location, demolition & removal, site, and utility points-of-connection plans.

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

See Appendix A, Geotechnical Information, for a preliminary 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.

See Appendix D, Results of Fire Flow Tests. These results are for information only; the Contractor shall conduct flow tests for fire protection design based on most current conditions.

6.4.4. Pavement Engineering and Traffic Estimates:

6.4.4.1 Pavement sections shall be designed in accordance with Section 01 10 00, Statement of Work, and shall be stamped by a licensed Geotechnical Engineer.

6.4.4.2 Estimated traffic volumes are approximately 150 passenger vehicles and light duty trucks daily. Trash pick up by typical municipal trash trucks should also be anticipated on a regular basis. Occasional use of vehicular paved areas by fire department vehicles and tractor trailers should also be expected.

6.4.5. Traffic Signage and Pavement Markings

6.4.5.1 General: Traffic signage and pavement markings shall comply with all applicable criteria of the Manual on Uniform Traffic Control Devices, installation requirements, and as augmented in this paragraph section.

6.4.5.2 Traffic Signage: Traffic signage shall be in accordance with all applicable criteria and installation requirements. For installation exterior signage requirements, see Appendix H, Exterior Signage.

6.4.5.3 Pavement Markings:

(a) Install retroreflective thermoplastic pavement markings on all new and overlay pavements for roadways and parking areas.

(b) Install permanent traffic paint only on existing pavement or to replace existing traffic paint markings.

(c) Pavement markings materials and installation shall conform to the 2005 State of Hawaii DOT Standard Specifications for Road and Bridge Construction, Section 629.

6.4.6. Base Utility Information

Digital base and utility maps (Bentley Microstation, dgn file format) are available upon request from DPW. Contractor shall fill out the DPW Conditional Release Form (Appendix AA) to request the master plans from DPW.

For Electrical Utility information see paragraph 6.9.

(a) The installation water system is owned and operated by the U.S. Army Garrison-Hawaii (USAG-HI), Directorate of Public Works (DPW). Design and construct the water mains and service laterals in accordance with City and

County of Honolulu, Board of Water Supply, Water System Standards and as augmented by USAG-HI, DPW water line requirements. For USAG-HI, DPW water line requirements see Appendix GG, DPW Water Line Requirements.

(b) The water service connection point is shown in Appendix J, Drawings. During the Design, the Design-Build Contractor shall coordinate with the DPW Water System Manager to obtain final connection approval.

(c) For additional DPW water line information, contact: Karl J Santa, Water System Manager, DPW Utilities Division, Email: Karl.SantaQ@u.s.army.mil, Phone: 808-656-3296.

(a) The installation sanitary sewer collection system is part of the Schofield Barracks Wastewater System, which is owned and operated by Aqua Engineers Inc. Design and construct sewer mains and laterals in accordance with City and County of Honolulu, Design Standards, Standard Details and Standard Specifications; and as augmented by Aqua Engineers, Inc. sewer requirements and this RFP. For Aqua Engineers Inc. sewer line requirements; see Appendix EE, Aqua Engineers Sewer Requirements.

(b) Sanitary sewer system shall be designed to provide self-cleansing velocities and without surcharging the system.

(c) The Government has obtained conditional approval to connect to the existing sewer collection system. Sewer service connection point is shown in Appendix J, Drawings. During the design phase the Design-Build Contractor shall coordinate with Aqua Engineers Inc. to obtain final connection approval.

(d) For additional Aqua Engineers, Inc. sewer requirements, contact: Jan Reyes, Aqua Engineers, Inc., Email: Jan@aquaengineers.com, Phone: 808-621-3098.

For gas utility requirements, see paragraph 6.8.

For Cable TV utility information see paragraph 6.9.

6.4.7. Cut and Fill

6.4.7.1 The finished grades adjacent to the new building shall be set minimum 6-inch below finished floor or first floor elevation except where grades are required on walkways and entrances to buildings that are handicap accessible. Finish grades shall slope away from the building at minimum 5% for approximately 10 feet and then slope minimum of 1% to existing or new storm drainage.

6.4.7.2 Remove all excess materials and dispose of them outside of Government property.

6.4.8. Borrow Material

There are no borrow sites available on the installation for this project. Obtain fill material from off-installation sources and ensure it is suitable for construction and contains no hazardous or deleterious material.

6.4.9. Haul Routes and Staging Areas

Contractor haul route and COSA requirements and notes are indicated in Appendix J, Drawings.

6.4.10. Clearing and Grubbing:

The Contractor shall clear and grub the project site as required.

6.4.11. Landscaping:

6.4.11.1 General.

The Contractor shall design, install, and establish landscaping within the project limits. The landscaping of the project shall comply with all necessary design guideline documents and AT/FP requirements; satisfy functional and aesthetic requirements of the site; and apply sustainability best management practices that reduce labor requirements for maintenance and conserve water and energy resources.

6.4.11.2 A licensed landscape Architect shall design the landscape (includes concept, planting, and irrigation plans, specifications and design analysis). The landscape plan shall be congruent with similar UEPH buildings and POV parking areas located at the Schofield Barracks Military Installation. The plan shall generally be in accordance with Appendix CC Landscaping & Trash Dumpster Guidance.

6.4.11.3 Plantings shall be drought and salt tolerant emphasizing native Hawaiian or Polynesian-introduced species that are suitable for the Schofield Barracks micro-climate and promote sustainable design practices and water conservation.

6.4.11.4 Landscaping shall conform to AT/FP Standards and design considerations for Unobstructed Space of buildings per UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings. All landscaping within 33 feet of inhabited buildings or portions thereof shall not allow for concealment from observation of explosive devices 6 inches or greater in height. This does

not preclude the placement of site furnishings or plantings around buildings. It only requires conditions such that any explosive devices placed in that space would be normally observable by building occupants.

6.4.11.5 Provide gravel strips 5-feet wide by 4-inches deep over weed block fabric along the exterior wall of the UEPH facility. Install brick headers, 4 inch x 8 inch bricks grouted side-to-side, to separate gravel from grassed areas.

6.4.11.6 Landscape Plantings

Plants shall be selected based on their suitability to the Schofield Barracks environmental conditions, be able to survive with minimal supplemental watering and comply with Appendix I Schofield Barracks Acceptable Plants List and Appendix CC Landscaping & Trash Dumpster Guidance for Schofield Barracks.

6.4.11.6.1 Plant suitable species of oval-shaped, medium-canopied native Hawaiian trees along the roads within the project limits. New trees shall be compatible with existing trees indicated to remain. Provide and/or maintain spacing of approximately 60-100 feet between trees.

6.4.11.6.2 Provide suitable species of shade trees within the parking lot at a ratio of one tree planting for every 12 parking stalls. Construct planter wells with a minimum area of 100 sq ft per tree. Provide basaltic rock mulch, aggregate size 3-5 inches (quarry surge), 4-inches deep over weed block fabric, in tree planter wells.

6.4.11.6.3 Provide small-canopied, native Hawaiian species of trees to enhance the visual and functional environment of the project area. In particular, plant trees to screen mechanical enclosures, trash enclosures, and other site furnishings; accent the entry way of the UEPH. Select single-trunked, native Hawaiian palms for tree plantings within the 33 feet standoff distance.

6.4.11.6.4 If provided, permanent, automatic, underground irrigation systems for all landscaped areas within the project limits shall conform to the requirements of RFP paragraph 5.2.7 IRRIGATION. Provide irrigation controllers which use ground moisture sensors to schedule watering cycles.

6.4.11.6.5 Although the irrigation system is to be initially connected to the potable water system, all waterlines used for irrigation purposes (from the reduced pressure principle (RPP) backflow preventer to each of the irrigation sprinkler heads) shall be constructed of materials required by the State of Hawaii Department of Health for R-1 recycled water lines (refer to State of Hawaii Department of Health "Guidelines for the Treatment and Use of Recycled Water" and City & County of Honolulu Water System Design Standards, Vol. 1).

In the future, the irrigation system may be connected to an R-1 irrigation distribution system. Contractor shall provide one (1) RPP Backflow preventer for each lateral connection to the potable water distribution system. Contractor shall also provide a 10 foot irrigation system (R-1 material type) capped stub-out line on the source side of each RPP. Contractor shall determine the location of the proposed capped stub-outs and obtain site approval from the Contracting Officer & DPW.

6.4.12. Turf:

6.4.12.1 General

Provide turf for all areas disturbed by Contractor's operations. Grassing shall be temporary or permanent and planted immediately (within 14 days) after completion of ground disturbing activities. Establish grass groundcover in accordance with all applicable NPDES permit requirements and as required to meet Erosion and Sediment Control requirements in specifications section 01 57 20. Grassing shall be with specie(s) that are non-invasive and

adaptable to the site conditions. Use grass specie(s) suitable for lawns within the project limits including the POV parking lots.

6.4.12.2 Temporary irrigation system shall be provided to establish turf in all areas disturbed by construction operations if the permanent irrigation system is not in place or active.

6.4.12.3 Contractor shall provide a minimum of 90 days of temporary irrigation and maintenance for establishment of temporary turf to the satisfaction of the Contracting Officer.

6.4.12.4 Contractor shall provide temporary irrigation as required, and maintenance for establishment of permanent grassing to the satisfaction of the Contracting Officer for a minimum of 90 days or until project turn over date, whichever is later. Minimum coverage for grassing shall be 95%.

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 and shall conform with the Schofield Barracks's Real Property Master Plan. 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 Schofield Barracks'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 Schofield Barracks's identified preferences. Implement these preferences considering the following:

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

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

The goal of this project is to achieve the design and construction of a new Unaccompanied Enlisted Personnel Housing (UEPH) on Schofield Barracks, Hawaii. This UEPH is required to meet the housing needs of enlisted personnel at the new location, who would otherwise be forced to live off base, and represents compliance with a Department of Defense mandate to improve the quality of life for military personnel.

Architectural Theme: This project is located in the Schofield Barracks Company Campus Zone. The buildings in this zone have similar characteristic "look and feel". The building theme should be adapted to its environment to blend into the surroundings and adjacent UEPH of Schofield Barracks. The colors of the new complex will also conform to the colors of the Schofield Barracks IDG. See Appendix II for acceptable exterior colors.

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 Schofield Barracks. 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) UEPH Common Areas

i. CENTRALIZED LAUNDRY: Provide continuous 4 inch high raised concrete pedestal beneath all laundry appliances. Provide fixed solid wood benches.

ii. MAIL ACCESS AREA: Mail Access Area shall conform to DoD 4525.6M Postal Manual. Mailboxes shall be front-loading type and shall be individual recessed apartment type. No mail collection units shall be provided at the mail access area. UFC 4-010-01, paragraph B-3.4, Standard 13 and paragraph B-4.2, Standard 17 does not apply. Mail being received at the UEPH is initially processed at the installation central mail handling facility. Other applicable requirements and standards in UFC 4-010-01 are applicable.

iii. VENDING AREA: Provide a minimum of one vending area on every floor.

(c) Exterior Color Objective

Building exterior colors for various design elements shall comply with Appendix II, Exterior Color Chart in conjunction with paragraph 6.5.2.3 Requirement #1-Visual compatibility- description that colors of the new complex shall conform to the colors of the recently completed adjacent complex. Color Approval: prior to painting, provide 8"x10" brush outs to DPW for approval.

(d) Termite Barrier Objective

Provide either Mesh Termite or Granular Termite Barrier (GTB)

i. Provide either Mesh Termite or Granular Termite Barrier (GTB) 1. Mesh Termite Barrier protection shall conform to ASTM A 478 and ASTM A 580/A 580M, Type A1AA marine grade 316 stainless steel mesh of 0.007 inch diameter wire with mesh openings of 0.026 x 0.018 inches.. Mesh Termite Barrier shall be applied to all floor penetrations to include but not limited to plumbing, electrical, telecommunication, and security penetrations: conduits, pipes, wires, manholes, etc., at all control joints, joints in between the slab and walls. Installation of the mesh barrier shall be in accordance with the manufacturer's recommendations. Fill all cracks showing up during construction with epoxy having a Shore D Hardness (ASTM 2240) greater than 85. The Contractor's finalized design shall be subject to Government Acceptance.

ii. Granular Termite Barrier shall designed, specified and constructed in accordance with Ameron Industry standards. The Contractor's finalized design shall be subject to Government Acceptance.

(e) Flooring

i. Interior floor finishes shall be moisture and mildew resistant, easily maintained, and suitable in accordance with industry standards for the architectural surface being finished.

ii. Floor finish for stairs shall be sealed concrete.

iii. Moisture, Alkalinity and Bond Tests: Determine the suitability of the concrete subfloor for receiving the resilient flooring with regard to moisture content and pH level by moisture and alkalinity tests and comply with manufacturer's recommendations. Conduct moisture vapor testing in accordance with ASTM F 1869 or ASTM F 2170, unless otherwise recommended by the flooring manufacturer. Conduct alkalinity testing as recommended by

the flooring manufacturer. Determine the compatibility of the resilient flooring adhesives to the concrete floors by a bond test in accordance with the flooring manufacturer's recommendations. If the results of the moisture vapor and alkalinity tests exceeds the maximum vapor emission and pH levels required by the flooring manufacturer, Moisture Vapor Treatment shall be provided to reduce vapor emission and pH to acceptable levels that the flooring manufacturer will warrant the flooring. Treatment material shall be compatible with flooring adhesives. Material and installation of the moisture vapor treatment shall provide a 10 year warranty to the Government.

iv. Provide vapor barrier beneath all concrete slabs. The vapor barrier shall be a minimum 10 mil thick and conform to ASTM E1745, Class A.

(f) Corner Guard: Provide corner guards at dwelling unit interior entry area.

(g) Bulletin Board: Provide one mounted on the wall across CQ Station and centrally located on all subsequent floor above the 1st Floor. Bulletin boards shall consist of a tack board, aluminum tabular frame, and sliding aluminum framed glazed doors. Frame shall be secured to the wall by means of concealed screws or bolt hangers. Bulletin board shall consist of a permanent header panel with a general title, such as "Notices" or "Information", and a 1/4-inch cork pinning surface glued to 1/4-inch thick plywood or hardboard backing. Cork shall have a plastic impregnated surface and burlap backing. The cork's surface finish shall be smooth and be free from air pockets, raised cork blemishes, and joint imperfections. Door frame shall have removable glazing bead applied on the inside. Glazing shall be 1/4-inch polished laminated glass. Each bulletin board door shall be complete with hardware including key operated lock. Hardware shall be aluminum with anodized finish matching the frame. Header panel shall be white letters on standard black background; cork panel - medium gray. Heading message shall be upper and lower case Helvetica medium, 2-inch capital letter height, centered.

(h) Functional Space Requirement:

i. Kitchen: the GFGI electric oven/range shall be 30 inches wide and cooktop surface shall be smooth type.

(i) Architectural conceptual drawings are not provided as part of Appendix J.

(j) LOBBY SEATING AREA: Lobby seating area should accommodate 3-4 occupants.

(k) UEPH ADJACENCY REQUIREMENTS:

1. Centralized Laundry: Locate in a central area on each floor, adjacent to Janitor's closet and accessible only from Corridor.

2. CQ Station: Adjacent to main entry lobby/corridor. Provide built-in counter oriented to facilitate arrival of individuals to the facility and to monitor common area activities.

3. Entry Lobby: Adjacent to the main entry and CQ Station.

4. Public Toilets: Adjacent to Entry Lobby or CQ Station.

5. Vending Area: Adjacent to Entry Lobby on the first floor.

6. Public Phone Area: Provide one at the First Floor with divider panels for acoustical privacy. Equipment and materials in the public telephone area shall be vandal resistant and easily cleaned.

7. Janitor's Closet: Adjacent to the Centralized Laundry on the First Floor and one adjacent to the Centralized Lobby on all other floors.

8. Primary Mechanical, Electrical and Telecommunications Rooms: Primary mechanical, electrical and telecommunications rooms shall be located on the first floor. Mechanical and Electrical rooms shall be accessible only from the building exterior. The telecomm room can be accessed from the Corridor.

9. Secondary Mechanical/AHU Room, Electrical Room and Telecommunications Room: Secondary mechanical/AHU, electrical, and telecomm rooms shall be adjacent to and accessible from the corridors.

10. Stairways: Provide as required by applicable codes.

11. Corridors: Adjacent to apartment modules, entry lobby, CQ Station, stairways.

(l) Future Photovoltaic (PV) Considerations to the Building Structure: Provisions for future rooftop photovoltaic equipment (i.e., panels, units, related components and accessories) shall be located at the central most portion of the building's rooftop (facing most effective side) and shall be designed to be minimally seen (low to the rooftop surface as possible) and strategically positioned (farthest from the roof's edge) for the least visual impact to everyone who visits, works, and lives at Schofield Barracks. The location of the proposed PV system shall be reviewed and approved of by DPW.

(m) Exterior Signage: Quantity, type, size, location of building identification signs and illumination requirements (where applicable) shall be in accordance with Appendix H.

1. Building Facility Numbers and/or Building Identification signs are required for:

i. stand alone buildings and structures

ii. trash enclosures, propane tank and mechanical equipment yard enclosures

iii. utility structures, pump house buildings

iv. motorcycle parking shelters, guard shacks, bicycle shelters, bus shelters, picnic shelters

v. POL and HAZMAT storage sheds

vi. exterior pad mounted, electrical transformers and exterior pad mounted electrical switchgears

(n) New buildings and structures shall have sloped standing seam metal roofing to match existing adjacent structures.

(o) Building Turn-Over Checklist: The D-B Contractor shall complete all items on the Building Turn-Over Checklist in Appendix QQ and prepare for discussion with the Government's project delivery team during the Red Zone Meeting (see Section 01 78 02.00 10, Para. 1.10) at approximately 80% of contract completion or 60 days prior to anticipated Beneficial Occupancy Date (BOD) whichever occurs first.

6.5.3. Not Used

6.5.4. INTERIOR DESIGN

(a) Floors: Interior floor finishes shall be moisture and mildew resistant, easily maintained and suitable in accordance with industry standards and comply with requirement of applicable codes for the architectural surface being finished.

(b) Ceramic Tile: Comply with ANSI A 137.1 and the recommendations of Tile Council of America (TCA) Handbook for Ceramic Tile Installation.

(c) Interior Walls and Partitions: Comply with requirement of applicable codes. Where bathtubs are installed back-to-back, both sides of the cement board partitions shall extend to the floor. Bedrooms: a minimum of one wall (longest wall) shall be finished with tackable material.

(d) Metal Support Systems: Non-load bearing metal studs and furring shall comply with ASTM C645, stud gauge shall be as required by height and loading. Metal framing and furring systems shall be capable of carrying a transverse load of 5 psf without exceeding either allowable stress or a deflection of L/240, provide galvanized finish.

(e) Gypsum board: Comply with ASTM C 36. Minimum panel thickness shall be 5/8 inch. Glass mat gypsum panels shall be used as substrate for ceramic tile wall application except at showers and tubs where cementitious backer board shall be used. Joint treatment shall conform to ASTM C 475, Screws shall conform to ASTM C646 and Drywall installation shall conform to ASTM C 840.

(f) Ceilings: Comply with requirements of applicable codes, including lateral bracing.

(g) Door Finish Hardware

1. All requirements for hardware keying shall be coordinated with the Contracting Officer. Hardware finish shall be #626. All locksets and exit devices shall accept same interchangeable cores. Plastic cores are unacceptable. Door hardware and security requirements must be coordinated with the functional requirements, the Room-by Room Criteria, and the electrical security/fire alarm system requirements of this document. Provide wall/jamb/post mounted actuators for Electrically Powered Automatic Door/Operator as required by applicable codes.

2. Programmable Electronic Key Card Access System: One (1) complete "Kaba Ilco Solitaire 710-11 Series Access Control System". Stand alone electronic card reader lock. Lever handle at exterior and knob on the interior. Programmable Electronic Key Card Access System (with unique Site ID#) for the UEPH, shall be provided for security purposes. All special tools, software, connecting cables and proprietary equipment necessary for the maintenance, testing, and re-programming of the system shall be furnished to the Contracting Officer Representative. The Front Desk Unit (FDU) shall be compatible with military identification card (CAC) to operate doors in the UEPH. FDU shall be capable of providing a detailed audit trail of up to 400 lock transactions. Locksets shall be equipped with an anti-pick latch and 1" solid metal deadbolt to prevent forced entry. Locksets shall be compatible with exit hardware. Provide removable cores with key override feature. Provide a two year warranty on the system and all components and locksets. All blank card keys will have serial numbers inscribed on them.

3. Finish Hardware for all Electrical and Mechanical Rooms: provide push button cipher mortise locks with deadbolt and key over-ride mastered to existing DPW keying system. "Kaba Ilco Simplex 5000 Series 50-31-XS-WL-626-41" with interchangeable core.

4. Finish Hardware for all Telecommunications Rooms: provide push button cipher mortise locks with deadbolt and key over-ride mastered to existing DPW keying system. "Kaba Ilco E-Plex 5000 Series E50-31-XS-WL-626-41" with interchangeable core. Keying shall be coordinated with DOIM keying system.

5. Dwelling Unit Main Entry Door Hardware: (door directly off the Corridor) provide lever handles at Corridor side and knob at dwelling side only.

6. Interior Door Hardware: All other interior door hardware shall be lever operation, and all other miscellaneous hardware as required for a complete installation. Provide door chimes, associated wiring, push buttons, and transformer for each bedroom of a dwelling unit. Push buttons shall be located on the Corridor side of the dwelling unit Main Entry Door. System shall be designed for operation at less than 50 volts. Push buttons shall be labeled to identify each bedroom. Provide door swing bar door guards mounted on the jamb on the interior of each bedroom of a dwelling unit.

Interior building signage requirements:

(a) Interior signage shall comply with UFC 3-120-01. Comply with requirements of ADAAG and UFAS. Provide graphic interior room identification signage for the following spaces:

(b) Public toilets. Provide Room Number and Room Function signage for all rooms, except apartment modules.

6.6. STRUCTURAL DESIGN

6.6.1 CRITERIA

The criteria listed below are in addition to criteria listed in Section 4.0 Applicable Criteria.

UFC 3-301-01: Structural Engineering. Only Appendix D is applicable.

UFC 4-010-02: DoD Minimum Antiterrorism Standoff Distances for Buildings (for Official Use Only)

6.6.2 DESIGN LIVE LOADS

6.6.2.1..Live Loads: Minimum design live loads shall be the greater of the loads specified in paragraph 3.5.1 and Appendix D of UFC 3-301-01.

6.6.2.2: Wind Speed: 105 mph (3 second gusts)

6.6.2.3: Seismic Design Data: The mapped maximum considered earthquake (MCE) spectral response accelerations for site class B are: S_s (at short periods) = 59% g; S_1 (at 1-second period) = 17% g. The acceleration values identified are for the general location of the facility. Verify and use site specific criteria based on the final site location of the facility. Adjust site class per IBC to match specific site information in Geotechnical report.

6.6.3 GEOTECHNICAL

Geotechnical information is provided in Appendix A. The contractor shall supplement this by conducting further geotechnical investigation as required.

6.6.4 ANTITERRORISM

Buildings shall comply with the requirements of UFC 4-010-01 based on "building category" type "billeting" necessary to mitigate the effects of "Type II" explosives, indicated in Table B-1 of UFC 4-010-01, for "Low Level of protection". A qualified blast resistant design consultant must be on the design team to provide structural analysis and design in accordance with UFC 4-010-01. Antiterrorism/Force Protection loads and minimum requirements are per UFC 4-010-01. For design of structural components subjected to dynamic loads, the U.S. Army Corps of Engineers Protective Design Center (PDC) developed SBEDS, Single-Degree-of-Freedom Blast Effects Design Spreadsheets (SBEDS). SBEDS is available for the successful contractor at the software tab of the PDC website, HYPERLINK "<https://pdc.usace.army.mil/>" <https://pdc.usace.army.mil/>.

6.6.5 ALL CONCRETE

Minimum concrete strength shall be 3000 psi. All concrete shall be reinforced. All floor mounted pads for electrical and mechanical equipment shall be 4 inch minimum thick concrete.

ASR mitigation is not required for this contract. The contractor shall fund both short term (ASTM C1260) and long term (ASTM C1293) testing required for this contract. The concrete supplier is not responsible to fund for these tests. No previous test data will be accepted. Test each aggregate (3C, 3F, pea gravel, and sands) used in the concrete mix design. Include both 14-day and 28-day readings for ASTM C1260 test. Report readings at 28 and 56 days and on a quarterly basis ASTM C1293 test results. Provide specific gravity and absorption tests for each aggregate. Provide a copy of both short term and long term testing to the Honolulu Engineering District Regional Technical Center. All data submitted becomes the property of the government and subject to public dissemination to the Hawaii ASR Working Group, DOD ASR Working Group, consultants, or other organizations.

6.6.5 PHOTOVOLTAIC (PV) READY

The roof shall be capable of supporting photovoltaic (PV) panels, which will be installed by another contract after the building construction is completed. The structure shall support PV panels weighing 4 PSF laid parallel to the roof surface. The roof structure shall include provisions for easy installation of temporary guard rails to satisfy OSHA requirements for the installation and maintenance of the PV panels.

6.7. THERMAL PERFORMANCE

[Not Supplied - PS_ThermalPerformance : THERMAL_PERFORMANCE]

6.8. PLUMBING

6.8.1 Plumbing systems shall be in accordance with Applicable Criteria, UFC 3-430-01FA and site conditions. Provide features and components applicable to site conditions including, but not limited to, pressure reducing valves, fixtures, handicapped accessible fixtures, etc.

6.8.2 New work shall include, but not be limited to, providing systems for new facility. In addition to the potable water system, provide R-1 reclaimed water system for flushing toilets and urinals. The R-1 piping system shall include, at minimum, all piping, appurtenances and miscellaneous items as required by the IPC for grey water systems, including, but not limited to, "purple pipe" and backflow prevention devices. R-1 reclaimed water from the site will not be available at the time of completion of this project. Connect the R-1 reclaimed water system within the building to the domestic water system within the building. Provide piping and stub-outs to manholes outside the building to enable future connection to the R-1 site system when made available. Label piping, valves and appurtenances as required by the IPC and with building served.

6.8.3 Solar hot water heating. See paragraph 5.9.4. If not life cycle cost efficient provide detailed calculations justifying why a solar thermal system will not be provided. Solar system shall automatically go into "vacation" mode when building is not occupied.

6.8.4 Provide LPG water heating system. LPG shall be provided from the LPG tanks located in the central plant for the adjacent UEPH provided in a previous project. Provide piping, equipment and appurtenances for LPG system, including individual LPG Advanced meter for new UEPH. Coordinate LPG system with DPW and The Gas Company.

6.8.5 See fire hydrant flow test results in Appendix D for existing water pressure.

6.8.6 Site chilled/hot water system shall be designed in accordance with UFC 3-430-01FA. Spacing of valve manholes shall not exceed 500 feet.

6.8.7 Provide an emergency shower/eyewash in the first floor mechanical room in accordance with ANSI Z358.1-2004.

6.8.8 Philadelphia vent systems, air admittance valve systems, engineered vent systems and SOVENT type systems shall be prohibited. No-hub piping below grade is also prohibited.

6.8.9 Provide rubber parts kits for backflow preventers. Provide a minimum of one kit for every valve in each different make/model of backflow preventer provided in the project.

6.8.10 Cold and hot water piping above grade shall be copper tubing, Type L. Cold water piping below grade shall be copper tubing, Type K. Hot water piping below grade shall be prefabricated insulated piping with copper tubing, Type K, carrier piping with fiberglass or PVC jacketing.

6.8.11 Flush valve type water closets shall not be used in the dwelling units. All water closets in dwelling units shall be provided with a seat and lid.

6.8.12 Provide hose bibs and floor drains in all mechanical rooms.

6.8.13 Length of pipe on the suction side of pumps that are less than six times the diameter of the pipe shall be provided with suction diffusers.

6.8.14 Limit sink faucets to no more than 1 gpm.

6.8.15 Provide utility meters for each individual building. Utilities to be metered including cold water, makeup water, hot water, propane and chilled water. Chilled water metering shall include total cooling BTUH of the chilled water serving each building which may be metered by flow and temperature. Metering shall be provided in accordance with DPW's Advanced Electrical Meter Specifications, Including Advanced Meter Data Management System Requirements dated 31 March 2009. Examples of requirements listed in the Advanced Meter Data Management System document include, but are not limited to: operating temperatures of 32 degrees F to 120 degrees F, operating humidity range of 5% to 90%, frequency of not less than one pulse per revolution, meter pulse shall not be coupled to meter dial to provide a pulse rate of not less than one pulse per gallon of water, LonWorks compliant.

6.9. SITE ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

6.9.1 General

6.9.1.1 The Site Electrical and Telecommunications drawings, Appendix J: Site and Utilities Drawings FY11 MCA PN 52267 Barracks sheets E-101, T-101, and T-102 indicate the exterior electrical and exterior telecommunications work for the project from existing base distribution utility tap/connection points to the exterior connection points for each service to the building.

6.9.1.1.1 The electrical and telecommunication points of connections at Schofield Barracks constructed under the project titled, FY 09 MCA PN 68823 UEPH Schofield Barracks, Hawaii. Obtain from contracting officer the as-built drawings, or if not available, the latest set of design drawings including all amendments and revisions for the basis of the bid proposal and the final design. The RFP drawings do not necessarily reflect as-built or future conditions. For your reference Appendix HH contains the latest design drawings available at the time of RFP preparation.

6.9.1.2 A new electrical service shall be provided between the primary utility tap point, PME UEPH, to complete the building connection to the existing primary electrical distribution system. Exterior electrical service shall consist of underground service lateral duct and conductors, exterior pad mounted transformer, manhole(s), associated equipment, and necessary appurtenances to provide a complete an operationally reliable/usable electrical power connection from the existing primary electrical distribution to the new barracks.

Contractor shall provide provisions such that outages to surrounding facilities are minimized. Coordinate and schedule outages with the Contracting Officer a minimum of 30 days prior to the scheduled outage. Outages to primary circuits shall not be longer than 8 hours unless it can be accomplished while the facilities are not in normal operation and the schedule is approved specifically by the Contracting Officer. If in cases where outages are longer than specified, the Government may require an alternate source of power such as an alternate primary circuit or generator power. The Contracting Officer will be the sole determinant if the contractor's justification for an outage longer than 8 hours is valid. If approved, he will also determine if the contractor's proposal for alternate source of power is adequate and complete. The outage shall not proceed until the Contracting Officer has approved the complete plan in writing. All costs for the alternate source of power and temporary connections shall be borne by the contractor.

6.9.1.3 An underground telecommunications service consisting of conduit-only infrastructure shall also be provided between the new UEPH telecommunications point of connection as shown on the drawings and the new barracks telecommunications entrance facility to complete the connection of the new facility to the existing telecommunications distribution infrastructure (exterior telecommunications wiring and connections shall be accomplished by JHITS contractor).

6.9.1.4 Provide adequate detail in plans, specifications, and design analysis such that analysis of design intent can be achieved in accordance with UFC 3-501-01, Electrical Engineering. Provide motor starting / flicker analysis, voltage drop calculations, illustrations of lighting fixture details on plans, wiring / conduit runs on plans, etc.

6.9.2 Power Requirements

6.9.2.1 The point of connection for the exterior electrical system is shown on the Electrical Site Plan, E-101.

Connect to spare section of pad mounted switch enclosure, PME UEPH. Install the new transformer in the space provided in the existing Mechanical Enclosure. Extend the conduit infrastructure from stub outs located near the Mechanical Enclosure as noted on sheet E-101. Primary electrical distribution, top of conduit system shall be not less than 24" below finished grade. Electrical ducts enclosing primary voltage conductors or subject to vehicular traffic shall be concrete encased schedule 40 PVC or EB duct. Exterior ducts enclosing secondary wiring not subject to vehicular traffic shall be in schedule 80 PVC or DB ducts below ground and rigid steel conduit above ground. Upon completion of conductor installation, duct openings shall be sealed. Field verify all service points.

6.9.2.2 Exterior ducts used for primary voltage conductors and other cables between manholes shall be 4" (4 trade size) minimum, with an additional minimum of one spare conduit equal in size of the largest conduit used in the duct run.

6.9.2.3 Exterior loads supplied from a building such as perimeter and multi-purpose court lighting, control, access control, utility metering, or other loads shall be served with a minimum of 1 inch size raceway. Larger size conduits shall be used to ensure correct conduit fill requirements. Empty conduit shall be provided with nylon pulling cord. 6.9.2.4 Primary electrical ducts shall be routed along the side of roadways to the greatest extent possible in order to minimize disruption to traffic and access to nearby occupied facilities.

6.9.2.5 Manholes shall be provided in lieu of handholes for distribution lines for the routing of primary voltage conductors. Manholes in traffic areas shall be designed for H20 wheel loading as defined by AASHTO HB-17. Manholes shall also have open sump floor openings to reduce the amount of water that is collected in the manhole. A brick-and-mortar collar with a minimum height of 12 inches shall also be provided for the manholes to accommodate future changes in the clearance to finished grade. At a minimum, manholes shall be placed at distance intervals to adequately support the installation of the primary electrical conductors used and also placed at roadway intersections.

6.9.2.6 Electrical equipment such as transformers and switches shall not be placed in manholes or underground vaults. Permanent ladders shall not be provided for electrical manholes.

6.9.2.7 Lead covered cables are prohibited. Primary voltage cables shall be MV-105, PVC jacketed, semi-conducting thermosetting insulating shield, copper tape shield, semi-conducting strand screen, 133% rating, copper conductors with filled strand, 15kV.

6.9.2.8 Primary voltage cable systems will incorporate a ground conductor connected in parallel with the cable shields and bonded at each point where they are connected to ground.

6.9.2.9 Copper conductors shall be used for all exterior wiring to include, but not limited to, primary and secondary feeders. The conductor shall be sized for the available system ground fault current but shall not be less than a #250 kcmil copper conductor equivalent.

6.9.2.10 Provide 15kV sectionalizing switches in lieu of y-splices, t-splices, junctions, or taps in primary voltage electrical lines. Y and T-splices shall not be permitted.

6.9.2.11 All electrical exterior pad mounted equipment enclosures (for transformers, sectionalizing switches, etc.) and exposed associated components shall be of stainless steel grade 304L construction and painted Federal Standard 595B color FS 10045 (brown).

6.9.2.12 Transformer base, hardware, fins and internal tanks shall also be of stainless steel grade 304L construction. Transformers shall be of dead front construction, have dual-voltage primary windings, one each for 12.47kV and 7,200V, with loop feed capability. For transformers there shall be 6 each primary voltage taps on each of the high-voltage windings (two each 2-1/2% taps above and four each 2-1/2% taps below each rated voltage). Nominal voltage is 7,200V for Schofield.

6.9.2.13 All transformers and exterior electrical pad mounted enclosures shall meet the requirements for Anti Terrorism and Force Protection (ATFP) guidelines for the facility in regards to spatial clearances. See UFC 4-010-01, DoD Minimum Antiterrorism Standards for Buildings.

6.9.2.14 Parking lot, area, motorcycle parking shelter, and security lighting shall be provided. Provide LED lighting fixtures with maximum cut-off illumination for the exterior Parking Lot and Area Lighting Systems with the following minimum characteristics:

(a) Street and general area lighting shall provide a minimum vertical target illuminance level of 1 foot-candle.

(b) Parking lot lighting shall provide a minimum vertical target illuminance level of 0.5 foot-candle and horizontal level of 1 foot-candle.

(c) Provide LED type lighting fixtures for parking lot and area lighting. The minimum characteristics are as follows:

- (1)CRI of 70
- (2)High-brightness LEDS; 5750K nominal color temperature
- (3)Minimum uniformity Ratio of 5:1
- (4)Optimized reflectors for low, medium, and high mounting heights
- (5) IES LM79 certified
- (6) LM80 compliant LEDS
- (7) ANSI C78.377-2008
- (8) DOE lab certified
- (9) 50,000 hours minimum B10L70 lifetime
- (10) 5 year warranty

To the maximum extent possible, utilize fully shielded or full cut-off luminaires to reduce luminaire brightness and direct glare. Fixture types shall be selected to match the existing types in the surrounding newly developed cantonment areas. Pole mounted exterior lighting subject to damage by vehicular traffic shall have vehicle impact-resistant base to prevent lighting pole/fixture damage.

6.9.2.15 All electrical boxes/enclosures (except metering) exposed to the environment shall be NEMA 4X.

6.9.2.16 Electrical connection for trash compactors shall be provided to the trash compactor location.

6.9.2.17 Provide advanced metering for this facility. An advanced metering system is one that collects time differentiated energy usage data from advanced meters via a network system or either an on-request for defined schedule basis. To the maximum extent possible, meters shall be installed indoors and located within a switchboard. See Appendix KK for further guidance.

6.9.2.18 Provide single phase 20A, 120V secondary service, minimum 3 - #2 conductors in 2" C (2 trade size) to new GFCI (government furnished contractor installed) CATV power pedestal. Provide 30"x 38"x 4" fiber reinforced concrete pad for power pedestal. The Contractor shall coordinate the required CATV distribution system with the 30th Signal Battalion / Network Enterprise Center via the contracting officer for approval. Provide minimum of three copies of the plan submittals. Upon approval, contractor shall energize pedestal by installing GFCI (Government Furnished Contractor Installed) equipment, (pedestal and plastic support box) as well as ground rod, wiring, conduits, and appurtenances to meet CATV service provider (Oceanic Cable) guidelines and requirements for service-vendor required access points, equipment provisions, power requirements, and system configuration. The point of contact for Oceanic Cable is Dean Yonezawa, (808) 625-8456.

6.9.3 Site Telecommunications

6.9.3.1 Telecommunications service to the facilities shall include telephone, cable television, utility monitoring, and base data network connections.

6.9.3.2 The point-of-connection for the telecommunications system is shown on the site telecommunications drawings. Intercept with new telecommunication maintenance hole, connect, and extend 4-4" C (4 trade size) concrete encased underground duct system from point of connection to telecommunication entrance facility. Telecommunications maintenance holes shall be stenciled and cover shall be round with "USA SIGNAL CORP" cast in the top of the cover, have a load rating of H-20 for heavy vehicular traffic, and have security bolts. In addition, provide 4-4" C conduit only infrastructure between existing telecommunication maintenance holes MH-0510 to MH-0531. Provide muletape or equivalent pulling means in all conduits. Field verify all service points.

6.9.3.3 CATV point of connection shall be at the new telecommunication maintenance hole. Intercept, connect, and extend conduit infrastructure. Provide new 1-4" C (4 trade size) concrete encased underground duct from new TMH, to new 2' x 6' x 2' (W x L x D) CATV pullbox. From pullbox route and stub up 1-4" C (4 trade size) conduit into GFCI (government furnished, contractor installed) CATV power pedestal. Provide muletape or equivalent pulling means in all conduits. Field verify all service points.

6.9.3.4 Ducts shall be extended to the facility to provide a pathway for building telecommunications services. Communications cabling, copper (CU) and fiber optic (FO) shall be installed and maintained by the Government Service Provider currently under the separate Joint Hawaii Information Transfer System (JHITS) contract via the 30th Signal Battalion / Network Enterprise Center. CATV cabling to be installed and maintained by Time Warner Oceanic Cable. The extended pathway shall be concrete encased 4" (4 trade size) schedule 40 PVC duct. New maintenance or hand holes shall be installed per I3A and ANSI/TIA/EIA standards.

6.9.3.5 Multicell fabric innerduct and pulling means will be provided in the ductline from originating maintenance hole to the associated facility. Provide the appropriate number of sleeves (3 pockets per sleeve) of "Maxcell" or equivalent fiber optic pulling sleeve in the following configuration (with "Muletape" or approved equal in each "pocket"):

4-way duct bank: 1 each 3-cell sleeve in first duct for building entrances or 3 each 3-cell sleeves in first duct for main (distribution) runs

6-way duct bank: 3 each 3-cell sleeves in first duct

9-way duct bank: 3 each 3-cell sleeves in first duct

12-way duct bank: 3 each 3-cell sleeves in first duct and second ducts

16-way duct bank: 3 each 3-cell sleeves in first duct and second ducts

6.9.3.6 Muletape or equivalent equal pulling means shall be provided in the remaining ducts of the ductline from originating maintenance hole to the associated facility.

6.9.3.7 Characteristics of the telecommunication conduit system acceptance test shall be as follows; All duct joints shall be reamed to avoid burrs, obstructions, or areas where the mandrel will not flow through freely and smoothly. All protruding surfaces in the telecommunications duct at joints or connections points shall be repaired or replaced by the contractor until it is accepted by the government and the telecommunications service provider. All new ducts shall be bi-directional mandrel tested by the contractor for acceptance by the government. All mandrel testing shall be witnessed by a government official and all current telecommunications service providers. Mandrels shall flow through freely and smoothly with no noticeable obstructions or hang-ups to pass testing. All equipment and personnel for mandrel testing shall be provided by the contractor. Mandrels utilized for telecommunication duct testing shall be 12 inch length, solid, non-tapered, diameter ¼ inch smaller than the interior of the duct tested. Similar mandrels of 6 inch length shall be used for only testing manufactured bends used for risers and building entrances. Contractor shall provide details of the mandrel test equipment to be used for government approval 30 days prior to testing. Contractor shall provide schedule of mandrel testing for government approval 15 days prior to any testing. Duct plugs shall be installed in empty conduits immediately after passing the mandrel test to prevent any debris from entering the conduit. Provide RCDD approved drawings of the telecommunications outside plant.

6.10. FACILITY ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

6.10.1 Interior Electrical

6.10.1.1 Locate service entrance equipment and other major electrical equipment in a dedicated electrical room. Facility main electrical room shall be located on first floor.

6.10.1.2 Provide dry-type distribution transformers: for single phase, between 15kVA and 333kVA; for three phase, between 15kVA and 1000kVA; that meet or exceed the nominal Premium Efficiency levels presented in 10 CFR § 431.196. In addition, for transformers rated for 15kVA or larger, use transformers with a 220 degree C (428 degrees F) insulations system not to exceed a 115 degree C (239 degrees F) temperature rise capable of carrying continuously 115% of nameplate kVA rating without exceeding insulation rating at a maximum ambient temperature of 40 degrees C (104 degrees F). Provide a transformer of 80 degrees C temperature rise capable of carrying continuously 130% of nameplate kVA without exceeding insulation rating when additional overload capacity is required.

6.10.1.3 Electrical distribution feeders shall not be installed under slab on grade.

6.10.1.4 Secondary service entrance conduits shall be concrete encased from pad mounted transformer to the facility.

6.10.1.5 Series-combination rated overcurrent protective devices shall not be used.

6.10.1.6 Wiring shall be in conduit and concealed behind or within walls, ceilings, and floors to provide an aesthetically pleasing and finished look.

6.10.1.7 Metal Clad cables, Armor Clad cables, and coilable duct assemblies shall not be used. Electrical non-metallic tubing or flexible non-metallic tubing shall not be used.

6.10.1.8 Non-metallic raceways shall not be used above finished grade.

6.10.1.9 Unless specified or indicated otherwise or required by NFPA 70, power and lighting wires shall be 600-volt, type THWN/THHN conforming to UL 83 or type XHHW conforming to UL 44. Where lighting fixtures require 90-degree Centigrade (C) conductors, provide only conductors with 90-degree C insulation or better. Note that designer of record shall use THWN values (75-degrees C) for capacities of THWN/THHN.

6.10.1.10 Receptacle outlets provided for vending machines as well as housekeeping receptacles located in hallways and lobbies (if provided) shall be placed on dedicated electrical circuits.

6.10.1.11 Provide 20A receptacles for all convenience outlets. No more than six each convenience outlets shall be on one circuit.

6.10.1.12 Provide GFCI receptacles such that they are integral with the outlet and should not affect downstream receptacles when tripped.

6.10.1.13 Provide stainless steel device plates for receptacles and switches.

6.10.1.14 Provide direct/indirect lighting fixtures with curved lens in office spaces.

6.10.1.15 Provide provisions for roof mounted interactive solar photovoltaic system. As a minimum, provide 2-4" C rigid metal conduit infrastructure and minimum of 30 square feet of dedicated floor space within main electrical room for controls, inverter, disconnects, meters, etc. for a fully functional grid connected photovoltaic system. Terminate conduits in roof mounted junction box and homerun to dedicated floor space. Terminate homerun in a second junction box. Provide pullstring in empty conduits.

6.10.1.16 Provide field installed arc flash labels for all panelboards, switchboards, switches, separately enclosed breakers, and any other field operable piece of equipment. Calculate the available arc flash hazard to determine the label information. The labels shall include the arc flash hazard level and the corresponding personal protective equipment. Submit arc flash calculations for review by the government.

6.10.1.17 Provide adequate detail in plans, specifications, and design analysis such that analysis of design intent can be achieved in accordance with UFC 3-501-01, Electrical Engineering. Provide motor starting / flicker analysis, voltage drop calculations, illustrations of lighting fixture details on plans, wiring / conduit runs on plans, etc.

6.10.2 Lightning Risk Assessment, since lightning flash densities are not available for Hawaii, the flash density identified for the West Coast shall be used (<0.1).

6.10.3 Facility Telecommunication

6.10.3.1 The contractor shall provide a complete set of as-builts, indicating all conduit and cable tray runs between telecommunications room equipment racks and outlets.

6.10.3.2 To the maximum extent possible, provide exterior access to first first floor telecommunications rooms, entrance facility, and equipment room.

6.10.3.3 Telephone/Data

(a) All inside plant copper cabling, patch panels, and connectors shall be Category 6. Data riser cable shall be single mode fiber optic cables.

(b) All administrative areas shall be dual 8-position type RJ45 jacks. Individual barracks rooms shall be single 8 position RJ45 jacks.

- (c) Dedicated inside and outside plant ducting space shall be provided for the purpose of fiber optic cable installation. A nylon pull cord shall be installed in all communications conduits, including entrance conduits, conduits between the cable tray and station outlets, and conduits having cable.
- (d) All telephone/data outlets shall be connected from the telecommunications room equipment rack patch panel with two 4-pair, ANSI/EIA/TIA 568B Category 6, unshielded twisted pair (UTP) solid copper station cable. All single 8-position type RJ45 shall be connected from the telecommunications room equipment rack patch panel with one 4-pair, ANSI/EIA/TIA 568B Category 6, unshielded twisted pair (UTP) solid copper station cable. All terminations shall be wired to the ANSI/EIA/TIA T568A configuration.
- (e) A wall telephone outlet shall be installed in all Telecommunications rooms, and stairwells.
- (f) A dual 8-position type RJ-45 type outlet/connector shall be provided in electrical and mechanical rooms. One connector shall be labeled for data use and the other for voice use.
- (g) Grounding and bonding conductors shall be sized in accordance with J-STD 607 and NEC. Grounding and bonding conductors shall be installed from the telecommunications room's terminal backboard and connected to the building's earth electrode subsystem.
- (h) Polyurethane foam duct seal shall not be used.
- (i) Provide new voice and data patch cords for both horizontal and vertical backbone cables. All voice jumpers/patch cords and jacks are to be color coded blue. All data jumpers/patch cords and jacks are to be color coded green.
- (j) The contractor shall provide wiring and installation for a single telecommunications outlet to service one (1) each government furnished and contractor installed wall mounted weather-proof emergency phone at building primary entrance.
- (k) The contractor shall provide a jack for official safety/courtesy/convenience wall phones in all lobbies, mail access areas, laundry rooms, rear (unmanned) entrances (if any), and corridors. For vending areas, provide two each jacks.
- (l) The 30th Signal Battalion / Network Enterprise Center shall be provided with Telecomm Room key/access similar to DPW access controls for Electrical/Mechanical Rooms. Telecomm room shall not use electronic-type keys.
- (m) All grounding conductor cable lugs shall be compression type, long barrel with two-hole tag, except otherwise specified. Mechanically held lugs are not acceptable. Oxide inhibitor is required for all lugs-to-bus bar connections.
- (n) All installed bolts, lockwashers, nuts, etc, required to terminate grounding conductor connections shall be type 316 stainless steel. All bolted connections shall utilize lockwashers.
- (o) Voice patch panels shall be placed on a separate rack from data patch panels. See Appendix LL for recommended layout.
- (p) Design of telecommunications rooms shall show all equipment but not limited to, racks, backboards, cable tray, etc. Cable tray shall not be flush mount to backboard and/or walls within Telecommunications Rooms, provide a 3" to 6" standoff allowing for cableflow. In addition, provide detailed floor plan with wall elevations.
- (q) Labeling of telecommunications components shall be in accordance with Appendix MM - Telecommunications Labeling Requirements.
- (r) Entrance telecommunications conduits shall have "Muletape" or approved equal installed in each conduit.
- (s) Cable trays shall be used as horizontal distribution pathway system. Conduits may be used only from cable tray to the individual room outlets.

6.10.3.4 Provide a minimum of 10% spare capacity for voice and data backbone infrastructure.

6.10.3.5 LAN type networking equipment will be installed in the telecommunications room. LAN type networking equipment is GFGI (Government Furnished, Government installed) and Government Connected.

6.10.3.6 Telecommunications system design shall be based upon the Technical Criteria for the Installation Information Infrastructure Architecture (I3A) and shall be reviewed by the Information Systems Engineering Command, Ft. Detrick Engineering Directorate (ISEC-FDED). As a minimum, provide Design Analysis, Specifications, Non-Bim, and BIM data. Documents can be mailed/email to:

DIRECTOR, USAISEC-FDED Korea Office

ATTN: ELIE-ISE-DE (Charles Hink)

Bldg 1002, Camp Coiner

Yongsan, Korea

EMAIL:

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6.10.3.7 CATV (Community Antenna Television)

(a) 1" (1 trade size) conduit minimum shall be used for interior distribution. CATV shall be distributed in a dedicated raceway system.

(b) Contractor shall use 75 ohm, tri-shield, 80% aluminum braid coaxial cable, RG-6 for horizontal cables and RG-11 for riser cables.

(c) The Contractor shall coordinate the required CATV distribution system with the Commercial Service Provider (Oceanic Time Warner Cable), with concurrence from the 30th Signal Battalion / Network Enterprise Center via the contracting officer for approval. Provide minimum of three copies of the plan submittals. The final installed distribution shall meet Oceanic Cable guidelines and requirements for service-vendor required access points, equipment provisions, power requirements, and system configuration.

6.11. HEATING, VENTILATING, AND AIR CONDITIONING

6.11.1 Provide HVAC for UEPH. Design solution shall be variable speed primary only chilled water, water cooled, variable frequency chiller(s) with oil-free compressors with magnetic bearings and digital, electronic controls and shall be in accordance with applicable criteria and site specific criteria. Provide heat recovery from the chiller(s) to generate central domestic hot water for the building. The chiller(s) shall be located within the footprint of the UEPH, in a ground floor mechanical room with exterior doors to provide maintenance access to the equipment. Locate chilled water pumps and condenser water pumps near chiller(s) within UEPH footprint. Provide and locate cooling tower within the central plant, adjacent to cooling tower provided in a previous project. Provide condenser water piping to/from new cooling tower to/from chiller(s) in UEPH. Dedicated outdoor air units (DOAUs) may be chilled water type or DX type. Total block cooling load is estimated at 200 tons.

6.11.2 Schofield Barracks is located in a high humid area and in an area where heating is not required. Follow UFC 3-410-01FA for SPECIAL CRITERIA FOR HUMID AREAS. VAV air handling system maybe provided. If a VAV air handling system is provided, delete requirement for individual equipment rooms for dwelling units.

6.11.3. All air conditioning units to include roof top air conditioning units and air handlers shall have continuous high output ultra violet (UV) lamps on the downstream side of the cooling coil for improved air quality to prevent microbial growth, fungus and mold on the cooling coils and drain pans. All air handlers shall have double wall construction with 2 inch thick insulation and solid galvanized steel inner casing. Air handling units shall be located and maintained from the floor level.

6.11.4. All three phase motors of one horsepower and larger shall be premium efficiency electric motors.

6.11.5. Provide a duct thermometer (0 deg. F to 100 deg. F) in the supply air duct of each air handling unit and rooftop air conditioning unit so that maintenance personnel can check the supply air temperature to see if the unit is operating properly.

6.11.6. All pressure gauges and thermostats exposed to the weather shall have either a stainless steel casing, aluminum casing with epoxy coating, or chrome plated brass case with stainless steel ring and be weatherproof. All gauges and thermostats shall be furnished with gage cocks to allow replacement without water leakage.

6.11.7. All chilled water and condenser water pumps shall have a nameplate attached to the bedplate with the GPM, head and impeller diameter information.

6.11.8. All pumps exposed to the weather shall have TEFC electric motor enclosures.

6.11.9. PVC pipe shall not be used for chilled water piping especially for underground pre-insulated pipe.

6.11.10. All air outlets shall be of aluminum or plastic. Steel air outlets will corrode due to high humidity.

6.11.11. All DDC building and energy management systems shall be native BACnet; no gateways are allowed. The DDC system shall tie into the DDC system provided for the adjacent FY09 UEPH project. At minimum, the following points shall be monitored and controlled:

6.11.11.1. Static pressure ductwork

6.11.11.2. VFD operation status (percentage)

6.11.11.3. Status of all fans (on/off)

6.11.11.4 AHU supply airflow (CFM) and outside airflow (CFM).

6.11.11.5. Temperatures for return air, supply air

6.11.11.6 AHU chilled water flow (GPM)

6.11.11.7 Temperatures for supply and return chilled water flow at each AHU.

6.11.11.8. Temperatures for the chiller (chilled and condenser water) and cooling tower (inlet and outlet)

6.11.11.9. Status for each pump (on/off)

6.11.11.10. Actuator status (modulating in percentage)

6.11.11.11. Control of setpoints for each thermostat

6.11.11.12. Hot water usage over time and flow rate.

6.11.11.13. Cold water usage over time.

6.11.12. Provide for future connection of DDC system to be tied in to the central DDC building and energy management at DPW headquarters. DPWs' mechanical engineer will have the highest accessible level for control systems. Provide both laptop and desktop computer to connect to DDC system. Locate desktop computer in the main mechanical room.

6.11.13. All training shall have as a minimum 40 hours devoted to classroom instructions and an additional one or two days of on-site training. Onsite training will include performance of one complete Preventive Maintenance cycle for each different type of equipment. A detailed written sequence of operation manual that will also be used as a training manual shall be provided to each student attending the training with another two copies supplied to the DPW mechanical engineer as extras.

6.11.14. Provide one gauge to read differential pressure (with reset) measuring the differential pressure between the inlet and discharge of each pump.

6.11.15. Provide a strainer upstream of each pump and a check valve downstream of each pump except sump pumps. Sump pumps shall not have a strainer. Suction diffusers shall be provided on pipe lengths on the discharge side of the pump that do not meet the six times the diameter of pipe.

6.11.16. Provide a standby chilled water pump and standby condenser water pump for each chilled water plant that has these pumps. Provisions shall be provided to automatically cycle the lead and standby pumps to obtain equal wear and to prevent premature failure due to non-use.

6.11.17. Chilled water pipes shall have a minimum 2 inch thick cellular glass insulation.

6.11.18. Chemical treatment shall be provided for chilled and condenser water systems.

6.11.19. Provide a water pressure reducing valve with pressure gauge for the cold water makeup for any chilled water system downstream of the reduced pressure backflow preventer. The pressure gauge shall be downstream of the pressure reducing valve.

6.11.20. Inlet guide vanes and fan discharge dampers for air handling units or roof top air conditioning units are not allowed for use in variable air volume (VAV) systems. Variable speed drives shall be provided in VAV systems. Systems above 10,000 CFM shall be VAV.

6.11.21. For systems with 10,000 CFM and below, provide forward curved fan wheels.

6.11.22. Chilled water systems of 150 tons and over will be divided between two or more chillers to ensure reliability and constant chilled water supply without temperature fluctuations, to prevent short cycling, and to minimize hot gas by-pass. If two chillers are provided, each chiller shall be of sufficient capacity to provide cooling for 75% of the total block peak load.

6.11.23. For packaged equipment 10 tons and below, a single compressor unit is acceptable (preferably two, if possible). Above 10 tons, units shall have minimum of two compressors with independent refrigerant circuits; for units using more than two compressors, a maximum of two compressors may be on one circuit. Up to 100 tons, a unit shall have no more than four compressors.

6.11.24. The equipment shall be furnished by a factory authorized supplier within a distance of 500 miles of the installation site which shall include but not limited to: (a) replacement units up to 10 tons; (b) adequate replacement

parts inventory of compressors, indoor fan housings, wheels, shafts, bearings, condenser fans, blades and motors, factory OEM accessories such as circuit breakers, relays, timers, and microprocessor controls unique to the manufacturer; (3) factory trained engineers to provide field support and training (minimum 10 years experience); (4) local warranty administration to expedite warranty issues in a timely manner; (5) available factory maintenance and repair training videos.

6.11.25. The manufacturer shall warrant the entire unit (air handler units, condenser units, chiller, cooling towers, and pumps) against failure within the first year of acceptance and extend the warranty (parts and labor) for compressors 2 to 5 years. The manufacturer or contractor shall provide a copy of the warranty certification (showing starting and expired dates) to DPW engineers.

6.11.26. Provide solid state phase monitor relay or internal phase monitor for every separately mounted three phase motor to prevent phase failure and phase reversal damage to the electric motors.

6.11.27. Provide a reverse phase and phase failure relay for every motor control center (MCC). Wire this unit into the primary circuit serving the control center through properly selected fuses. Upon a detection of a 10% phase unbalance or a reverse phase condition, all motors shall stop. Provide a green pilot light located on the started section labeled "Power Normal". When a power failure occurs on any phase, light shall de-energize and ring an alarm located in the motor control center. This panel shall not be required for started with internal phase monitors.

6.11.28. Factory coatings shall be provided.

6.11.28.1. All air cooled condensing units, air cooled water chillers, air cooled condensers, and all outdoor packaged units shall have a baked powder coated finish capable of withstanding a minimum 500-hour salt-spray test in accordance with ASTM B 117.

6.11.28.2. All air cooled condensing units, air cooled water chillers, air cooled condensers, and all outdoor packaged units shall be provided with copper tube/aluminum fin condenser coils with a factory applied (preferably) epoxy-phenolic coating and be tested in accordance with ASTM B117. Locally applied protective coating shall be provided with a 3-year conditioning warranty for the coating.

6.11.29. Interior ductwork shall be galvanized steel schedule 22 gauge minimum with 2" exterior insulation. Liners (interior insulation) and duct board will not be allowed. The diffusers shall have dampers for air balancing. Material shall be non-asbestos.

6.11.30. Chillers shall not have R-22. If R-134a is provided, the contractor shall provide solid state HFC refrigerant leak detectors (4 each) with strobe light alarm capable of detecting the presence of escaping refrigerant R-134a and can be wall mounted.

6.11.31. Chiller manufacturer shall furnish neoprene isolator pads for mounting equipment on the concrete pads. The contractor shall provide concrete pads of sufficient size for equipment and shall be a minimum of 6" wider than the equipment on all sides. Contractor shall ensure that the chillers are not installed close to the edges of the concrete pad; vibration over time will start breaking the concrete at the edges.

6.11.32. The contractor shall provide a factory-trained representative, employed by the chiller manufacturer, to perform the start-up procedures as outlined in the Start-up, Operation and Maintenance manual provided by the chiller manufacturer. Manufacturer shall supply the following literature: (a) Start-up, operation and maintenance instructions; (b) Installation instructions; (c) Field wiring diagrams.

6.11.33. The contractor shall supply and install main electrical power line, disconnect switches, circuit breakers and electrical protection devices per NEC requirements and as indicated by the chiller manufacturer, if applicable. The contractor shall wire the chilled water pump, condenser water pump and tower fan control circuit to the chiller control circuit. The contractor shall supply and install electrical wiring and devices required to interface the chiller controls with the building control system, if applicable. The contractor shall supply electrical to the unit at the voltage, phase and frequency required for each piece of equipment. The contractor is responsible for performing all electrical work in accordance with NEC requirements (latest edition).

6.11.34. Sequence of Operation for chilled water systems shall be as follows:

6.11.34.1. Smoke detection. The unit smoke detector normally closed (NC) contacts shall be hardwired to the fan

Start/Stop control circuit. Upon detection of smoke, the control circuit will shut down the air handling unit fan, generating an alarm. The alarm will disable the unit, closing the outside air damper and turning the unit off.

6.11.34.2. Supply fan. The supply fan will run anytime the unit is commanded to run. The fan will run for a minimum of five minutes and be off a minimum of five minutes (time adjustable) unless shut down on local safeties. Alarms will be provided as follows: Failure-commanded on, but the fan status is off; Running in hand-commanded off, but the status is on.

6.11.34.3. Cooling mode supply air temperature setpoint-fixed. The unit will maintain a fixed supply air temperature setpoint of 54.6°F (adjustable). Alarms shall be provided as follows: High supply temperature-whenever the supply air temperature is 5°F (adjustable) or more above setpoint; Low supply air temperature-whenever the supply air temperature is 5°F (adjustable) or more below setpoint.

6.11.34.4. Supply air volume. Modulate supply air volume to satisfy space temperature setpoint, with reverse action for heating mode (if applicable) and direct action for cooling mode. Minimum airflow (adjustable) will be 50% of scheduled airflow. If duct static pressure rises above the duct static pressure switch setpoint, switch contacts will open, disabling the unit supply fan and generating alarm.

6.11.34.5. Fan coil unit. Each fan coil shall be provided with its own three-way motorized control valve piping package and thermostat. The three way valve shall modulate chilled water to satisfy the temperature setpoint. When unit is shut off, the three-way valve shall divert flow from the coil section to the bypass line back to the chilled water return piping.

6.11.34.6. Programmable Thermostat Setpoints shall be initially set for:

Time Between: 5:30 am – 4:00 pm

Cooling 74°F±2°F

Time Between: 4:30 pm – 5:00 am

Cooling 76°F±2°F

6.11.34.6. Non-Programmable Thermostat Setpoints shall be initially set for:

Cooling 74°F±2°F

6.11.34.7. Run Conditions-Scheduled. The air handling unit will run based on an operator-determined schedule. Emergency shutdown: On receiving an Emergency Shutdown Signal, the unit will shut down and generate an alarm and close low leakage dampers to seal all outside air intakes and exhaust duct outlets.

6.11.35. Provide meters for each vertical building for utilities serving each respective building as applicable, including cold water, makeup water, hot water, natural gas, propane, steam, chilled water. Metering shall be provided in accordance with DPW's Advanced Electrical Meter Specifications, Including Advanced Meter Data Management System Requirements dated 31 March 2009. Examples of requirements listed in the Advanced Meter Data Management System document include, but are not limited to: operating temperatures of 32 degrees F to 120 degrees F, operating humidity range of 5% to 90%, frequency of not less than one pulse per revolution, meter pulse shall not be coupled to meter dial to provide a pulse rate of not less than one pulse per gallon of water, LonWorks compliant.

6.11.36. The TAB firm shall be a prime subcontractor of the Prime Contractor and be financially and corporately independent of the mechanical subcontractor, reporting directly to and paid by the Prime Contractor.

6.11.37. The Commissioning firm shall be a prime subcontractor of the Prime Contractor and be financially and corporately independent of the mechanical subcontractor, reporting directly to and paid by the Prime Contractor.

6.11.38. Motorized dampers shall be dual bearing type system that are self-sealing, self-lubricating and non-absorbing which result in maintenance free performance. Damper blades shall be extruded aluminum (6063T5) with EPDM blade seals. Linkage hardware shall be provided in the frame side and constructed of aluminum and corrosion-resistant, zinc-plated steel, complete with cup-point trunnion screws for a slip-proof grip. Dampers shall be in accordance with applicable criteria including, but not limited to, ATFP criteria for low-leakage performance. Provide TAMCO series 1000 air-foil control dampers or approved equal.

6.11.39. Additional requirements for UNACCOMPANIED ENLISTED PERSONNEL HOUSING (UEPH) – BARRACKS

6.11.39.1. Provide individual temperature control for each bedroom.

6.11.39.2. It is preferred that equipment be located so that equipment can be maintained from the floor level.

6.11.39.3. Provide kitchen exhaust hoods to match size of range/oven width.

6.11.39.4 Cooling only units shall be used.

6.11.39.5. Air conditioning in room shall de-energize when exterior doors or windows are open. Room air conditioning shall only operate when rooms are occupied.

6.11.40. Centralized Laundry

6.11.40.1 Provide general exhaust ventilation in the laundry room to remove excess humidity when the clothes dryers are not in operation. The general exhaust should be on a timer to cease operation after the appropriate amount of air changes have been achieved to exhaust the excess humidity.

6.11.40.2 Do not manifold dryer vents to a common exhaust. Each dryer shall be individually exhausted directly to the exterior of the building.

Integrate the control system to the installation's existing UMCS. The existing UMCS is [Not Supplied - PS_HVAC : UMCS_DESCRIPTION]

Provide M&C Software with a license for no less than 1 clients

Provide M&C Software with a license for no less than 1000 points.

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 All fire protection features shall be in accordance with UFC 3-600-01, including (but not limited to) automatic sprinkler system (w/ hydraulic calculations), fire detection and alarm system, mass notification system, barriers (fire, smoke, thermal), fire barrier plans, fire hydrants, hydrant test data, etc.

6.13.2 A qualified Fire Protection Engineer must be on the design team to provide complete Fire Protection Design in accordance with UFC 3-600-1

6.13.3 Waivers for deviations from any fire protection criteria shall be submitted through the District Fire Protection Engineer and Division Fire Protection Engineer in writing prior to submitting to HQUSACE. Approved written waivers shall be included within the design analysis for the project.

6.13.4 Provide a wet pipe fire sprinkler system in accordance with Applicable Criteria. System shall include and be designed as applicable to the facility and site conditions including, but not limited to, the design solution outside of the building.

6.13.4.1 Applicable features shall include, but not be limited to, providing an OS&Y valve on the fire sprinkler riser, fire department connections, fire hydrant flow tests, etc.

6.13.5 Fire Alarm Reporting System

6.13.5.1 Provide new class A fire alarm system for each building. The fire alarm transceiver shall be capable of transmitting and receiving signals from the existing Army Monaco receiving station at the Navy Fire Department (ROCC) Pearl Harbor.

6.13.5.2 The fire alarm frequency is 138.2875 MHz.

6.13.5.3 All Fire Alarm system notification appliances shall be readily and easily distinguishable from mass notification system devices in terms of visual (color of illuminated visual devices) or audible characteristics.

6.13.5.4 The Fire alarm system shall comply with the requirements of UFC 3-600-01. The location for the building fire alarm control panel will be coordinated with the local Fire authority, but it is generally located at the primary entrance to the facility. Horn and strobe annunciation shall be provided. Fire alarm strobes shall be installed in accordance with UFC 3-600-01, NFPA 72 and ABA. In general strobes to be installed in all rooms and public areas (public toilet, corridors, vending area, etc.) except for janitor's closets, stairs, and dwelling units. Horns should produce a sound that is in accordance with NFPA 72 and distinctive from other alarms in the building. Pull stations will be the non-glass, key reset type. Duct smoke detectors shall be provided in accordance with NFPA 90A. The HVAC system will be shutdown upon activation of fire alarm system or by HVAC shutdown switch located on the local operating console (LOC) of the mass notification system. An alarm signal will be transmitted to the local fire department. This signal must be compatible with the local fire department's equipment.

6.13.5.5 Install addressable control modules directly in the device, within a maximum of 12 inches of the device they are monitoring, or the connection between the control module and the device shall be provided with a loop circuit with separate conduits.

6.13.5.6 Minimum spacing of conduit in and out of appliances, devices, fire alarm panel, and transceiver is 4 ft. horizontal runs and 1 ft. for vertical runs. Exceptions to the one out of each device and appliance allowed by NFPA 72 is prohibited such that there will be continual operation of the system in the event of a single conduit and conductors within gets cut or ground fault occurs.

6.13.5.7 Smoke detectors in dwelling units shall be addressable non-latching type (sounder base to stop audible alarm when smoke clears smoke chamber) and placed on a "Class A" circuit per NFPA 72. Locate smoke detectors away from kitchen range / oven and bathroom.

6.13.5.8 Provide storage batteries which shall have ample capacity to operate the fire alarm system for a period of 72 hours and following to operate all components of the system including all alarm signaling devices in the total alarm mode for a period of 15 minutes.

6.13.5.9 The entire fire alarm system (including mass notification system) conduit and junction boxes shall be concealed in walls or ceilings. Surface mounted conduits and junction boxes will only be accepted in the utility room. Panels, battery boxes, extender panels shall be semi-recessed or fully recessed.

6.13.6 Mass Notification System

6.13.6.1 The mass notification system provided shall be a MadahCom Waves system and able to communicate with the existing MadahCom base wide mass notification system. MadahCom authorized and employed personnel or a MadahCom factory-trained, certified, and authorized representative shall provide all mass notification system installation, preparation, programming, testing, certification, and commissioning services to deliver a fully complete and properly functioning installation that is integrated with the existing system at Schofield Barracks. The existing central broadcast location for Schofield Barracks is the Installation Operations Center located in the basement of Bldg. #106, Wheeler Army Airfield, HQ U.S. Army Garrison, Hawaii. All mass notification appliances shall be readily and easily distinguishable from Fire Alarm system notification devices in terms of visual (color of illuminated visual devices) or audible characteristics. Speaker and amber lens strobe mass notification appliances shall be provided in accordance with the latest edition ABA Accessibility Guidelines. In general, strobes shall be installed in all rooms except for janitor's closets, stairways, and dwelling units. Mass notification strobe locations shall be located in the same areas as the fire alarm notification devices. However, mass notification strobes shall not be combined with fire alarm strobes and be located on the opposite wall of fire alarm strobe(s). The mass notification appliance housing shall be marked "ALERT". Audible notification appliances are required on the exterior of buildings. Testing for exterior locations and appliances shall meet the latest edition of UFC-4-021-01. Any mass notification system spare parts, manuals, documentation, or special tools/equipment normally provided to installed system owners shall be provided to Mr. Francis Smith, DPTMS CBRNE Specialist, phone number (808) 655-4365.

6.13.7 Provide roof access in accordance with UFC 3-600-01, 2-9 for all exit stairs that extend to top floor in bldgs 3 or more stories in height.

6.14. SUSTAINABLE DESIGN

6.14.1. LEED Rating Tool Version. This project shall be executed using LEED-NC Version 3.

6.14.2. The minimum requirement for this project is to achieve LEED Silver level. Each non-exempt facility (building plus sitework) must achieve this level. In addition to any facilities indicated as exempt in paragraph 3, the following facilities are exempt from the minimum LEED achievement requirement: [Not Supplied - PS_SustainableDesignGeneral : SD_EXEMPT_FACILITIES].

6.14.3. Credit Validation: LEED registration, compiling of documentation at LEED OnLine and use of the LEED Letter Templates is required. Registration and payment of registration fees will be by the Government. Administration/team management of the online project will be by the Government. Validation of credits will be accomplished by the Government. LEED certification of the project by the Contractor is not required. The Government may choose to seek LEED certification of the project, in which case the Government will pay certification fees and coordinate with the GBCI and the Contractor will furnish audit data as requested at no additional cost.

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

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

SS Credit 1 Site Selection:

Project site IS NOT considered prime farmland.

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

Project site contains no habitat for threatened or endangered species.

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

Project site WAS NOT previously used as public parkland.

SS Credit 2 Development Density & Community Connectivity.

Project site DOES NOT meets the criteria for this credit.

SS Credit 3 Brownfield Redevelopment.

Project site DOES NOT meets the criteria for this credit.

SS Credit 4.1 Public Transportation Access.

Project site DOES NOT meets the criteria for this credit.

EA Credit 6 Green Power.

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

MR Credit 2 Construction Waste Management.

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

Regional Priority Credits (Version 3 only)

The project zip code is 96786.

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

6.15. ENVIRONMENTAL

6.15.1 SPECIFICATIONS

Specification section 01 57 20.00 10 Environmental Protection is supplemented by the additional information provided here and in Appendix E.

6.15.1.1 Erosion and Sediment Control Plan

Include site-specific Best Management Practices (BMPs) in the plan. Email copies of site specific BMPs and copies of any inspection or corrective action reports to the Directorate of Public Works Environmental Division (DPW Env), Clean Water Program Manager: James Rice, HYPERLINK "mailto:james.c.rice1@us.army.mil"james.c.rice1@us.army.mil.

6.15.1.2 Spill Control Plan

Immediately report all hazardous material spills to the Contracting Officer. In addition, notify DPW Env at the following phone numbers:

Emergency Spill Line - 656-1111 during normal working hours.

After working hours, notify the Installation On-Scene coordinator,

Ms. Rhonda Suzuki 864-1457

Mr. Jim Rice 864-1438

Mr. Gary Akasaki 864-1001

6.15.1.3 Spill Response

Provide a properly trained spill response team to support the Installation On-Scene Coordinator. If the Contractor is not able to provide this team, provide contract documentation indicating that he has qualified contract services available for spill response. Provide DPW Env a point of contact that will be responsible for the Contractor's spill response. This person shall provide his phone number and copies of his current spill response training certificate. The Contractor shall pay for the disposal of hazardous material to permitted facilities and submit the disposal reports to DPW Environmental.

6.15.1.4 Asbestos Prohibition

All materials used in this contract shall be asbestos-free (not contain any detectable amount of asbestos).

6.15.1.5 AIR RESOURCES - Sound Intrusions, additional requirements

The Contractor shall also comply with the provisions of the State of Hawaii Administrative Rules, Title 11, Chapter 46, "Community Noise Control".

6.15.1.6 Pest Management Report

Complete and submit DD Form 1352 "Pest Management Report" (see Appendix E), for pesticide (insecticide and herbicide) usage to the Contracting Officer on a monthly basis, by the first working day after each month, starting the first month that pesticides have been used. The DD Form 1352 (fillable .pdf) is available at:

Step 1 - Your Name and Contact Information:

Enter the requested information (please include an email address if you have one, in case you forget your password, and to receive notification of updated training)

Click on the "**Next Step**" button

Step 2 - Account Information:

Enter the requested information

Click on the "**Next Step**" button

Step 3 - User Type:

From the drop down menu, select "**Contract (Construction)**"

From the next drop down menu, select the type of work that your company is performing on this contract

Click on the "**Next Step**" button

Step 4 - Organizational Information:

From the drop down menu, select the installation: "**Schofield**"

From the drop down menu, select your company name

Click on the "**Next Step**" button

Step 5 - Job Functions:

From the job function box, select the job function which you are required to perform. Note that at least one job function must be selected

Click on the **Next Step** button

Step 6 - User Agreement:

Read the user agreement. Click on "**I Agree - Complete Registration**"

At the next screen, select "**Training**"

The next screen will list the training modules that need to be completed

Step 7 - Training:

Complete each module, followed by the test

After successfully completing all modules, proceed to printing your completion certificate

Step 8 - Print Certificate

From the top menu bar, select "**My Completed Training**" to print the training certificate. Click on the "**Print Certificate (Large)**"

6.15.1.7.3 Training Certification

Upon successful completion of the on-line training, individuals will receive a "Certificate of Accomplishment" that will be valid for three years from the date indicated for each competency area and is transferable among Army contracts in Hawaii. Certificates earned for training in other states or other DoD agencies will not be accepted. A copy of all current, valid certificates shall be maintained at the jobsite for all personnel identified above, at all times. The training must be retaken whenever a certificate's three year period of validity has expired.

6.15.1.7.4 Quarterly Staff Environmental Compliance Training

At least once per quarter, both contractor and subcontractors shall discuss and cover an environmental compliance issue that is specific to the work they are performing at the construction site. A training roster containing the date of training, compliance issue discussed and notes of the discussion, and the names of persons attending the training shall be prepared and kept in a training file that is accessible to inspectors.

6.15.1.8 Inspections

Representatives from DPW Env, HDOH, or EPA may inspect the construction site without notice to determine if the site is in compliance with EPA, HDOH, or Installation regulations. Any deficiencies identified during inspections shall be corrected within 14 calendar days or as specified.

6.15.2 ENVIRONMENTAL ISSUES

Overall environmental goal for the UEPH PN52267 WBR Construct Barracks, Schofield Barracks is to provide a safe and healthy environment for Contractors.

6.15.2.1 Environmental Concerns:

Proper handling of unexpected unearthed contaminated soil;

Worker safety protection due to exposure during construction.

6.15.3 ENVIRONMENTAL CONSIDERATIONS DURING CONSTRUCTION

A Site Characterization Report, "Final Site Characterization PN 68823 - UEPH Barracks Complex", prepared by Element Environmental LLC, May 2009, describes the results of studies conducted to determine the presence and extent of arsenic and organochlorine pesticide residues at the site related to past application during normal

maintenance of the former golf course and the presence of chlordane residue from past application for termite control in the family housing area. The site contained pole-mounted transformers which may have contained polychlorinated biphenyls (PCBs) in the past. Although existing records indicate that none of the transformers have leaked in the past, studies were also conducted to determine if residual PCB residues were present at the site. Excerpts from the report are included in Appendix E. The Contractor shall be responsible for verifying government furnished data and taking any appropriate actions to protect worker health and safety. The complete report is available on request. Based on past practices and site observations, the following requirements shall be incorporated during construction.

6.15.3.1 Dust Control

During ground disturbance work, effective dust control measures shall be implemented and maintained in accordance with Site Specific Best Management Practices.

6.15.3.2 Soil Management

If petroleum impacted soil (discoloration or strong petroleum odor) is encountered during ground disturbing work, immediately notify the Contracting Officer or one of his designated representatives (COR) of the discovery. Segregate suspected contaminated soils and protect from the rain and wind to avoid spreading of contamination. In addition, notify the Directorate of Public Works (DPW) Environmental Compliance Branch Chief (808-656-5301) of the discovery.

To the maximum extent practicable, soil shall be reused on site. Excess soil shall not be used as fill for other projects off site. Excess soil shall be disposed of at a permitted solid waste disposal facility in accordance with applicable rules and regulations.

6.15.4 ELECTRICAL TRANSFORMERS

During removal of the electric transformers, take extra precautions to prevent spilling of transformer oil. Contractor shall be responsible for costs associated with the proper disposal of PCB contaminated soil arising from oil spillage during transformer removal.

6.15.5 PESTICIDES USED FOR GROUND TREATMENT UNDER BUILDING SLABS

There are no regulatory requirements to test for pesticides, such as Chlordane, used to treat soil under building slabs at a Construction site. Legally applied pesticides and pesticide products are not required to be remediated under either CERCLA or RCRA. Soil contaminated with pesticide used for its intended purpose will be managed in place, to protect future site occupants from exposure. Soil sampling, analysis, and remediation are not required, since the potential for exposure to contaminated soil would only occur during construction activities. The Contractor shall be responsible for taking any actions necessary to protect worker health and safety during construction activities. If the Contractor decides to test the soil or conduct personal air monitoring, it will be at his expense.

6.15.6 SAFETY

Occupational Safety and Health Administration (OSHA) 29 CFR 1926, Safety and Health Regulations for Construction, will be followed at all times during construction for worker safety protection. Debris and soil containing fuels and hazardous construction materials are assumed to be a concern to worker health and the appropriate personnel protection equipment shall be used.

6.15.7 APPLICABLE FEDERAL AND STATE LAWS AND ACTIONS.

Except as specified otherwise in the SOW, design construction facilities shall comply with the latest editions (as of the date of the bid opening) of the following. Major environmental Federal/State and local guidance and regulations are listed below:

6.15.7.1 Mercury

Solid and Hazardous Disposal Act as amended by the Resource Conservation and Recovery Act and amendments (RCRA), Public Law 94-580. Solid Waste Disposal Act. Among other items, this Act requires Federal agencies to obtain permits for their hazardous waste treatment, storage, and disposal facilities.

6.15.7.2 Safety and Health

Hawaii Revised Statutes, Chapter 396, Hawaii Occupational Safety and Health Law.

U.S. Army Corps of Engineers Engineering Manual, EM 385-1-1, Safety and Health Requirements Manual.

6.16. PERMITS

6.16.1 Determine permit requirements as part of the design process and shall secure all permits necessary for this construction. Permit requirements include, but are not limited to the following:

6.16.1.1 Directorate of Public Works (DPW), Hawaii, Excavation Permit. Obtain a DPW Excavation Permit prior to commencing trenching and excavation activities. A copy of the DPW Excavation Permit Application Form is included. See Appendix BB: Directorate of Public Works Excavation Permit.

6.16.1.2 National Pollutant Discharge Elimination System (NPDES) General Permit Coverage

6.16.1.2.1 Storm Water Associated with Construction Activities.

(a) If required, prepare and submit the Notice of Intent (NOI) and supporting documents, including a site specific best management practices plan, filing fees, and other documentation as required, to ensure all permit requirements are designed, implemented, and monitored. For additional NPDES related Contractor requirements and responsibilities, see Appendix FF, Specification Section 01 57 23, Storm Water Pollution Prevention Measures.

(b) Contractor shall prepare Specification Section 01 57 23, Storm Water Pollution Prevention Measures for Construction activities based on Contractor's Storm Water Pollution & Prevention Plan and Best Management Practices to be used for this project. The POH editing guide for Specification Section 01 57 23, as provided in Appendix FF, shall be edited in accordance with requirements of "Rules Relating to Soil Erosion Standards & Guidelines, Department of Planning & Permitting, City and County of Honolulu" and all other criteria contained in the specification. Changes may be made to recommendations for erosion control methods in this specification. However, no changes shall be made to criteria requirements, maintenance, inspection and other requirements contained in this specification.

6.16.1.2.2 Discharges of Hydro-testing Waters. If required, prepare and submit the Notice of Intent (NOI) and supporting documents, including water characterization, treatment plans, best management practices plans, filing fees, and other documentation as required, to ensure all permit requirements are designed, implemented, and monitored.

6.16.1.2.3 Discharges Associated with Construction Activity Dewatering. If required, prepare and submit the Notice of Intent (NOI) and supporting documents, including ground water source characterization, treatment plans, best management practices plans, filing fees, and other documentation as required, to ensure all permit requirements are designed, implemented, and monitored.

6.16.1.2.4 The DOH issued Notice of General Permit Coverage (NGPC), Site Specific Best Management Practices (BMP) plan, copies of the NOI and all other supporting documents, shall be on site at all times for inspection by DOH and USAGH DPW environmental personnel. All activities in the approved BMP plan and supporting documents shall be implemented.

6.16.1.3 Aqua Engineers New Connection Permit and Aqua Engineers Construction Permit (See Appendix EE) are required to be completed and submitted by the Contractor to Aqua Engineers for review and approval a minimum of 30 days prior to proceeding with any sewer construction work for this project. See permit application form for additional sewer notification requirements.

6.16.1.4 Department of the Army Permit (DA Permit) and State of Hawaii Water Quality Certification (WQC). The placement of fill material within Waters of the U.S. require a Clean Water Act Section 404 Permit and a Clean

Water Act Section 401 Water Quality Certification. Structures, or parts thereof, that may need a permit include, but is not limited to, drainage outlets and lined swales. For these type of structures that may be constructed in or near a potential water body, coordinate with the U.S. Army Corps of Engineers Regulatory Branch for a Jurisdictional Determination to document if a permit is required or not required. If a permit is required, prepare and submit the DA Permit application, application for water quality certification, filing fees, all related supporting documents, including a site specific best management practices plan, monitoring plan, and other documentation as required, to ensure all permit requirements are designed, implemented, and monitored.

6.17. DEMOLITION

Concept site demolition plans are provided in Appendix J, Drawings, for Design-Build Offerors' use to prepare cost proposal. Contractor shall be fully responsible to determine final demolition requirements and prepare final demolition plans and specs for this project. Contractor shall preserve all trees indicated to remain as shown in Appendix J, Drawings.

Contractor should note that the FY09 UEPH project is responsible for demolition of all above ground structures and improvements, including the site of the FY11 UEPH, with the exception of existing underground utilities. Contractor shall verify location of underground utilities and remove all those that interfere with construction of the FY11 UEPH project.

6.18. ADDITIONAL FACILITIES

None.

End of Section 01 10 00

**SECTION 01 32 01.00 10
PROJECT SCHEDULE**

1.0 GENERAL

1.1. REFERENCES

1.2. QUALIFICATION

2.0 PRODUCTS (NOT APPLICABLE)

3.0 EXECUTION

3.1. GENERAL REQUIREMENTS

3.2. BASIS FOR PAYMENT AND COST LOADING

3.3. PROJECT SCHEDULE DETAILED REQUIREMENTS

3.4. PROJECT SCHEDULE SUBMISSIONS

3.5. SUBMISSION REQUIREMENTS

3.6. PERIODIC SCHEDULE UPDATE MEETINGS

3.7. REQUESTS FOR TIME EXTENSIONS

3.8. DIRECTED CHANGES

3.9. WEEKLY PROGRESS MEETINGS

3.10. OWNERSHIP OF FLOAT

3.11. TRANSFER OF SCHEDULE DATA INTO RMS/QCS

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.

- U.S. ARMY CORPS OF ENGINEERS (USACE) ER 1-1-11 (1995) Progress, Schedules, and Network Analysis Systems <http://www.usace.army.mil/publications/eng-regs/er1-1-11/entire.pdf>

1.2. QUALIFICATIONS

Designate an authorized representative who shall be responsible for the preparation of the schedule and all required updating (statusing) and preparation of reports. The authorized representative shall be experienced in scheduling projects similar in nature to this project and shall be experienced in the use of the scheduling software that meets the requirements of this specification.

2.0 PRODUCTS (Not Applicable)

3.0 EXECUTION

3.1. GENERAL REQUIREMENTS

3.1.1. Submit a project schedule as specified herein for approval showing the sequence in which the Contractor proposes to perform the work and dates on which the Contractor contemplates starting and completing all schedule activities. The scheduling of the entire project, including the design and construction sequences is required. Contractor management personnel shall actively participate in its development. Designers, subcontractors and suppliers working on the project shall also contribute in developing an accurate project schedule. The schedule must be a forward planning as well as a project monitoring tool. The approved project schedule shall be used to measure the progress of the work and to aid in evaluating requests for excusable time extensions. The schedule shall be cost loaded and activity coded as specified herein. The schedule will provide the basis for all progress payments. If the Contractor fails to submit any schedule within the time prescribed, the Contracting Officer may withhold approval of progress payments until the Contractor submits the required schedule

3.1.2. Status the schedule on at least a monthly basis, as specified herein. If in the opinion of the Contracting Officer, the Contractor falls behind the approved schedule, the Contractor shall take steps necessary to improve its progress including those that may be required by the Contracting Officer, without additional cost to the Government. In this circumstance, the Contracting Officer may require the Contractor to increase the number of shifts, overtime operations, days of work, and/or the amount of construction plant, and to submit for approval any supplementary schedule or schedules as the Contracting Officer deems necessary to demonstrate how the approved rate of progress will be regained. See paragraph 3.7.4.

3.1.3. Failure of the Contractor to comply with the requirements of the Contracting Officer shall be grounds for a determination by the Contracting Officer that the Contractor is not prosecuting the work with sufficient diligence to ensure completion within the time specified in the contract. Upon making this determination, the Contracting Officer may terminate the Contractor's right to proceed with the work, or any separable part of it, in accordance with the default terms of the contract.

3.2. BASIS FOR PAYMENT AND COST LOADING

The schedule shall be the basis for determining contract earnings during each update period and therefore the amount of each progress payment. Lack of an approved schedule update or qualified scheduling personnel will result in an inability of the Contracting Officer to evaluate contract earned value for the purposes of payment. Failure of the Contractor to provide all information, as specified herein will result in the disapproval of the preliminary, initial and subsequent schedule updates. In the event schedule revisions are directed by the Contracting Officer and those revisions have not been included in subsequent revisions or updates, the Contracting Officer may hold retainage up to the maximum allowed by contract, each payment period, until such revisions to the project schedule have been made. Activity cost loading shall be reasonable as determined by the Contracting Officer. The aggregate value of all activities coded to a contract CLIN as specified herein shall equal the value of the CLIN on the Schedule.

3.3. PROJECT SCHEDULE DETAILED REQUIREMENTS

The computer software system utilized to produce and update the project schedule shall be capable of meeting all requirements of this specification. Failure of the Contractor to meet the requirements of this specification will result in the disapproval of the schedule. Scheduling software that meets the activity coding structure defined in the Standard Data Exchange Format (SDEF) in ER-1-1-11(1995) referenced herein are Primavera Project Planner (P3) by Primavera, and Open Plan by Deltek.

3.3.1. Use of the Critical Path Method

Use the Critical Path Method (CPM) of network calculation to generate the project schedule. Prepare the project schedule using the Precedence Diagram Method (PDM).

3.3.2. Level of Detail Required

Develop the project schedule to an appropriate level of detail. Failure to develop the project schedule to an appropriate level of detail, as determined by the Contracting Officer, will result in its disapproval. The Contracting Officer will consider, but is not limited to, the following characteristics and requirements to determine appropriate level of detail:

3.3.2.1. Activity Durations

Reasonable activity durations are those that allow the progress of ongoing activities to be accurately determined between update periods. Less than 2 percent of all non-procurement activities shall have Original Durations (OD) greater than 20 work days or 30 calendar days. Procurement activities are defined herein.

3.3.2.2. Design and Permit Activities

Include design and permit activities, including necessary conferences and follow-up actions and design package submission activities. Include the design schedule in the project schedule, showing the sequence of events involved in carrying out the project design tasks within the specific contract period. This shall be at a detailed level of scheduling sufficient to identify all major design tasks, including those that control the flow of work. Include review and correction periods associated with each item.

3.3.2.3. Procurement Activities

Include activities associated with the submittal, approval, procurement, fabrication and delivery of long lead materials, equipment, fabricated assemblies and supplies. Long lead procurement activities are those with an anticipated procurement sequence of over 90 calendar days. A typical procurement sequence includes the string of activities: submit, approve/review, procure, fabricate, and deliver.

3.3.2.4. Mandatory Tasks

Include and properly schedule the following tasks (See also the Sample Preliminary Submittal Register Input Form):

3.3.2.4.1. Submission, review and acceptance of design packages, including BIM

3.3.2.4.2. Submission of mechanical/electrical/information systems layout drawings

3.3.2.4.3. Submission and approval of O & M manuals

3.3.2.4.4. Submission and approval of as-built drawings

3.3.2.4.5. Submission and approval of 1354 data and installed equipment lists

3.3.2.4.6. Submission and approval of testing and air balance (TAB)

3.3.2.4.7. Submission of TAB specialist design review report

- 3.3.2.4.8. Submission and approval of fire protection specialist
- 3.3.2.4.9. Submission and approval of testing and balancing of HVAC plus commissioning plans and data. Develop the schedule logic associated with testing and commissioning of mechanical systems to a level of detail consistent with the contract commissioning requirements.
- 3.3.2.4.10. Air and water balancing
- 3.3.2.4.11. HVAC commissioning
- 3.3.2.4.12. Controls testing plan submission
- 3.3.2.4.13. Controls testing
- 3.3.2.4.14. Performance Verification testing
- 3.3.2.4.15. Other systems testing, if required
- 3.3.2.4.16. Contractor's pre-final inspection
- 3.3.2.4.17. Correction of punch list from Contractor's pre-final inspection
- 3.3.2.4.18. Government's pre-final inspection
- 3.3.2.4.19. Correction of punch list from Government's pre-final inspection
- 3.3.2.4.20. Final Inspection

3.3.2.5. Government Activities. Show Government and other agency activities that could impact progress. These activities include but are not limited to: approvals, design reviews, review conferences, release for construction of design package(s), environmental permit approvals by State regulators, inspections, utility tie-ins, Government Furnished Property/Equipment (GFP) and Notice to Proceed for phasing requirements, if any.

3.3.2.6. Activity Responsibility Coding (RESP)

Assign Responsibility Code for all activities to the Prime Contractor, Subcontractor or Government agency responsible for performing the activity. Activities coded with a Government Responsibility code include, but are not limited to: Government approvals, Government design reviews, environmental permit approvals by State regulators, Government Furnished Equipment (GFE) and Notice to Proceed (NTP) for phasing requirements. Code all activities not coded with a Government Responsibility Code to the Prime Contractor or Subcontractor responsible to perform the work. Activities shall not have more than one Responsibility Code. Examples of acceptable activity code values are: DOR (for the designer of record); ELEC (for the electrical subcontractor); MECH (for the mechanical subcontractor); and GOVT (for USACE). Unacceptable code values are abbreviations of the names of subcontractors.

3.3.2.7. Activity Work Area Coding (AREA)

Assign Work Area code to activities based upon the work area in which the activity occurs. Define work areas based on resource constraints or space constraints that would preclude a resource, such as a particular trade or craft work crew from working in more than one work area at a time due to restraints on resources or space. Examples of Work Area Coding include different areas within a floor of a building, different floors within a building, and different buildings within a complex of buildings. Activities shall not have more than one Work Area Code. Not all activities are required to be Work Area coded. A lack of Work Area coding will indicate the activity is not resource or space constrained.

3.3.2.8. Contract Changes/Requests for Equitable Adjustment (REA) Coding (MODF)

Assign Activity code to any activity or sequence of activities added to the schedule as a result of a Contract Modification, when approved by Contracting Officer, with a Contract Changes/REA Code. Key all Code values to

the Government's modification numbering system. Any activity or sequence of activities added to the schedule as a result of alleged constructive changes made by the Government may be added to a copy of the current schedule, subject to the approval of the Contracting Officer. Assign Activity codes for these activities with a Contract Changes/REA Code. Key the code values to the Contractor's numbering system. Approval to add these activities does not necessarily mean the Government accepts responsibility and therefore liability for such activities and any associated impacts to the schedule, but rather the Government recognizes such activities are appropriately added to the schedule for the purposes of maintaining a realistic and meaningful schedule. Such activities shall not be Responsibility Coded to the Government unless approved. An activity shall not have more than one Contract Changes/REA Code

3.3.2.9. Contract Line Item (CLIN) Coding (BIDI)

Code all activities to the CLIN on the Contract Line Item Schedule to which the activity belongs. An activity shall not contain more than one CLIN Item Code. CLIN Item code all activities, even when an activity is not cost loaded.

3.3.2.10. Phase of Work Coding (PHAS)

Assign Phase of Work Code to all activities, based upon the phase of work in which the activity occurs. Code activities to either a Design Phase or a Construction Phase. Code fast track design and construction phases proposed by the Contractor to allow filtering and organizing the schedule by fast track design and construction packages. If the contract specifies construction phasing with separately defined performance periods, identify a Construction Phase Code to allow filtering and organizing the schedule accordingly. Each activity shall have only one Phase of Work code.

3.3.2.11. Category of Work Coding (CATW)

Assign Category of Work code to all Activities based upon the category of work which the activity belongs. Category of Work Code must include, but is not limited to: Design, Design Submittal, design reviews, review conferences, Construction Submittal, Approvals (if any), Acceptance, Procurement, Fabrication, Delivery, Weather Sensitive Installation, Non-Weather Sensitive Installation, Start Up, Test, and Turnover. Assign a Category of Work code to each activity. Each activity shall have only one Category of Work Code.

3.3.2.12. Definable Features of Work Coding (FOW1, FOW2, FOW3)

Assign a Definable Feature of Work Code to appropriate activities based on the definable feature of work to which the activity belongs. Definable Feature of Work is defined in Specification Section 01 45 04.00 10, Contractor Quality Control. An activity shall not have more than one Definable Feature of Work Code. Not all activities are required to be Definable Feature of Work Coded.

3.3.3. Scheduled Project Completion and Activity Calendars

The schedule interval shall extend from NTP date to the required contract completion date. The contract completion activity (End Project) shall finish based on the required contract duration, as adjusted for any approved contract time extensions. The first scheduled work period shall be the day after NTP is acknowledged by the Contractor. Schedule activities on a calendar to which the activity logically belongs. Activities may be assigned to a 7 day calendar when the contract assigns calendar day durations for the activity such as a Government Acceptance activity. If the Contractor intends to perform physical work less than seven days per week, schedule the associated activities on a calendar with non-work periods identified including weekends and holidays. Assign the Category of Work Code - Weather Sensitive Installation to those activities that are weather sensitive. Original durations must account for anticipated normal adverse weather. The Government will interpret all work periods not identified as non-work periods on each calendar as meaning the Contractor intends to perform work during those periods.

3.3.3.1. Project Start Date

The schedule shall start no earlier than the date on which the NTP was acknowledged. Include as the first activity in the project schedule an activity called "Start Project" or "NTP". The "Start Project" activity shall have an "ES" constraint date equal to the date that the NTP was acknowledged, with a zero day duration.

3.3.3.2. Schedule Constraints and Open Ended Logic

Constrain completion of the last activity in the schedule by the contract completion date. Schedule calculations shall result in negative float when the calculated early finish date of the last activity is later than the contract completion date. Include as the last activity in the project schedule an activity called "End Project". The "End Project" activity shall have an "LF" constraint date equal to the contract completion date for the project, and with a zero day duration or by using the "project must finish by" date in the scheduling software. The schedule shall have no constrained dates other than those specified in the contract. The use of artificial float constraints such as "zero fee float" or "zero total float" are typically prohibited. There shall only be 2 open ended activities: Start Project (or NTP) with no predecessor logic and End Project with no successor logic.

3.3.3.3. Early Project Completion

In the event the Preliminary or Initial project schedule calculates an early completion date of the last activity prior to the contract completion date, the Contractor shall identify those activities that it intends to accelerate and/or those activities that are scheduled in parallel to support the Contractor's "early" completion. The last activity shall have a late finish constraint equal to the contract completion date and the schedule will calculate positive float. The Government will not approve an early completion schedule with zero float on the longest path. The Government is under no obligation to accelerate activities for which it is responsible to support a proposed early contract completion.

3.3.4. Interim Completion Dates

Constrain contractually specified interim completion dates to show negative float when the calculated early finish date of the last activity in that phase is later than the specified interim completion date.

3.3.4.1. Start Phase

Include as the first activity for a project phase an activity called "Start Phase X" where "X" refers to the phase of work. The "Start Phase X" activity shall have an "ES" constraint date equal to the date on which the NTP was acknowledged, and a zero day duration.

3.3.4.2. End Phase

Include as the last activity for a project phase an activity called "End Phase X" where "X" refers to the phase of work. The "End Phase X" activity shall have an "LF" constraint date equal to the specified completion date for that phase and a zero day duration.

3.3.4.3. Phase "X" Hammock

Include a hammock type activity for each project phase called "Phase X" where "X" refers to the phase of work. The "Phase X" hammock activity shall be logically tied to the earliest and latest activities in the phase.

3.3.5. Default Progress Data Disallowed

Do not automatically update Actual Start and Finish dates with default mechanisms that may be included in the scheduling software. Activity Actual Start (AS) and Actual Finish (AF) dates assigned during the updating process shall match those dates provided from Contractor Quality Control Reports. Failure of the Contractor to document the AS and AF dates on the Daily Quality Control report for every in-progress or completed activity, and failure to ensure that the data contained on the Daily Quality Control reports is the sole basis for schedule updating shall result in the disapproval of the Contractor's updated schedule and the inability of the Contracting Officer to evaluate Contractor progress for payment purposes. Updating of the percent complete and the remaining duration of any activity shall be independent functions. Disable program features which calculate one of these parameters from the other.

3.3.6. Out-of-Sequence Progress

Activities that have progressed before all preceding logic has been satisfied (Out-of-Sequence Progress) will be allowed only on a case-by-case basis subject to approval by the Contracting Officer. Propose logic corrections to eliminate all out of sequence progress or justify not changing the sequencing for approval prior to submitting an

updated project schedule. Correct out of sequence progress that continues for more than two update cycles by logic revision, as approved by the Contracting Officer.

3.3.7. Negative Lags and Start to Finish Relationships

Lag durations contained in the project schedule shall not have a negative value. Do not use Start to Finish relationships (SF).

3.3.8. Calculation Mode

Schedule calculations shall retain the logic between predecessors and successors even when the successor activity starts and the predecessor activity has not finished. Software features that in effect sever the tie between predecessor and successor activities when the successor has started and the predecessor logic is not satisfied ("progress override") will not be allowed.

3.3.9. Milestones

Include milestone activities for each significant project event including but not limited to: milestone activities for each fast track design package released for construction; design complete; foundation/substructure construction complete; superstructure construction complete; building dry-in or enclosure complete to allow the initiation of finish activities; permanent power complete; and building systems commissioning complete.

3.4. PROJECT SCHEDULE SUBMISSIONS

Provide the submissions as described below. The data CD, reports, and network diagrams required for each submission are contained in paragraph SUBMISSION REQUIREMENTS.

3.4.1. Preliminary Project Schedule Submission

Submit the Preliminary Project Schedule, defining the Contractor's planned operations for the first 90 calendar days for approval within 15 calendar days after the NTP is acknowledged. The approved Preliminary Project Schedule will be used for payment purposes not to exceed 90 calendar days after NTP. Completely cost load the Preliminary Project Schedule to balance the contract award CLINS shown on the Price Schedule. Detail it for the first 90 calendar days. It may be summary in nature for the remaining performance period. It must be early start and late finish constrained and logically tied as previously specified. The Preliminary Project Schedule forms the basis for the Initial Project Schedule specified herein and must include all of the required Plan and Program preparations, submissions and approvals identified in the contract (for example, Quality Control Plan, Safety Plan, and Environmental Protection Plan) as well as design activities, the planned submissions of all early design packages, permitting activities, design review conference activities and other non-construction activities intended to occur within the first 90 calendar days. Schedule any construction activities planned for the first 90 calendar days after NTP. Constrain planned construction activities by Government acceptance of the associated design package(s) and all other specified Program and Plan approvals. Activity code any activities that are summary in nature after the first 90 calendar days with Responsibility Code (RESP) and Feature of Work code (FOW1, FOW2, FOW3)

3.4.2. Initial Project Schedule Submission

Submit the Initial Project Schedule for approval within 42 calendar days after NTP. The schedule shall demonstrate a reasonable and realistic sequence of activities which represent all work through the entire contract performance period. The Initial Schedule shall be at a reasonable level of detail as determined by the Contracting Officer. Include detailed design and permitting activities, including but not limited to identification of individual design packages, design submission, reviews and conferences; permit submissions and any required Government actions; and long lead procurement activities required prior to design completion. The Initial Project Schedule shall include the entire construction sequence and all fast track construction activities, with as much detail as is known at the time but, as a minimum, shall include all construction start and completion milestone activities, and detailed construction activities through the dry-in milestone, including all activity coding and cost loading. Include the remaining construction, including cost loading, but it may be scheduled summary in nature. As the design proceeds and design packages are developed, fully detail the remaining construction activities concurrent with the monthly schedule updating process. Constrain construction activities by Government acceptance of associated

designs. When the design is complete, incorporate into the then approved schedule update all remaining detailed construction activities that are planned to occur after the dry-in milestone.

3.4.3. Design Package Schedule Submission:

With each design package submitted to the Government, submit a frag-net schedule extracted from the then current Preliminary, Initial or Updated schedule which covers the activities associated with that Design Package including construction, procurement and permitting activities.

3.4.4. Periodic Schedule Updates

Based on the result of the meeting specified in PERIODIC SCHEDULE UPDATE MEETINGS, submit periodic schedule updates. These submissions shall enable the Contracting Officer to assess Contractor's progress. If the Contractor fails or refuses to furnish the information and project schedule data, which in the judgment of the Contracting Officer or authorized representative is necessary for verifying the Contractor's progress, the Contractor shall be deemed not to have provided an estimate upon which progress payment may be made. Update the schedule to include detailed lower WBS activities procurement and construction activities as the design progresses, but not later than the submission of the final, un-reviewed design submission for each separate design package. The Contracting Officer may require submission of detailed schedule activities for any distinct construction that is started prior to submission of a final design submission, if such activity is authorized.

3.4.5. Standard Activity Coding Dictionary

Use the activity coding structure defined in the Standard Data Exchange Format (SDEF) in ER 1-1-11, Appendix A. This exact structure is mandatory, even if some fields are not used. A template SDEF compatible schedule backup file (sdef.prx) is available on the QCS website: www.rmssupport.com. The SDEF format is as follows:

| Field | Activity Code | Length | Description |
|-------|---------------|--------|--|
| 1 | WRKP | 3 | Workers per Day |
| 2 | RESP | 4 | Responsible Party (e.g. GC, subcontractor, USACE) |
| 3 | AREA | 4 | Area of Work |
| 4 | MODF | 6 | Modification or REA number |
| 5 | BIDI | 6 | Bid Item (CLIN) |
| 6 | PHAS | 2 | Phase of Work |
| 7 | CATW | 1 | Category of Work |
| 8 | FOW1 | 10 | Feature of Work (used up to 10 characters in length) |
| 9 | FOW2 | 10 | Feature of Work (used up to 20 characters in length) |
| 10 | FOW3 | 10 | Feature of Work (used up to 30 characters in length) |

3.5. SUBMISSION REQUIREMENTS

Submit the following items for the Preliminary Schedule, Initial Schedule, and every Periodic Schedule Update throughout the life of the project:

3.5.1. Data CD's

Provide two sets of data CD's containing the project schedule in the backup format. Each CD shall also contain all previous update backup files. File medium shall be CD. Label each CD, indicating the type of schedule (Preliminary, Initial, Update), full contract number, Data Date and file names. Each schedule shall have a unique file name as determined by the Contractor.

3.5.2. Narrative Report

Provide a Narrative Report with the Preliminary, Initial, and each Periodic Update of the project schedule, as the basis of the progress payment request. The Narrative Report shall include: a description of activities along the 2 most critical paths where the total float is less than or equal to 20 work days, a description of current and anticipated problem areas or delaying factors and their impact, and an explanation of corrective actions taken or required to be taken. The narrative report is expected to communicate to the Government, the Contractor's thorough analysis of the schedule output and its plans to compensate for any problems, either current or potential, which are revealed through its analysis. Identify and explain why any activities that, based their calculated late dates, should have either started or finished during the update period but did not.

3.5.3. Approved Changes Verification

Include only those project schedule changes in the schedule submission that have been previously approved by the Contracting Officer. The Narrative Report shall specifically reference, on an activity by activity basis, all changes made since the previous period and relate each change to documented, approved schedule changes.

3.5.4. Schedule Reports

The format, filtering, organizing and sorting for each schedule report shall be as directed by the Contracting Officer. Typically reports shall contain: Activity Numbers, Activity Description, Original Duration, Remaining Duration, Early Start Date, Early Finish Date, Late Start Date, Late Finish Date Total Float, Actual Start Date, Actual Finish Date, and Percent Complete. The following lists typical reports that will be requested. One or all of these reports may be requested for each schedule submission.

3.5.4.1. Activity Report

A list of all activities sorted according to activity number.

3.5.4.2. Logic Report

A list of detailed predecessor and successor activities for every activity in ascending order sorted by activity number.

3.5.4.3. Total Float Report

A list of all incomplete activities sorted in ascending order of total float. List activities which have the same amount of total float in ascending order of Early Start Dates. Do not show completed activities on this report.

3.5.4.4. Earnings Report by CLIN

A compilation of the Contractor's Total Earnings on the project from the NTP to the data date. This report shall reflect the earnings of specific activities based on the agreements made in the schedule update meeting defined herein. Provided that the Contractor has provided a complete schedule update, this report shall serve as the basis of determining progress payments. Group activities by CLIN Item number and sort by activity number. This report shall: sum all activities coded to a particular CLIN and provide a CLIN Item percent earned value; and complete and sum CLIN items to provide a total project percent complete. The printed report shall contain, for each activity: the Activity Number, Activity Description, Original Budgeted Amount, Quantity to Date, Percent Complete (based on cost), and Earnings to Date.

3.5.5. Network Diagram

The network diagram is required for the Preliminary, Initial and Periodic Updates. Depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished. The Contracting Officer will use, but is not limited to, the following conditions to review compliance with this paragraph:

3.5.5.1. Continuous Flow

Show a continuous flow from left to right with no arrows from right to left. Show the activity number, description, duration, and estimated earned value on the diagram.

3.5.5.2. Project Milestone Dates

Show dates on the diagram for start of project, any contract required interim completion dates, and contract completion dates.

3.5.5.3. Critical Path

Clearly show the critical path.

3.5.5.4. Banding

Organize activities as directed to assist in the understanding of the activity sequence. Typically, this flow will group activities by category of work, work area and/or responsibility.

3.5.5.5. S-Curves

Earnings curves showing projected early and late earnings and earnings to date.

3.6. PERIODIC SCHEDULE UPDATE MEETINGS

Conduct periodic schedule update meetings for the purposes of reviewing the Contractor's proposed out of sequence corrections, determining causes for delay, correcting logic, maintaining schedule accuracy and determining earned value. Meetings shall occur at least monthly within five days of the proposed schedule data date and after the Contractor has updated the schedule with Government concurrence respecting actual start dates, actual finish dates, remaining durations and percent complete for each activity it intend to status. Match the actual start and finish dates with the dates exported, as described in paragraph 3.3.5. Provide a computer with the scheduling software loaded and a projector during the meeting which allows all meeting participants to view the proposed schedule update during the meeting. The meeting and resultant approvable schedule update shall be a condition precedent to a formal submission of the update as described in SUBMISSION REQUIREMENTS and to the submission of an invoice for payment. The meeting will be a working interactive exchange which will allow the Government and the Contractor the opportunity review the updated schedule on a real time and interactive basis. The Contractor's authorized scheduling representative will organize, sort, filter and schedule the update as requested by the Government. The meeting will last no longer than 8 hours. A rough draft of the proposed activity logic corrections and narrative report shall be provided to the Government 48 hours in advance of the meeting. The Contractor's Project Manager and Authorized Scheduler shall attend the meeting with the Authorized Representative of the Contracting Officer.

3.6.1. Update Submission Following Progress Meeting

Submit a complete update of the project schedule containing all approved progress, revisions, and adjustments, pursuant to paragraph SUBMISSION REQUIREMENTS not later than 4 working days after the periodic schedule update meeting, reflecting only those changes made during the previous update meeting.

3.6.2. Status of Activities

Update status information, including Actual Start Dates (AS), Actual Finish Dates (AF), Remaining Durations (RD) and Percent Complete shall be subject to the approval of the Government prior to the meeting. As a minimum, address the following items on an activity by activity basis during each progress meeting:

3.6.2.1. Actual Start and Finish Dates

Accurately status the AS and/or AF dates for each activity currently in-progress or completed since the last update. The Government may allow an AF date to be assigned with the percent complete less than 100% to account for the value of work remaining but not restraining successor activities. Only assign AS dates when actual progress occurs on an activity.

3.6.2.2. Remaining Duration

Update the estimated RD for all incomplete activities independent of Percent Complete. Remaining durations may exceed the activity OD or may exceed the activity's prior update RD if the Government considers the current OD or RD to be understated based on current progress, insufficient work crews actually manning the job, unrealistic OD or deficiencies that must be corrected that restrain successor activities.

3.6.2.3. Percent Complete

Update the percent complete for each activity started, based on the realistic assessment of earned value. Activities which are complete but for remaining minor punch list work and which do not restrain the initiation of successor activities may be statused 100 percent complete. To allow for proper schedule management, cost load the correction of punch list from Government pre-final inspection activity(ies) not less than 1% of the total contract value, which activity(ies) may be declared 100 percent complete upon completion and correction of all punch list work identified during Government pre-final inspection(s).

3.6.2.4. Logic Changes

Specifically identify and discuss all logic changes pertaining to NTP on change orders, change orders to be incorporated into the schedule, contractor proposed changes in work sequence, corrections to schedule logic for out-of-sequence progress, and other changes that have been made pursuant to contract provisions. The Government will only approve logic revisions for the purpose of keeping the schedule valid in terms of its usefulness in calculating a realistic completion date, correcting erroneous logic ties, and accurately sequencing the work.

3.6.2.5. Other Changes

Other changes required due to delays in completion of any activity or group of activities include: 1) delays beyond the Contractor's control, such as strikes and unusual weather. 2) delays encountered due to submittals, Government Activities, deliveries or work stoppages which make re-planning the work necessary. 3) Changes required to correct a schedule that does not represent the actual or planned prosecution and progress of the work.

3.7. REQUESTS FOR TIME EXTENSIONS

In the event the Contractor believes it is entitled to an extension of the contract performance period, completion date, or any interim milestone date, furnish the following for a determination by the Contracting Officer: justification, project schedule data, and supporting evidence as the Contracting Officer may deem necessary. Submission of proof of excusable delay, based on revised activity logic, duration, and costs (updated to the specific date that the delay occurred) is a condition precedent to any approvals by the Government. In response to each Request For Proposal issued by the Government, the Contractor shall submit a schedule impact analysis demonstrating whether or not the change contemplated by the Government impacts the critical path.

3.7.1. Justification of Delay

The project schedule shall clearly display that the Contractor has used, in full, all the float time available for the work involved with its request. The Contracting Officer's determination as to the number of allowable days of contract extension shall be based upon the project schedule updates in effect for the time period in question, and other factual information.

Actual delays that are found to be caused by the Contractor's own actions, which result in a calculated schedule delay, will not be a cause for an extension to the performance period, completion date, or any interim milestone date.

3.7.2. Submission Requirements

Submit a justification for each request for a change in the contract completion date of less than 2 weeks based upon the most recent schedule update at the time of the NTP or constructive direction issued for the change. Such a request shall be in accordance with the requirements of other appropriate Contract Clauses and shall include, as a minimum:

3.7.2.1. A list of affected activities, with their associated project schedule activity number.

3.7.2.2. A brief explanation of the causes of the change

3.7.2.3. An analysis of the overall impact of the changes proposed.

3.7.2.4. A sub-network of the affected area

Identify activities impacted in each justification for change by a unique activity code contained in the required data file.

3.7.3. Additional Submission Requirements

The Contracting Officer may request an interim update with revised activities for any requested time extension of over 2 weeks. Provide this disk within 4 days of the Contracting Officer's request.

3.7.4. If Progress Falls Behind the Approved Project Schedule

3.7.4.1. Should progress fall behind the approved schedule (more than 20 work days of negative float) due to Contractor generated problems, promptly provide a supplemental recovery or completion schedule that illustrates its efforts to regain time to assure a completion by the required contract completion date.

3.7.4.2. The supplemental recovery or completion schedule will not replace the original, approved schedule as the official contract schedule. Continue to update the original, approved schedule on at least a monthly basis. In addition, the Contractor and the Contracting Officer will monitor the supplemental recovery or completion schedule on at least a bi-weekly basis to determine its effect on regaining the rate of progress to assure project completion by the contractually required completion date.

3.7.4.3. Do not artificially improve progress by simply revising the schedule logic, modifying or adding constraints, or shortening future work activity durations. Resource and manpower load the supplemental recovery schedule or completion schedule with crew size and productivity for each remaining activity, indicating overtime, weekend work, and/or double shifts needed to regain the schedule, in accordance with FAR 52.236.15, without additional cost to the Government. Indicate assumptions made and the basis for any logic, constraint, or duration changes used in the creation of the supplemental recovery or completion schedule in a narrative submitted for the Contracting Officer's approval. Any additional resources or manpower must be evident at the work site. Do not modify the official contract schedule to include these assumptions.

3.7.4.4. Failure to perform work and maintain progress in accordance with the supplemental recovery or completion schedule may result in an interim and final unsatisfactory performance rating and/or may result in corrective action by the Contracting Officer in accordance with FAR 52.236-15.

3.8. DIRECTED CHANGES

If the NTP is issued for changes prior to settlement of price and/or time, submit proposed schedule revisions to the Contracting Officer within 2 weeks of the NTP being issued. The Contracting Officer will approve proposed revisions to the schedule prior to inclusion of those changes within the project schedule. If the Contractor fails to submit the proposed revisions, the Contracting Officer may furnish the Contractor with suggested revisions to the project schedule. The Contractor shall include these revisions in the project schedule until revisions are submitted and final changes and impacts have been negotiated. If the Contractor has any objections to the revisions furnished by the Contracting Officer, advise the Contracting Officer within 2 weeks of receipt of the revisions. Regardless of the objections, the Contractor shall continue to update the schedule with the Contracting Officer's revisions until a mutual agreement in the revisions is reached. If the Contractor fails to submit alternative revisions within 2 weeks of

receipt of the Contracting Officer's proposed revisions, the Contractor will be deemed to have concurred with the Contracting Officer's proposed revisions. The proposed revisions will then be the basis for an equitable adjustment for performance of the work.

3.9. WEEKLY PROGRESS MEETINGS

3.9.1. The Government and the Contractor shall meet weekly (or as otherwise mutually agreed to) between the meetings described in paragraph PERIODIC SCHEDULE UPDATE MEETINGS for the purpose of jointly reviewing the actual progress of the project as compared to the as planned progress and to review planned activities for the upcoming two weeks. The then current and approved schedule update shall be used for the purposes of this meeting and for the production and review of reports. The Contractor's Project Manager and the Authorized Representative of the Contracting Officer shall attend. The weekly progress meeting will address the status of RFI's, RFP's and Submittals.

3.9.2. Provide a bar chart produced by the scheduling software, organized by Total Float and Sorted by Early Start Date, and a two week "look-ahead" schedule by filtering all schedule activities to show only current ongoing activities and activities schedule to start during the upcoming two weeks, organized by Work Area Code (AREA) and sorted by Early Start Date.

3.9.3. The Government and the Contractor shall jointly review the reports. If it appears that activities on the longest path(s) which are currently driving the calculated completion date (driving activities), are not progressing satisfactorily and therefore could jeopardize timely project completion, corrective action must be taken immediately. Corrective action includes but is not limited to: increasing the number of work crews; increasing the number of work shifts; increasing the number of hours worked per shift; and determining if Government responsibility coded activities require Government corrective action.

3.10. OWNERSHIP OF FLOAT

Float available in the schedule, at any time, shall not be considered for the exclusive use of either the Government or the Contractor.

3.11. TRANSFER OF SCHEDULE DATA INTO RMS/QCS

Download and upload the schedule data into the Resident Management System (RMS) prior to RMS databases being transferred to the Government and is considered to be additional supporting data in a form and detail required by the Contracting Officer pursuant to FAR 52.232-5 - Payments under Fixed-Price Construction Contracts. The receipt of a proper payment request pursuant to FAR 52.232-27 - Prompt Payment for Construction Contracts is contingent upon the Government receiving both acceptable and approvable hard copies and electronic export from QCS of the application for progress payment.

End of Section 01 32 01.00 10

**SECTION 01 33 00
SUBMITTAL PROCEDURES**

- 1.0 GENERAL**
- 1.1. DEFINITIONS
- 1.2. NOT USED
- 1.3. SUBMITTAL CLASSIFICATION
- 1.4. APPROVED OR CONCURRED WITH SUBMITTALS
- 1.5. DISAPPROVED SUBMITTALS
- 1.6. WITHHOLDING OF PAYMENT
- 1.7. GENERAL
- 1.8. SUBMITTAL REGISTER
- 1.9. SCHEDULING
- 1.10. TRANSMITTAL FORM (ENG FORM 4025)
- 1.11. SUBMITTAL PROCEDURES
- 1.12. CONTROL OF SUBMITTALS
- 1.13. GOVERNMENT APPROVED SUBMITTALS
- 1.14. INFORMATION ONLY SUBMITTALS
- 1.15. STAMPS

1.0 GENERAL

1.1. DEFINITIONS

1.1.1. Submittal

Contract Clauses "FAR 52.236-5, Material and Workmanship," paragraph (b) and "FAR 52.236-21, Specifications and Drawings for Construction," paragraphs (d), (e), and (f) apply to all "submittals."

1.1.2. Submittal Descriptions (SD)

Submittals requirements are specified in the technical sections. Submittals are identified by SD numbers and titles as follows.

SD-01 Preconstruction Submittals

- Certificates of insurance.
- Surety bonds.
- List of proposed subcontractors.
- List of proposed products.
- Construction Progress Schedule.
- Submittal register.
- Schedule of prices.
- Accident Prevention Plan.
- Work plan.
- Quality control plan.
- Environmental protection plan.

SD-02 Shop Drawings

- Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.
- Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system into the project.
- Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

SD-03 Product Data

- Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials or equipment for some portion of the work.
- Samples of warranty language when the contract requires extended product warranties.

SD-04 Samples

- Physical examples of materials, equipment or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged.
- Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.
- Field samples and mock-ups constructed on the project site establish standards by which the ensuring work can be judged. Includes assemblies or portions of assemblies that are to be incorporated into the project and those which will be removed at conclusion of the work.

SD-05 Design Data

- Calculations, mix designs, analyses or other data pertaining to a part of work.
- Design submittals, design substantiation submittals and extensions of design submittals.

SD-06 Test Reports

- Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product or system to be provided has been tested in accord with specified requirements. (Testing must

have been within three years of date of contract award for the project.)

- Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for the project before shipment to job site.
- Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.
- Investigation reports.
- Daily checklists.
- Final acceptance test and operational test procedure.

SD-07 Certificates

- Statements printed on the manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements. Must be dated after award of project contract and clearly name the project.
- Document required of Contractor, or of a supplier, installer or subcontractor through Contractor, the purpose of which is to further quality of orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel qualifications.
- Confined space entry permits.
- Text of posted operating instructions.

SD-08 Manufacturer's Instructions

- Preprinted material describing installation of a product, system or material, including special notices and Material Safety Data sheets concerning impedances, hazards and safety precautions.

SD-09 Manufacturer's Field Reports

- Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- Factory test reports.

SD-10 Operation and Maintenance Data

- Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

SD-11 Closeout Submittals

- Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

1.1.3. Approving Authority

Office authorized to approve submittal.

1.1.4. Work

As used in this section, on- and off-site construction required by contract documents, including labor necessary to produce submittals, construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction.

1.2. NOT USED

1.3. SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.3.1. Designer of Record Approved (DA)

1.3.1.1. Designer of Record (DOR) approval is required for all extensions of design, critical materials, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction", they are considered to be "shop drawings". Provide the Government the number of copies designated hereinafter of all DOR approved submittals, after the DOR has taken appropriate action. The DOR shall ensure that submittals conform to the Solicitation, the Accepted Proposal and the completed design, however see below for those submittals proposing a deviation to the contract or a substitution of a material, system, or piece of equipment that was identified by manufacturer, brand name or model description in the accepted contract proposal.

1.3.1.2. The DOR shall ensure that the submittals comply with all applicable Buy American Act and Trade Agreement Act clauses in the contract. The DOR may confer with the Contracting Officer's Representative for advice and interpretation of those clauses, as necessary.

1.3.1.3. The Government may, but is not required to, review any or all DOR approved submittals for conformance to the solicitation, accepted proposal and the completed design. Except for submittals designated as deviating from the Solicitation, the Accepted Proposal or completed design, the Contractor may proceed with acquisition and installation upon DOR approval. Government Approved (GA)

1.3.2. Government Approved (GA)

Government approval is required for any item specifically designated as requiring Government approval in the Solicitation, for internal and external color finish selections and other items as designated by the Contracting Officer. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction," they are considered to be "shop drawings."

1.3.3. Government Conformance Review of Design (CR)

The Government will review all intermediate and final design submittals for conformance with the technical requirements of the solicitation. Section 01 33 16 **DESIGN AFTER AWARD** covers the design submittal and review process in detail. Review will be only for conformance with the applicable codes, standards and contract requirements. Design data includes the design documents described in Section 01 33 16 **DESIGN AFTER AWARD**. Generally, design submittals should be identified as SD-05 Design Data submittals.

1.3.4. Designer of Record Approved/Government Conformance Review (DA/CR)

1.3.4.1. Deviations to the Accepted Design. Designer of Record approval and the Government's concurrence are required for any proposed deviation from the accepted design which still complies with the contract (the Solicitation and Accepted Proposal) before the Contractor is authorized to proceed with material acquisition or installation. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction", they are considered to be "shop drawings." If necessary to facilitate the project schedule, the Contractor and the DOR may discuss a submittal proposing a deviation with the Contracting Officer's Representative prior to officially submitting it to the Government. However, the Government reserves the right to review the submittal before providing an opinion, if it deems it necessary. In any case, the Government will not formally agree to or provide a preliminary opinion on any deviation without the DOR's approval or recommended approval. The Government reserves the right to non-concur with any deviation from the design, which may impact furniture, furnishings, equipment selections or operations decisions that were made, based on the reviewed and concurred design.

1.3.4.2. Substitutions. Unless prohibited or provided for otherwise elsewhere in the Contract, where the accepted contract proposal named products, systems, materials or equipment by manufacturer, brand name and/or by model number or other specific identification, and the Contractor desires to substitute manufacturer or model after award, submit a requested substitution for Government concurrence. Include substantiation, identifying information and the DOR's approval, as meeting the contract requirements and that it is equal in function, performance, quality and salient features to that in the accepted contract proposal.

1.3.5. Designer of Record Approved/Government Approved (DA/GA)

Any proposed deviation to the solicitation and/or the accepted proposal constitutes a change to the contract. In addition to the above stated requirements for proposed deviations to the accepted design, both Designer of Record and Government Approval and, where applicable, a contract modification are required before the Contractor is

authorized to proceed with material acquisition or installation for any proposed deviation to the contract. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction", they are considered to be "shop drawings". The Government reserves the right to accept or reject any such proposed deviation at its discretion.

1.3.6. Information Only

All submittals not requiring Designer of Record or Government approval will be for information only. Provide the Government "For Information Only" copies of all submittals not requiring Government approval or concurrence, after the Designer of Record has taken the appropriate action.

1.4. APPROVED OR CONCURRED WITH SUBMITTALS

Do not construe the Contracting Officer's approval of or concurrence with submittals as a complete check, but only that design, general method of construction, materials, detailing and other information appear to meet the Solicitation and Accepted Proposal. Approval or concurrence will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Contractor Quality Control (CQC) requirements of this contract is responsible for design, dimensions, all design extensions, such as the design of adequate connections and details, etc., and the satisfactory construction of all work. The Government won't consider re-submittals for the purpose of substituting previously approved materials or equipment unless accompanied by an explanation of why a substitution is necessary.

1.5. DISAPPROVED SUBMITTALS

Make all corrections required by the Contracting Officer, obtain the Designer of Record's approval when applicable, and promptly furnish a corrected submittal in the form and number of copies specified for the initial submittal. Resubmit any "information only" submittal found to contain errors or unapproved deviations from the Solicitation or Accepted Proposal as one requiring "approval" action, requiring both Designer of Record and Government approval. If the Contractor considers any correction indicated on the submittals to constitute a change to the contract, provide prompt notice in accordance with the Contract Clause "Changes" to the Contracting Officer.

1.6. WITHHOLDING OF PAYMENT

No payment for materials incorporated in the work will be made if all required Designer of Record or required Government approvals have not been obtained. No payment will be made for any materials incorporated into the work for any conformance review submittals or information only submittals found to contain errors or deviations from the Solicitation or Accepted Proposal.

1.7. GENERAL

Make submittals as required by the specifications. The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections. Units of weights and measures used on all submittals shall be the same as those used in the contract drawings. Each submittal shall be complete and in sufficient detail to allow ready determination of compliance with contract requirements. Prior to submittal, the Contractor's Quality Control (CQC) System Manager and the Designer of Record, if applicable, shall check, approve, sign, and stamp all items, indicating action taken. Clearly identify proposed deviations from the contract requirements. Include items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals. Schedule and make submittals requiring Government approval prior to the acquisition of the material or equipment covered thereby. Pick up and dispose of samples remaining upon completion of the work in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

1.8. SUBMITTAL REGISTER (GA)

Develop a complete list of submittals, including each separate design package submittal. Submit the initial submittal register within 15 days after Notice to Proceed, including, as a minimum, the design packages and other initial submittals required elsewhere in the contract. The Designer of Record shall identify required submittals in the

specifications, and use the list to prepare the Submittal Register, utilizing the government-provided software, QCS (see Section 01 45 01.10), to create the ENG Form 4288. Appendix Ris a preliminary submittal register input form for use with the Quality Management System and the Resident Office Management System (QCS and RMS). The Government will provide the Contractor the actual Excel Spreadsheet version of this sample input form after award to modify and to use for input into QCS. The Excel Spreadsheet is not totally inputable into QCS, so additional keystroke input will be necessary. The sample input form is not all-inclusive. In addition, additional submittals may be required by other parts of the contract. After award, the parties will meet to discuss contract specific (or task order specific for a task order contract) distribution for the submittals all-inclusive and additional submittals may be required by other parts of the contract. Develop and complete the submittal register as the design is completed. Submit it to the Contracting Officer with the un-reviewed final design package submission or as soon as the design specifications are completed, if before the final design submission. When applicable, if the Contractor elects to fast track design and construction, using multiple design package submissions, update the submittal register to reflect the submittals associated with each design submission, clearly denoting all revisions to the previous submission. The submittal register serves as a scheduling document for submittals and for control of submittal actions throughout the contract period. Coordinate the submit dates and need dates used in the submittal register with dates in the Contractor prepared progress schedule. Submit monthly updates to the submittal register showing the Contractor action codes and actual dates with Government action codes and actual dates or until all submittals have been satisfactorily completed. Revise and submit the submittal register when revising the progress schedule.

1.9. SCHEDULING

Schedule submittals covering component items forming a system or items that are interrelated to be coordinated and submitted concurrently. Schedule certifications to be submitted with the pertinent drawings. Allow adequate time (a minimum of 15 calendar days exclusive of mailing time) and show on the register for those items requiring Government approval or concurrence. No delay damages or time extensions will be allowed for time lost in late submittals by the Contractor.

1.10. TRANSMITTAL FORM (ENG FORM 4025)

Use the transmittal form (ENG Form 4025) for submitting submittals in accordance with the instructions on the reverse side of the form. These forms will be furnished to the Contractor or are included in the QCS software if the Contractor is required to use QCS for this contract. Use a separate transmittal form for each specification section. Complete this form by filling out all the heading blank spaces and identify each item submitted. Exercise special care to ensure proper listing of the specification paragraph and/or sheet number of the contract drawings pertinent to the data submitted for each item.

1.11. SUBMITTAL PROCEDURES

Make submittals as follows:

1.11.1. Procedures

The Government will further discuss detailed submittal procedures with the Contractor at the Post-Award Conference.

1.11.2. Deviations

For submittals which include proposed deviations requested by the Contractor, check the column "variation" of ENG Form 4025. Set forth in writing the reason for any deviations and annotate such deviations on the submittal. The Government reserves the right to rescind inadvertent approval of submittals containing unnoted deviations.

1.12. CONTROL OF SUBMITTALS

Carefully control his procurement operations to ensure that each individual submittal is made on or before the scheduled submittal date shown on the approved "Submittal Register."

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 two (2) copies of the submittal and return two (2) copy(ies) of the submittal.

1.14. INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the Contracting Officer is not required on information only submittals. The Government reserves the right to require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe. The Government will retain two (2) copies of information only submittals.

1.15. STAMPS

Use stamps similar to the following on the submittal data to certify that the submittal meets contract requirements:

CONTRACTOR

(FIRM NAME)

Approved

Approved with corrections as noted on submittal data and/or attached sheet(s)

Signature:

Title:

Date:

For design-build construction, both the Contractor Quality Control System Manager and the Designer of Record shall stamp and sign to certify that the submittal meets contract requirements.

**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 (jamb, headers, sills) connections of windows to support members and connections of support members to the rest of the structure. For 3 story and higher buildings, provide calculations to demonstrate compliance with progressive collapse requirements.

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

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

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

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

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

3.5.2.8. For parts including plumbing systems:

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

3.5.2.9. For elevator systems:

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

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

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

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

3.5.3. Geotechnical Investigations and Reports:

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

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

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

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

3.5.4. LEED Documentation:

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

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

3.5.5. Energy Conservation:

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

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

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

3.5.6. Specifications

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

3.5.7. Building Rendering

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

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

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

3.5.8. Interim Building Design Contents

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

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

3.5.8.1. Lawn and Landscaping Irrigation System

3.5.8.2. Landscape, Planting and Turfing

3.5.8.3. Architectural

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

3.5.8.4. Structural Systems. Include:

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

3.5.8.5. Plumbing Systems

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

3.5.8.6. HVAC Systems

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

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

3.5.8.7. Fire Protection and Life Safety.

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

3.5.8.8. Elevators. Provide:

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

3.5.8.9. Electrical Systems.

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

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

3.5.8.10. Electronic Systems including the following responsibilities:

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

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

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

3.6. FINAL DESIGN REVIEWS AND CONFERENCES

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

3.7. FINAL DESIGN REQUIREMENTS

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

3.7.1. Drawings

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

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

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

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

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

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

All CAD files shall be fully compatible with 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) ANSI D 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 Honolulu Engineer District | 2/0 | 9/0 | 7/0 | 4 | 1 | 6 | 0 |
| Commander, U.S.Army Engineer District, Center of Standardization Fort Worth, TX | 0/0 | 0/0 | 0/0 | 1 | N/A | 0 | 0 |
| Installation | 1/0 | 10/0 | 9/0 | 9 | 2 | 1 | 0 |
| U.S.Army Corps of Engineers Construction Area Office | 1/0 | 4/0 | 3/0 | 1 | 1 | 1 | 0 |
| Information Systems Engineering Command (ISEC) | 0/0 | 0/0 | 0/0 | 1 | N/A | N/A | 1 |
| Other Offices | 0/0 | 0/0 | 2/0 | 2 | N/A | 0 | 0 |

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

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

3.9.2. Web based Design Submittals

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

3.9.3. Mailing of Design Submittals

3.9.3.1. Mail all design submittals to the Government during design and construction, using an overnight mailing service. The Government will furnish the Contractor addresses where each copy shall be mailed to after award of the contract (or individual task order if this is an indefinite delivery/indefinite quantity, task order contract). Mail the submittals to eight (8) 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 v3 Submittals (OCT09) | Provide for Credit Audit Only | REQUIRED DOCUMENTATION | Date Submitted (to be filled in by Contractor) | Government Reviewer's Use |
|---------------------------------------|--|---|-------------------------------|--|--|---------------------------|
| PAR | | FEATURE | DUE AT | | DATE | REV |
| GENERAL | | | | | | |
| | | GENERAL - All calculations shall be in accordance with LEED 2009 Reference Guide. | | | | |
| | | GENERAL: Obtain excel version of this spreadsheet at http://en.sas.usace.army.mil/enWeb , "Engineering Criteria". | | | | |
| | | GENERAL - For all credits, narrative/comments may be added to describe special circumstances or considerations regarding the project's credit approach. | | | | |
| | | GENERAL - Include all required LEED drawings indicated below in contract drawings with applicable discipline drawings, labeled For Reference Only. | | | | |
| | | NOTE: Each submittal indicated with "****" differs from LEED certified project submittals by either having a different due date or being an added submittal not required by GBCI. | | | | |
| | | NOTE: Projects seeking LEED certification need only submit to GBCI whatever documentation is acceptable to GBCI (for example, licensed professional certifications). This checklist identifies what must be submitted to the Government for internal review purposes. Government review of LEED documentation in no way supercedes or modifies the requirements and rulings of GBCI for purposes of compliance with project requirement to obtain LEED certification. | | | | |
| | | GENERAL - Audit documentation may include but is not limited to what is indicated in this table. | | | | |
| | | | Closeout | List of all Final Design submittals revised after final design to reflect actual closeout conditions. Revised Final Design submittals. - OR - Statement confirming that no changes have been made since final design that effect final design submittal documents. | | Proj Engr (PE) |
| CATEGORY 1 - SUSTAINABLE SITES | | | | | | |
| SSPR1 | | Construction Activity Pollution Prevention (PREREQUISITE) | **Final Design | List of drawings and specifications that address the erosion control, particulate/dust control and sedimentation control measures to be implemented. | | CIV |
| | | | **Final Design | Delineation and labeling of "LEED Project site boundary" on site plan. | | CIV |
| | | | **Final Design | Narrative that indicates which compliance path was used (NPDES or Local standards) and describes the measures to be implemented on the project. If a local standard was followed, provide specific information to demonstrate that the local standard is equal to or more stringent than the NPDES program. | | CIV |
| SS1 | | Site Selection | Final Design | Statement confirming that project does not meet any of the prohibited criteria. | | CIV |
| | | | **Final Design | Delineation and labeling of "LEED Project site boundary" on site plan. | | CIV |
| | | | Final Design | X LEED Site plan drawing that shows all proposed development, line depicting boundary of all bodies of water and/or wetlands within 100 feet of project boundary and a line depicting 5' elevation above 100 year flood line that falls within project boundary. Not required if neither condition applies. | | CIV |
| SS2 | | Development Density & Community Connectivity | Final Design | Option 1: LEED Site vicinity plan showing project site and surrounding development. Show density boundary or note drawing scale. | | CIV |
| | | | **Final Design | Delineation and labeling of "LEED Project site boundary" on site plan. | | CIV |
| | | | Final Design | Option 1: Table indicating, for project site and all surrounding sites within density radius (keyed to site vicinity plan), site area and building area. Project development density calculation. Density radius calculation. Development density calculation within density radius. | | CIV |
| | | | Final Design | Option 2: LEED Site vicinity plan showing project site, the 1/2 mile community radius, pedestrian walkways and the locations of the residential development(s) and Basic Services surrounding the project site. | | CIV |
| | | | Final Design | Option 2: List (including business name and type) of all Basic Services facilities within the 1/2 mile radius, keyed to site vicinity plan. | | CIV |
| SS3 | | Brownfield Redevelopment | Final Design | Narrative describing contamination and the remediation activities included in project. Include statement indicating how site was determined to be a brownfield. | | CIV |
| | | | **Final Design | Delineation and labeling of "LEED Project site boundary" on site plan. | | CIV |
| SS4.1 | | Alternative Transportation: Public Transportation Access | Final Design | Statement indicating which option for compliance applies. State whether public transportation is existing or proposed and, if proposed, cite source of this information. | | CIV |
| | | | **Final Design | Delineation and labeling of "LEED Project site boundary" on site plan. | | CIV |
| | | | Final Design | Option 1: LEED Site vicinity plan showing project site, mass transit stops and pedestrian path to them with path distance noted. | | CIV |
| | | | Final Design | Option 2: LEED Site vicinity plan showing project site, bus stops and pedestrian path to them with path distance noted. | | CIV |
| SS4.2 | | Alternative Transportation: Bicycle Storage & Changing Rooms | Final Design | FTE calculation. Bicycle storage spaces calculation. Shower/changing facilities calculation. | | CIV |
| | | | Final Design | List of drawings that show the location(s) of bicycle storage areas. Statement indicating distance from building entrance. | | CIV |
| | | | Final Design | List of drawings that show the location(s) of shower/changing facilities and, if located outside the building, statement indicating distance from building entrance. | | CIV |

| LEED Credit Paragraph | Contractor Check Here if Credit is Claimed | LEED-NC v3 Submittals (OCT09) | Provide for Credit Audit Only | REQUIRED DOCUMENTATION | Date Submitted (to be filled in by Contractor) | Government Reviewer's Use |
|-----------------------|--|--|-------------------------------|--|--|---------------------------|
| PAR | | FEATURE | DUE AT | | DATE | REV |
| SS4.3 | | Alternative Transportation: Low Emitting & Fuel Efficient Vehicles | Final Design | Statement indicating which option for compliance applies. FTE calculation. Statement indicating total parking capacity of site. | | CIV |
| | | | **Final Design | Delineation and labeling of "LEED Project site boundary" on site plan. | | CIV |
| | | | Final Design | Option 1: Low-emission & fuel-efficient vehicle calculation. | | CIV |
| | | | Final Design | Option 1: List of drawings and specification references that show location and number of preferred parking spaces for low-emission & fuel-efficient vehicles and signage. | | CIV |
| | | | Final Design | Option 1: Statement indicating quantity, make, model and manufacturer of low-emission & fuel-efficient vehicles to be provided. Statement confirming vehicles are zero-emission or indicating ACEEE vehicle scores. | | CIV |
| | | | Final Design | Option 2: Low-emission & fuel-efficient vehicle parking calculation. | | CIV |
| | | | Final Design | Option 2: List of drawings and specification references that show location and number of preferred parking spaces and signage. | | CIV |
| | | | Final Design | Option 3: Low-emission & fuel-efficient vehicle refueling station calculation. | | CIV |
| | | | Final Design | Option 3: List of drawings and specifications indicating location and number of refueling stations, fuel type and fueling capacity for each station for an 8-hour period. | | CIV |
| | | | Closeout | X Option 3: Construction product submittals indicating what was provided and confirming compliance with respect to fuel type and fueling capacity for each station for an 8-hour period. | | CIV |
| SS4.4 | | Alternative Transportation: Parking Capacity | Final Design | Statement indicating which option for compliance applies. | | CIV |
| | | | **Final Design | Delineation and labeling of "LEED Project site boundary" on site plan. | | CIV |
| | | | Final Design | Option 1: Preferred parking calculation including number of spaces required, total provided, preferred spaces provided and percentage. | | CIV |
| | | | Final Design | Option 2: FTE calculation. Preferred parking calculation including number of spaces provided, preferred spaces provided and percentage. | | CIV |
| | | | Final Design | Options 1 and 2: List of drawings and specification references that show location and number of preferred parking spaces and signage. | | CIV |
| | | | Final Design | Option 3: Narrative indicating number of spaces required and provided and describing infrastructure and support programs with description of project features to support them. | | CIV |
| SS5.1 | | Site Development: Protect or Restore Habitat | **Final Design | Option 1: List of drawing and specification references that convey site disturbance limits. | | CIV |
| | | | **Final Design | Delineation and labeling of "LEED Project site boundary" on site plan. | | CIV |
| | | | **Final Design | Option 2: LEED site plan drawing that delineates boundaries of each preserved and restored habitat area with area (sf) noted for each. | | CIV |
| | | | **Final Design | Option 2: Percentage calculation of restored/preserved habitat to total site area. List of drawings and specification references that convey restoration planting requirements. | | CIV |
| SS5.2 | | Site Development: Maximize Open Space | Final Design | Option 2: LEED site plan drawing delineating boundary of vegetated open space adjacent to building with areas of building footprint and designated open space noted. | | CIV |
| | | | **Final Design | Delineation and labeling of "LEED Project site boundary" on site plan. | | CIV |
| SS6.1 | | Stormwater Design: Quantity Control | Final Design | Statement indicating which option for compliance applies. | | CIV |
| | | | **Final Design | Delineation and labeling of "LEED Project site boundary" on site plan. | | CIV |
| | | | Final Design | Option 1: Indicate pre-development and post-development runoff rate(cfs) and runoff quantity (cf) -OR - Narrative describing site conditions, measures and controls to be implemented to prevent excessive stream velocities and erosion. | | CIV |
| | | | Final Design | Option 2: Indicate pre-development and post-development runoff rate(cfs) and runoff quantity (cf). Indicate percent reduction in each. | | CIV |
| SS6.2 | | Stormwater Design: Quality Control | Final Design | For non-structural controls, list all BMPs used and, for each, describe the function of the BMP and indicate the percent annual rainfall treated. List all structural controls and, for each, describe the pollutant removal and indicate the percent annual rainfall treated. | | CIV |
| | | | **Final Design | Delineation and labeling of "LEED Project site boundary" on site plan. | | CIV |
| SS7.1 | | Heat Island Effect: Non-Roof | **Final Design | LEED site plan drawing indicating locations and quantities of each paving type, including areas of shaded pavement. Percentage calculation indicating percentage of reflective/shaded/open grid area. | | CIV |
| | | | **Final Design | Delineation and labeling of "LEED Project site boundary" on site plan. | | CIV |

Monday, November 29, 2010

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

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

CATEGORY 3 – ENERGY AND ATMOSPHERE

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

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

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

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

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

| LEED Credit Paragraph | Contractor Check Here if Credit is Claimed | LEED-NC v3 Submittals (OCT09) | Provide for Credit Audit Only | REQUIRED DOCUMENTATION | DATE | REV |
|-----------------------|--|---|-------------------------------|---|------|------------|
| PAR | | FEATURE | DUE AT | | | |
| | | | Closeout | Spreadsheet indicating, for each filter installed during construction, the manufacturer, model number, MERV rating, location installed, and if it was replaced immediately prior to occupancy. | | PE |
| EQ3.2 | | Construction IAQ Management Plan: Before Occupancy | **Preconstruction | Construction IAQ Management Plan | | PE |
| | | | Closeout | Statement indicating which option for compliance applies and confirming that required activities have occurred that meet the applicable requirements. | | PE |
| | | | Closeout | Option 1a: Narrative describing the project's flushout process, including specifics about temperature, airflow and duration, special considerations (if any) and demonstrating compliance. | | PE |
| | | | Closeout | Option 1b: Narrative describing the project's pre-occupancy and post-occupancy flushout processes, including specifics about temperature, airflow and duration, special considerations (if any) and demonstrating compliance. | | PE |
| | | | Closeout | Option 2: Narrative describing the project's IAQ testing process, including specifics about contaminants tested for, locations, remaining work at time of test, retest parameters and special considerations (if any). | | PE |
| | | | Closeout | Option 2: IAQ testing report demonstrating compliance. | | PE |
| EQ4.1 | | Low Emitting Materials: Adhesives & Sealants | Closeout | Spreadsheet indicating, for each applicable indoor adhesive, sealant and sealant primer used, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data. | | PE |
| | | | Closeout | Spreadsheet indicating, for each applicable indoor aerosol adhesive, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data - OR - Statement confirming no indoor aerosol adhesives were used for the project. | | PE |
| | | | Closeout | Manufacturer published product data or certification confirming material VOCs in spreadsheet | X | PE |
| EQ4.2 | | Low Emitting Materials: Paints & Coatings | Closeout | Spreadsheet indicating, for each applicable indoor paint and coating used, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data. | | PE |
| | | | Closeout | Spreadsheet indicating, for each applicable indoor anti-corrosive/anti-rust paint and coating used, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data - OR - Statement confirming no indoor anti-corrosive/anti-rust paints were used for the project . | | PE |
| | | | Closeout | Manufacturer published product data or certification confirming material VOCs in spreadsheet | X | PE |
| EQ4.3 | | Low Emitting Materials: Flooring Systems | Closeout | Spreadsheet indicating, for each indoor flooring system used, the manufacturer, product name/model number, if it meets LEED requirement (yes/no) and source of LEED compliance data. | | PE |
| | | | Closeout | Spreadsheet indicating, for each indoor carpet cushion used, the manufacturer, product name/model number, if it meets LEED requirement (yes/no) and source of LEED compliance data - OR - Statement confirming no indoor carpet cushion was used for the project. | | PE |
| | | | Closeout | Manufacturer published product data or certification confirming material compliance label in spreadsheet | X | PE |
| EQ4.4 | | Low Emitting Materials: Composite Wood & Agrifiber Products | Closeout | Spreadsheet indicating, for each indoor composite wood and agrifiber product used, the manufacturer, product name/model number, if it contains added urea formaldehyde (yes/no) and source of LEED compliance data. | | PE |
| | | | Closeout | Manufacturer published product data or certification confirming material urea formaldehyde in spreadsheet | X | PE |
| EQ5 | | Indoor Chemical & Pollutant Source Control | Closeout | Spreadsheet indicating, for each permanent entryway system used, the manufacturer, product name/model number and description of system. | | PE |
| | | | Final Design | List of drawing and specification references that convey locations and installation methods for entryway systems. | | ARC |
| | | | Final Design | Spreadsheet indicating, for each chemical use area, the room number, room name, description of room separation features (walls, floor/ceilings, openings) and pressure differential from surrounding spaces with doors closed - OR - Statement confirming that project includes no chemical use areas and that no hazardous cleaning materials are needed for building maintenance. | | ARC MEC |
| | | | Final Design | If project includes chemical use areas: List of drawing and specification references that convey locations of chemical use areas, room separation features and exhaust system. | | ARC |

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

INNOVATION & DESIGN PROCESS

| LEED Credit Paragraph | Contractor Check Here if Credit is Claimed | | Provide for Credit Audit Only | | Date Submitted (to be filled in by Contractor) | Government Reviewer's Use |
|-----------------------|--|--------------------------------------|-------------------------------|---|--|---------------------------|
| PAR | | FEATURE | DUE AT | REQUIRED DOCUMENTATION | DATE | REV |
| | | LEED-NC v3 Submittals (OCT09) | | | | |
| IDc1.1 | | Innovation in Design | Final Design | Narrative describing intent, requirement for credit, project approach to the credit. List of drawings and specification references that convey implementation of credit. All other documentation that validates claimed credit. | | |
| IDc1.2 | | Innovation in Design | Final Design | | | |
| IDc1.3 | | Innovation in Design | Final Design | | | |
| IDc1.4 | | Innovation in Design | Final Design | | | |
| IDc2 | | LEED Accredited Professional | Final Design | Narrative indicating name of LEED AP, company name of LEED AP, description of LEED AP's role and responsibilities in the project. | | ARC |

ATTACHMENT F
Version 07-07-2010

BUILDING INFORMATION MODELING REQUIREMENTS

1.0 Section 1 - Submittal Format

1.1. Design Deliverables. Develop all designs using Building Information Modeling (BIM) and Computer Aided Design (CAD) software. Design submittal drawings shall be ANSI D 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 Honolulu Engineer 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 Honolulu Engineer 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 Uniformat, to at least the sub-systems level and uses quantity information supplied directly from BIM output to the maximum extent possible, though other "Gap" quantity information will be included as necessary for a complete and accurate cost estimate.

6.4.2.1. Sub system level extracted quantities from the BIM for use within the estimate shall be provided according to how detailed line items or tasks should be installed/built so that accurate costs can be developed and/or reflected. Therefore, when developing a BIM, the designer shall be cognizant of what tasks need to be separated appropriately at the beginning stages of model development, such as tasks done on the first floor versus the same task on higher floors that will be more labor intensive and therefore need to have a separate quantity and be priced differently. Tasks and their extracted quantities from the BIM shall be broken 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 01.10
QUALITY CONTROL SYSTEM (QCS)**

1.0 GENERAL

- 1.1. CORRESPONDENCE AND ELECTRONIC COMMUNICATIONS
- 1.2. QCS SOFTWARE
- 1.3. SYSTEM REQUIREMENTS
- 1.4. RELATED INFORMATION
- 1.5. CONTRACT DATABASE
- 1.6. DATABASE MAINTENANCE
- 1.7. IMPLEMENTATION
- 1.8. DATA SUBMISSION VIA COMPUTER DISKETTE OR CD-ROM
- 1.9. MONTHLY COORDINATION MEETING
- 1.10. NOTIFICATION OF NONCOMPLIANCE

1.0 GENERAL

The Government will use the Resident Management System for Windows (RMS) to assist in its monitoring and administration of this contract. The Contractor shall use the Government-furnished Construction Contractor Module of RMS, referred to as QCS, to record, maintain, and submit various information throughout the contract period. The Contractor module, user manuals, updates, and training information can be downloaded from the RMS web site. This joint Government-Contractor use of RMS and QCS will facilitate electronic exchange of information and overall management of the contract. QCS provides the means for the Contractor to input, track, and electronically share information with the Government in the following areas:

- Administration
- Finances
- Quality Control
- Submittal Monitoring
- Scheduling
- Import/Export of Data
- Request for Information
- Accident Reporting
- Safety Exposure Manhours

1.1. CORRESPONDENCE AND ELECTRONIC COMMUNICATIONS

For ease and speed of communications, both Government and Contractor will exchange correspondence and other documents in electronic format. Correspondence, pay requests and other documents comprising the official contract record shall also be provided in paper format, with signatures and dates where necessary. Paper documents will govern, in the event of discrepancy with the electronic version.

1.2. OTHER FACTORS

Particular attention is directed to Contract Clause, "Schedules for Construction Contracts", Contract Clause, "Payments", Section 01 32 01.00 10, PROJECT SCHEDULE, Section 01 33 00, SUBMITTAL PROCEDURES, and Section 01 45 04.00 10, CONTRACTOR QUALITY CONTROL, which have a direct relationship to the reporting to be accomplished through QCS. Also, there is no separate payment for establishing and maintaining the QCS database; all costs associated therewith shall be included in the contract pricing for the work.

1.3. QCS SOFTWARE

QCS is a Windows-based program that can be run on a stand-alone personal computer or on a network. The Government will make available the QCS software to the Contractor after award of the construction contract. Prior to the Pre-Construction Conference, the Contractor shall be responsible to download, install and use the latest version of the QCS software from the Government's RMS Internet Website. Upon specific justification and request by the Contractor, the Government can provide QCS on CD-ROM. Any program updates of QCS will be made available to the Contractor via the Government RMS Website as they become available.

1.4. SYSTEM REQUIREMENTS

The following listed hardware and software is the minimum system configuration that the Contractor shall have to run QCS:

(a) Hardware

- IBM-compatible PC with 1000 MHz Pentium or higher processor
- 256 MB RAM for workstation / 512+ MB RAM for server
- 1 GB hard drive disk space for sole use by the QCS system
- Compact disk (CD) Reader, 8x speed or higher
- SVGA or higher resolution monitor (1024 x 768, 256 colors)
- Mouse or other pointing device
- Windows compatible printer (Laser printer must have 4+ MB of RAM)
- Connection to the Internet, minimum 56K BPS

(b) Software

- MS Windows 2000 or higher
- MS Word 2000 or newer
- Latest version of : Netscape Navigator, Microsoft Internet Explorer, or other browser that supports HTML 4.0 or higher
- Electronic mail (E-mail), MAPI compatible
- Virus protection software that is regularly upgraded with all issued manufacturer's updates

1.5. RELATED INFORMATION

1.5.1. QCS USER GUIDE

After contract award, the Contractor shall download instructions for the installation and use of QCS from the Government RMS Internet Website. In case of justifiable difficulties, the Government will provide the Contractor with a CD-ROM containing these instructions.

1.5.2. CONTRACTOR QUALITY CONTROL (CQC) TRAINING

The use of QCS will be discussed with the Contractor's QC System Manager during the mandatory CQC Training class.

1.6. CONTRACT DATABASE

Prior to the pre-construction conference, the Government will provide the Contractor with basic contract award data to use for QCS. The Government will provide data updates to the Contractor as needed, generally by using the government's SFTP repository built into QCS import/export function. These updates will generally consist of submittal reviews, correspondence status, QA comments, and other administrative and QA data.

1.7. DATABASE MAINTENANCE

The Contractor shall establish, maintain, and update data for the contract in the QCS database throughout the duration of the contract. The Contractor shall establish and maintain the QCS database at the Contractor's site office. Data updates to the Government, e.g., daily reports, submittals, RFI's, schedule updates, payment requests, etc. shall be submitted using the government's SFTP repository built into QCS export function. If permitted by the Contracting Officer, email or CD-ROM may be used instead (see Paragraph DATA SUBMISSION VIA CD-ROM). The QCS database typically shall include current data on the following items:

1.7.1. ADMINISTRATION

1.7.1.1. Contractor Information

The database shall contain the Contractor's name, address, telephone numbers, management staff, and other required items. Within 14 calendar days of receipt of QCS software from the Government, the Contractor shall deliver Contractor administrative data in electronic format.

1.7.1.2. Subcontractor Information

The database shall contain the name, trade, address, phone numbers, and other required information for all subcontractors. A subcontractor must be listed separately for each trade to be performed. Each subcontractor/trade shall be assigned a unique Responsibility Code, provided in QCS. Within 14 calendar days of receipt of QCS software from the Government, the Contractor shall deliver subcontractor administrative data in electronic format.

1.7.1.3. Correspondence

All Contractor correspondence to the Government shall be identified with a serial number. Correspondence initiated by the Contractor's site office shall be prefixed with "S". Letters initiated by the Contractor's home (main)

office shall be prefixed with "H". Letters shall be numbered starting from 0001. (e.g., H-0001 or S-0001). The Government's letters to the Contractor will be prefixed with "C".

All Requests For Information (RFI) shall be exchanged using the Built-in RFI generator and tracker in QCS.

1.7.1.4. Equipment

The Contractor's QCS database shall contain a current list of equipment planned for use or being used on the jobsite, including the most recent and planned equipment inspection dates.

1.7.1.5. Management Reporting

QCS includes a number of reports that Contractor management can use to track the status of the project. The value of these reports is reflective of the quality of the data input, and is maintained in the various sections of QCS. Among these reports are: Progress Payment Request worksheet, QA/QC comments, Submittal Register Status, Three-Phase Inspection checklists.

1.7.2. FINANCES

1.7.2.1. Pay Activity Data

The QCS database shall include a list of pay activities that the Contractor shall develop in conjunction with the design and construction schedule. The sum of all pay activities shall be equal to the total contract amount, including modifications. Pay activities shall be grouped by Contract Line Item Number (CLIN), and the sum of the activities shall equal the amount of each CLIN. The total of all CLINs equals the Contract Amount.

1.7.2.2. Payment Requests

All progress payment requests shall be prepared using QCS. The Contractor shall complete the payment request worksheet prompt payment certification, and payment invoice in QCS. The work completed under the contract, measured as percent or as specific quantities, shall be updated at least monthly. After the update, the Contractor shall generate a payment request report using QCS. The Contractor shall submit the payment request, prompt payment certification, and payment invoice with supporting data by using the government's SFTP repository built into QCS export function. If permitted by the Contracting Officer, E-mail or a CD-ROM may be used. A signed paper copy of the approved payment request is also required, which shall govern in the event of discrepancy with the electronic version.

1.7.3. Quality Control (QC)

QCS provides a means to track implementation of the 3-phase QC Control System, prepare daily reports, identify and track deficiencies, document progress of work, and support other contractor QC requirements. The Contractor shall maintain this data on a daily basis. Entered data will automatically output to the QCS generated daily report. The Contractor shall provide the Government a Contractor Quality Control (CQC) Plan within the time required in Section 01 45 04.00 10, CONTRACTOR QUALITY CONTROL. Within seven calendar days of Government acceptance, the Contractor shall submit a QCS update reflecting the information contained in the accepted CQC Plan: schedule, pay activities, features of work, submittal register, QC requirements, and equipment list.

1.7.3.1. Daily Contractor Quality Control (CQC) Reports

QCS includes the means to produce the Daily CQC Report. The Contractor may use other formats to record basic QC data. However, the Daily CQC Report generated by QCS shall be the Contractor's official report. Data from any supplemental reports by the Contractor shall be summarized and consolidated onto the QCS-generated Daily CQC Report. Daily CQC Reports shall be submitted as required by Section 01 45 04.00 10, CONTRACTOR QUALITY CONTROL. Reports shall be submitted electronically to the Government within 24 hours after the date covered by the report. The Contractor shall also provide the Government a signed, printed copy of the daily CQC report.

1.7.3.2. Deficiency Tracking

The Contractor shall use QCS to track deficiencies. Deficiencies identified by the Contractor will be numerically tracked using QC punch list items. The Contractor shall maintain a current log of its QC punch list items in the QCS database. The Government will log the deficiencies it has identified using its QA punch list items. The Government's QA punch list items will be included in its export file to the Contractor. The Contractor shall regularly update the correction status of both QC and QA punch list items.

1.7.3.3. QC Requirements

The Contractor shall develop and maintain a complete list of QC testing and required structural and life safety special inspections required by the International Code Council (ICC), transferred and installed property, and user training requirements in QCS. The Contractor shall update all data on these QC requirements as work progresses, and shall promptly provide this information to the Government via QCS.

1.7.3.4. Three-Phase Control Meetings

The Contractor shall maintain scheduled and actual dates and times of preparatory and initial control meetings in QCS.

1.7.3.5. Labor and Equipment Hours

The Contractor shall log labor and equipment exposure hours on a daily basis. This data will be rolled up into a monthly exposure report.

1.7.3.6. Accident/Safety Tracking Reporting

The Government will issue safety comments, directions, or guidance whenever safety deficiencies are observed. The Government's safety comments will be included in its export file to the Contractor. The Contractor shall regularly update the correction status of the safety comments. In addition, the Contractor shall utilize QCS to advise the Government of any accidents occurring on the jobsite. This supplemental entry is not to be considered as a substitute for completion of mandatory notification and reports, e.g., ENG Form 3394 and OSHA Form 300.

1.7.3.7. Features of Work

The Contractor shall include a complete list of the features of work in the QCS database. A feature of work may be associated with multiple pay activities. However, each pay activity (see subparagraph "Pay Activity Data" of paragraph "Finances") will only be linked to a single feature of work.

1.7.3.8. Hazard Analysis

The Contractor shall use QCS to develop a hazard analysis for each feature of work included in its CQC Plan. The hazard analysis shall address any hazards, or potential hazards, that may be associated with the work

1.7.4. Submittal Management

The Government will provide the submittal register form, ENG Form 4288, SUBMITTAL REGISTER, in electronic format. The Contractor and Designer of Record (DOR) shall develop and maintain a complete list of all submittals, including completion of all data columns and shall manage all submittals. Dates on which submittals are received and returned by the Government will be included in its export file to the Contractor. The Contractor shall use QCS to track and transmit all submittals. ENG Form 4025, submittal transmittal form, and the submittal register update, ENG Form 4288, shall be produced using QCS. QCS and RMS will be used to update, store and exchange submittal registers and transmittals, but will not be used for storage of actual submittals.

1.7.5. Schedule

The Contractor shall develop a design and construction schedule consisting of pay activities, in accordance with Section 01 32 01.00 10, PROJECT SCHEDULE, as applicable. This schedule shall be input and maintained in the QCS database either manually or by using the Standard Data Exchange Format (SDEF) (see Section 01 32 01.00 10 PROJECT SCHEDULE). The updated schedule data shall be included with each pay request submitted by the Contractor.

1.7.5.1. Import/Export of Data

QCS includes the ability to export Contractor data to the Government and to import submittal register and other Government-provided data from RMS, and schedule data using SDEF.

1.8. IMPLEMENTATION

Contractor use of QCS as described in the preceding paragraphs is mandatory. The Contractor shall ensure that sufficient resources are available to maintain its QCS database, and to provide the Government with regular database updates. QCS shall be an integral part of the Contractor's management of quality control.

1.9. DATA SUBMISSION VIA COMPUTER DISKETTE OR CD-ROM

The Government-preferred method for Contractor's submission of QCS data is by using the government's SFTP repository built into QCS export function.. Other data should be submitted using E-mail with file attachment(s). For locations where this is not feasible, the Contracting Officer may permit use of CD-ROM for data transfer. Data on CDs shall be exported using the QCS built-in export function. If used, CD-ROMs will be submitted in accordance with the following:

1.9.1. File Medium

The Contractor shall submit required data on CD-ROMs. They shall conform to industry standards used in the United States. All data shall be provided in English.

1.9.2. Disk Or Cd-Rom Labels

The Contractor shall affix a permanent exterior label to each diskette and CD-ROM submitted. The label shall indicate in English, the QCS file name, full contract number, contract name, project location, data date, name and telephone number of person responsible for the data.

1.9.3. File Names

The files will be automatically named by the QCS software. The naming convention established by the QCS software shall not be altered in any way by the Contractor.

1.10. MONTHLY COORDINATION MEETING

The Contractor shall update the QCS database each workday. At least monthly, the Contractor shall generate and submit an export file to the Government with schedule update and progress payment request. As required in Contract Clause "Payments", at least one week prior to submittal, the Contractor shall meet with the Government representative to review the planned progress payment data submission for errors and omissions.

The Contractor shall make all required corrections prior to Government acceptance of the export file and progress payment request. Payment requests accompanied by incomplete or incorrect data submittals will be returned. The Government will not process progress payments until an acceptable QCS export file is received.

1.11. NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the requirements of this specification. 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.

End of Section 01 45 01.10

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

1.0 GENERAL

1.1. REFERENCES

1.2. PAYMENT

2.0 PRODUCTS (NOT APPLICABLE)

3.0 EXECUTION

3.1. GENERAL REQUIREMENTS

3.2. QUALITY CONTROL PLAN

3.3. COORDINATION MEETING

3.4. QUALITY CONTROL ORGANIZATION

3.5. SUBMITTALS AND DELIVERABLES

3.6. CONTROL

3.7. TESTS

3.8. COMPLETION INSPECTION

3.9. DOCUMENTATION

3.10. NOTIFICATION OF NONCOMPLIANCE

1.0 GENERAL

1.1. REFERENCES

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

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

1.2. PAYMENT

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

2.0 PRODUCTS (Not Applicable)

3.0 EXECUTION

3.1. GENERAL REQUIREMENTS

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause titled "Inspection of Construction." The quality control system shall consist of plans, procedures, and organization necessary to produce an end product, which complies with the contract requirements. The system shall cover all design and construction operations, both onsite and offsite, and shall be keyed to the proposed design and construction sequence. The site project superintendent is responsible for the quality of work on the job and is subject to removal by the Contracting Officer for non-compliance with the quality requirements specified in the contract. The site project superintendent in this context shall be the highest level manager responsible for the overall construction activities at the site, including quality and production. The site project superintendent shall maintain a physical presence at the site at all times, except as otherwise acceptable to the Contracting Officer, and shall be responsible for all construction and construction related activities at the site.

3.2. QUALITY CONTROL PLAN

Furnish for Government review, not later than 30 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause titled "Inspection of Construction." The plan shall identify personnel, procedures, control, instructions, tests, records, and forms to be used. The Government will consider an interim plan for the first 30 days of operation. Design and construction may begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. The Government will not permit work outside of the features of work included in an accepted interim plan to begin until acceptance of a CQC Plan or another interim plan containing the additional features of work to be started. Where the applicable Code issued by the International Code Council calls for an inspection by the Building Official, the Contractor shall include the inspections in the Quality Control Plan and shall perform the inspections. The Designer of Record shall develop a program for any special inspections required by the applicable International Codes and the Contractor shall perform these inspections, using qualified inspectors. Include the special inspection plan in the QC Plan.

3.2.1. Content of the CQC Plan

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

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

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

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

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

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

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

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

3.2.1.8. Reporting procedures, including proposed reporting formats.

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

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

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

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

3.2.2.1. The Contractor's QCP Plan shall provide and maintain a Design Quality Control (DQC) Plan as an effective quality control program which will assure that all services required by this design-build contract are performed and provided in a manner that meets professional architectural and engineering quality standards. As a minimum, competent, independent reviewers identified in the DQC Plan shall review all documents. Use personnel who were not involved in the design effort to produce the design to perform the independent technical review (ITR). The ITR is intended as a quality control check of the design. Include, at least, but not necessarily limited to, a review of the contract requirements (the accepted contract or task order proposal and amended RFP), the basis of design, design calculations, the design configuration management documentation and check the design documents for

errors, omissions, and for coordination and design integration. The ITR team is not required to examine, compare or comment concerning alternate design solutions but should concentrate on ensuring that the design meets the contract requirements. Correct errors and deficiencies in the design documents prior to submitting them to the Government.

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

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

3.2.3. Acceptance of Plan

Government acceptance of the Contractor's plan is required prior to the start of design and construction. Acceptance is conditional and will be predicated on satisfactory performance during the design and construction. The Government reserves the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.4. Notification of Changes

After acceptance of the CQC Plan, notify the Government in writing of any proposed change. Proposed changes are subject to Government acceptance.

3.3. COORDINATION MEETING

After the Postaward Conference, before start of design or construction, and prior to acceptance by the Government of the CQC Plan, the Contractor and the Government shall meet and discuss the Contractor's quality control system. Submit the CQC Plan for review a minimum of 7 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations, design activities, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. The Government will prepare minutes of the meeting for signature by both parties. . The minutes shall become a part of the contract file. There may be occasions when either party will call for subsequent conferences to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4. QUALITY CONTROL ORGANIZATION

3.4.1. Personnel Requirements

The requirements for the CQC organization are a CQC System Manager, a Design Quality Manager, and sufficient number of additional qualified personnel to ensure contract compliance. The CQC organization shall also include personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly. The Contractor's CQC staff shall maintain a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure contract compliance. The CQC staff shall be subject to acceptance by the Contracting Officer. Provide adequate office space, filing systems and other resources as necessary to maintain an effective and fully functional CQC organization. Promptly furnish complete records of all letters, material submittals, shop drawing submittals, schedules and all other project documentation to the CQC organization. The CQC organization shall be responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the Contracting Officer.

3.4.2. CQC System Manager

Identify as CQC System Manager an individual within the onsite work organization who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System

Manager shall be a graduate engineer, graduate architect, or a BA/BS graduate of an ACCE accredited construction management college program. The CQC system Manager may alternately be an engineering technician with at least 2 years of college and an ICC certification as a Commercial Building Inspector (Residential Building Inspector certification will be required for Military Family Housing projects). In addition, the CQC system manager shall have a minimum of 5 years construction experience on construction similar to this contract. The CQC System Manager shall be on the site at all times during construction and shall be employed by the prime Contractor. Assign the CQC System Manager no other duties (except may also serve as Safety and Health Officer, if qualified and if allowed by Section 00 73 00). Identify an alternate for the CQC System Manager in the plan to serve in the event of the System Manager's absence. The requirements for the alternate shall be the same as for the designated CQC System Manager but the alternate may have other duties in addition to serving in a temporary capacity as the acting QC manager.

3.4.3. CQC Personnel

3.4.3.1. In addition to CQC personnel specified elsewhere in the contract provide specialized CQC personnel to assist the CQC System Manager in accordance with paragraph titled Area Qualifications.

3.4.3.2. These individuals may be employees of the prime or subcontractor; be responsible to the CQC System Manager; **are not intended to be full time, but must be physically present at the construction site during work on their areas of responsibility**; have the necessary education and/or experience in accordance with the experience matrix listed herein. These individuals may perform other duties but must be allowed sufficient time to perform their assigned quality control duties as described in the Quality Control Plan. **One person may cover more than one area, provided that they are qualified to perform QC activities for the designated areas below and provided that they have adequate time to perform their duties:**

3.4.4. Experience Matrix

3.4.4.1. Area Qualifications

3.4.4.1.1. Civil - Graduate Civil Engineer or (BA/BS) graduate in construction management with 4 years experience in the type of work being performed on this project or engineering technician with 5 yrs related experience.

3.4.4.1.2. Mechanical - Graduate Mechanical Engineer or (BA/BS) graduate in construction management with 4 yrs related experience or engineering technician with an ICC certification as a Commercial Mechanical Inspector with 5 yrs related experience.

3.4.4.1.3. Electrical - Graduate Electrical Engineer or (BA/BS) graduate in construction management with 4 yrs related experience or engineering technician with an ICC certification as a Commercial Electrical Inspector with 5 yrs related experience.

3.4.4.1.4. Structural - Graduate Structural Engineer or (BA/BS) graduate in construction management with 4 yrs related experience or person with an ICC certification as a Reinforced Concrete Special Inspector and Structural Steel and Bolting Special Inspector (as applicable to the type of construction involved) with 5 yrs related experience.

3.4.4.1.5. Plumbing - Graduate Mechanical Engineer or (BA/BS) graduate in construction management with 4 yrs related experience, or person with an ICC certification as a Commercial Plumbing Inspector with 5 yrs related experience.

3.4.4.1.6. Concrete, Pavements and Soils Materials Technician (present while performing tests) with 2 yrs experience for the appropriate area

3.4.4.1.7. Testing, Adjusting and Balancing Specialist must be a member (TAB) Personnel of AABC or an experienced technician of the firm certified by the NEBB (present while testing, adjusting, balancing).

3.4.4.1.8. Design Quality Control Manager Registered Architect or Professional Engineer (not required on the construction site)

3.4.4.1.9. Registered Fire Protection Engineer with 4 years related experience or engineering technician with 5 yrs related experience (but see requirements for Fire Protection Engineer of Record to witness final testing in Section 01 10 00, paragraph 5.10, Fire Protection).

3.4.4.1.10. QC personnel assigned to the installation of the telecommunication system or any of its components shall be Building Industry Consulting Services International (BICSI) Registered Cabling Installers, Technician Level. Submit documentation of current BICSI certification. In lieu of BICSI certification, QC personnel shall have a minimum of 5 years experience in the installation of the specified copper and fiber optic cable and components. They shall have factory or factory approved certification from each equipment manufacturer indicating that they are qualified to install and test the provided products. QC personnel shall witness and certify the testing of telecommunications cabling and equipment.

3.4.5. Additional Requirement

In addition to the above experience and/or education requirements the CQC System Manager shall have completed the course entitled "Construction Quality Management for Contractors". This course is periodically offered at This course is periodically offered by the GCA, BIA and ABC. Inquire with the District, GCA, BIA or ABC for schedule and location of classes.. 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:
 - [Not Supplied - ConstructionReqQC : LAB_NAME]
 - [Not Supplied - ConstructionReqQC : LAB_ATTEN]
 - [Not Supplied - ConstructionReqQC : LAB_MAIL]
 - [Not Supplied - ConstructionReqQC : LAB_STATE]
- For other deliveries:
 - [Not Supplied - ConstructionReqQC : LAB_NAME_OTHER]

[Not Supplied - ConstructionReqQC : LAB_ATTEN_OTHER]

[Not Supplied - ConstructionReqQC : LAB_MAIL_OTHER]

[Not Supplied - ConstructionReqQC : LAB_STATE_OTHER]

The area or resident office will coordinate, exact delivery location, and dates for each specific test.

3.8. COMPLETION INSPECTION

3.8.1. Punch-Out Inspection

Near the end of the work, or any increment of the work established by a time stated in the SPECIAL CONTRACT REQUIREMENTS Clause, "Commencement, Prosecution, and Completion of Work", or by the specifications, the CQC Manager shall conduct an inspection of the work. Prepare a punch list of items which do not conform to the approved drawings and specifications and include in the CQC documentation, as required by paragraph DOCUMENTATION. The list of deficiencies shall include the estimated date by which the deficiencies will be corrected. The CQC System Manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished, the Contractor shall notify the Government that the facility is ready for the Government Pre-Final inspection.

3.8.2. Pre-Final Inspection

As soon as practicable after the notification above, the Government will perform the pre-final inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. The Contractor's CQC System Manager shall ensure that all items on this list have been corrected before notifying the Government, so that a Final inspection with the customer can be scheduled. Correct any items noted on the Pre-Final inspection in a timely manner. Accomplish these inspections and any deficiency corrections required by this paragraph within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

3.8.3. Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative shall attend the final acceptance inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups and major commands may also attend. The Government will formally schedule the final acceptance inspection based upon results of the Pre-Final inspection. Provide notice to the Government at least 14 days prior to the final acceptance inspection and include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the contract clause titled "Inspection of Construction".

3.9. DOCUMENTATION

3.9.1. Maintain current records providing factual evidence that required quality control activities and/or tests have been performed. These records shall include the work of subcontractors and suppliers using government-provided software, QCS (see Section 01 45 01.10). The report includes, as a minimum, the following information:

3.9.1.1. Contractor/subcontractor and their area of responsibility.

3.9.1.2. Operating plant/equipment with hours worked, idle, or down for repair.

3.9.1.3. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.

- 3.9.1.4. Test and/or control activities performed with results and references to specifications/drawings requirements. Identify the applicable control phase (Preparatory, Initial, Follow-up). List deficiencies noted, along with corrective action.
- 3.9.1.5. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.
- 3.9.1.6. Submittals and deliverables reviewed, with contract reference, by whom, and action taken.
- 3.9.1.7. Offsite surveillance activities, including actions taken.
- 3.9.1.8. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
- 3.9.1.9. Instructions given/received and conflicts in plans and/or specifications.
- 3.9.1.10. Provide documentation of design quality control activities. For independent design reviews, provide, as a minimum, identity of the ITR team, the ITR review comments, responses and the record of resolution of the comments.
- 3.9.2. Contractor's verification statement.

These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. Furnish the original and one copy of these records in report form to the Government daily within 24 hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, submit one report for every 7 days of no work and on the last day of a no work period. Account for all calendar days throughout the life of the contract. The first report following a day of no work shall be for that day only. The CQC System Manager shall sign and date reports. The report shall include copies of test reports and copies of reports prepared by all subordinate quality control personnel. The Contractor may submit these forms electronically, in lieu of hard copy.

3.10. NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

End of Section 01 45 04.00 10

**SECTION 01 50 02
TEMPORARY CONSTRUCTION FACILITIES**

1.0 OVERVIEW

1.1. GENERAL REQUIREMENTS

1.2. AVAILABILITY AND USE OF UTILITY SERVICES

1.3. BULLETIN BOARD, PROJECT SIGN, AND PROJECT SAFETY SIGN

1.4. PROTECTION AND MAINTENANCE OF TRAFFIC

1.5. MAINTENANCE OF CONSTRUCTION SITE

1.0 OVERVIEW

1.1. GENERAL REQUIREMENTS

1.1.1. Site Plan

Prepare a site plan indicating the proposed location and dimensions of any area to be fenced and used by the Contractor, the number of trailers to be used, avenues of ingress/egress to the fenced area and details of the fence installation. Identify any areas which may have to be graveled to prevent the tracking of mud. Also indicate if the use of a supplemental or other staging area is desired.

1.2. AVAILABILITY AND USE OF UTILITY SERVICES

1.2.1. See Section 00 72 00, Contract Clauses and Section 00 73 00, Special Contract Requirements, for Utility Availability requirements.

1.2.2. Sanitation

Provide and maintain within the construction area minimum field-type sanitary facilities approved by the Contracting Officer. Government toilet facilities will not be available to Contractor's personnel.

1.2.3. Telephone

Make arrangements and pay all costs for desired telephone facilities.

1.3. BULLETIN BOARD, PROJECT SIGN, AND PROJECT SAFETY SIGN

1.3.1. Bulletin Board

Immediately upon beginning of onsite work, provide a weatherproof glass-covered bulletin board not less than 36 by 48 inches in size for displaying the Equal Employment Opportunity poster, a copy of the wage decision contained in the contract, Wage Rate Information poster, and other information approved by the Contracting Officer. Locate the bulletin board at the project site in a conspicuous place easily accessible to all employees, as approved by the Contracting Officer. Display legible copies of the aforementioned data until work is completed. Remove the bulletin board from the site upon completion of the project.

1.3.2. Project and Safety Signs

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>.

1.4. PROTECTION AND MAINTENANCE OF TRAFFIC

Provide access and temporary relocated roads as necessary to maintain traffic. Maintain and protect traffic on all affected roads during the construction period except as otherwise specifically directed by the Contracting Officer. Take measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades, placing of lights around and in front of equipment and the work, and the erection and maintenance of adequate warning, danger, and direction signs, as required by the State and local authorities having jurisdiction. Protect the traveling public from damage to person and property.

The Contractor's traffic on roads selected for hauling material to and from the site shall interfere as little as possible with public traffic. Investigate the adequacy of existing roads and the allowable load limit on these roads. Repair any damage to roads caused by construction operations.

1.4.1. Haul Roads

The Contractor shall, at its own expense, construct access and haul roads necessary for proper prosecution of the work under this contract. Construct haul roads with suitable grades and widths. Avoid sharp curves, blind corners, and dangerous cross traffic. Provide necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic. The method of dust control, although optional, shall be adequate to ensure safe operation at all times. Location, grade, width, and alignment of construction and hauling roads shall be subject to approval by the Contracting Officer. Provide adequate lighting to assure full and clear visibility for full width of haul road and work areas during any night work operations. Remove haul roads designated by the Contracting Officer upon completion of the work and restore those areas.

1.4.2. Barricades

Erect and maintain temporary barricades to limit public access to hazardous areas. Barricades shall be required whenever safe public access to paved areas such as roads, parking areas or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic. Securely place barricades clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

1.5. MAINTENANCE OF CONSTRUCTION SITE

Mow grass and vegetation located within the boundaries of the construction site for the duration of the project, from NTP to contract completion. Edge or neatly trim grass and vegetation along fences, buildings, under trailers, and in areas not accessible to mowers from NTP to contract completion.

End of Section 01 50 02

**SECTION 01 57 20.00 10
ENVIRONMENTAL PROTECTION**

1.0 GENERAL REQUIREMENTS

- 1.1. SUBCONTRACTORS
- 1.2. ENVIRONMENTAL PROTECTION PLAN
- 1.3. PROTECTION FEATURES
- 1.4. ENVIRONMENTAL ASSESSMENT OF CONTRACT DEVIATIONS
- 1.5. NOTIFICATION

2.0 PRODUCTS (NOT USED)

3.0 EXECUTION

- 3.1. LAND RESOURCES
- 3.2. WATER RESOURCES
- 3.3. AIR RESOURCES
- 3.4. CHEMICAL MATERIALS MANAGEMENT AND WASTE DISPOSAL
- 3.5. RECYCLING AND WASTE MINIMIZATION
- 3.6. HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES
- 3.7. BIOLOGICAL RESOURCES
- 3.8. INTEGRATED PEST MANAGEMENT
- 3.9. PREVIOUSLY USED EQUIPMENT
- 3.10. MILITARY MUNITIONS
- 3.11. TRAINING OF CONTRACTOR PERSONNEL
- 3.12. POST CONSTRUCTION CLEANUP

1.0 GENERAL REQUIREMENTS

Minimize environmental pollution and damage that may occur as the result of construction operations. Protect the environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire duration of this contract. Comply with all applicable environmental Federal, State, and local laws and regulations. The Contractor shall be responsible for any delays resulting from failure to comply with environmental laws and regulations

1.1. SUBCONTRACTORS

Ensure compliance with this section by subcontractors.

1.2. ENVIRONMENTAL PROTECTION PLAN

1.2.1. The purpose of the Environmental Protection Plan is to present a comprehensive overview of known or potential environmental issues which the Contractor must address during construction. Define issues of concern within the Environmental Protection Plan as outlined in this section. Address each topic in the plan at a level of detail commensurate with the environmental issue and required construction task(s). Identify and discuss topics or issues which are not identified in this section, but which the Contractor considers necessary, after those items formally identified in this section. Prior to commencing construction activities or delivery of materials to the site, submit the Plan for review and Government approval. The Contractor shall meet with the Government prior to implementation of the Environmental Protection Plan, for the purpose of discussing the implementation of the initial plan; possible subsequent additions and revisions to the plan including any reporting requirements; and methods for administration of the Contractor's Environmental Plans. Maintain and keep the Environmental Protection Plan current onsite.

1.2.2. Compliance

No requirement in this Section shall be construed as relieving the Contractor of any applicable Federal, State, and local environmental protection laws and regulations. During Construction, the Contractor shall be responsible for identifying, implementing, and submitting for approval any additional requirements to be included in the Environmental Protection Plan.

1.2.3. Contents

The plan shall include, but shall not be limited to, the following:

1.2.3.1. Name(s) of person(s) within the Contractor's organization who is(are) responsible for ensuring adherence to the Environmental Protection Plan.

1.2.3.2. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site, if applicable

1.2.3.3. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel

1.2.3.4. Description of the Contractor's environmental protection personnel training program

1.2.3.5. An erosion and sediment control plan which identifies the type and location of the erosion and sediment controls to be provided. Include monitoring and reporting requirements to assure that the control measures are in compliance with the erosion and sediment control plan, Federal, State, and local laws and regulations. A Storm Water Pollution Prevention Plan (SWPPP) may be substituted for this plan.

1.2.3.6. Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on the site

1.2.3.7. Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Include measures to minimize the amount of mud transported onto paved public roads by vehicles or runoff.

1.2.3.8. Work area plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Include measures for marking the limits of use areas including methods for protection of features to be preserved within authorized work areas.

1.2.3.9. Drawing showing the location of on-installation borrow areas.

1.2.3.10. A spill control plan shall include the procedures, instructions, and reports to be used in the event of an unforeseen spill of a substance regulated by 40 CFR 68, 40 CFR 302, 40 CFR 355, and/or regulated under State or Local laws and regulations. The spill control plan supplements the requirements of EM 385-1-1. This plan shall include as a minimum:

(a) The name of the individual who will report any spills or hazardous substance releases and who will follow up with complete documentation. This individual shall immediately notify the Government and the local Fire Department in addition to the legally required Federal, State, and local reporting channels (including the National Response Center 1-800-424-8802) if a reportable quantity is released to the environment. The plan shall contain a list of the required reporting channels and telephone numbers.

(b) The name and qualifications of the individual who will be responsible for implementing and supervising the containment and cleanup

(c) Training requirements for Contractor's personnel and methods of accomplishing the training

(d) A list of materials and equipment to be immediately available at the job site, tailored to cleanup work of the potential hazard(s) identified.

(e) The names and locations of suppliers of containment materials and locations of additional fuel oil recovery, cleanup, restoration, and material-placement equipment available in case of an unforeseen spill emergency

(f) The methods and procedures to be used for expeditious contaminant cleanup

1.2.3.11. A solid waste management plan identifying waste minimization, collection, and disposals methods, waste streams (type and quantity), and locations for solid waste diversion/disposal including clearing debris and C&D waste that is diverted (salvaged, reused, or recycled). Detail the contractor's actions to comply with, and to participate in, Federal, state, regional, local government, and installation sponsored recycling programs to reduce the volume of solid waste at the source. Identify any subcontractors responsible for the transportation, salvage and disposal of solid waste. Submit licenses or permits for solid waste disposal sites that are not a commercial operating facility. Attach evidence of the facility's ability to accept the solid waste to this plan. A construction and demolition waste management plan, similar to the plan specified in the UFGS 01 74 19 (formerly 01572) may be used as the non-hazardous solid waste management plan. Provide a Non-Hazardous Solid Waste Diversion Report. Submit the report on the first working day after the first quarter that non-hazardous solid waste has been disposed and/or diverted and each quarter thereafter (e.g. the first working day of January, April, July, and October) until the end of the project. Additionally, a summary report, with all data fields, is required at the end of the project. The report shall indicate the total type and amount of waste generated, total type and amount of waste diverted, type and amount of waste sent to waste-to-energy facility and alternative daily cover, in tons along with the percent that was diverted. Maintain, track and report construction and demolition waste data in a manner such that the installation can enter the data into the Army SWAR database, which separates data by type of material. A cumulative report in LEED Letter Template format may be used but must be modified to include the date disposed of/diverted and include the above stated diversion data. NOTE: The Solid Waste Diversion Reports are separate documentation than the LEED documentation.

1.2.3.12. DELETED.

1.2.3.13. An air pollution control plan detailing provisions to assure that dust, debris, materials, trash, etc., do not become air borne and travel off the project site.

1.2.3.14. A contaminant prevention plan that: identifies potentially hazardous substances to be used on the job site; identifies the intended actions to prevent introduction of such materials into the air, water, or ground; and details provisions for compliance with Federal, State, and local laws and regulations for storage and handling of

these materials. In accordance with EM 385-1-1, include a copy of the Material Safety Data Sheets (MSDS) and the maximum quantity of each hazardous material to be on site at any given time in the contaminant prevention plan. Update the plan as new hazardous materials are brought on site or removed from the site. Reference this plan in the storm water pollution prevention plan, as applicable.

1.2.3.15. A waste water management plan that identifies the methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines. If a settling/retention pond is required, include the design of the pond including drawings, removal plan, and testing requirements for possible pollutants. If land application will be the method of disposal for the waste water, include a sketch showing the location for land application along with a description of the pretreatment methods to be implemented and any required permits. If surface discharge will be the method of disposal, include a copy of the permit and associated documents as an attachment prior to discharging the waste water. If disposal is to a sanitary sewer, include documentation that the waste water treatment plant Operator has approved the flow rate, volume, and type of discharge.

1.2.3.16. A historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on the project site: and/or identifies procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in the area are discovered during construction. Include methods to assure the protection of known or discovered resources and shall identify lines of communication between Contractor personnel and the Government.

1.2.3.17. A pesticide treatment plan, updated, as information becomes available. Include: sequence of treatment, dates, times, locations, pesticide trade name, EPA registration numbers, authorized uses, chemical composition, formulation, original and applied concentration, application rates of active ingredient (i.e. pounds of active ingredient applied), equipment used for application and calibration of equipment. The Contractor is responsible for Federal, State, Regional and Local pest management record keeping and reporting requirements as well as any additional Installation specific requirements. Follow AR 200-1, Chapter 5, Pest Management, Section 5-4, "Program Requirements" for data required to be reported to the Installation.

1.3. PROTECTION FEATURES

This paragraph supplements the Contract Clause PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES AND IMPROVEMENTS. Prior to start of any onsite construction activities, the Contractor and the Government shall make a joint condition survey. Immediately following the survey, the Contractor shall prepare a brief report including a plan describing the features requiring protection under the provisions of the Contract Clauses, which are not specifically identified on the drawings as environmental features requiring protection along with the condition of trees, shrubs and grassed areas immediately adjacent to the site of work and adjacent to the Contractor's assigned storage area and access route(s), as applicable. Both the Contractor and the Government will sign this survey, upon mutual agreement as to its accuracy and completeness. The Contractor develop a plan that depicts how it will protect those environmental features included in the survey report and any indicated on the drawings, regardless of interference which their preservation may cause to the Contractor's work under the contract.

1.4. ENVIRONMENTAL ASSESSMENT OF CONTRACT DEVIATIONS

Any deviations, requested by the Contractor, from the drawings, plans and specifications which may have an environmental impact will be subject to approval by the Government and may require an extended review, processing, and approval time. The Government reserves the right to disapprove alternate methods, even if they are more cost effective, if the Government determines that the proposed alternate method will have an adverse environmental impact.

1.5. NOTIFICATION

The Government will notify the Contractor in writing of any observed noncompliance with Federal, State or local environmental laws or regulations, permits, and other elements of the Contractor's Environmental Protection plan. The Contractor shall, after receipt of such notice, inform the Government of the proposed corrective action and take such action when approved by the Government. The Government may issue an order stopping all or part of the

work until satisfactory corrective action has been taken. No time extensions shall be granted or equitable adjustments allowed to the Contractor for any such suspensions. This is in addition to any other actions the Government may take under the contract, or in accordance with the Federal Acquisition Regulation or Federal Law.

2.0 PRODUCTS (NOT USED)

3.0 EXECUTION

3.1. LAND RESOURCES

Confine all activities to areas defined by the drawings and specifications. Prior to the beginning of any construction, identify any land resources to be preserved within the work area. Except in areas indicated on the drawings or specified to be cleared, do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without approval. Do not attach or fasten any ropes, cables, or guys to any trees for anchorage unless specifically authorized. Provide effective protection for land and vegetation resources at all times as defined in the following subparagraphs. Remove all stone, soil, or other materials displaced into uncleared areas..

3.1.1. Work Area Limits

Prior to commencing construction activities, mark the areas that need not be disturbed under this contract. Mark or fence isolated areas within the general work area which are not to be disturbed. Protect monuments and markers before construction operations commence. Where construction operations are to be conducted during darkness, any markers shall be visible in the dark. Personnel shall be knowledgeable of the purpose for marking and/or protecting particular objects.

3.1.2. Landscape

Clearly identify trees, shrubs, vines, grasses, land forms and other landscape features indicated and defined on the drawings to be preserved by marking, fencing, or wrapping with boards, or any other approved techniques. Restore landscape features damaged or destroyed during construction operations outside the limits of the approved work area.

3.1.3. Erosion and Sediment Controls

Provide erosion and sediment control measures in accordance with Federal, State, and local laws and regulations. Coordinate with approving authorities (federal, state, etc.) for specific requirements to be included in the plan. The erosion and sediment controls selected and maintained by the Contractor shall be such that water quality standards are not violated as a result of the Contractor's construction activities. Keep the area of bare soil exposed at any one time by construction operations to a minimum necessary. Construct or install temporary and permanent erosion and sediment control best management practices (BMPs). BMPs may include, but not be limited to, vegetation cover, stream bank stabilization, slope stabilization, silt fences, construction of terraces, interceptor channels, sediment traps, inlet and outfall protection, diversion channels, and sedimentation basins. Remove any temporary measures after the area has been stabilized.

3.1.4. Contractor Facilities and Work Areas

Place field offices, staging areas, stockpile storage, and temporary buildings in areas designated on the drawings or as directed by the Government. Make only approved temporary movement or relocation of Contractor facilities. Provide erosion and sediment controls for on-site borrow and spoil areas to prevent sediment from entering nearby waters. Control temporary excavation and embankments for plant and/or work areas to protect adjacent areas.

3.2. WATER RESOURCES

Monitor construction activities to prevent pollution of surface and ground waters. Do not apply toxic or hazardous chemicals to soil or vegetation unless otherwise indicated. Monitor all water areas affected by construction activities. For construction activities immediately adjacent to impaired surface waters, the Contractor shall be capable of quantifying sediment or pollutant loading to that surface water when required by state or federally issued Clean Water Act permits.

3.2.1. Stream Crossings

Stream crossings shall allow movement of materials or equipment without violating water pollution control standards of the Federal, State, and local governments or impede state-designated flows.

3.2.2. Wetlands

Do not enter, disturb, destroy, or allow discharge of contaminants into any wetlands.

3.3. AIR RESOURCES

Comply with all Federal and State air emission and performance laws and standards for equipment operation, activities, or processes.

3.3.1. Particulates

Control dust particles; aerosols and gaseous by-products from construction activities; and processing and preparation of materials, such as from asphaltic batch plants, including weekends, holidays and hours when work is not in progress. Maintain excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and other work areas within or outside the project boundaries free from particulates which would cause the Federal, State, and local air pollution standards to be exceeded or which would cause a hazard or a nuisance. Sprinkling, chemical treatment of an approved type, baghouse, scrubbers, electrostatic precipitators or other methods are permitted to control particulates in the work area. Sprinkling, to be efficient, must be repeated to keep the disturbed area damp at all times. Provide sufficient, competent equipment available to accomplish these tasks. Perform particulate control as the work proceeds and whenever a particulate nuisance or hazard occurs. Comply with all State and local visibility regulations.

3.3.2. Odors

Control odors from construction activities at all times. Odors shall not cause a health hazard and shall be in compliance with State regulations and/or local ordinances.

3.3.3. Sound Intrusions

Keep construction activities under surveillance and control to minimize environment damage by noise. Comply with the provisions of the state and Installation rules.

3.3.4. Burning

Burning is not allowed on the project site unless specified in other sections of the specifications or by written authorization. Specific times, locations, and manners of burning shall be subject to approval.

3.4. CHEMICAL MATERIALS MANAGEMENT AND WASTE DISPOSAL

Disposal of wastes shall be as directed below, unless otherwise specified in other sections and/or shown on the drawings.

3.4.1. Solid Wastes

Place solid wastes (excluding clearing debris) in containers which are emptied on a regular schedule. Conduct handling, storage, and disposal to prevent contamination. Employ segregation measures so that no hazardous or toxic waste will become co-mingled with solid waste. Transport solid waste off Government property and dispose of it in compliance with Federal, State, and local requirements for solid waste disposal. The minimum acceptable off-site solid waste disposal option is a Subtitle D RCRA permitted landfill. Verify that the selected transporters and disposal facilities have the necessary permits and licenses to operate. Comply with Federal, State, and local laws and regulations pertaining to the use of landfill areas.

3.4.2. Chemicals and Chemical Wastes

Dispense chemicals, ensuring no spillage to the ground or water. Perform and document periodic inspections of dispensing areas to identify leakage and initiate corrective action. The Government may periodically review this documentation. Collect chemical waste in corrosion resistant, compatible containers. Monitor and remove collection drums to a staging or storage area when contents are within 6 inches of the top. Classify, manage, store, and dispose of wastes in accordance with Federal, State, and local laws and regulations.

3.4.3. Contractor Generated Hazardous Wastes/Excess Hazardous Materials

Hazardous wastes are defined in 40 CFR 261, or are as defined by applicable state and local regulations. Hazardous materials are defined in 49 CFR 171 - 178. At a minimum, manage and store hazardous waste in compliance with 40 CFR 262. Take sufficient measures to prevent spillage of hazardous and toxic materials during dispensing. Segregate hazardous waste from other materials and wastes; protect it from the weather by placing it in a safe covered location and take precautionary measures, such as berming or other appropriate measures, against accidental spillage. Store, describe, package, label, mark, and placard hazardous waste and hazardous material in accordance with 49 CFR 171 - 178, state, and local laws and regulations. Transport Contractor generated hazardous waste off Government property in accordance with the Environmental Protection Agency and the Department of Transportation laws and regulations. Dispose of hazardous waste in compliance with Federal, State and local laws and regulations. Immediately report spills of hazardous or toxic materials to the Government and the Facility Environmental Office. Contractor will be responsible for cleanup and cleanup costs due to spills. Contractor is responsible for the disposition of Contractor generated hazardous waste and excess hazardous materials.

3.4.4. Fuel and Lubricants

Conduct storage, fueling and lubrication of equipment and motor vehicles in a manner that affords the maximum protection against spill and evaporation. Manage and store fuel, lubricants and oil in accordance with all Federal, State, Regional, and local laws and regulations.

3.5. RECYCLING AND WASTE MINIMIZATION

Participate in State and local government sponsored recycling programs. The Contractor is further encouraged to minimize solid waste generation throughout the duration of the project. Line and berm fueling areas and establish storm water control structures at discharge points for site run-off. Keep a liquid containment clean-up kit available at the fueling area.

3.6. HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

Existing historical, archaeological, and cultural resources within the Contractor's work area are shown on the drawings. Protect and preserve these resources during the life of the Contract. Temporarily suspend all activities that may damage or alter such resources, if any previously unidentified or unanticipated historical, archaeological, and cultural resources are discovered or found during excavation or other construction activities. Resources covered by this paragraph include but are not limited to: any human skeletal remains or burials; artifacts; shell, midden, bone, charcoal, or other deposits; rock or coral alignments, pavings, wall, or other constructed features; and any indication of agricultural or other human activities. Upon such discovery or find, notify the Government so that the appropriate authorities may be notified and a determination made as to their significance and what, if any, special disposition of the finds should be made. Cease all activities that may result in impact to or the destruction of these resources. Secure the area and prevent employees or other persons from trespassing on, removing, or otherwise disturbing such resources.

3.7. BIOLOGICAL RESOURCES

Minimize interference with, disturbance to, and damage to fish, wildlife, and plants, including their habitat. Protect threatened and endangered animal and plant species including their habitat in accordance with Federal, State, Regional, and local laws and regulations.

3.8. INTEGRATED PEST MANAGEMENT

Coordinate, through the Government, with the Installation Pest Management Coordinator (IPMC) at the earliest possible time prior to pesticide application, in order to minimize impacts to existing fauna and flora. Discuss

integrated pest management strategies with the IPMC and receive concurrence from the IPMC, through the COR, prior to the application of any pesticide associated with these specifications. Give IMPC personnel the opportunity to be present at all meetings concerning treatment measures for pest or disease control and during application of the pesticide. The use and management of pesticides are regulated under 40 CFR 152 - 186.

3.8.1. Pesticide Delivery and Storage

Deliver pesticides, approved for use on the Installation, to the site in the original, unopened containers bearing legible labels indicating the EPA registration number and the manufacturer's registered uses.

3.8.2. Qualifications

Use the services of a subcontractor for pesticide application whose principal business is pest control. The subcontractor shall be licensed and certified in the state where the work is to be performed.

3.8.3. Pesticide Handling Requirements

Formulate, treat with, and dispose of pesticides and associated containers in accordance with label directions.

3.8.4. Application

A state certified pesticide applicator shall apply pesticides in accordance with EPA label restrictions and recommendations.

3.9. PREVIOUSLY USED EQUIPMENT

Clean all previously used construction equipment prior to bringing it onto the project site. Ensure that the equipment is free from soil residuals, egg deposits from plant pests, noxious weeds, and plant seeds. Consult with the USDA jurisdictional office for additional cleaning requirements.

3.10. MILITARY MUNITIONS

Immediately stop work in that area and immediately inform the Government, in the event military munitions, as defined in 40 CFR 260, are discovered or uncovered.

3.11. TRAINING OF CONTRACTOR PERSONNEL

Train personnel in all phases of environmental protection and pollution control. Conduct environmental protection/pollution control meetings for all Contractor personnel prior to commencing construction activities. Conduct additional meetings for new personnel and when site conditions change. The training and meeting agenda shall include methods of detecting and avoiding pollution; familiarization with statutory and contractual pollution standards; installation and care of devices, vegetative covers, and instruments required for monitoring purposes to ensure adequate and continuous environmental protection/pollution control; anticipated hazardous or toxic chemicals or wastes, and other regulated contaminants; recognition and protection of archaeological sites, artifacts, wetlands, and endangered species and their habitat that are known to be in the area.

3.12. POST CONSTRUCTION CLEANUP

Clean up all areas used for construction in accordance with Contract Clause: "Cleaning Up". Unless otherwise instructed in writing, obliterate all signs of temporary construction facilities such as haul roads, work area, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other vestiges of construction prior to final acceptance of the work. Grade, fill and seed the entire disturbed area, unless otherwise indicated.

**SECTION 01 62 35
RECYCLED/RECOVERED MATERIAL**

1.0 GENERAL

1.1. REFERENCES

1.2. OBJECTIVES

1.3. EPA DESIGNATED ITEMS INCORPORATED IN THE WORK

1.4. EPA PROPOSED ITEMS INCORPORATED IN THE WORK

1.5. EPA LISTED ITEMS USED IN CONDUCT OF THE WORK BUT NOT INCORPORATED IN THE WORK

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.

- U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)
- 40 CFR 247 Comprehensive Procurement Guideline for Products Containing Recovered Materials

1.2. OBJECTIVES

Government procurement policy is to acquire, in a cost effective manner, items containing the highest percentage of recycled and recovered materials practicable consistent with maintaining a satisfactory level of competition without adversely affecting performance requirements or exposing suppliers' employees to undue hazards from the recovered materials. The Environmental Protection Agency (EPA) has designated certain items which must contain a specified percent range of recovered or recycled materials. The Contractor shall make all reasonable efforts to use recycled and recovered materials in providing the EPA designated products and in otherwise utilizing recycled and recovered materials in the execution of the work.

1.3. EPA DESIGNATED ITEMS INCORPORATED IN THE WORK

Materials that have been designated by EPA as being products which are or can be made with recovered or recycled materials, when incorporated into the work under this contract, shall contain at least the minimum percentage of recycled or recovered materials indicated by EPA unless adequate justification (non-availability) for non-use is provided. When a designated item is specified as an option to a non-designated item, the designated item requirements apply only if the designated item is used in the work.

1.4. EPA PROPOSED ITEMS INCORPORATED IN THE WORK

Products other than those designated by EPA are still being researched and are being considered for future Comprehensive Procurement Guideline (CPG) designation. It is recommended that these items, when incorporated in the work under this contract, contain the highest practicable percentage of recycled or recovered materials, provided specified requirements are also met.

1.5. EPA LISTED ITEMS USED IN CONDUCT OF THE WORK BUT NOT INCORPORATED IN THE WORK

There are many products listed in 40 CFR 247 which have been designated or proposed by EPA to include recycled or recovered materials that may be use by the Contractor in performing the work but will not be incorporated into the work. These products include office products, temporary traffic control products, and pallets. It is recommended that these non-construction products, when used in the conduct of the work, contain the highest practicable percentage of recycled or recovered materials and that these products be recycled when no longer needed.

End of Section 01 62 35

**SECTION 01 78 02.00 10
CLOSEOUT SUBMITTALS**

1.0 OVERVIEW

- 1.1. SUBMITTALS
- 1.2. PROJECT RECORD DOCUMENTS
- 1.3. EQUIPMENT DATA
- 1.4. CONSTRUCTION WARRANTY MANAGEMENT
- 1.5. MECHANICAL TESTING, ADJUSTING, BALANCING, AND COMMISSIONING
- 1.6. OPERATION AND MAINTENANCE MANUALS
- 1.7. FIELD TRAINING
- 1.8. PRICING OF CONTRACTOR-FURNISHED AND INSTALLED PROPERTY AND GOVERNMENT-FURNISHED CONTRACTOR-INSTALLED PROPERTY
- 1.9. LEED REVIEW MEETINGS
- 1.10. RED ZONE MEETING
- 1.11. FINAL CLEANING
- 1.12. INTERIM FORM DD1354 "TRANSFER AND ACCEPTANCE OF MILITARY REAL PROPERTY"

EXHIBIT 1 SAMPLE RED ZONE MEETING CHECKLIST

1.0 OVERVIEW

1.1. SUBMITTALS

Government approval is required for any submittals with a "G" designation; submittals not having a "G" designation are for Designer of Record approval or for information only. Submit the following in accordance with Section 01 33 00 submittals:

SD-02 Shop Drawings

- As-Built Drawings - G
 - Drawings showing final as-built conditions of the project. Provide electronic drawing files as specified in Section 01 33 16, 3 sets of blue-line prints and one set of the approved working as-built drawings.

SD-03 Product Data

- As-Built Record of Equipment and Materials
 - Two copies of the record listing the as-built materials and equipment incorporated into the construction of the project.
- Construction Warranty Management Plan
 - Three sets of the construction warranty management plan containing information relevant to the warranty of materials and equipment incorporated into the construction project, including the starting date of warranty of construction. Furnish with each warranty the name, address, and telephone number of each of the guarantor's representatives nearest to the project location.
- Warranty Tags
 - Two record copies of the warranty tags showing the layout and design.
- Final Cleaning
 - Two copies of the listing of completed final clean-up items.

1.2. PROJECT RECORD DOCUMENTS

1.2.1. As-Built Drawings – G

An as-built drawing is a construction drawing revised to reflect the final as-built conditions of the project as a result of modifications and corrections to the project design required during construction. The final as-built drawings shall not have the appearance of marked up drawings, but that of professionally prepared drawings as if they were the "as designed" drawings.

1.2.2. Maintenance of As-Built Drawings

1.2.2.1. The Configuration Management Plan shall describe how the Contractor will maintain up-to-date drawings, how it will control and designate revisions to the drawings and specifications (In accordance with Special Contract Requirement: ***Deviating from the Accepted Design*** and Section 01 33 16: ***Design after Award***, the Designer of Record's approval is necessary for any revisions to the accepted design).

1.2.2.2. Make timely updates, carefully maintaining a record set of working as-built drawings at the job site, marked in red, of all changes and corrections from the construction drawings. Enter changes and corrections on drawings promptly to reflect "Current Construction". Perform this update no less frequently than weekly for the blue line drawings and update no less frequently than quarterly for the CADD/CAD and BIM files, which were prepared previously in accordance with Section 01 33 16. Include a confirmation that the as-builts are up to date with the submission of the monthly project schedule.

1.2.2.3. If the DB Contractor fails to maintain the as-built drawings as required herein, the Government will retain from the monthly progress payment, an amount representing the estimated monthly cost of maintaining the as-built drawings. Final payment with respect to separately priced facilities or the contract as a whole will be withheld until the Contractor submits acceptable as-built drawings and the Government approves them.

1.2.2.4. The marked-up set of drawings shall reflect any changes, alterations, adjustments or modifications. Changes must be reflected on all sheets affected by the change. Changes shall include marking the drawings to reflect structural details, foundation layouts, equipment sizes, and other extensions of design.

1.2.2.5. Typically, room numbers shown on the drawings are selected for design convenience and do not represent the actual numbers intended for use by the end user. Final as-built drawings shall reflect actual room numbers adopted by the end user.

1.2.2.6. If there is no separate contract line item (CLIN) for as-built drawings, the Government will withhold the amount of \$35,000, or 1% of the present construction value, whichever is the greater, until the final as-built drawing submittal has been approved by the Government.

1.2.3. Underground Utilities

The drawings shall indicate, in addition to all changes and corrections, the actual location, kinds and sizes of all sub-surface utility lines. In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, the as-built drawings shall show, by offset dimensions to two permanently fixed surface features, the end of each run including each change in direction. Locate Valves, splice boxes and similar appurtenances by dimensioning along the utility run from a reference point. Record average elevation of the top of each run or underground structure..

1.2.4. Partial Occupancy

For projects where portions of construction are to be occupied or activated before overall project completion, including portions of utility systems, supply as-built drawings for those portions of the facility being occupied or activated at the time the facility is occupied or activated. Show this same as-built information previously furnished on the final set of as-built drawings.

1.2.5. As-Built Conditions That are Different From the construction Drawings

Accurately reflect all as-built conditions that are different, such as dimensions, road alignments and grades, and drainage and elevations, from the construction drawings on each drawing. If the as-built condition is accurately reflected on a shop drawing, then furnish that shop drawing in CADD format. Reference the final as-built construction drawing the shop drawing file that includes the as-built information. In turn, the shop drawing shall reference the applicable construction as-built drawing. Delete any options shown on drawings and not selected clearly reflect options selected on final as-built drawings.

1.2.6. Additional As-Built Information that Exceeds the Detail Shown on the construction Drawings:

These as-built conditions include those that reflect structural details, foundation layouts, equipment, sizes, mechanical and electrical room layouts and other extensions of design, that were not shown in the project design documents because the exact details were not known until after the time of approved shop drawings. It is recognized that these shop drawing submittals (revised showing as-built conditions) will serve as the as-built record without actual incorporation into the construction drawings, piping, and equipment drawings. Include locations of all explorations, logs of all explorations, and results of all laboratory testing, including those provided by the Government. Furnish all such shop drawings in CADD /CADformat. Include fire protection details, such as wiring, performed for the design of the project.

1.2.7. Final As-Built Drawings

Submit final as-built CADD/CAD and BIM Model(s) and Facility Data files at the time of Beneficial Occupancy of the project or at a designated phase of the project. In the event the Contractor accomplishes additional work after this submittal, which changes the as-built conditions, submit a new DVD with all drawing sheets and three blue-line copies of affected sheets which depict additional changes.

1.2.8. Title Blocks

In accordance with the configuration management plan, clearly mark title blocks to indicate final as-built drawings.

1.2.9. Other As-Built Documents

Provide scans of all other documents such as design analysis, catalog cuts, certification documents that are not available in native electronic format in an organized manner in Adobe.pdf format.

1.2.9.1. LEED Documentation

Update LEED documentation on at least a monthly basis and have it available for review by the Government on the jobsite at all times during construction. Submit the final LEED Project Checklist(s), final LEED submittals checklist and complete project documentation, verifying the final LEED score and establishing the final rating. Provide full support to the validation review process, including credit audits. See also the LEED documentation requirements in Section 01 33 16, DESIGN AFTER AWARD.

1.2.9.2. GIS Documentation

Provide final geo-referenced GIS database of the new building footprint along with any changes made to exterior of the building. The intent of capturing the final building footprint and exterior modifications in a GIS database is to provide the installation with a data set of the comprehensive changes made to the landscape as a result of the construction project. The Government will incorporate this data set into the installations existing GIS MasterPlan or Enterprise GIS system. The GIS database deliverable shall follow a standard template provided to the Contractor by the Government, adhere to detailed specifications outlined in ECB No 2006-15, and be documented using the Federal Geographic Data Committee (FGDC) metadata standard.

1.3. EQUIPMENT DATA

1.3.1. Real Property Equipment

Provide an Equipment-in-Place list of all installed equipment furnished under this contract. Include all information usually listed on manufacturer's name plate. Include the cost of each piece of installed property F.O.B. construction site. For each of the items which is specified herein to be guaranteed for a specified period from the date of acceptance thereof, provide the following information: The name, serial and model number address of equipment supplier, or manufacturer originating the guaranteed item. The Contractor's guarantee to the Government of these items will not be limited by the terms of any manufacturer's guarantee to the Contractor. Furnish the list as one (1) reproducible and three (3) copies thirty (30) calendar days before completion of any segment of the contract work which has an incremental completion date.

1.3.2. Maintenance and Parts Data

Furnish a brochure, catalog cut, parts list, manufacturer's data sheet or other publication showing detailed parts data on all other equipment subject to repair and maintenance procedures not otherwise required in Operations and Maintenance Manuals specified elsewhere in this contract. Distribution of directives shall follow the same requirements as listed in paragraph above.

1.3.3. Construction Specifications

Furnish permanent electronic files of final as-built construction specifications, including modifications thereto, with the as-built drawings.

1.4. CONSTRUCTION WARRANTY MANAGEMENT

1.4.1. Prior to the end of the one year warranty, the Government may conduct an infrared roof survey on any project involving a membrane roofing system. This survey will be conducted in accordance with ASTM C1153-90, "Standard Practice for Location of Wet Insulation in Roofing Systems Using Infrared Imaging". The Contractor shall replace all damaged materials and locate and repair sources of moisture penetration.

1.4.2. Management

1.4.2.1. Warranty Management Plan

Develop a warranty management plan containing information relevant to the clause **Warranty of Construction** in FAR 52.246-21. Submit the warranty management plan for Government approval at least 30 days before the planned pre-warranty conference. In the event of phased turn-over of the contract, update the Warranty Management Plan as necessary to include latest information required. Include all required actions and documents to assure that the Government receives all warranties to which it is entitled. The plan shall be in narrative form and contain sufficient detail to render it suitable for use by future maintenance and repair personnel, whether tradesmen, or of engineering background, not necessarily familiar with this contract. The term "status" as indicated below shall include due date and whether item has been submitted or was accomplished. Submit warranty information made available during the construction phase prior to each monthly pay estimate. Assemble information in a binder and turn over to the Government upon acceptance of the work. The construction warranty period shall begin on the date of project acceptance and shall continue for the full product warranty period. The Contractor, Government, including the Customer Representative shall jointly conduct warranty inspections, 4 months and 9 months, after acceptance. The warranty management plan shall include, but shall not be limited to, the following information:

- (1) Roles and responsibilities of all personnel associated with the warranty process, including points of contact and telephone numbers within the organizations of the contractors, subcontractors, manufacturers or suppliers involved.
- (2) Listing and status of delivery of all Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers, and for all commissioned systems such as fire protection and alarm systems, sprinkler systems, lightning protection systems, etc.
- (3) A list for each warranted equipment, item, feature of construction or system indicating:
 - (i) Name of item.
 - (ii) Model and serial numbers.
 - (iii) Location where installed.
 - (iv) Name and phone numbers of manufacturers or suppliers.
 - (v) Names, addresses and telephone numbers of sources of spare parts.
 - (vi) Warranties and terms of warranty. Include one-year overall warranty of construction. Indicate those items, which have extended warranties with separate warranty expiration dates.
 - (vii) Cross-reference to warranty certificates as applicable.
 - (viii) Starting point and duration of warranty period.
 - (ix) Summary of maintenance procedures required to continue the warranty in force.
 - (x) Cross-reference to specific pertinent Operation and Maintenance manuals.
 - (xi) Organization, names and phone numbers of persons to call for warranty service.
 - (xii) Typical response time and repair time expected for various warranted equipment.
- (4) The Contractor's plans for attendance at the 4 and 9 month post-construction warranty inspections conducted by the Government.
- (5) Procedure and status of tagging of all equipment covered by extended warranties.
- (6) Copies of instructions to be posted near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

1.4.3. Performance Bond

1.4.3.1. The Contractor's Performance Bond will remain effective throughout the construction warranty period.

1.4.3.2. In the event the Contractor or his designated representative(s) fails to commence and diligently pursue any work required under this clause, and in a manner pursuant to the requirements thereof, the Government shall have

a right to demand that said work be performed under the Performance Bond by making written notice on the surety. If the surety fails or refuses to perform the obligation it assumed under the Performance Bond, the Government shall have the work performed by others, and after completion of the work, may make demand for reimbursement of any or all expenses incurred by the Government while performing the work, including, but not limited to administrative expenses.

1.4.3.3. In the event sufficient funds are not available to cover the construction warranty work performed by the Government at the Contractor's expense, the Government will have the right to recoup expenses from the bonding company.

1.4.3.4. Following oral or written notification of required warranty repair work, the Contractor will respond as dictated by para. 1.4.5. Written verification will follow oral instructions. Failure of the Contractor to respond will be cause for the Government to proceed against the Contractor as outlined in the paragraph 1.4.5.5 and/or above.

1.4.4. Pre-Warranty Conference

Prior to contract completion, or completion of any phase or portion of contract to be turned over, and at a time designated by the Contracting Officer, the Contractor shall meet with the Government to develop a mutual understanding with respect to the requirements of this clause. Communication procedures for Contractor notification of warranty defects, priorities with respect to the type of defect, reasonable time required for Contractor response, and other details deemed necessary by the Government for the execution of the construction warranty shall be established/reviewed at this meeting. In connection with these requirements and at the time of the Contractor's quality control completion inspection, the Contractor will furnish the name, telephone number and address of a licensed and bonded company which is authorized to initiate and pursue warranty work action on behalf of the Contractor. This point of contact will be located within the local service area of the warranted construction, will be continuously available, and will be responsive to Government inquiry on warranty work action and status. This requirement does not relieve the Contractor of any of his responsibilities in connection with other portions of this provision.

1.4.5. Contractor's Response to Warranty Service Requirements.

Following Government oral or written notification, which may include authorized installation maintenance personnel, the Contractor shall respond to warranty service requirements in accordance with the "Warranty Service Priority List" and the three categories of priorities listed below. Submit a report on any warranty item that has been repaired during the warranty period. The report shall include the cause of the problem, date reported, corrective action taken, and when the repair was completed. If the Contractor does not perform the construction warranty within the timeframe specified, the Government will perform the work and backcharge the construction warranty payment item established.

1.4.5.1. First Priority Code 1 Perform onsite inspection to evaluate situation, and determine course of action within 4 hours, initiate work within 6 hours and work continuously to completion or relief.

1.4.5.2. Second Priority Code 2 Perform onsite inspection to evaluate situation, and determine course of action within 8 hours, initiate work within 24 hours and work continuously to completion or relief.

1.4.5.3. Third Priority Code 3 All other work to be initiated within 3 work days and work continuously to completion or relief.

1.4.5.4. The "Warranty Service Priority List" is as follows:

- Code 1 - Air Conditioning System
 - (a) Buildings with computer equipment.
 - (b) Barracks, mess halls (entire building down).
- Code 2 - Air Conditioning Systems
 - (a) Recreational support.
 - (b) Air conditioning leak in part of building, if causing damage.
 - (c) Air conditioning system not cooling properly

- (d) Admin buildings with Automated Data Processing (ADP) equipment not on priority list.
 - Code 1 - Doors
- (a) Overhead doors not operational.
 - Code 1 - Electrical
- (a) Power failure (entire area or any building operational after 1600 hours).
- (b) Traffic control devices.
- (c) Security lights.
- (d) Smoke detectors and fire alarm systems
- (e) Power or lighting failure to an area, facility, portion of a facility, which may adversely impact health, safety, security, or the installation's mission requirement, or which may result in damage to property.
 - Code 2 - Electrical
- (a) Power failure (no power) for unoccupied buildings or portions thereof or branch circuits within occupied buildings, not listed as Code 1.
- (a) Receptacle and lights, not listed as code 1.
 - Code 3 - Electrical
- (a) Street, parking area lights
 - Code 1 - Gas
- (a) Leaks and breaks.
- (b) No gas to cantonment area.
 - Code 1 - Heat
- (a) Area power failure affecting heat.
- (b) Heater in unit not working.
 - Code 2 Heat
- (a) All heating system failures not listed as Code 1.
 - Code 3 - Interior
- (a) Floor damage
- (b) Paint chipping or peeling
 - Code 1 - Intrusion Detection Systems - N/A.
 - Code 2 - Intrusion Detection Systems other than those listed under Code 1
 - Code 1 - Kitchen Equipment
- (a) Dishwasher.
- (b) All other equipment hampering preparation of a meal.
 - Code 2 - Kitchen Equipment
- (a) All other equipment not listed under Code 1.
 - Code 2 - Plumbing
- (a) Flush valves not operating properly
- (b) Fixture drain, supply line commode, or water pipe leaking.
- (c) Commode leaking at base.
 - Code 3 - Plumbing
- (a) Leaking faucets

- Code 1 - Refrigeration
 - (a) Mess Hall.
 - (b) Medical storage.
- Code 2 - Refrigeration
 - (a) Mess hall - other than walk-in refrigerators and freezers.
- Code 1 - Roof Leaks
 - (a) Temporary repairs will be made where major damage to property is occurring.
- Code 2 - Roof Leaks
 - (a) Where major damage to property is not occurring, check for location of leak during rain and complete repairs on a Code 2 basis.
- Code 1 - Sprinkler System
 - (a) All sprinkler systems, valves, manholes, deluge systems, and air systems to sprinklers.
- Code 1 - Tank Wash Racks (Bird Baths)
 - (a) All systems which prevent tank wash.
- Code 1 - Water (Exterior)
 - (a) Normal operation of water pump station.
- Code 2 - Water (Exterior)
 - (a) No water to facility.
- Code 1 - Water, Hot (and Steam)
 - (a) Barracks (entire building).
- Code 2 - Water, Hot
 - (a) No hot water in portion of building listed under Code 1

1.4.5.5. Should parts be required to complete the work and the parts are not immediately available, the Contractor shall have a maximum of 12 hours after arrival at the job site to provide the Government, with firm written proposals for emergency alternatives and temporary repairs for Government participation with the Contractor to provide emergency relief until the required parts are available on site for the Contractor to perform permanent warranty repair. The Contractor's proposals shall include a firm date and time that the required parts shall be available on site to complete the permanent warranty repair. The Government will evaluate the proposed alternatives and negotiate the alternative considered to be in the best interest of the Government to reduce the impact of the emergency condition. Alternatives considered by the Government will include the alternative for the Contractor to "Do Nothing" while waiting until the required parts are available to perform permanent warranty repair. Negotiating a proposal which will require Government participation and the expenditure of Government funds shall constitute a separate procurement action by the using service.

1.4.6. Equipment Warranty Identification Tags

1.4.6.1. Provide warranty identification tags at the time of installation and prior to substantial completion shall provide warranty identification tags on all Contractor and Government furnished equipment which the Contractor has installed.

- (a) The tags shall be suitable for interior and exterior locations, resistant to solvents, abrasion, and to fading caused by sunlight, precipitation, etc. These tags shall have a permanent pressure-sensitive adhesive back, and they shall be installed in a position that is easily (or most easily) noticeable. Tag each component of contractor furnished equipment that has differing warranties on its components.
- (b) Submit sample tags, representing how the other tags will look, for Government review and approval.
- (c) Tags for Warranted Equipment: The tag for this equipment shall be similar to the following: Exact format and size will be as approved.

EQUIPMENT WARRANTY - CONTRACTOR FURNISHED EQUIPMENT

MFG NAME MODEL NO.

SERIAL NO.

CONTRACT NO.

CONTRACTOR NAME

CONTRACTOR WARRANTY EXPIRES

MFG WARRANTY(IES) EXPIRE

EQUIPMENT WARRANTY - GOVERNMENT FURNISHED EQUIPMENT

MFG NAME MODEL NO.

SERIAL NO.

CONTRACT NO.

DATE EQUIP PLACED IN SERVICE

MFG WARRANTY(IES) EXPIRE

(d) If the manufacturer's name (MFG), model number and serial number are on the manufacturer's equipment data plate and this data plate is easily found and fully legible, this information need not be duplicated on the equipment warranty tag

1.4.6.2. Execution: Complete the required information on each tag and install these tags on the equipment by the time of and as a condition of final acceptance of the equipment.

1.5. MECHANICAL TESTING, ADJUSTING, BALANCING, AND COMMISSIONING

Submit; all reports, statements, certificates, and completed checklists for testing, adjusting, balancing, and commissioning of mechanical systems prior to final inspection and transfer of the completed facility for approval, as specified in applicable technical specification sections.

1.6. OPERATION AND MAINTENANCE MANUALS

1.6.1. General Requirements

1.6.1.1. Inasmuch as the operations and maintenance manuals are required to operate and maintain the facility, the operations and maintenance (O&M) manuals will be considered a requirement prior to substantial completion of any facility to be turned over to the Government. Beneficial occupancy of all or portions of a facility prior to substantial completion will not relieve the Contractor of liquidated damages, if substantial completion exceeds the required completion date.

1.6.1.2. Provide one permanent electronic copy on CD-ROM and 2 hard copies of the Equipment Operating, Maintenance, and Repair Manuals. Provide separate manuals for each utility system as defined hereinafter. Submit Operations and Maintenance manuals for approval before field training or 90 days before substantial completion (whichever occurs earlier). If there is no separate CLIN for O&M Manuals, the Government will withhold an amount representing \$20,000, as non-progressed work, until submittal and approval of all O&M manuals are complete.

1.6.2. Definitions

1.6.2.1. Equipment

A single piece of equipment operating alone or in conjunction with other equipment to accomplish a system function.

1.6.2.2. System

A combination of one or more pieces of equipment which function together to accomplish an intended purpose (i.e. HVAC system is composed of many individual pieces of equipment such as fans, motors, compressors, valves, sensors, relays, etc.)

1.6.3. Hard Cover Binders

The manuals shall be hard cover with posts, or 3-ring binders, so sheets may be easily substituted. Print the following identification on the cover: the words "EQUIPMENT OPERATING, MAINTENANCE, AND REPAIR MANUALS," the project name, building number, and an indication of utility or systems covered, the name of the Contractor, and the Contract number. Manuals shall be approximately 8-1/2 by 11-inches with large sheets folded in and capable of being easily pulled out for reference. All manuals for the project must be similar in appearance, and be of professional quality.

1.6.4. Warning Page

Provide a warning page to warn of potential dangers (if they exist, such as high voltage, toxic chemicals, flammable liquids, explosive materials, carcinogens, high pressures, etc.). Place the warning page inside the front cover and in front of the title page. Include any necessary Material Safety Data Sheets (MSDS) here.

1.6.5. Title Page

The title page shall include the same information shown on the cover and show the name of the preparing firm and the date of publication.

1.6.6. Table of Contents

Each volume of the set of manuals for this project shall include a table of contents, for the entire set, broken down by volume.

1.6.7. GENERAL

Organize manuals according to the following format, and include information for each item of equipment. Submit a draft outline and table of contents for approval at 50% contract completion.

TABLE OF CONTENTS

PART I: Introduction

- Equipment Description
- Functional Description
- Installation Description

PART II: Operating Principles

PART III: Safety

PART IV: Preventive Maintenance

- Preventive Maintenance Checklist, Lubrication
- Charts and Diagrams

PART V: Spare Parts Lists

- Troubleshooting Guide
- Adjustments
- Common Repairs and Parts Replacement

PART VI: Illustrations

1.6.7.1. Part I-Introduction

Part I shall provide an introduction, equipment or system description, functional description and theory of operation, and installation instructions for each piece of equipment. Include complete instructions for uncrating, assembly, connection to the power source and pre-operating lubrication in the installation instructions as applicable. Illustrations, including wiring and cabling diagrams, are required as appropriate in this section. Include halftone pictures of the equipment in the introduction and equipment description, as well as system layout drawings with each item of equipment located and marked. Do not use copies of previously submitted shop drawings in these manuals.

1.6.7.2. Part II-Operating Principles

Part II shall provide complete instructions for operating the system, and each piece of equipment. Illustrations, halftone pictures, tables, charts, procedures, and diagrams are required when applicable. This will include step-by-step procedures for start-up and shutdown of both the system and each component piece of equipments, as well as adjustments required to obtain optimum equipment performance, and corrective actions for malfunctions. Show performance sheets and graphs showing capacity data, efficiencies, electrical characteristics, pressure drops, and flow rates here, also. Marked-up catalogs or catalog pages do not satisfy this requirement. Present performance information as concisely as possible with only data pertaining to equipment actually installed. Include actual test data collected for Contractor performance here.

1.6.7.3. Part III-Safety

Part III shall contain the general and specific safety requirements peculiar to each item of equipment. Repeat safety information as notes cautions and warnings in other sections where appropriate to operations described.

1.6.7.4. Part IV-Preventive Maintenance

Part IV shall contain a troubleshooting guide, including detailed instructions for all common adjustments and alignment procedures, including a detailed maintenance schedule. Also include a diagnostic chart showing symptoms and solutions to problems. Include test hookups to determine the cause, special tools and test equipment, and methods for returning the equipment to operating conditions. Information may be in chart form or in tabular format with appropriate headings. Include instructions for the removal, disassembly, repair, reassembly, and replacement of parts and assemblies where applicable and the task is not obvious.

1.6.7.5. Part V-Spare Parts List

Part V shall contain a tabulation of description data and parts location illustrations for all mechanical and electrical parts. The heading of the parts list shall clearly identify the supplier, purchase order number, and equipment. Include the unit price for each part. List parts by major assemblies, and arrange the listing in columnar form. Include names and addresses of the nearest manufacturer's representatives, as well as any special warranty information. Provide a list of spare parts that are recommended to be kept in stock by the Government installation.

1.6.7.6. Part VI-Illustrations

Part VI shall contain assembly drawings for the complete equipment or system and for all major components. Include complete wiring diagrams and schematics. Other illustrations, such as exploded views, block diagrams, and cutaway drawings, are required as appropriate.

1.6.8. Framed Instructions

Post framed instructions are required for substantial completion. Post framed instructions under glass or in laminated plastic, including wiring and control diagrams showing the complete layout of the entire system, including equipment, ductwork, piping valves, dampers, and control sequence at a location near the equipment described. Prepare condensed operating instructions explaining preventive maintenance procedures methods of checking the system for normal safe operation, valve schedule and procedures for safely starting and stopping the system in type form, framed as specified above for the wiring and control diagrams and posted beside the diagrams. Submit proposed diagrams, instructions, and other sheets prior to posting. Post the framed instructions before field training.

1.6.9. (Reserved. See 1.7 for Field Training)

1.6.10. System/Equipment Requirements

1.6.10.1. Facility Heating System

Provide information on the following equipment: boilers, water treatment, chemical feed pumps and tanks, converters, heat exchangers, pumps, unit heaters, fin-tube radiation, air handling units (both heating only and heating and cooling), and valves (associated with heating systems).

1.6.10.2. Air-Conditioning Systems

Provide information in chillers, packaged air-conditioning equipment, towers, water treatment, chemical feed pumps and tanks, air-cooled condensers, pumps, compressors, air handling units, and valves (associated with air-conditioning systems).

1.6.10.3. Temperature Control and HVAC Distribution Systems

Provide all information described for the following equipment: valves, fans, air handling units, pumps, boilers, converters and heat exchangers, chillers, water cooled condensers, cooling towers, and fin-tube radiation, control air compressors, control components (sensors, controllers, adapters and actuators), and flow measuring equipment.

1.6.10.4. Central Heating Plants

Provide the information described for the following equipment: boilers, converters, heat exchangers, pumps, fans, steam traps, pollution control equipment, chemical feed equipment, control systems, fuel handling equipment, de-aerators, tanks (flash, expansion, return waters, etc.), water softeners, and valves.

1.6.10.5. Heating Distribution Systems

Provide the information described for the following equipment: valves, fans, pumps, converters and heat exchangers, steam traps, tanks (expansion, flash, etc.), and piping systems.

1.6.10.6. Exterior Electrical Systems

Provide information on the following equipment: power transformers, relays, reclosers, breakers, and capacitor bank controls.

1.6.10.7. Interior Electrical Systems

Provide information on the following equipment: relays, motor control centers, switchgear, solid state circuit breakers, motor controller, EPS lighting systems, wiring diagrams and troubleshooting flow chart on control systems, and special grounding systems.

1.6.10.8. Energy Monitoring and Control Systems

The maintenance manual shall include descriptions of maintenance for all equipment, including inspection, periodic preventative maintenance, fault diagnosis, and repair or replacement of defective components.

1.6.10.9. Domestic Water Systems

Provide the identified information on the following equipment: tanks, unit process equipment, pumps, motors, control and monitoring instrumentation, laboratory test equipment, chemical feeders, valves, switching gear, and automatic controls.

1.6.10.10. Wastewater Treatment Systems

Provide the identified information on the following equipment: tanks, unit process equipment, pumps, motors, control and monitoring instrumentations, laboratory test equipment chemical feeders, valves, scrapers, skimmers, comminutors, blowers, switching gear, and automatic controls.

1.6.10.11. Fire Protection Systems

Provide information on the following equipment: alarm valves, manual valves, regulators, foam and gas storage tanks, piping materials, sprinkler heads, nozzles, pumps, and pump drivers.

1.6.10.12. Fire Alarm and Detection Systems

- (1) The maintenance manual shall include description of maintenance for all equipment, including inspection, periodic preventive maintenance, fault diagnosis, and repair or replacement of defective components.
- (2) Provide all software; database with complete identification of programmable portions of system equipment and devices, and all other system programming data on all modes of the system; connecting cables; and proprietary equipment necessary for the operation, maintenance, testing, repair and programming, etc. of the system and that may be required for implementation of future changes to the fire system (additional and/or relocated initiating devices, notification devices, etc.
- (3) Provide all system and equipment technical data and computer software with the requisite rights to Government use, in accordance with the applicable contract clauses.
- (4) Training shall include software and programming required for the effective operation, maintenance, testing, diagnostics and expansion of the system.

1.6.10.13. Plumbing Systems

Provide information on the following equipment: water heaters, valves, pressure regulators backflow preventors, piping materials, and plumbing fixtures.

1.6.10.14. Liquid Fuels Systems

Provide information on the following equipment: tanks, automatic valves manual valves, filter separators, pumps, mechanical loading arms, nozzles, meters, electronic controls, electrical switch gear, and fluidic controls.

1.6.10.15. Cathodic Protection Systems

Provide information on the following material and equipment: rectifiers, meters, anodes, anode backfill, anode lead wire, insulation material and wire size, automatic controls (if any), rheostats, switches, fuses and circuit breakers, type and size of rectifying elements, type of oil in oil-immersed rectifiers, and rating of shunts.

1.6.10.16. Generator Installations

Provide information on the following equipment: generator sets, automatic transfer panels, governors, exciters, regulators starting systems, switchgear, and protective devices.

1.6.10.17. Miscellaneous Systems

Provide information on the following: communication and ADP systems, security and intrusion alarm, elevators, material handling, active solar, photovoltaic, nurse call, paging, intercom, closed circuit TV, irrigation, sound and material delivery systems, kitchen, refrigeration, disposal, ice making equipment, and other similar type special systems not otherwise specified.

1.6.10.18. Laboratory, Environmental and Pollution Control Systems

Provide information on the following equipment: wet scrubbers, quench chambers, scrub tanks, liquid oil separators, and fume hoods.

1.7. FIELD TRAINING

Field Training is a requirement for substantial completion. Conduct a training course for the operating staff for each particular system. Conduct the training is to be conducted during hours of normal working time after the system is functionally complete. The field instructions shall cover all of the items contained in the Equipment Operating, Maintenance and Repair Manuals. The training will include both classroom and "hands-on" training. Submit a lesson plan outlining the information to be discussed during training periods. Submit this lesson plan for approval 90 days before contract completion before the field training occurs. Record training on DVD and furnish to the Government within ten (10) days following training. Document all training and furnish a list of all attendees.

1.8. PRICING OF CONTRACTOR-FURNISHED AND INSTALLED PROPERTY AND GOVERNMENT-FURNISHED CONTRACTOR-INSTALLED PROPERTY

Promptly furnish and require any sub-contractor or supplier to furnish, in like manner, unit prices and descriptive data required by the Government for Property Record purposes of fixtures and equipment furnished and/or installed by the Contractor or sub-contractor, except prices do not need to be provided for Government-Furnished Property.

1.9. LEED REVIEW MEETINGS

1.9.1. Pre-Closeout Meeting. Approximately 30 days before submittal of LEED closeout documentation, the Contractor and the Government's project delivery team (including Installation representative) will meet to review the documentation, determine which, if any, credits will be audited and identify any corrections/missing items prior to the closeout LEED documentation submittal.

1.9.2. Approximately 14 days after submittal of LEED closeout documentation, the Contractor and the Government's project delivery team (including Installation representative) will meet to review the LEED closeout

documentation. The review conference will include discussion of and resolution of all review comments to ensure consensus on achievement of credits and satisfactory documentation. At the review conference a final score will be determined and endorsed in writing by all parties.

1.10. RED ZONE MEETING

At approximately 80% of contract completion or 60 days before the anticipated Beneficial Occupancy Date (BOD), whichever occurs first, the Contractor and the Government's project delivery team will conduct what is known as the Red Zone Meeting to discuss the close-out process, to schedule the events and review responsibilities for actions necessary to produce a timely physical, as well as fiscal, project close-out. The Red Zone meeting derives its name from the football term used to describe the team effort to move the ball the last 20 yards into the end zone. The close-out of a construction project sometimes can be equally as hard and most definitely requires the whole team's efforts. The ACO will chair the meeting. If not already provided, shortly before the meeting, the Contractor shall provide an electronic copy or access to the CADD as-built drawings, completed commensurate with the amount of work completed at the time of the Red Zone Meeting, as an indicator of the Contractors' understanding of and ability to meet the USACE CADD Standards and to ensure that the Contractor is making progress with CADD As-Built requirements. EXHIBIT 1 is a generic meeting checklist.

1.11. FINAL CLEANING

Clean the premises in accordance with FAR clause 52.236-12 and additional requirements stated here. Remove stains, foreign substances, and temporary labels from surfaces. Vacuum carpet and soft surfaces. Clean equipment and fixtures to a sanitary condition. Clean or replace filters of operating equipment if cleaning isn't possible or practicable. Remove debris from roofs, drainage systems, gutters, and downspouts. Sweep paved areas and rake clean landscaped areas. Remove waste, surplus materials, and rubbish from the site. Remove all temporary structures, barricades, project signs, fences and construction facilities. Submit a list of completed clean-up items on the day of final inspection.

1.12. INTERIM FORM DD1354 "TRANSFER AND ACCEPTANCE OF MILITARY REAL PROPERTY

Near the completion of Project, but a minimum of 60 days prior to final acceptance of the work, complete, update draft provided with the final design package(s) (see Section 01 33 16, paragraph 3.7.5) and submit an accounting of all installed property on Interim Form DD1354 "Transfer and Acceptance of Military Real Property." Include any additional assets/improvements/alterations and cost updates from the Draft DD Form 1354. Contact the COR for any project specific information necessary to complete the DD Form 1354. This form will be a topic for the Red Zone Meeting discussed above. For information purposes, a blank DD Form 1354 (fill-able) in ADOBE (PDF) may be obtained at the following web site: <http://www.dtic.mil/whs/directives/infomgt/forms/eforms/dd1354.pdf> Submit the completed Checklist for Form DD1354 of Government-Furnished and Contractor-Furnished/Contractor Installed items. Attach this list to the updated DD Form 1354. Instructions for completing the form and a blank checklist (fill-able) in ADOBE (PDF) may be obtained at the following web site: http://www.wbdg.org/ccb/DOD/UFC/ufc_1_300_08.pdf

EXHIBIT 1

SAMPLE

Red Zone Meeting Checklist

Date: _____

| | |
|-------------------------------|--|
| Contract No. | |
| Description / Location | |
| Contractor | |
| Contracting Officer | |

| Action | Completion Milestone | √ |
|--|-----------------------------|----------|
| Inspections | | |
| Fire | | |
| Safety | | |
| Pre-final | | |
| Mechanical Test & Balance | | |
| Commissioning | | |
| Landscaping Complete | | |
| Erosion Control | | |
| Beneficial Occupancy Date (BOD) | | |
| Furniture Installation | | |
| Comm Installation | | |
| As-Built Drawings | | |
| Provide all O&M manuals, tools, shop drawings, spare parts, etc. to customer | | |
| Training of O&M Personnel | | |
| Provide Warranty documents to Customer | | |
| Contract completion | | |

| | | |
|---|--|--|
| Ribbon cutting | | |
| Payroll Clearances | | |
| DD Form 2626 - Construction Contractor Performance Evaluation | | |
| DD Form 2631 – A-E Performance Rated after Construction | | |
| Status of Pending Mods and REA's/Claims | | |
| Final Payment Completed | | |
| Release of Claims | | |
| Return of Unobligated Funds | | |
| Move Project from CIP to General Ledger | | |
| Financial completion | | |

End of Section 01 78 02.00 10

APPENDIX A
Geotechnical Information
Draft Submittal

Draft Submittal



**PRELIMINARY GEOTECHNICAL
EXPLORATION REPORT
FY11 MCA PN 52267
NEW UNACCOMPANIED ENLISTED
PERSONNEL HOUSING (UEPH)
BARRACKS**

**SCHOFIELD BARRACKS
HONOLULU, OAHU, HAWAII**

Prepared for:

Sam O. Hirota, Inc.
864 South Beretania Street
Honolulu, Hawaii 96813

&

U.S. Army Corps of Engineers, Honolulu District
Engineering and Construction Division
Building 230, Room 205
Fort Shafter, HI 96858

July 2010

Prepared by:



Yogi Kwong Engineers, LLC
1357 Kapiolani Blvd., Suite 1450
Honolulu, Hawaii 96814

Project No. 10007

Monday, November 29, 2010



July 12, 2010

Ms. Jamisen S. Hirota, P.E.
Sam O. Hirota, Inc.
864 S. Beretania Street
Honolulu, HI 96813

Subject: Draft Submittal
Preliminary Geotechnical Exploration Report
FY11 MCA PN 52267
New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks
Schofield Barracks, Oahu, Hawaii

Dear Ms. Hirota:

Yogi Kwong Engineers, LLC is pleased to submit this Preliminary Geotechnical Exploration Report for the proposed FY11 MCA PN 52267 New UEPH Barracks at Schofield Barracks, Oahu, Hawaii for project team review. Our geotechnical engineering services were performed in general accordance with our fee proposal dated March 04, 2010.

We appreciate the opportunity to provide these services to Sam O. Hirota Inc. If you have any questions regarding this letter and the attached Geotechnical Investigation Report, please do not hesitate to contact us.

Yours truly,
Yogi Kwong Engineers, LLC

Kealohi Sandefur, P.E.
Project Engineer Principal

James Kwong, Ph.D., P.E.
Principal

Yogi Kwong Engineers, LLC
1357 Kapiolani Blvd., Suite 1450
Honolulu, HI 96814
Tel: (808) 942-0001
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Monday, November 29, 2010

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1.0 INTRODUCTION

This preliminary geotechnical exploration report presents our findings for the proposed FY11 MCA PN 52267 New UEPH Barracks at Schofield Barracks, on the island of Oahu, Hawaii. It is our understanding that the proposed construction project will be procured on a design-build basis and that successful bidder will be expected to perform additional geotechnical borings, subsurface investigation and as-needed geotechnical laboratory testing in support of final approved design. The approximate project location and its general vicinity are shown on the Project Location Map, Figure 1.

1.1 PROJECT DESCRIPTION

It is our understanding that a six (6) story Unaccompanied Enlisted Personnel Housing structure and its associated new pedestrian sidewalk and court area and pavement areas for a privately owned vehicle (POV) parking and fire lane access to the new building are proposed for construction at the project location in Schofield Barracks. A preliminary conceptual layout of the proposed facilities in Schofield Barracks has been provided by the Army Corps of Engineers (COE) as illustrated in Figure 2.

Based on the preliminary conceptual layout, the proposed new UEPH structure will have a building footprint approximately 16,300 square feet in plan. A proposed parking lot is to be constructed to the south of the new UEPH building and will cover a surface area of approximately 56,500 square feet.

We understand that this project will be contracted as design-build and therefore no anticipated loading and finished grading information is currently available from the COE.

1.2 PURPOSE AND SCOPE OF WORK

The purpose of this geotechnical investigation and report is to explore the subsurface conditions at the proposed facility locations and provide generalized subsoil and geotechnical data set of the encountered subsurface conditions in support of the Design-Build Offeror's cost proposal preparation.

As specified the contract scope of work dated in the February 02, 2010, detailed geotechnical design evaluations such as recommendations of building foundation types, load bearing capacities, seismic design parameters, reaction block lateral earth pressures, retaining wall and buried structures design are not included in our scope of work as part this report. It is our understanding that such detailed geotechnical design evaluations and design shall be the responsibility of the selected design-build contractor and their Engineer-of-Record.

The following scope of services was performed in general accordance with our fee proposal dated March 04, 2010 to Sam O. Hirota, Inc.:

- Drilled a total of five (5) borings, including three (3) borings each to approximate depths of 43.5 feet at the proposed FY11 UEPH Barracks building site, and an additional two (2) borings to an approximate depth of 7.5 feet each in the proposed FY11 UEPH POV parking areas.
- Performed soil sampling and classification during the field exploration, and conducted sample preservation for subsequent geotechnical laboratory testing.
- Performed geotechnical laboratory tests, including moisture content and density determination, Atterberg limits (plasticity index), one-dimensional swell or settlement potential, expansion potential, direct shear, unconfined compressive strength, consolidation and laboratory compaction and CBR testing.
- Analyzed the field exploration and laboratory test data for the evaluation subsurface conditions and minimum pavement recommendations.
- Conducted an in-house quality assurance review of the geotechnical recommendations and evaluation by a principal engineer of our firm.
- Prepared this draft submittal of this Geotechnical Investigation Report for project team review and comment.

The scope of our services presented herein was limited to a geotechnical exploration and did not include any civil, structural, hydrological, environmental or hazardous waste assessments/evaluations, permit application, and/or topographic survey of the project site.

2.0 FIELD EXPLORATION AND LABORATORY TESTING

2.1 FIELD EXPLORATION

The field exploration for this project was performed on May 27, 2010 and also between June 14, 2010 and June 16, 2010. The field exploration included performing field percolation tests and subsequent drilling and sampling of a total of five (5) borings to the approximate depths between 7.5 feet to 43.5 feet below the existing ground surface. Additional bulk soil samples were obtained from between 1 to 2 feet below ground surface near borings B-1 and B-2 for laboratory compaction and CBR testing. The approximate locations of the exploratory borings are shown on the Boring Location Map, Figure 3. A detailed description of the procedures used to perform the exploratory borings, along with the logs of these borings, is presented in Appendix A. A detailed description of the procedures used to

perform the field percolation tests, along with the results of the field percolation tests, is also presented in Appendix A.

2.2 LABORATORY TESTING

A laboratory testing program was performed to verify our visual field classifications and to determine pertinent geotechnical engineering properties of selected soil samples retrieved in the YKE borings. The geotechnical laboratory testing was performed by Advanced Terra Testing Inc. in Lakewood, Colorado; Construction Engineering Labs Inc. in Pearl City, Hawaii; and at YKE's geotechnical laboratory in Honolulu, Hawaii. A description of the laboratory test procedures is presented in Appendix B.

The testing performed included moisture content and density determination, Atterberg limits, one-dimensional swell or settlement potential, expansion potential, direct shear, unconfined compressive strength, consolidation, and laboratory compaction (Modified Proctor) and CBR tests.

2.3 PREVIOUS SUBSURFACE EXPLORATIONS IN SUPPORT OF FY09 UEPH BARRACKS

YKE previously performed a total of ten (10) exploratory borings in March and April of 2008 in support of the FY09 UEPH Barracks project. The previous exploratory borings were drilled in the general vicinity of the proposed FY11 UEPH Barracks project site. The approximate locations of the previous exploratory borings are presented on the Boring Location Map, Figure 3.

Additionally, laboratory tests including moisture content and density determination, Atterberg limits, one-dimensional swell or settlement potential, direct shear, unconfined compressive strength, one-dimensional consolidation, and laboratory compaction (Modified Proctor) and CBR tests were previously performed in support of the FY09 UEPH Barracks project.

The previous logs of borings and lab test results are present in Appendix D of this report for supplementary subsurface information purposes.

3.0 SITE CONDITIONS

3.1 SURFACE CONDITIONS

As shown in Figures 1 and 2, the project site located in Schofield Barracks and is generally bounded by Wilson Street to the northeast, Menoher Road to the northwest, and Montague Road along the southeast and southwest ends of the project site. We understand that the FY09 UEPH Barracks project is currently under construction and will include a 6-story UEPH Barracks and paved POV parking lot and an underground storm water retention-detention structure. Based on the available information, the completed FY09 UEPH

Barracks project will encompass the greater western quadrant of the project site whereas the proposed FY11 UEPH Barracks project site will generally expand the remaining northern, eastern and southern quadrants between the bounding adjacent streets.

The FY09 UEPH Barracks project was observed to be under construction during our field exploration period. Demolition of several pre-existing two-story duplex-type personnel housing structures was also observed to be on-going. Based on the available records, pre-existing underground utilities such as water and sewer lines are present within the project site. It is not known if these pre-existing utilities will be abandoned in place or demolished and removed during construction of the FY09 UEPH Barracks. It is assumed that new underground utilities will be constructed as part of the FY09 UEPH Barracks project.

The ground surface of the site was observed to have two (2) distinct and relatively level terraces. Based on the available site survey topographic information provided by SOH, the upper terrace expands the southwestern half of the project site at elevations typically between 924 and 926 feet Mean Sea Level (MSL) and the lower terrace expands the northeastern half of the project site at elevations typically between 917 and 919 feet MSL. The proposed FY11 UEPH Barracks building will generally be located on the lower terrace to the northeast and the proposed POV parking area will generally expand across the upper and lower terrace from south to east. The transition slope between the upper and lower terraces was observed to range approximately between 4H:1V and 6H:1V.

3.2 REGIONAL GEOLOGY

The Island of Oahu was formed by the coalescing of two (2) separate volcanic islands formed by the Waianae Volcano in northwest Oahu and the Ko'olau Volcano in southeast Oahu. The Waianae Volcano first ceased eruptions over 3.6 million years ago. The Ko'olau Volcano basalts filled the sea between the two islands and lapped over the older Waianae Volcano basalts until ceasing eruptions over 2.6 million years ago.

The project is located on the Schofield Plateau along western flank of the Ko'olau Volcano. The Schofield Plateau is underlain by deeply weathered basaltic lava flows from the Ko'olau Volcanic Series that stretched along an elongate shield, built principally by eruptions along a northwest-trending rift zone. Basalt lava flows in the high ground areas of the Schofield Plateau are deeply weathered, forming soil and soil like extremely to highly weathered friable to weak rock materials (Saprolite) to depths of up to 200 feet or more. Tropical rains have eroded steep and large gulches in the high lands, such as the Kolekole Pass, resulting in significant alluvial fan formations as eroded saprolitic silt and clay soils were spread over substantial areas of the Schofield Plateau exposed paleo-ground surfaces.

A Regional Geology Map showing the general geology in the vicinity of the project area is presented in Figure 4.

3.3 SUBSURFACE CONDITIONS

The subsurface conditions presented in this report are based on our interpretation of the borings drilled for this project, and YKE's general experience in this area. Based on the field exploration and laboratory testing results, the subsurface conditions at the proposed project site are discussed in the following subsections.

3.3.1 *Fills*

The near surface Fills encountered in the borings generally consisted of medium stiff to stiff reddish-brown and brown elastic silts (MH) with varying amounts of coral and basalt gravels and sand. The near surface fill soils were encountered to approximate depths between 3 to 4 feet below ground surface in borings B-2, B-3 and B-5 and was underlain by Weathered Alluvium at the encountered locations. Higher sampling blow counts are probably indicative of the presence of large roots, detritus, cobbles or boulders in the Fill layer. Based on our laboratory testing results, the tested fill soils exhibited low to moderate shrink and swell potential.

3.3.2 *Weathered Alluvium*

The near surface Weathered Alluvium encountered in the borings included chemically weathered alluvium derived from upslope erosion and deposition of primarily weathered residual soils and variously weathered basalt rocks. It is also probable that some of the surface deposits include fills derived from weathered alluvium or residual soils. This generalized geologic unit typically consisted of primarily very stiff to hard brown to dark reddish-brown elastic silt (MH), with varying amounts of roots.

Weathered Alluvium was encountered to approximate depths between 4 and 9 feet below ground surface in borings B-1, B-3 B-4 and B-5 and was encountered through the explored depths in boring B-2. The Weathered Alluvium was underlain by Residual Soil at the explored locations. Higher sampling blow counts are probably indicative of the presence of cobbles or boulders in the Weathered Alluvium. Based on our laboratory testing results, the Alluvium soil/samples tested exhibited low to moderate shrink and swell potential.

3.3.3 *Residual Soil*

The encountered Residual Soils in the borings consisted primarily of very stiff to hard, reddish-brown, brownish-red and light-brown elastic silts (MH) with some mottling. The residual soil was probably derived from chemical weathering of the basaltic lavas.

Residual Soils were encountered underlying the Weathered Alluvium in borings B-1, B-3 B-4 and B-5. Residual Soils were not encountered through the explored depths in borings B-2. Residual Soils were encountered to depths of approximately 7 to 16 feet below existing ground surface (bgs) at boring locations B-3 through B-5 and through the explored depths at boring B-1. Higher sampling blow counts are probably indicative of the presence of highly to moderately weathered basalt cobbles or boulders in the Residual Soil deposit.

3.3.4 Extremely to Highly Weathered Basalt (Saprolite)

Saprolite includes soil-like friable or weak rock formed by the in-place chemical weathering of basaltic lavas. Saprolite typically includes soil-like extremely weathered basalt, friable highly weathered basalt and contains remnant relic structures such as vesicles or mineralogical stratification that were present in the original rock fabric from which it formed. In general, the overlying Residual Soil deposit transitions to Saprolite and changes in color while mottled appearance becomes prominent.

The Saprolite encountered in the borings can be generally described as mottled with brown, reddish-brown, orange-brown, grey and/or purple elastic silts to fat clays with zones containing friable highly weathered gravel, cobbles and boulders. Moderately to slightly weathered, dense basalt core-stone boulders were encountered at various depths in the Saprolitic soils. Generally, the encountered Saprolitic soils can be described as stiff to very stiff with medium stiff zones or layers.

More detailed descriptions of the subsurface conditions encountered in the YKE borings are presented in the logs of borings in Appendix A of this report.

3.3.5 Geohydrologic Conditions

Groundwater was not encountered in the exploratory borings during our field exploration for the FY11 New UEP H Barracks Project. However, high moisture contents near saturation levels were encountered in several of the tested soil samples at various depths. Therefore, perched subsurface seepage or groundwater should be anticipated particularly during or after rainy periods and/or high flood levels in nearby streams where gravelly seams may present preferential paths for horizontal ground water seepage and perched water tables.

4.0 DISCUSSION AND GEOTECHNICAL RECOMMENDATIONS

Since the proposed facilities will be constructed on a design-build basis, the types and sizes of the building foundation system(s), the building slabs, and the new sidewalk and parking pavement sections will be selected and designed in the future by the successful bidder and their geotechnical and structural consultants. It is our understanding that a detailed, site-specific geotechnical investigation will be expected to be performed by the selected Design-

Build Contractor's and their Geotechnical Engineer-of-Record (Geotechnical Engineer). As such, it is our understanding that geotechnical evaluations and design considerations for building foundation types, load bearing capacities, potential settlements, seismic design parameters, reaction block lateral earth pressures, retaining wall and buried structure design parameters and other as-needed geotechnical design considerations not discussed in this report will be the responsibility of the selected Design-Build Contractor's Geotechnical Engineer. YKE's geotechnical discussion and recommendations as presented herein are solely intended to provide a conceptual and uniform geotechnical subsurface characterization for bidding purposes and is not intended to be used for detailed design by the design-build contractor.

In accordance with the scope of work for this Geotechnical Investigation Report, details of the geotechnical considerations are discussed in the following sections.

4.1 CONCRETE SIDEWALKS

Due to the presence of near surface soils with low to moderate swell potential and historical observations of on-site cracked and buckling sidewalks, we recommend that the following minimum thickness be used for the new concrete sidewalks subject to pedestrian traffic only based on UFC 3-250-01FA (See Figure 5):

Concrete Sidewalk for Pedestrian Traffic Only

4 inch Concrete Slab

4 inch Base Course (CBR=30, 100% Compaction per D-1557)

8-inch Minimum Total Thickness

The above recommended sidewalk design thicknesses assume that good drainage will be provided to divert surface water away and avoid subsurface seepage from ponding at low lying areas of the underlying silty sub-grades. The final sidewalk design thicknesses may be adjusted depending on the final finished grades surrounding the proposed buildings, facilities and structures, and the results of more CBR and swell and/or expansion potential tests that could be performed in the sidewalk sub-grade soils during construction by the design-build contractor.

4.2 PAVEMENT RECOMMENDATIONS

Due to the lack of a site grading plan at this stage for the design-build project, it is not known if the proposed POV parking pavement areas will be built on cut, fills or a combination of both. However, based on the preliminary conceptual POV parking paving limits, some level of cut or fill is anticipated at the pavement areas due to the slight ground surface undulations and sloping grounds around and between the two terraced areas. Based on the available information the POV parking pavement will only be used by privately owned vehicles, two

axle trucks, occasional trash vehicles, and on rare occasions by large emergency vehicles. It is our understanding that the larger army type vehicles will not be typically accessing the POV parking areas.

It should be noted that the preliminary pavement thicknesses recommended herein are not developed for support of frequent heavy construction traffic. Heavy construction equipment and traffic should be anticipated on a construction site such as the TS/C project site, but detailed construction traffic loads are not available for our consideration in this report. We recommend that the contractor be required to designate/design, as necessary, construction haul routes and/or construction access roads for use by their heavy construction equipment such as over-sized dump trucks and tracked vehicles to avoid damage to the finished surfaces of the new pavements.

All areas within the pavement limits should be thoroughly cleared and grubbed of vegetation, rubbish, debris, and any other deleterious materials and the removed materials should be properly disposed off-site prior to the commencement of earthwork for the project.

It is recommended that the design-build contractor scarify and then re-compact the pavement sub-grade to 95% maximum dry density per the latest procedure of ASTM D-1557 Test Method to a minimum depth of six (6) inches below the sub-grade surface. The re-compact pavement sub-grade should be moisture conditioned to within 2% wet of the optimum moisture content, and kept moist but not wet, prior to the placement of the Base Course and Pavement layers.

It is also our understanding that the quality of locally mined and manufactured base course aggregates varies with the locations of quarries and so sometimes even between different productions or stockpiles from the same quarry. As a result, CBR values of the locally available base course materials do not always attain the highest design value of 100 considered in UFC 3-250-01F A, and a lower design CBR value of 80 has therefore been assumed in the flexible pavement designs presented below.

As required by the COE in the RFP, recommendations for both flexible and rigid pavement thicknesses are provided in this draft report. Due to record price increase of asphalt products in the last several years, the COE requires that pertinent design information be provided for different pavement options. The COE also directs that plain concrete shall be used for all rigid pavements, except for odd shaped slabs which shall be properly reinforced, and that joint shall be provided in the rigid pavements spacing at 12 to 14 feet apart. It is also our understanding that plain concrete pavements should not be used in areas where differential settlement may be anticipated.

4.2.1 Flexible Pavements for POV Parking

Based on UFC 3-250-01FA (January 2004), and the available project information, listed below are the design assumptions made for the proposed POV Parking flexible pavement design:

| | |
|------------------------|---|
| Traffic Category | = III (10% two axle trucks, no three, four, and five axle trucks) (UFC 3-250-01FA, pg 3-1) |
| Road Class | = E (TM 5-822-2, Table 1-1) |
| Design Index | = 3 (UFC 3-250-01FA, Table 3-1) |
| Design Sub-Grade CBR | = 9 |
| Design Base Course CBR | = 80 (UFC 3-250-01FA, pg. 6-2) |

A minimum total pavement thickness of 5.5 inches consisting of the minimum required 1.5-inch asphalt concrete (AC) surface course and 4-inch base course was initially determined for the POV parking from UFC 3-250-01FA Table 6-1 on the basis of these design assumptions.

Based on our local design experience and to comply with design directives from the COE, however, we have increased the AC surface course thickness to 2.5 inches for durability concern, and adjusted the respective base course thicknesses to six (6) inches to simplify construction, and replace two (2) inches of the sub-base or base course with a layer of geogrid and a layer of geotextile. The COE requests that up to two (2) inches of the sub-base materials may be substituted with a layer of geogrid (Tensar BX 1110 or equivalent) and a layer of geotextile (Mirafi 170N or equivalent) to achieve some cost savings.

However, due to the already minimal adjusted base-course layer thickness of six (6) inches, the geogrid and geotextile layers have been included as an additional pavement structure layer rather than a partial replacement layer.

The compacted densities of both the base and sub-base courses are also specified to adhere to the UFC minimum requirement of 100% maximum dry density as determined by the latest procedure of ASTM Test Method D1557 based on the COE's recent review of local performance issues of flexible pavements at various Army facilities in Hawaii.

As a result, we recommend that the following minimum flexible pavement thickness design be used for the proposed POV parking area (see Figure 6):

- 2.5-inch Asphalt Concrete
- 6-inch Base Course (95% compaction)
- Geogrid+Geotextile Fabric
- 10.5-inch Total Pavement Thickness**

The base course thickness was increased to six (6) inches from the minimum required thickness of four (4) inches allowed in UFC 3-250-01FA. The thicker base course is similar to the minimum required 6-inch base course for flexible pavements in the U.S. Navy pavement design manual, UFC 3-250-12N, Design: Pavements. Due to the waiver of a drainage layer, we believe that a thicker base course (typically consisting of higher permeability or better draining material) could enhance the drainage capacity of the flexible pavement design section and provide for a more durable pavement in the long term.

The combined geotextile and geogrid should be placed on top of the properly compacted subgrade after it is backfilled and re-compacted as necessary, before placement of the overlying pavement structure. Based on past research and experience, it is our understanding that the geotextile and geogrid would provide additional pavement subgrade support against potential long term stability issues due to sub-grade saturation.

Prior to placement of the POV parking flexible pavement, the pavement subgrade should be scarified to a minimum depth of six (6) inches below the subgrade surface, moisture conditioned to within 2% wet of the optimum moisture content, then re-compacted to 95% maximum dry density per ASTM D-1557 Test Method and kept moist but not wet prior to placement pavement structure.

The recommended pavement section considers normal parking traffic with occasional buses, trash pickups, emergency vehicles and/or delivery trucks and less than 1% three axle truck and that good surface drainage will be provided to divert surface water away from the underlying silty sub-grade.

The final pavement section may depend on the final finished grades of the proposed parking lot, knowledge of more accurate traffic mix data, and the results of more CBR and swell tests that should be performed in the actual sub-grade soils during construction by the design-build contractor.

4.2.2 Rigid Pavements for POV Parking

Similarly, based on the available project information discussed above and UFC 3-250-01FA (January 2004), listed below are the design assumptions made for the proposed POV parking rigid pavement design:

| | |
|------------------|---------------------------------|
| Traffic Category | = III (UFC 3-250-01FA, pg 3-1) |
| Road Class | = E (TM 5-822-2, Table 1-1) |
| Design Index | = 3 (UFC 3-250-01FA, Table 3-1) |
| Sub-Grade CBR | = 9 |

| | |
|-------------------------------------|--|
| Base Course CBR | = 80 |
| Modulus of Subgrade Reaction (pci) | = 25 (UFC 3-250-01FA, Table 9-1) |
| Modulus of Soil Reaction (pci) | = 37.5 (at top of sub-base course, UFC 3-250-01FA Fig. 9-1, pg. 9-3) |
| Flexural Strength of Concrete (psi) | = 650 |

The correlation between moisture content and the type of subgrade material provided in UFC 3-250-01FA, Table 9-1, was used to determine the subgrade modulus of soil reaction of 25 pci. Based on the subgrade modulus of soil reaction, the equivalent modulus of soil reaction on top of a minimum required 4-inch sub-base course with a CBR value of 80 was then determined to be 37.5 pci using Figure 9-1 (pg. 9-3) in UFC 3-250-01FA.

For the proposed POV parking area, we therefore recommend the following minimum rigid pavement design thickness based on the above considerations (see Figure 7):

| | |
|-------------------------------|---|
| 6-inch Plain Concrete | |
| <u>4-inch Sub-Base Course</u> | (CBR = 80, 100% Compaction per ASTM D-1557) |
| 10-inch | Minimum Total Thickness |

The above recommended rigid pavement thickness design assumes that good surface and subsurface drainage will be provided to divert surface runoff and subsurface seepage water away from the underlying silty sub-grades. The final pavement section may be adjusted depending on the final finished grades of the POV parking area, and the determination of any required subsurface drainage system by the COE or the Design-Build Engineer of Record.

Prior to placement of the POV parking rigid pavement, the pavement subgrade should be scarified to a minimum depth of six (6) inches below the subgrade surface, moisture conditioned to within 2% wet of the optimum moisture content, then re-compacted to 95% maximum dry density per ASTM D-1557 Test Method and kept moist prior to placement of the granular capping fill.

4.2.3 Permeable Pavements for POV Parking

To reduce storm water runoffs, the COE requires permeable pavements be considered by the design-build contractor and its designer engineer of record.

Based on our understanding of the current project requirements and the site conditions discussed above, the permeable pavement system for the POV parking areas is expected to include a permeable interlocking concrete pavement, bedding course, geotextile under the bedding course, an upper permeable subbase, at least one layer of geogrid membrane under

the subbase, an open graded lower subbase layer, and a woven geotextile between the lower subbase and the uncompacted clay soils subgrade.

The permeable pavement system should be equal to, or better than, the AquaPave Permeable Pavement Systems, and similar installed systems must be in use for at least 3 years and have at least 3 successfully completed and performing applications for commercial and government projects.

The permeable pavement system is expected to perform as a partial exfiltration system, with some seepage into the low permeability subgrade clay soils, and partial storage and seepage through an underground storm water detention system to be design and constructed by the design-build contractor.

Due to the general limited local experience with interlocking concrete permeable pavement systems for commercial and military housing applications, the COE is requesting that a test section be performed prior to full production and that experienced and certified design and installation personnel from the contractor or paving subcontractor and the permeable pavement supplier shall be present on-site throughout construction of the test section and full installation of the permeable pavement system at the proposed OVP parking areas.

A minimum 25 years design and performance life should be considered in the design of the permeable pavement system. The contractor and permeable pavement system suppliers must prepare and submit maintenance and repair plan and program for the design life duration of the proposed permeable pavement system for COE review and acceptance prior to mobilization of any equipment and personnel.

Based on the traffic loading outlined in subsection 4.2.1, the following minimum permeable pavement section is recommended from a geotechnical standpoint:

3.5-inch thick Permeable Interlocking Concrete pavement (slip & skid resistance)

2-inch thick Bedding Course (1/4-inch clear crushed open-graded)

Geotextile (AP Inbitex Geotextile or equivalent)

8-inch thick Upper Permeable Subbase (3/4-inch clear crushed open-graded)

Geogrid Membrane (AP-BR 6000 or equivalent)

24-inch Lower Subbase (2-1/2 inches clear crushed open-graded with at least one layer of AP-BR 6000 geogrid or equivalent)

Woven geotextile

Subgrade (grade to drain to underground retention system, uncompacted but in-situ soil engineering properties preserved)

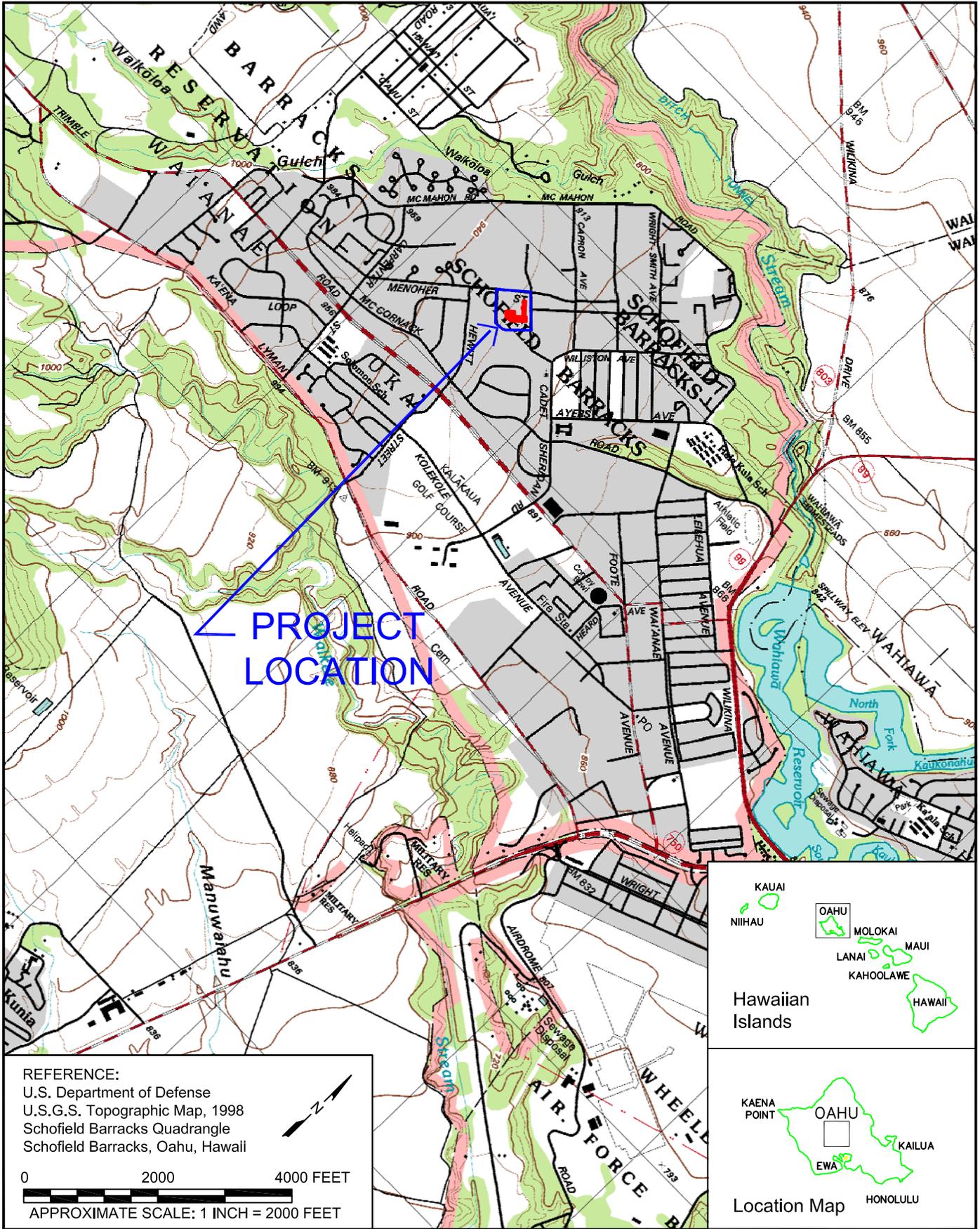
5.0 LIMITATIONS

The conceptual geotechnical recommendations and conclusions presented in this report are based on the assumption that the scope of the construction project, as described, does not change appreciably and that significant variations in soil properties from those encountered by our field exploration do not occur. The borings are widely spaced; therefore, some variation in soil properties between the borings is likely. If any conditions notably different from those described herein are encountered during construction, we should be immediately notified. The conceptual geotechnical pavement recommendations presented in this report were developed assuming the Geotechnical Engineer-of-Record will be retained to review the design-build team's design prior to finalization of plans and to observe actual field conditions encountered during construction, to verify the applicability of the preliminary conceptual recommendations presented in this report, and to recommend appropriate changes in design or construction procedures if conditions differ from those described herein.

This report was prepared for use by Samuel O. Hirota, Inc. and the U.S. Army Corps of Engineers, Honolulu District, in accordance with generally accepted geotechnical engineering principles and practices for design-build bid procurement. The geotechnical opinions and recommendations given in this report are based on our analysis of the data collected for this project. Additional conclusions and/or recommendations made from the data by others are solely their own responsibility.

Our analysis is based on the data obtained from the borings at the locations indicated on the Boring Location Map. If project plans or requirements change, the conclusions and preliminary conceptual recommendations provided herein by YKE may need to be revised. The nature and extent of variations between the borings may become evident during construction and will likely differ from those discussed in this report. No warranty is included, either expressed or implied, that the actual conditions encountered will conform exactly to the conditions described herein. It is understood that a qualified geotechnical engineer will be retained by the prospective bidders to further explore the subsurface conditions based on their individual design concepts and subsequently to also observe all earthwork and foundation preparation during construction of the proposed design-build project.

Our services were provided in a manner consistent with the level of care and skill ordinarily exercised by other professional consultants under similar circumstances. No other representation is intended or implied.



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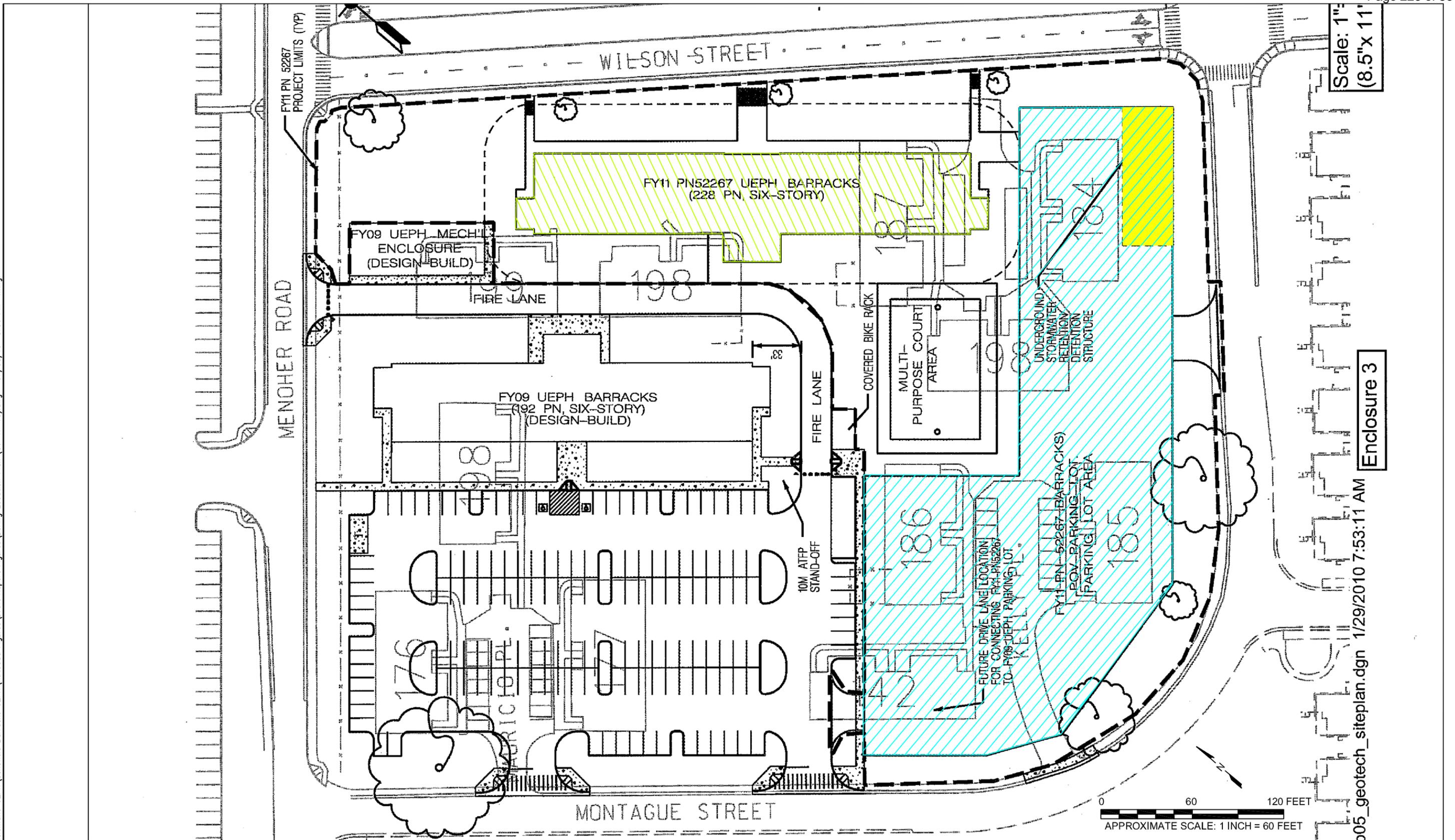
PROJECT LOCATION MAP

FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks
Schofield Barracks, Oahu, Hawaii Project No. 10007



FIGURE 1

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Enclosure 3

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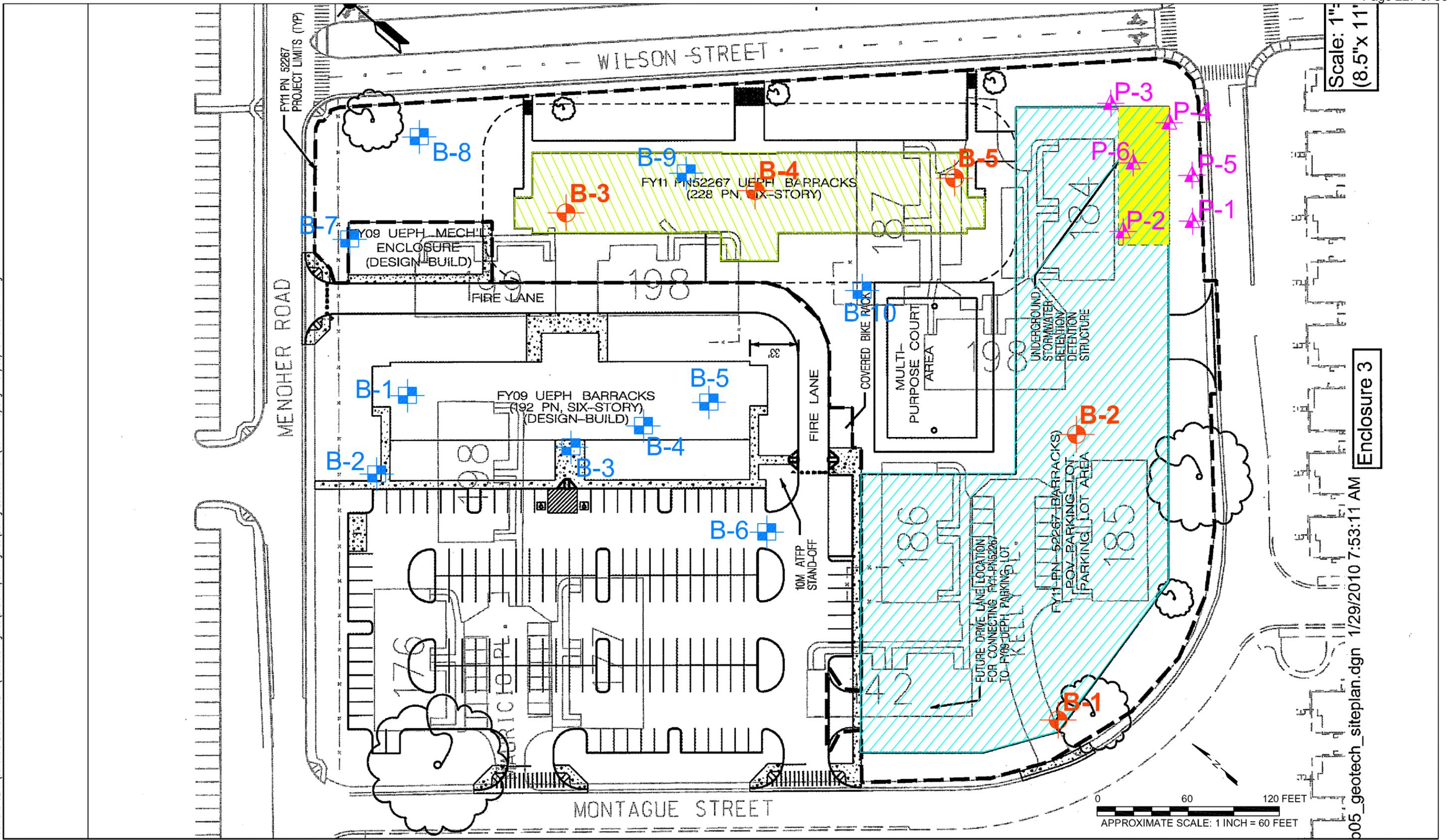
PRELIMINARY CONCEPTUAL LAYOUT OF PROPOSED NEW UEPH FACILITIES
 FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks
 Schofield Barracks, Oahu, Hawaii
 Project No. 10007

NOTES:

- UNDERGROUND STORMWATER RETENTION DETENTION STRUCTURE
- FY11 PN52267 UEPH BARRACKS SIX-STORY BUILDING
- FY11 PN52267 UEPH BARRACKS POV PARKING LOT

YKE
 YOGI KWONG ENGINEERS, LLC
FIGURE 2

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Enclosure 3

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BORING LOCATION MAP

FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks
Schofield Barracks, Oahu, Hawaii
Project No. 10007

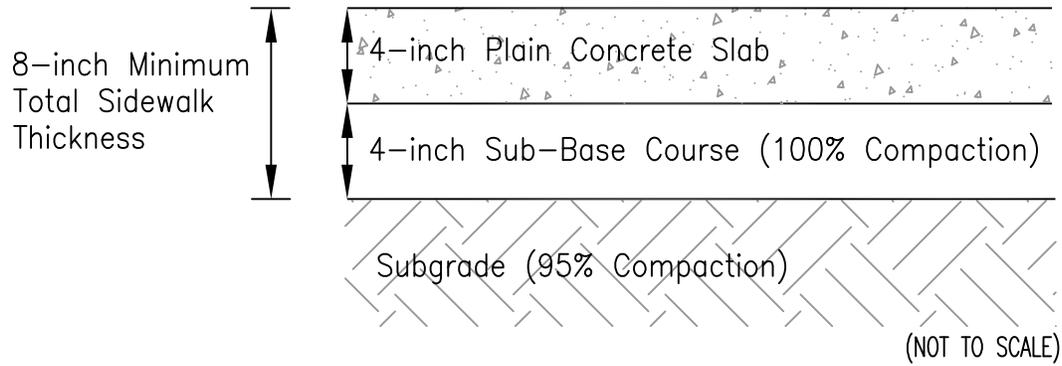
| NOTES: | |
|--------|--|
| | YKE BORING (FY09 PN 068823) |
| | YKE BORING (FY11 PN 52267) |
| | PERCOLATION TEST |
| | UNDERGROUND STORMWATER RETENTION DETENTION STRUCTURE |
| | FY11 PN52267 UEPH BARRACKS SIX-STORY BUILDING |
| | FY11 PN52267 UEPH BARRACKS POV PARKING LOT |



FIGURE 3



DRAFT



DESIGN ASSUMPTIONS:

1. UFC 3-250-01FA PAVEMENT DESIGN FOR ROADS
2. Sub-Base Course CBR = 30

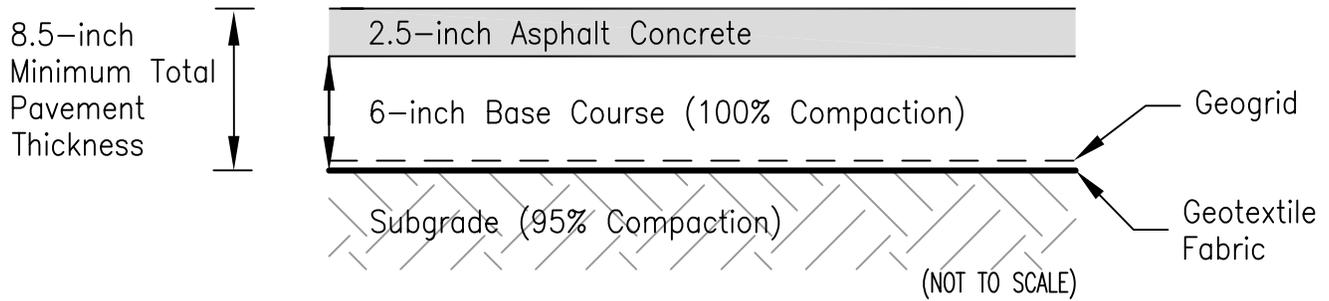
CONCRETE SIDEWALKS FOR PEDESTRIAN TRAFFIC ONLY

FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks
Schofield Barracks, Oahu, Hawaii

Project No. 10007



DRAFT



DESIGN ASSUMPTIONS:

1. Traffic Category = III (UFC 3-250-01FA, pg. 3-1)
2. Road Class = E (TM 5-822-2, Table 1-1)
3. Design Index = 3 (UFC 3-250-01FA, Table 3-1)
4. Subgrade CBR = 9
5. Base Course CBR = 80

FLEXIBLE PAVEMENT FOR POV PARKING

FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks
Schofield Barracks, Oahu, Hawaii

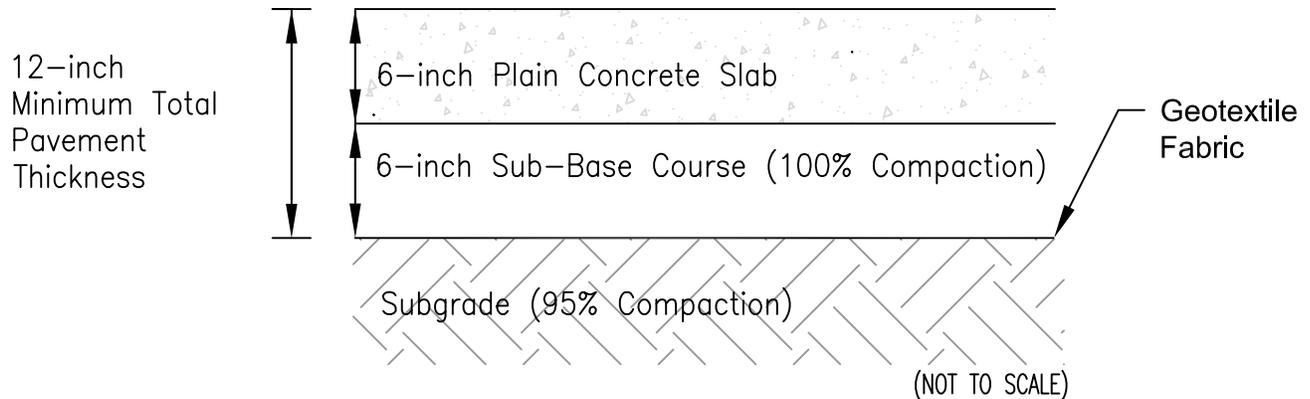
Project No. 10007



FIGURE 6

Monday, November 29, 2010

DRAFT



DESIGN ASSUMPTIONS:

1. Traffic Category = III (UFC 3-250-01FA, pg. 3-1)
2. Road Class = E (TM 5-822-2, Table 1-1)
3. Design Index = 3 (UFC 3-250-01FA, Table 3-1)
4. Subgrade CBR = 9
5. Modulus of Subgrade Reaction (pci) = 25 (UFC 3-250-01FA, Table 9-1)
6. Sub-Base Course CBR = 30
7. Flexural Strength of Concrete (psi) = 650

RIGID PAVEMENT FOR POV PARKING

FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks
Schofield Barracks, Oahu, Hawaii

Project No. 10007



FIGURE 7

Monday, November 29, 2010

APPENDIX A FIELD EXPLORATION

- A.1 Exploratory Borings
- A.2 Soil Sampling
- A.3 Field Percolation Test

APPENDIX B LABORATORY TESTING

- B.1 Moisture Content and Dry Density Tests
- B.2 Atterberg Limits (Plasticity Index)
- B.3 One-Dimensional Consolidation Test
- B.4 Unconfined Compression Strength Test
- B.5 California Bearing Ratio (CBR)
- B.6 Modified Proctor Compaction
- B.7 Direct Shear
- B.8 One-Dimensional Swell Potential Test
- B.9 Expansion Index Test

APPENDIX C PHOTOGRAPHS OF SELECTED SOIL SAMPLES**APPENDIX D PREVIOUS LOGS OF BORINGS AND LABORATORY TEST RESULTS
(FY09 MCA PN 068823 UEPH)****LIST OF APPENDIX FIGURES**

| | |
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| Figures A-i to A-vi | Absorption Area Requirements of Percolation Holes P-1 to P-6 |
| Figure A-1 | Unified Soil Classification System |
| Figure A-2 | Description of Rock Materials |
| Figure A-3 | Log of Boring Key |
| Figures A-4 to A-8 | Logs of Borings |
| Figure B-1 | Atterberg Limits (Plasticity Chart) |
| Figure B-2 | Unconfined Compression Strength |
| Figure B-3 and B-4 | Laboratory California Bearing Ratio (CBR) Test |
| Figure B-5 and B-6 | Modified Proctor Compaction Test |
| Figures C-1 to C-22 | Selected Sample Photographs |

| | |
|--------------------------|--|
| Figure D-1 | Log of Boring Key |
| Figure D-2 through D-11 | Logs of Borings |
| Figure D-12 and D-13 | Atterberg Limits (Plasticity Chart) |
| Figure D-14 | One-Dimensional Swell or Settlement Potential |
| Figures D-15 and D-16 | Direct Shear Test |
| Figure D-17 and D-18 | Unconfined Compression Test |
| Figure D-19 and D-20 | Consolidation Test |
| Figure D-21 through D-23 | Modified Proctor Compaction Test |
| Figure D-24 through D-26 | Laboratory California Bearing Ratio (CBR) Test |

LIST OF APPENDIX TABLES

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| Table A-1 | Results of Field Percolation Tests |
| Table B-1 | Summary of One-Dimensional Swell Potential Test Results |
| Table B-2 | Summary of Expansion Index Test Results |

APPENDIX A FIELD EXPLORATION

A.1 EXPLORATORY BORINGS

Field explorations consisted of a total of five (5) borings, B-1 through B-5, that were completed between June 14 and July 09, 2010. The location of the project site is indicated on Figure 1. The approximate locations of the borings are shown on Figure 2.

The borings were drilled by Hawaii Test Borings, Inc. using a Simco truck mounted drill rig with 4-inch solid-stem, continuous flight augers and/or wash boring methods. The drilling bit used is noted on the Logs of Borings, which are presented on Figures A-4 through A-8.

After drilling, the borings were backfilled with the drill cuttings and imported gravel as necessary, and sealed with cement grout in the top 5 feet.

A.2 SOIL SAMPLING

Relatively undisturbed and disturbed soil samples were obtained using a Standard Penetration Test (SPT) sampler, and a Dames & Moore type "U" sampler. The SPT, and Dames & Moore samplers were driven into the ground by successive blows of a 140-pound hammer falling 30 inches. The sampler was typically driven for a total distance of 18 inches, and blow counts for each 6 inches of penetration were recorded. Where the SPT sampler was used, this procedure followed the American Society of Testing and Materials (ASTM) D1586 standard for determining the standard penetration resistance of soil. The requirements for the "standard penetration resistance" are the sum of blow counts for the second and third 6 inches and are noted on the Log of Borings.

Soil samples recovered from the field were initially classified according to the ASTM D2488 standards and the Unified Soil Classification System, shown on Figure A-1. These classifications were later refined according to ASTM D2487 based on the results of laboratory tests performed on selected samples. Samples recovered during the field exploration program were transported to our office in Honolulu for further examination and laboratory testing.

A.3 FIELD PERCOLATION TEST

In accordance with the scope of work dated February 2, 2010, YKE has performed one (1) field percolation test in support of the storm water retention/detention area. Field percolation testing was performed in general accordance with the standard test procedures set forth in UFC 3-240-09F A (TM 5-814-3) Chapter 6, subparagraph d (Percolation Tests). In accordance with UFC 3-240-09F A six (6) 3.5-inch diameter percolation test boreholes were explored, prepared and tested for soil percolation properties in the vicinity of the proposed storm water retention/detention area. Finished grade elevations are not known at this time. Therefore, percolation boreholes were explored to one (1) foot below existing grade and percolation tests were performed.

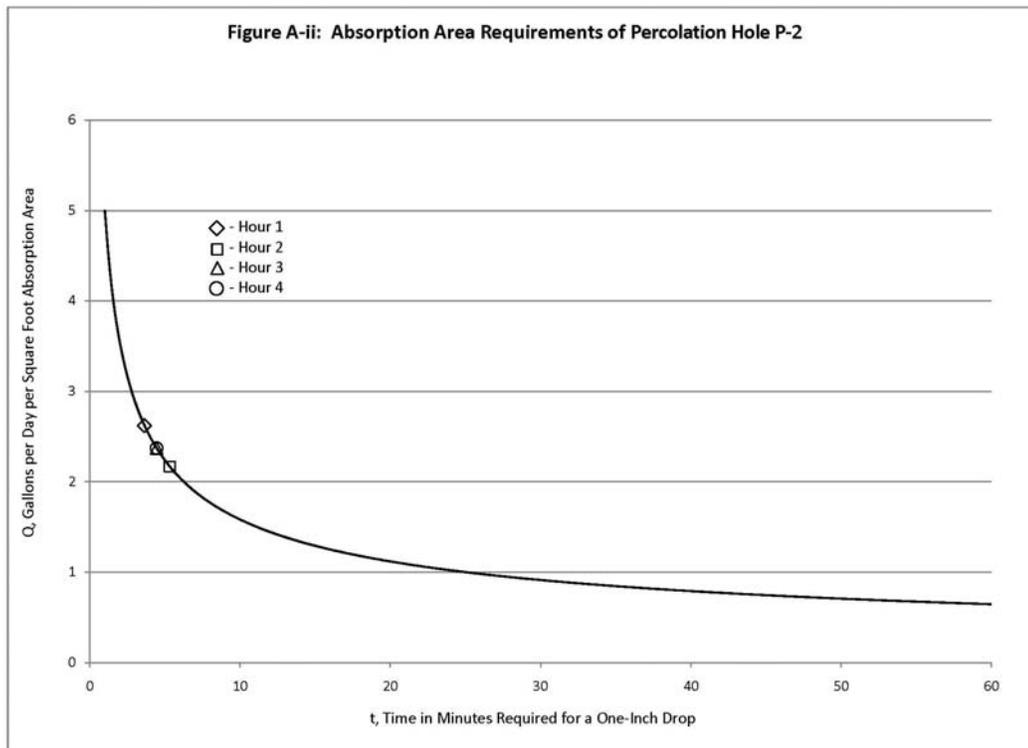
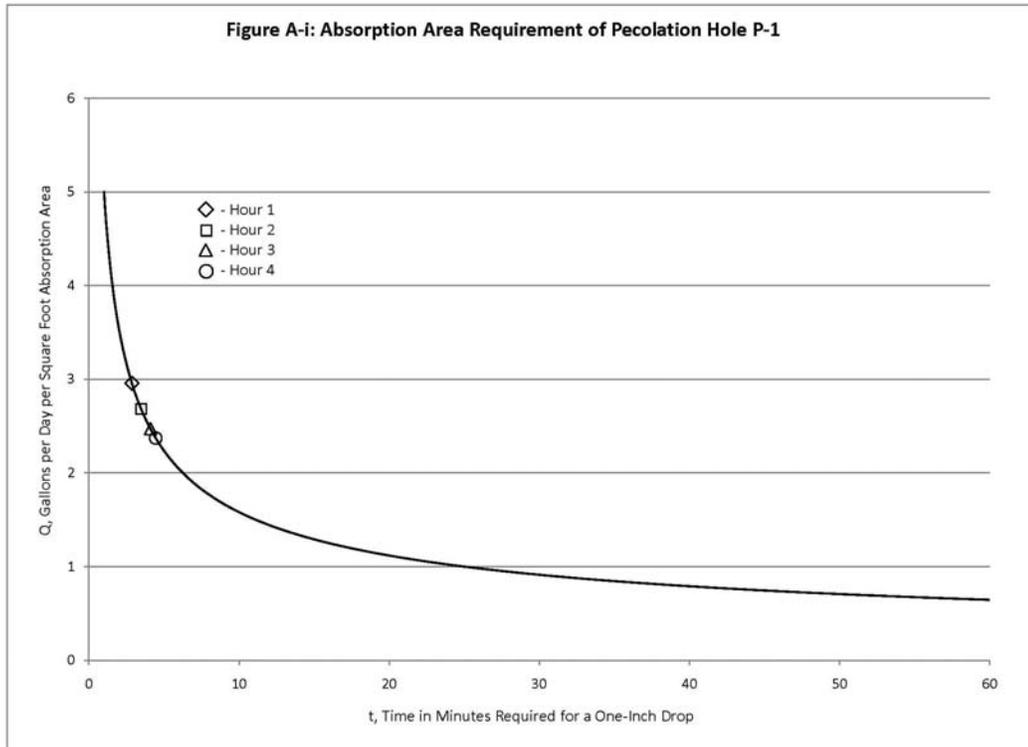
We understand that the percolation test method in UFC 3-240-09F A is commonly used in soil absorption properties in domestic waste water applications (i.e. septic tanks). The UFC 3-240-09F A percolation test method calls for a 24 hour pre-filling or soaking period prior to performing the percolation test in cohesive ground conditions. We understand that the retention-detention structure will serve as an infiltration system and not a wastewater system. Therefore, the percolation tests deviated from the UFC 3-240-09F A 24 hour pre-filling period and alternatively the percolation test holes were subjected to a one (1) hour pre-filling period.

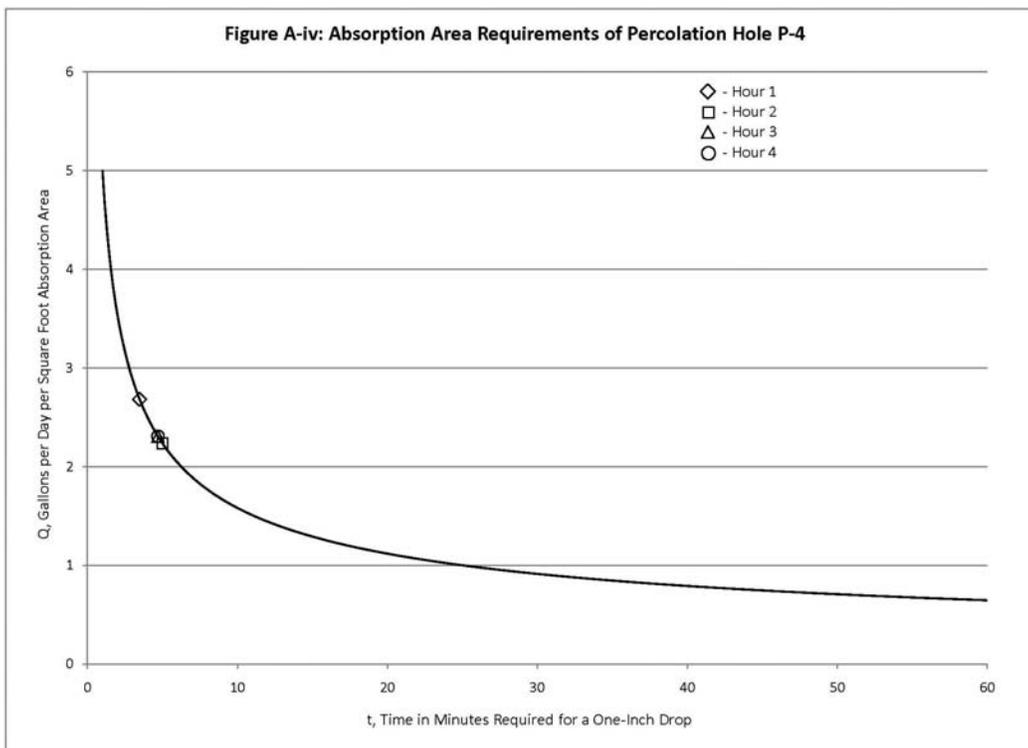
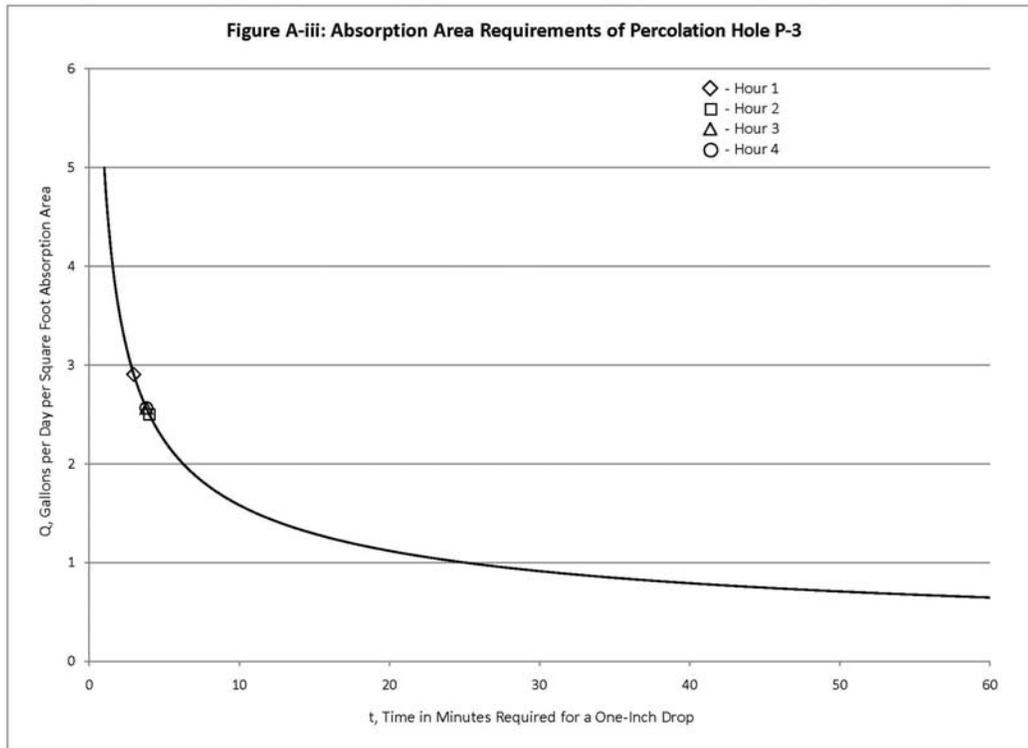
After the one-hour pre-filling period, water head drops in water level were measured over a 1-hour test period. Four (4) consecutive one-hour percolation tests were performed in each borehole totaling in four consecutive hours of percolation tests at each test location. In accordance with Chapter 6 subparagraph d of UFC 3-240-09F A, the percolation rate was recorded over the last 10-minute reading during each of the one-hour tests.

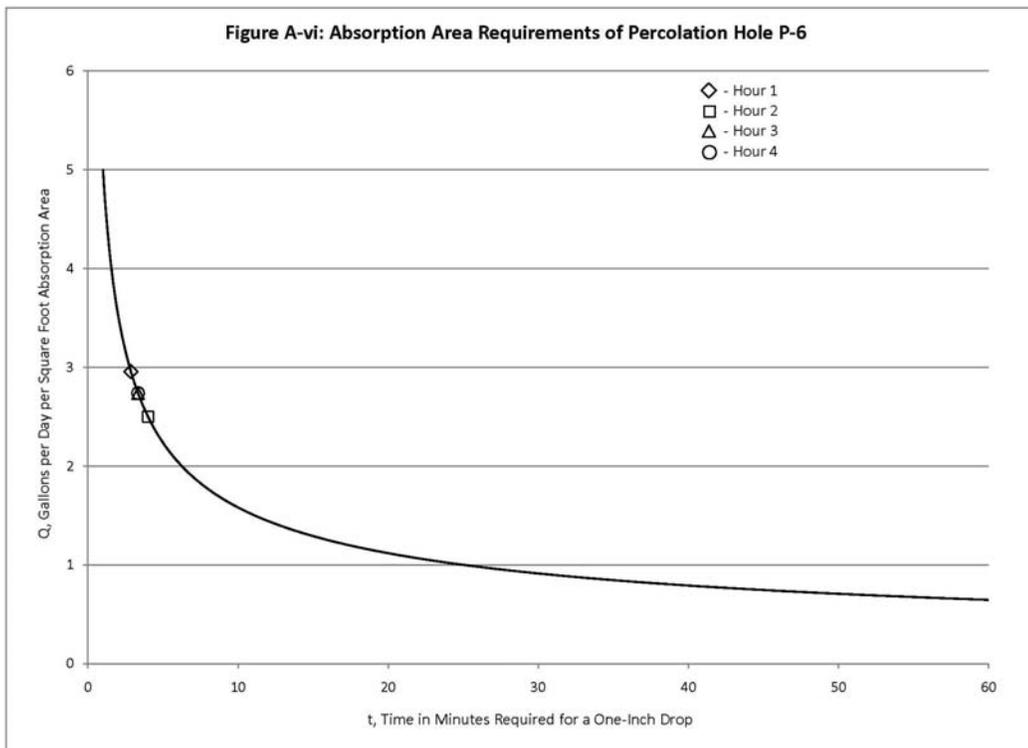
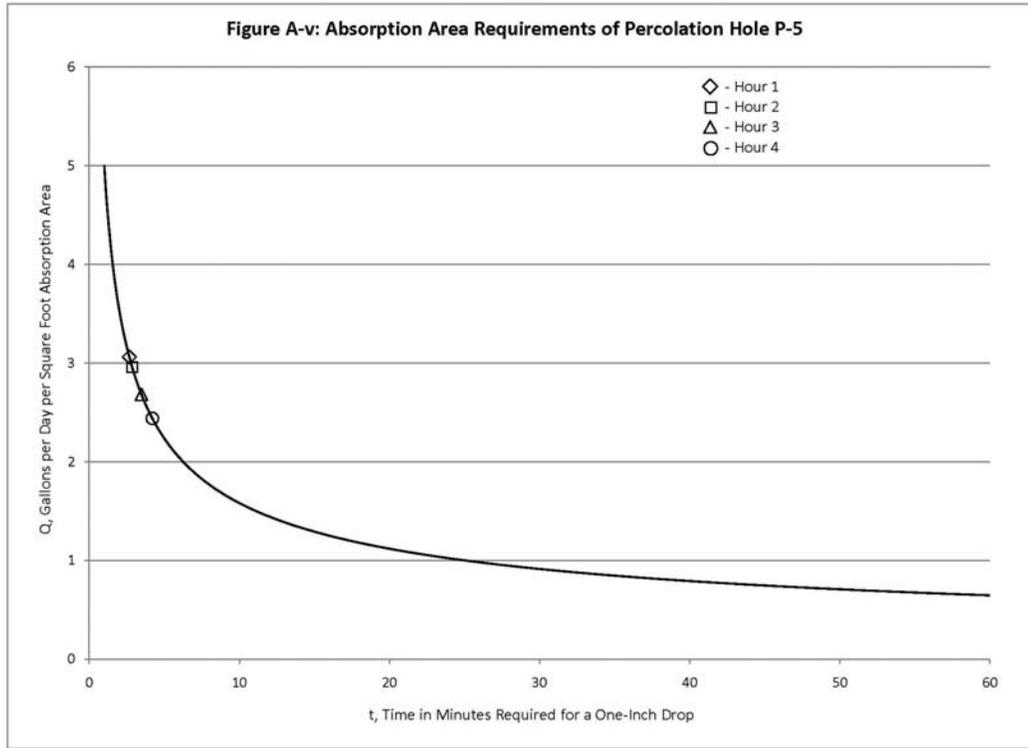
The results of the field percolation tests are presented in the Table A.1 below. Absorption area requirements comparing of absorption flow rate (Q in gallons per day per square foot of absorption area) versus time required for a one inch drop are graphically presented in Figures A.3.1 to A.3.6.

Table A-1: Results of Field Percolation Tests

| Location P-1 | | | Location P-2 | | |
|--------------|-------------------------------------|---------------------|--------------|--|---------------------|
| | Head Drop in Final 10 Minutes | Percolation Rate | | Head Drop in Final 10 Minutes | Percolation Rate |
| Test I.D | (inches) | (in./hr) | Test I.D | (inches) | (in./hr) |
| Hour 1 | 9.5 | 21.0 | Hour 1 | 8.8 | 16.5 |
| Hour 2 | 8.9 | 17.3 | Hour 2 | 7.9 | 11.3 |
| Hour 3 | 8.4 | 14.4 | Hour 3 | 8.2 | 13.5 |
| Hour 4 | 8.3 | 13.5 | Hour 4 | 8.2 | 13.5 |
| Location P-3 | | | Location P-4 | | |
| | Head Drop in Final 10 Minutes | Percolation Rate | | Head Drop in Final 10 Minutes | Percolation Rate |
| Test I.D | (inches) | (in./hr) | Test I.D | (inches) | (in./hr) |
| Hour 1 | 9.4 | 20.3 | Hour 1 | 8.9 | 17.3 |
| Hour 2 | 8.5 | 15.0 | Hour 2 | 8.0 | 12.0 |
| Hour 3 | 8.6 | 15.8 | Hour 3 | 8.1 | 12.8 |
| Hour 4 | 8.6 | 15.8 | Hour 4 | 8.1 | 12.8 |
| Location P-5 | | | Location P-6 | | |
| | Head Drop in Final 10 Minutes | Percolation Rate | | Head Drop in Final 10 Minutes | Percolation Rate |
| Test I.D | (inches) | (in./hr) | Test I.D | (inches) | (in./hr) |
| Hour 1 | 9.8 | 22.5 | Hour 1 | 9.5 | 21.0 |
| Hour 2 | 9.5 | 21.0 | Hour 2 | 8.5 | 15.0 |
| Hour 3 | 8.9 | 17.3 | Hour 3 | 9.0 | 18.0 |
| Hour 4 | 8.4 | 14.3 | Hour 4 | 9.0 | 18.0 |







SOIL CLASSIFICATION CHART

| | Major Divisions | | Symbol | Typical Names | Other Criteria |
|--|---|--|--|---|--|
| COARSE GRAINED SOILS More than 50% of material larger than No. 200 sieve size | Gravels More than 50% of coarse fraction retained on No. 4 sieve | Clean Gravel Little or no fines (<5%) | GW | Well-graded gravels, gravel-sand mixtures, little or no fines | Cu>4 and 1<=Cc=3 |
| | | | GP | Poorly graded gravels, gravel-sand mixtures, little or no fines | Not meeting Cu and Cc criteria for GW |
| | | Gravels with Fines Appreciable amount of fines (>12%) | GM | Silty gravels, gravel-sand-silt mixtures | Atterberg limit below A-line or PI<4 |
| | | | GC | Clayey gravels, gravel-sand-silt mixtures | Atterberg limit above A-line with PI>7 |
| | Sands More than 50% of coarse fraction passing No. 4 sieve | Clean Sands Little or no fines (<5%) | SW | Well-graded sands, gravelly sands, little or no fines | Cu>6 and 1<=Cc=3 |
| | | | SP | Poorly graded sands, gravelly sands, little or no fines | Not meeting Cu and Cc criteria for SW |
| | | Sands with Fines Appreciable amount of fines (>12%) | SM | Silty sands, sand-silt mixture | Atterberg limit below A-line or PI<4 |
| | | | SC | Clayey sands, sand-clay mixture | Atterberg limit above A-line with PI>7 |
| FINE GRAINED SOILS More than 50% of material smaller than No. 200 sieve size | Silts and Clays Liquid limit less than 50% | ML | Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity | Atterberg limit below A-line | |
| | | CL | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clay | Atterberg limit above A-line | |
| | | OL | Organic silts and organic silty clays flow plasticity | Atterberg limit below A-line | |
| | Silts and Clays Liquid limit larger than 50% | MH | Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts | Atterberg limit below A-line | |
| | | CH | Inorganic clays of high plasticity, fat clays | Atterberg limit above A-line | |
| | | OH | Organic clays of high plasticity, organic silts | Atterberg limit below A-line | |
| HIGHLY ORGANIC SOILS | | Pt | Peat and other highly organic soils | | |

Notes: 1. Cu = D60/D10, Cc = (D30)^2/(D60 x D10) where D60, D30 and D10 are diameters associated with 60%, 30% and 10% smaller in gradation curves.
2. Dual symbols are used to indicate borderline classifications such as GP/SP.

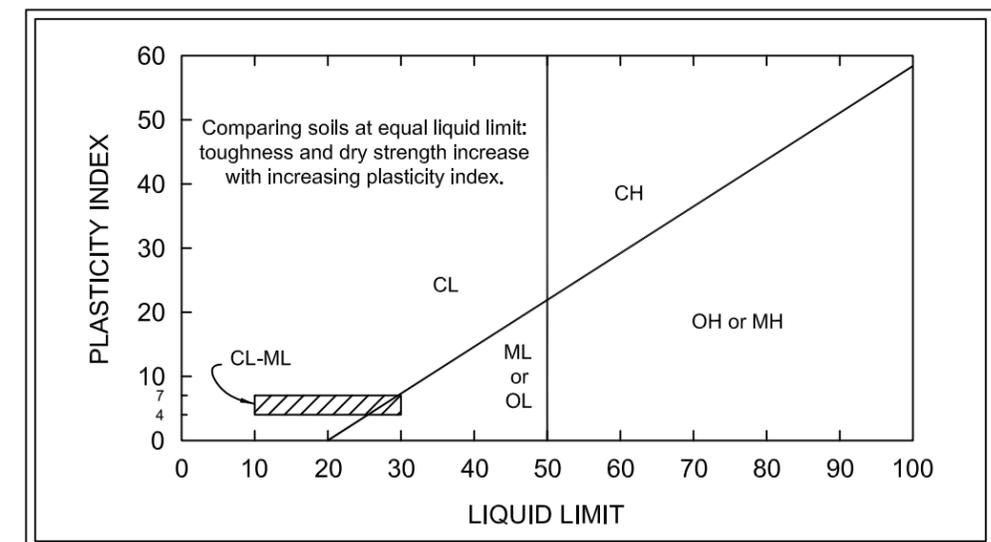
GRADATION CHART

| Soil Fraction | Size Range | | | | |
|---------------|-------------|-------|-------------|-------|------|
| | Lower Limit | | Upper Limit | | |
| | Millimeters | Sieve | Millimeters | Sieve | |
| Boulders | 304.8 | 12* | 914.4 | 36* | |
| Cobbles | 76.2 | 3* | 304.8 | 12* | |
| Gravel | Coarse | 2 | 10** | 4.76 | 4** |
| | Medium | 0.42 | 40** | 2 | 10** |
| | Fine | 0.074 | 200** | 0.42 | 40** |
| Fines | | | 0.074 | 200** | |

* U.S. standard sieve opening in inches

** U.S. standard sieve number

PLASTICITY CHART



UNIFIED SOIL CLASSIFICATION

FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks Schofield Barracks, Oahu, Hawaii



YOGI KWONG ENGINEERS, LLC
PROJECT NO. 10007

FIGURE A-1

DESCRIPTION OF ROCK MATERIALS

A. DEGREE OF WEATHERING

The following terms were used to describe the chemical weathering of rock:

Extremely Weathered: The original minerals of the rock have been almost entirely altered to secondary minerals, even though the original fabric may be intact.

Highly Weathered: The rock is weakened to such an extent that a 2-inch diameter core can be broken readily by hand across the rock fabric.

Moderately Weathered: Rock is discolored and noticeably weakened, but a 2-inch diameter core cannot usually be broken by hand, across the rock fabric.

Slightly Weathered: Rock is slightly discolored, but not noticeably lower in strength than fresh rock.

Unweathered: Rock shows no discoloration, loss of strength, or any other effect of weathering.

B. HARDNESS

The following terms were used to describe the hardness of rock and soil:

Soft: Reserved for plastic material.

Friable: Easily crumbled, pulverized, or reduced to powder.

Low Hardness: Can be gouged deeply or carved with pocket knife.

Moderately Hard: Can be readily scratched by a knife blade; scratch leaves heavy trace of dust and scratch is readily visible after the powder has been blown away.

Hard: Can be scratched with difficulty, scratch produces little powder and is often faintly visible.

Very Hard: Cannot be scratched with pocket knife.

C. ROCK FRACTURE CHARACTERISTICS

The general fracture spacing is described in the boring log according to the following criteria:

Crushed: Less than 5 microns (mechanical clay) to 0.1 foot.

Intensely Fractured: 0.05 to 0.1 foot (contain no clay).

Closely Fractured: 0.1 to 0.5 feet.

Moderately Fractured: 1.0 to 3.0 feet.

Very Widely Fractured: Over 3 feet.

DESCRIPTION OF ROCK MATERIALS

FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks
Schofield Barracks, Oahu, Hawaii

Project No. 10007



FIGURE A-2

SCHOFIELD BARRACKS UEPH

LOCATION: SCHOFIELD BARRACKS, OAHU, HAWAII

DATE(S) DRILLED:

GROUND SURFACE ELEVATION:

LOGGED BY:

CHECKED BY:

GROUNDWATER LEVEL / DATE:

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LB / 30 IN

CONTRACTOR: HAWAII TEST BORINGS, INC.

DRILLING METHOD: 4-INCH SOLID STEM AUGER

DRILL EQUIP: SIMCO DRILL RIG

BOREHOLE BACKFILL: GRAVEL, GROUT, AC PAVEMENT

| DEPTH (FT) | SAMPLE TYPE | SAMPLE NO. | SAMPLING RESISTANCE | RECOVERY, % | RQD, % | GRAPHIC LOG | DESCRIPTION | WATER CONTENT, % | DRY UNIT WEIGHT, pcf | UCS, psf | LIQUID LIMIT | PLASTICITY INDEX | OTHER TESTS AND REMARKS |
|------------|-------------|------------|---------------------|-------------|--------|---|---|------------------|----------------------|----------|--------------|------------------|-------------------------|
| 0 | | | | | | | STRATA SYMBOLS | | | | | | |
| | | | | | |  | ASPHALT CONCRETE | | | | | | |
| | | | | | |  | Elastic silt (MH) | | | | | | |
| | | | | | |  | Boulders | | | | | | |
| | | | | | |  | Cobbles | | | | | | |
| | | | | | | | SAMPLER SYMBOLS | | | | | | |
| | | | | | | | Standard Penetration Test (SPT) sampler | | | | | | |
| | | | | | | | Dames and Moore (D&M) sampler | | | | | | |
| | | | 10 | | | | Number of blows to advance sampler 12 inches, or distance indicated | | | | | | |
| | | | | 87 | | | Percent Soil Recovery in Sampler | | | | | | |
| | | | | | | | ABBREVIATIONS FOR TESTS | | | | | | |
| | | | | | | | PP = Unconfined Compressive Strength from Pocket Penetrometer, tsf | | | | | | |
| | | | | | | | TV = Shear Strength from Torvane, tsf | | | | | | |
| | | | | | | | DS = Direct Shear Test | | | | | | |
| | | | | | | | CON = One-Dimensional Consolidation Test | | | | | | |
| | | | | | | | UCS = Unconfined Compressive Strength Test | | | | | | |
| | | | | | | | Swell = Swell Potential Test | | | | | | |
| | | | | | | | X = Pending Test Result | | | | | | |
| 30 | | | | | | | | | | | | | |

DRAFT

SCHOFIELD BARRACKS UEPH

LOCATION: SCHOFIELD BARRACKS, OAHU, HAWAII
GROUND SURFACE ELEVATION: +/- 923 FEET
GROUNDWATER LEVEL / DATE: NOT ENCOUNTERED
CONTRACTOR: HAWAII TEST BORINGS, INC.
DRILL EQUIP: SIMCO DRILL RIG

DATE(S) DRILLED: 6-14-10
CHECKED BY: K. Sandefur
HAMMER TYPE: SAFETY
HAMMER WEIGHT/DROP: 140 LB / 30 IN
DRILLING METHOD: 4-INCH SOLID STEM AUGER
BOREHOLE BACKFILL: GRAVEL, GROUT

| DEPTH (FT) | SAMPLE TYPE | SAMPLE NO. | SAMPLING RESISTENCE | RECOVERY, % | RQD, % | GRAPHIC LOG | DESCRIPTION | WATER CONTENT, % | DRY UNIT WEIGHT, pcf | UCS, psf | LIQUID LIMIT | PLASTICITY INDEX | OTHER TESTS AND REMARKS | |
|------------|---|------------|---------------------|-------------|--------|---|--|--|----------------------|----------|--------------|------------------|-------------------------|---------------|
| 0 |  | 1 | 41 | 78 | |  | WEATHERED ALLUVIUM / FILL Brownish-red elastic silt (MH) with trace small basalt gravel with roots, very stiff, moist | 29.5 | 91.0 | | | | PP = 4.5+ tsf | |
| | | 2 | 28 | 89 | | | | | 30.5 | | 70 | 33 | PP = 4.5+ tsf | |
| | | 3 | 59 | 67 | | |  | RESIDUAL SOIL Reddish-brown elastic silt (MH) with slight grayish brown mottling, very stiff, moist | 35.2 | 83.1 | | | | PP = 4.5+ tsf |
| | | 4 | 14 | 71 | | | | | 34.0 | | | | | |
| | | | | | | | Boring completed at 7.5 feet below existing ground surface on 06/14/10. | | | | | | | |
| 10 | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | | |

DRAFT

SCHOFIELD BARRACKS UEPH

LOCATION: SCHOFIELD BARRACKS, OAHU, HAWAII
GROUND SURFACE ELEVATION: +/- 923 FEET
GROUNDWATER LEVEL / DATE: NOT ENCOUNTERED
CONTRACTOR: HAWAII TEST BORINGS, INC.
DRILL EQUIP: SIMCO DRILL RIG

LOGGED BY: M. Sohn
HAMMER TYPE: SAFETY
DRILLING METHOD: 4-INCH SOLID STEM AUGER
BOREHOLE BACKFILL: GRAVEL, GROUT

DATE(S) DRILLED: 6-14-10
CHECKED BY: K. Sandefur
HAMMER WEIGHT/DROP: 140 LB / 30 IN

| DEPTH (FT) | SAMPLE TYPE | SAMPLE NO. | SAMPLING RESISTENCE | RECOVERY, % | RQD, % | GRAPHIC LOG | DESCRIPTION | WATER CONTENT, % | DRY UNIT WEIGHT, pcf | UCS, psf | LIQUID LIMIT | PLASTICITY INDEX | OTHER TESTS AND REMARKS | |
|------------|-------------|------------|---------------------|-------------|--------|-------------|---|---|----------------------|----------|--------------|------------------|-------------------------|--|
| 0 | | 1 | 14 | 72 | | | FILL Brown and light brown elastic silt (MH) with some coral and basalt gravel and trace sand with roots, stiff, moist | 35.2 | 71.5 | | | | PP = 4.5+ tsf Swell | |
| | | 2 | 9 | 71 | | | | | 32.4 | | 74 | 35 | PP = 4.5+ tsf | |
| | | 3 | 49 | 100 | | | | WEATHERED ALLUVIUM / FILL Reddish-brown elastic silt (MH) with small basalt gravel and some roots, very stiff, moist | 41.2 | 64.2 | | | | |
| | | 4 | 39 | 100 | | | | becomes dark brown, hard | 27.3 | | | | | |
| 7.5 | | | | | | | Boring completed at 7.5 feet below existing ground surface on 06/14/10. | | | | | | | |

DRAFT

SCHOFIELD BARRACKS UEPH

LOCATION: SCHOFIELD BARRACKS, OAHU, HAWAII
GROUND SURFACE ELEVATION: +/- 917 FEET
GROUNDWATER LEVEL / DATE: NOT ENCOUNTERED
CONTRACTOR: HAWAII TEST BORINGS, INC.
DRILL EQUIP: SIMCO DRILL RIG

DATE(S) DRILLED: 6-14-10 TO 6-15-10
CHECKED BY: K. Sandefur
HAMMER WEIGHT/DROP: 140 LB / 30 IN

LOGGED BY: M. Sohn and A. Luke
HAMMER TYPE: SAFETY
DRILLING METHOD: 4-INCH SOLID STEM AUGER
BOREHOLE BACKFILL: GRAVEL, GROUT

| DEPTH (FT) | SAMPLE TYPE | SAMPLE NO. | SAMPLING RESISTANCE | RECOVERY, % | RQD, % | GRAPHIC LOG | DESCRIPTION | WATER CONTENT, % | DRY UNIT WEIGHT, pcf | UCS, psf | LIQUID LIMIT | PLASTICITY INDEX | OTHER TESTS AND REMARKS |
|------------|-------------|------------|---------------------|-------------|--------|-------------|---|------------------|----------------------|----------|--------------|------------------|---|
| 0 | | | | | | | FILL | | | | | | |
| | | 1 | 59 | 78 | | | Brown elastic silt (MH) with coral and basalt gravel and sand, and fine roots, fine, very stiff, moist | 19.9 | 89.3 | | | | |
| | | 2 | 22 | 100 | | | becomes reddish brown, with less gravel and roots | 26.4 | | | | | |
| 5 | | 3 | 103 @ 10" | 100 | | | WEATHERED ALLUVIUM / FILL | 30.7 | 78.9 | | | | sampler refusal, 45 blows for final 4 inches, Swell |
| | | 4 | 55 | 96 | | | Reddish-brown elastic silt (MH) with some small basalt gravel, hard, moist with probable cobbles and boulders with some fine roots, hard | 27.1 | | 70 | 35 | | |
| 10 | | 5 | 95 | 100 | | | RESIDUAL SOIL | | | | | | PP = 4.5+ tsf |
| | | 6 | 25 | 96 | | | Reddish-brown elastic silt (MH) with some red mottling, hard, moist with some roots, very stiff | 30.7 | | | | | PP = 4.5+ tsf |
| 15 | | 7 | 48 | 100 | | | becomes brown, stiff | | | | | | PP = 1.5 tsf |
| | | 8 | 11 | 88 | | | EXTREMELY TO HIGHLY WEATHERED BASALT (SAPROLITE) | 30.9 | | | | | PP = 1.5 tsf |
| | | 9 | 42 | 100 | | | Mottled yellowish and grayish brown elastic silt (MH) with some sand, stiff, moist | | | | | | |
| 20 | | 10 | 17 | 79 | | | grayish brown mottled with gray, yellowish brown and red speckels, very stiff | | | | | | PP = 4.5+ tsf |
| | | 11 | 37 | 53 | | | layers or pockets of brownish red and mottled gray, very stiff | 40.8 | | | | | PP = 2.0 tsf |
| 25 | | 12 | 12 | 83 | | | Dark reddish brown mottled with some yellow spots | X | X | | | | PP = 3.5 tsf DS |
| | | | | | | | light reddish brown mottled with yellow brown, medium stiff to stiff | 33.3 | | | | | PP = 3.0 tsf Paused on 6/14/10 Resumed on 6/15/10 |
| 30 | | | | | | | | | | | | | |

DRAFT

SCHOFIELD BARRACKS UEPH

LOCATION: SCHOFIELD BARRACKS, OAHU, HAWAII
GROUND SURFACE ELEVATION: +/- 917 FEET
GROUNDWATER LEVEL / DATE: NOT ENCOUNTERED
CONTRACTOR: HAWAII TEST BORINGS, INC.
DRILL EQUIP: SIMCO DRILL RIG

DATE(S) DRILLED: 6-14-10 TO 6-15-10
LOGGED BY: M. Sohn and A. Luke
HAMMER TYPE: SAFETY
DRILLING METHOD: 4-INCH SOLID STEM AUGER
BOREHOLE BACKFILL: GRAVEL, GROUT
CHECKED BY: K. Sandefur
HAMMER WEIGHT/DROP: 140 LB / 30 IN

| DEPTH (FT) | SAMPLE TYPE | SAMPLE NO. | SAMPLING RESISTANCE | RECOVERY, % | RQD, % | GRAPHIC LOG | DESCRIPTION | WATER CONTENT, % | DRY UNIT WEIGHT, pcf | UCS, psf | LIQUID LIMIT | PLASTICITY INDEX | OTHER TESTS AND REMARKS |
|------------|-------------|------------|---------------------|-------------|--------|-------------|--|------------------|----------------------|----------|--------------|------------------|-------------------------|
| 30 | | 13 | 26 | 56 | | | Dark reddish-brown elastic silt (MH) mottled with yellowish-brown, very stiff, moist | 35.8 | 79.8 | | | | |
| | | 14 | 8 | 46 | | | mottled grayish brown, orange brown and yellowish orange, medium stiff to stiff | 42.7 | | | | | PP = 2.0 tsf |
| 35 | | 15 | 20 | 33 | | | mottled purple, orange and yellowish brown with trace gray spots, stiff | 52.5 | 61.6 | | | | PP = 3.5 tsf |
| | | 16 | 8 | 50 | | | purple mottled with brown, gray and orange, medium stiff to stiff | 47.0 | | | | | PP = 2.5 tsf |
| 40 | | 17 | 73 | 100 | | | mottled with brown, orange, yellow, and red with gray seams, hard, moist | 49.2 | 73.0 | | | | PP = 3.25 tsf |
| | | 18 | 33 | 88 | | | pockets or layers of mottled purple and mottled orangish brown, very stiff | 37.8 | | | | | |
| 45 | | | | | | | Boring completed at 43.5 feet below existing ground surface on 06/15/10. | | | | | | |
| 50 | | | | | | | | | | | | | |
| 55 | | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | | |

DRAFT

LOCATION: SCHOFIELD BARRACKS, OAHU, HAWAII
GROUND SURFACE ELEVATION: +/- 917 FEET
GROUNDWATER LEVEL / DATE: NOT ENCOUNTERED
CONTRACTOR: HAWAII TEST BORINGS, INC.
DRILL EQUIP: SIMCO DRILL RIG

DATE(S) DRILLED: 6-15-10 TO 6-16-10
CHECKED BY: K. Sandefur
HAMMER WEIGHT/DROP: 140 LB / 30 IN

LOGGED BY: M. Sohn and A. Luke
HAMMER TYPE: SAFETY
DRILLING METHOD: 4-INCH SOLID STEM AUGER
BOREHOLE BACKFILL: GRAVEL, GROUT

| DEPTH (FT) | SAMPLE TYPE | SAMPLE NO. | SAMPLING RESISTANCE | RECOVERY, % | RQD, % | GRAPHIC LOG | DESCRIPTION | WATER CONTENT, % | DRY UNIT WEIGHT, pcf | UCS, psf | LIQUID LIMIT | PLASTICITY INDEX | OTHER TESTS AND REMARKS |
|------------|-------------|------------|---------------------|-------------|--------|-------------|---|------------------|----------------------|----------|--------------|------------------|---|
| 0 | | 1 | 65 | 100 | | | WEATHERED ALLUVIUM / FILL brownish-red elastic silt (MH) with trace white sand and gravel with large and small roots, very stiff to hard, moist | 25.0 | 75.1 | | | | PP = 4.5+ tsf Swell |
| 1.5 | | 2 | 48 | 100 | | | with some coarse sand to small gravel sized basalt | 28.6 | | | | | PP = 4.5+ tsf |
| 3 | | 3 | 136 @ 9" | 100 | | | RESIDUAL SOIL reddish-brown elastic silt (MH) with probable cobbles and boulders, hard, moist | 29.5 | 80.1 | 7,764 | | | PP = 4.5+ tsf Sampler refusal, 47 blows for final 3 inches |
| 3.5 | | 4 | 66 | 89 | | | EXTREMELY TO HIGHLY WEATHERED BASALT (SAPROLITE) mottled yellowish-brown and reddish-brown elastic silt (MH), with cobbles and boulders, hard, moist | 28.0 | | | | | Sampler refusal, auger grinding and refusal. Move boring 3 feet eastward and continue exploration |
| 5 | | 5 | 130 @ 8.5" | 83 | | | reddish-brown mottled with grayish brown with probable cobbles and boulders, hard | 28.1 | 82.2 | | 84 | 46 | Sampler refusal, 51 blows for final 2.5" |
| 5.5 | | 6 | 45 | 92 | | | brown with trace red, gray and white | 30.4 | | | | | PP = 4.5+ tsf |
| 7 | | 7 | 106 | 100 | | | brown | 32.8 | 80.5 | | | | PP = 4.5+ tsf CON |
| 7.5 | | 8 | 10 | 77 | | | pockets or layers of brown and reddish brown, stiff | 37.5 | | | | | |
| 9 | | 9 | 69 | 53 | | | brown mottled with brownish-gray, some red, yellow-orange and black spots, hard | | | | | | PP = 4.5+ tsf |
| 9.5 | | 10 | 9 | 88 | | | brown mottled with orange-brown, light brown and brownish red, stiff | 42.2 | | | | | |
| 11 | | 11 | 32 | 61 | | | reddish-brown mottled with yellowish orange spots, very stiff | | | | | | |
| 11.5 | | 12 | 20 | 96 | | | purple-brown, mottled with yellowish brown with yellowish-orange and gray spots, very stiff | 42.2 | | | | | |

DRAFT

SCHOFIELD BARRACKS UEPH

LOCATION: SCHOFIELD BARRACKS, OAHU, HAWAII
GROUND SURFACE ELEVATION: +/- 917 FEET
GROUNDWATER LEVEL / DATE: NOT ENCOUNTERED
CONTRACTOR: HAWAII TEST BORINGS, INC.
DRILL EQUIP: SIMCO DRILL RIG

LOGGED BY: M. Sohn and A. Luke
HAMMER TYPE: SAFETY
DRILLING METHOD: 4-INCH SOLID STEM AUGER
BOREHOLE BACKFILL: GRAVEL, GROUT

DATE(S) DRILLED: 6-15-10 TO 6-16-10
CHECKED BY: K. Sandefur
HAMMER WEIGHT/DROP: 140 LB / 30 IN

| DEPTH (FT) | SAMPLE TYPE | SAMPLE NO. | SAMPLING RESISTENCE | RECOVERY, % | RQD, % | GRAPHIC LOG | DESCRIPTION | WATER CONTENT, % | DRY UNIT WEIGHT, pcf | UCS, psf | LIQUID LIMIT | PLASTICITY INDEX | OTHER TESTS AND REMARKS |
|------------|-------------|------------|---------------------|-------------|--------|-------------|---|------------------|----------------------|----------|--------------|------------------|-------------------------|
| 30 | | 13 | 53 | 94 | | | Brown elastic silt (MH) mottled with trace yellow, orange and gray spots, very stiff, moist | X | X | | | | PP = 3.5 tsf CON |
| | | 14 | 19 | 79 | | | mottled reddish brown, orange-brown, yellow-brown, gray brown, black and brown, with wet pockets or zones | 56.6 | | | | | PP = 2.0 tsf |
| 35 | | 15 | 76 | 100 | | | mottled gray brown, yellow brown, purple and brownish red, hard, moist | 47.6 | 74.0 | | | | PP = 4.5+ tsf |
| | | 16 | 13 | 67 | | | stiff | 49.9 | | | | | PP = 3 tsf |
| 40 | | 17 | 38 | 61 | | | with gray seams | 56.3 | 64.8 | X | | | PP = 1.5 tsf |
| | | 18 | 24 | 50 | | | | 50.8 | | | | | PP = 3 tsf |
| 45 | | | | | | | Boring completed at 43.5 feet below existing ground surface on 06/16/10. | | | | | | |
| 50 | | | | | | | | | | | | | |
| 55 | | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | | |

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Date Printed: 7/12/2010

FIGURE A-7
Monday, November 29, 2010

LOCATION: SCHOFIELD BARRACKS, OAHU, HAWAII
GROUND SURFACE ELEVATION: +/- 916 FEET
GROUNDWATER LEVEL / DATE: NOT ENCOUNTERED
CONTRACTOR: HAWAII TEST BORINGS, INC.
DRILL EQUIP: SIMCO DRILL RIG

LOGGED BY: A. Luke
HAMMER TYPE: SAFETY
DRILLING METHOD: 4-INCH SOLID STEM AUGER
BOREHOLE BACKFILL: GRAVEL, GROUT, AC PAVEMENT (6 - inch thick)

DATE(S) DRILLED: 6-16-10
CHECKED BY: K. Sandefur
HAMMER WEIGHT/DROP: 140 LB / 30 IN

| DEPTH (FT) | SAMPLE TYPE | SAMPLE NO. | SAMPLING RESISTANCE | RECOVERY, % | RQD, % | GRAPHIC LOG | DESCRIPTION | WATER CONTENT, % | DRY UNIT WEIGHT, pcf | UCS, psf | LIQUID LIMIT | PLASTICITY INDEX | OTHER TESTS AND REMARKS |
|------------|-------------|------------|---------------------|-------------|--------|-------------|--|------------------|----------------------|----------|--------------|------------------|-------------------------|
| 0 | | | | | | | AC PAVEMENT (6 - inch thick) | | | | | | |
| | | 1 | 36 | 42 | | | FILL Reddish-brown elastic silt (MH) with sand and gravel, very stiff, moist | 33.2 | 83.9 | | | | PP = 4.5+ tsf |
| | | 2 | 19 | 73 | | | WEATHERED ALLUVIUM / FILL Dark reddish-brown elastic silt (MH) with some small basalt gravel, very stiff | 32.1 | | | | | PP = 4 tsf |
| | | 3 | 46 | 67 | | | RESIDUAL SOIL Reddish-brown and dark reddish-brown elastic silt (MH), with black streaks, very stiff, moist | 31.0 | 88.7 | 72 | 37 | | PP = 4.5+ tsf |
| | | 4 | 28 | 83 | | | with trace of black and orange mottling, very stiff | 33.6 | | | | | PP = 4.5+ tsf |
| | | 5 | 82 | 100 | | | with trace black streaks, hard | | | | | | PP = 4.5+ tsf |
| | | 6 | 27 | 79 | | | very stiff | 33.1 | | | | | |
| | | 7 | 37 | 75 | | | with some grayish brown mottling with orange speckles, moist, very stiff | | | | | | PP = 4.5+ tsf |
| | | 8 | 19 | 71 | | | EXTREMELY TO HIGHLY WEATHERED BASALT (SAPROLITE) pockets of layers of reddish brown and brown mottled elastic silt (MH) with trace gray speckles, very stiff, moist | 35.5 | | | | | |
| | | 9 | 47 | 64 | | | brownish-red with black streaks, very stiff | 36.7 | | | | | PP = 4.5+ tsf |
| | | 10 | 9 | 83 | | | mottled reddish-brown and gray brown with yellowish brown and orangish brown, stiff | | | | | | |
| | | 11 | 26 | 42 | | | also mottled with red and gray, very stiff | 46.8 | 69.0 | | | | CON |
| | | 12 | 14 | 67 | | | grayish-brown mottled with reddish brown, orange brown and some red, stiff, moist | 50.1 | | | | | PP = 4.5+ tsf |

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Date Printed: 7/12/2010

FIGURE A-8
 Monday, November 29, 2010

SCHOFIELD BARRACKS UEPH

LOCATION: SCHOFIELD BARRACKS, OAHU, HAWAII
GROUND SURFACE ELEVATION: +/- 916 FEET
GROUNDWATER LEVEL / DATE: NOT ENCOUNTERED
CONTRACTOR: HAWAII TEST BORINGS, INC.
DRILL EQUIP: SIMCO DRILL RIG

LOGGED BY: A. Luke
HAMMER TYPE: SAFETY
DRILLING METHOD: 4-INCH SOLID STEM AUGER
BOREHOLE BACKFILL: GRAVEL, GROUT, AC PAVEMENT (6 - inch thick)

DATE(S) DRILLED: 6-16-10
CHECKED BY: K. Sandefur
HAMMER WEIGHT/DROP: 140 LB / 30 IN

| DEPTH (FT) | SAMPLE TYPE | SAMPLE NO. | SAMPLING RESISTANCE | RECOVERY, % | RQD, % | GRAPHIC LOG | DESCRIPTION | WATER CONTENT, % | DRY UNIT WEIGHT, pcf | UCS, psf | LIQUID LIMIT | PLASTICITY INDEX | OTHER TESTS AND REMARKS |
|------------|---|------------|---------------------|-------------|--------|---|---|------------------|----------------------|----------|--------------|------------------|-------------------------|
| 30 |  | 13 | 20 | 44 | |  | Reddish brown elastic silt (MH) mottled with yellow and orange with trace gray speckles, stiff, moist | 48.3 | 61.3 | | | | PP = 4 tsf |
| |  | 14 | 15 | 63 | |  | mottled with purple, orange and yellow, stiff to very stiff | 46.7 | | | | | PP = 3.5 tsf |
| 35 |  | 15 | 30 | 56 | |  | mottled with orange, yellow, gray, red and purple, very stiff | | | | | | PP = 2.5 tsf |
| |  | 16 | 22 | 65 | |  | mottled with brown, orange, red and gray, becomes purple mottled with orange and yellow, some gray speckles | 53.5 | | | | | PP = 3 tsf |
| 40 |  | 17 | 37 | 61 | |  | mottled with red, purple, yellowish gray, orange and black speckles | | | | | | PP = 2.5 tsf |
| |  | 18 | 21 | 65 | |  | mottled with brown, purple, red, grayish yellow and orange | 52.2 | | | | | PP = 3.5 tsf |
| 45 | | | | | | | Boring completed at 43.5 feet below existing ground surface on 06/16/10. | | | | | | |
| 50 | | | | | | | | | | | | | |
| 55 | | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | | |

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APPENDIX B LABORATORY TESTING

To verify field descriptions of the soil samples and classifications, selected soil samples obtained during the field exploration were laboratory tested for moisture content and dry density, Atterberg limits, one-dimensional consolidation, unconfined compressive and direct shear strength and laboratory compaction and CBR tests. The tests and results are described in the following paragraphs.

B.1 MOISTURE CONTENT AND DRY DENSITY

Selected soil samples were tested to measure their moisture contents and dry densities. The tests were performed in accordance with American Society for Testing and Materials (ASTM) Test Method D2216-05. The moisture contents and dry densities are presented on the Log of Borings at the appropriate sample depths.

B.2 ATTERBERG LIMITS (PLASTICITY INDEX)

To assist in classifying the soils, Plasticity Index tests were performed on selected samples. The tests were performed in accordance with ASTM D4318-05. The results are presented in Figures B-1 and also in the Logs of Borings at the appropriate sample depths.

B.3 ONE-DIMENSIONAL CONSOLIDATION TEST

(There tests are on-going and will be include in subsequent report submittal)

The compressibility of a relatively undisturbed soil samples were determined by the performance of one-dimensional consolidation test in accordance with ASTM D2435. The results are presented in Figure B-2 and B-3.

B.4 UNCONFINED COMPRESSIVE STRENGTH TEST

(There tests are on-going and will be include in subsequent report submittal)

The unconfined compressive strength of selected silt samples were determined by the performance of unconfined compressive strength tests in accordance with ASTM D2166. The results are presented in Figure B-4.

B.5 CALIFORNIA BEARING RATIO (CBR)

Laboratory CBR Tests were performed on near surface bulk samples obtained within the parking areas. The tests were performed in accordance with ASTM D1883-07 test procedures. The test results are presented in Figure B-5 and B-6.

B.6 MODIFIED PROCTOR COMPACTION TEST

Modified Proctor Compaction Tests were performed on near surface bulk samples obtained within the parking areas. The tests were performed in accordance with ASTM D1557-07 Method B test procedures. The test results are presented in Figure B-7 and B-8.

B.7 DIRECT SHEAR TEST

(There tests are on-going and will be include in subsequent report submittal)

The Direct Shear Test was performed to determine the consolidated drained shear strength of a soil material in direct shear. The test was performed by deforming a specimen at a controlled strain rate on or near a single shear plane determined by the configuration of the apparatus. Three specimens are tested for each sampled depth, each under a different normal load, to determine the effects of normal stress on shear resistance, displacement and strength properties such as Mohr strength envelopes. The Direct Shear Tests were performed in accordance with ASTM D3080.

B.8 ONE-DIMENSIONAL SWELL POTENTIAL TEST

Swell potential tests were performed on selected samples in general accordance with ASTM D2435 Method A. Selected Samples were allowed to air dry prior to saturation in water. The amount of swell was measured until the time rate of swell slowed. The “final” water content was determined at the end of the test. The test results are presented in the Table B-1 below.

Table B-1: Summary of One-Dimensional Swell Potential Test Results

| Location | Depth (ft) | Initial | | Air Dry | | Final | | Load (psf) | Recorded Swell Potential (%) |
|----------|------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------|------------------------------|
| | | Water Content (%) | Dry Density (pcf) | Water Content (%) | Dry Density (pcf) | Water Content (%) | Dry Density (pcf) | | |
| B-2 | 1.5 | 36.0 | 77.4 | 26.7 | 79.1 | 45.4 | 76.7 | 50 | 3.1 |
| B-3 | 5.5 | 30.7 | 80.2 | 23.5 | 81.5 | 44.2 | 80.4 | 50 | 1.3 |
| B-3 | 5.5 | 30.7 | 78.9 | 30.7 | 78.9 | 45.0 | 79.1 | 50 | 0 |
| B-4 | 1.5 | 25.0 | 75.1 | 19.1 | 76.2 | 44.3 | 75.8 | 150 | 0.5 |
| B-4 | 1.5 | 26.0 | 72.2 | 26.0 | 72.2 | 44.8 | 72.8 | 150 | 0 |

B.9 EXPANSION INDEX TEST

The expansion potential test was performed in general accordance with ASTM D4829-03. Soil specimens were compacted into a metal ring to obtain a degree of saturation between 40 and 60 %. A vertical confining pressure of 1 psi is applied and the compacted sample is inundated with distilled water. The deformation is recorded for 24 hours or until the rate of deformation became less than 0.005 mm/h, whichever occurred first. For samples compacted to 50% saturated, the expansion index is calculated as follows:

$$EI_{meas} = \frac{\Delta H}{H_i} \times 1000 \quad \text{where: } EI_{meas} = \text{measured expansion index}$$

$$\Delta H = \text{change in height}$$

$$H_i = \text{initial height}$$

For samples compacted between 40% and 60%, the expansion index at 50% saturation is corrected using the following equation:

$$EI_{50} = EI_{meas} - (50 - S_{meas}) \frac{65 + EI_{meas}}{220 - S_{meas}} \quad \text{where: } EI_{50} = \text{estimate of expansion index at 50\% initial saturation}$$

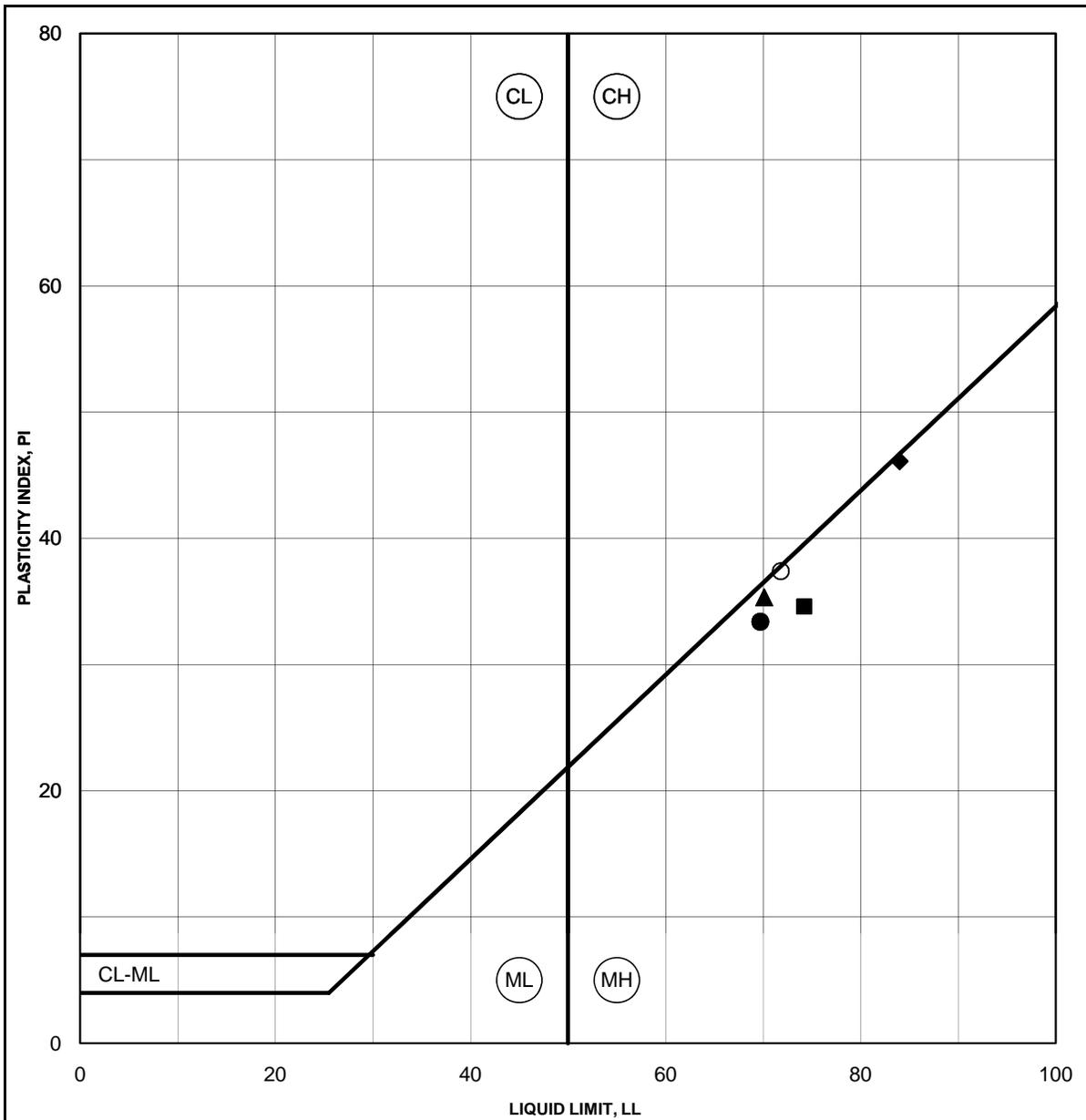
$$S_{meas} = \text{measured initial saturation, \%}$$

The results are presented in the Table B-2 below.

Table B-2: Summary of Expansion Potential Test Results

| Combined Sample Boring Depth (in) | Initial Moisture Content (w, %) | Moisture Content During EI Test (w, %) | Final Moisture Content (w, %) | Degree of Saturation (S, %) | Expansion Index, Measured (EI _{meas}) | Expansion Index at S=50 (EI ₅₀) | Expansion Potential |
|-----------------------------------|---------------------------------|--|-------------------------------|-----------------------------|---|---|---------------------|
| B-3 36.0 | 29.2 | 19 | .8 | 42.3 | 50.7 | 41.1 | 41.5 |
| B-4 36.0 | | | | | | | |
| B-5 42.0 | | | | | | | |
| | | | | | | | LOW |

Refer to ASTM 48269 for further discussion of the Expansion potential.



| Boring | Depth (ft) | LL % | PL % | PI % | Classification | |
|--------|------------|------|------|------|----------------|---|
| ● | B-1 | 3.0 | 70 | 36 | 33 | Weathered Alluvium / Fill : Elastic Silt (MH) |
| ■ | B-2 | 3.0 | 74 | 40 | 35 | Weathered Alluvium / Fill : Elastic Silt (MH) |
| ▲ | B-3 | 7.5 | 70 | 35 | 35 | |
| ◆ | B-4 | 11.0 | 84 | 38 | 46 | Saprolite : Elastic Silt (MH) |
| ○ | B-5 | 5.5 | 72 | 34 | 37 | Residual Soil : Elastic Silt (MH) |

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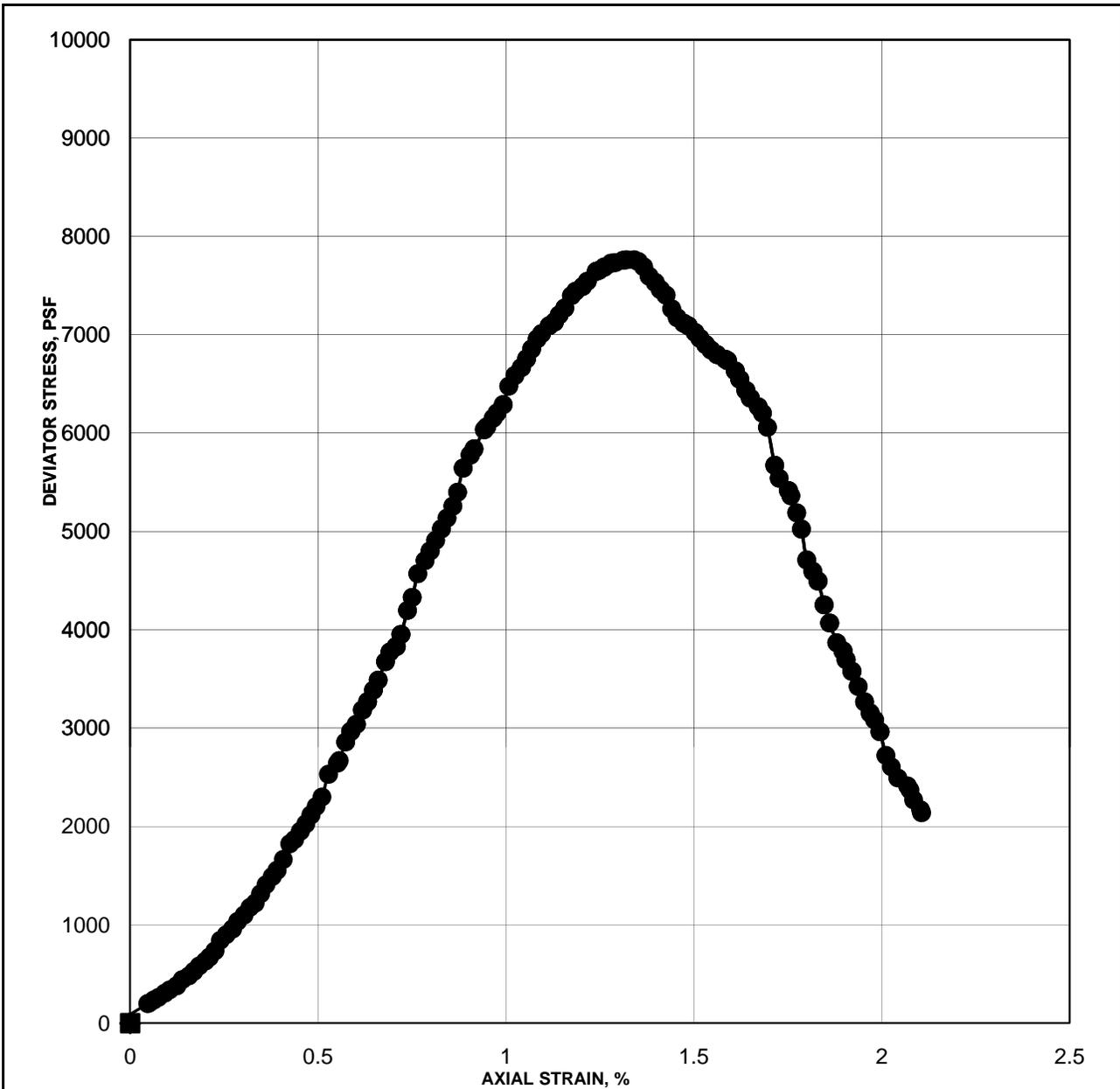
Location: Schofield Barracks, Oahu, Hawaii

Project Number: 10007

PLASTICITY CHART

FIGURE B-1





| Boring | Depth (ft) | Description | Nu | w _o (%) | γ _d (pcf) | ε _r (%) | UCS (psf) | |
|--------|------------|-------------|---|--------------------|----------------------|--------------------|-----------|------|
| ● | B-4 | 5.5 | Residual Soil: Brown elastic silt with some tan specks (MH) | 136 | 29.5 | 80.1 | 1.00 | 7764 |
| ■ | B- | 0.0 | | | | 0.00 | #DIV/0! | |
| ◇ | B- | 0.0 | | | | 2.11 | #DIV/0! | |
| ○ | B- | 0.0 | | | | 2.00 | #DIV/0! | |
| □ | B- | 0.0 | | | | 2.11 | #DIV/0! | |

Project: FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks

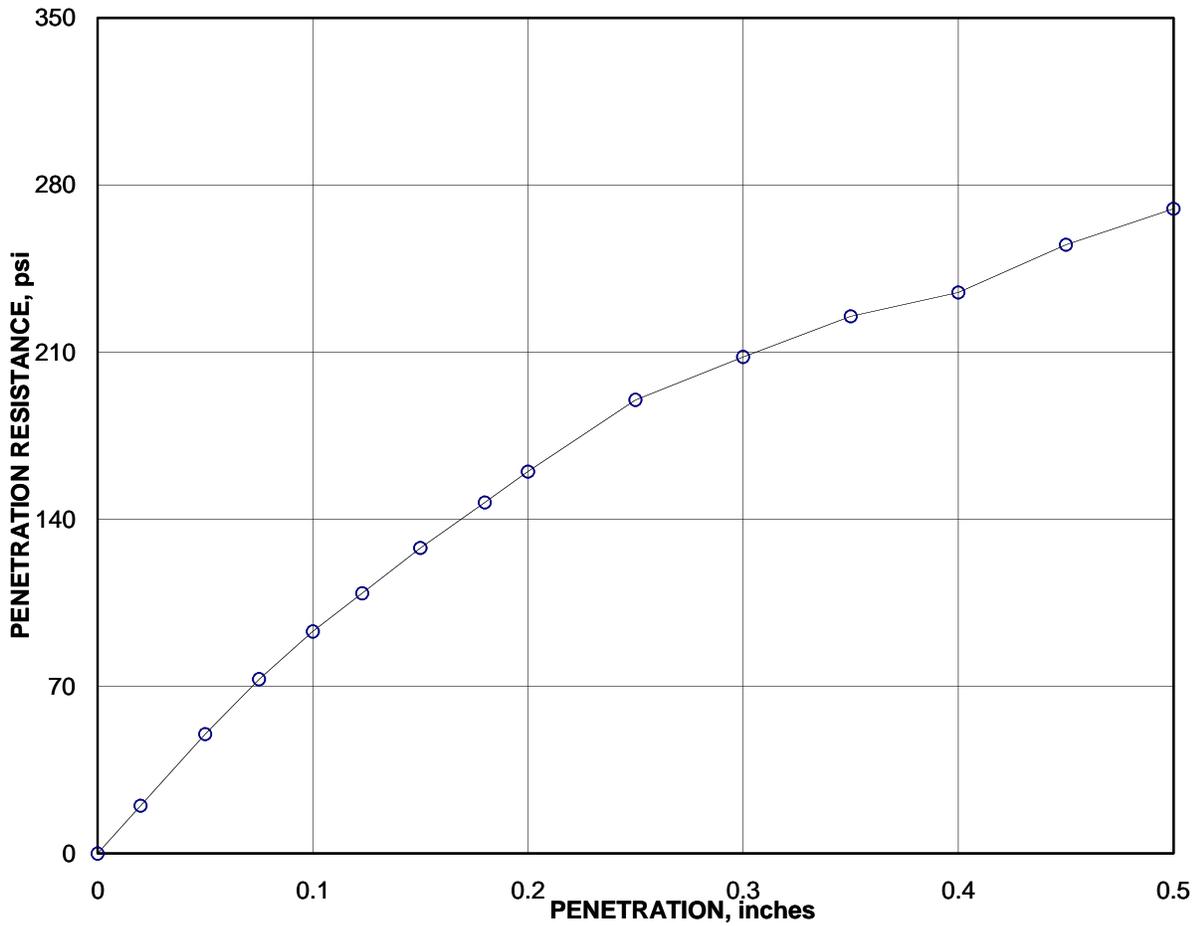
Location: Schofield Barracks, Oahu, Hawaii

Project Number: 10007

UNCONFINED COMPRESSION STRENGTH

FIGURE B-2





ASTM TEST SPECIFICATION: D 1883-07 Standard Test Method for CBR of Laboratory-Compacted Soil

| | | |
|--------------------|---|----------------------------|
| Boring | B-1 | Depth, 12 - 18 inch |
| Description | Weathered Alluvium / Fill: Reddish Brown Elastic Silt (MH) | |

| | |
|---|---|
| Modified Maximum Dry Density (ASTM D1557-07) (γ_{dmax} , pcf) | Optimum Moisture Content (w_{opt} , %) |
| 93.0 | 29.8 |

| Test No. | | 1 | 2 | 3 |
|----------------------------|---------------------|-------|---|---|
| Initial | Moisture Content, % | 29.4 | | |
| | Dry Density, pcf | 90.7 | | |
| Final | Moisture Content, % | 30.7 | | |
| | Dry Density, pcf | 89.8 | | |
| Linearity Correction (in.) | | 0.000 | | |
| Surcharge Weight, lbs | | 10 | | |
| Total Swell, % | | 1.0 | | |
| CBR Value @ 0.1" | | 9.2 | | |
| CBR Value @ 0.2" | | 10.8 | | |

Project: FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks

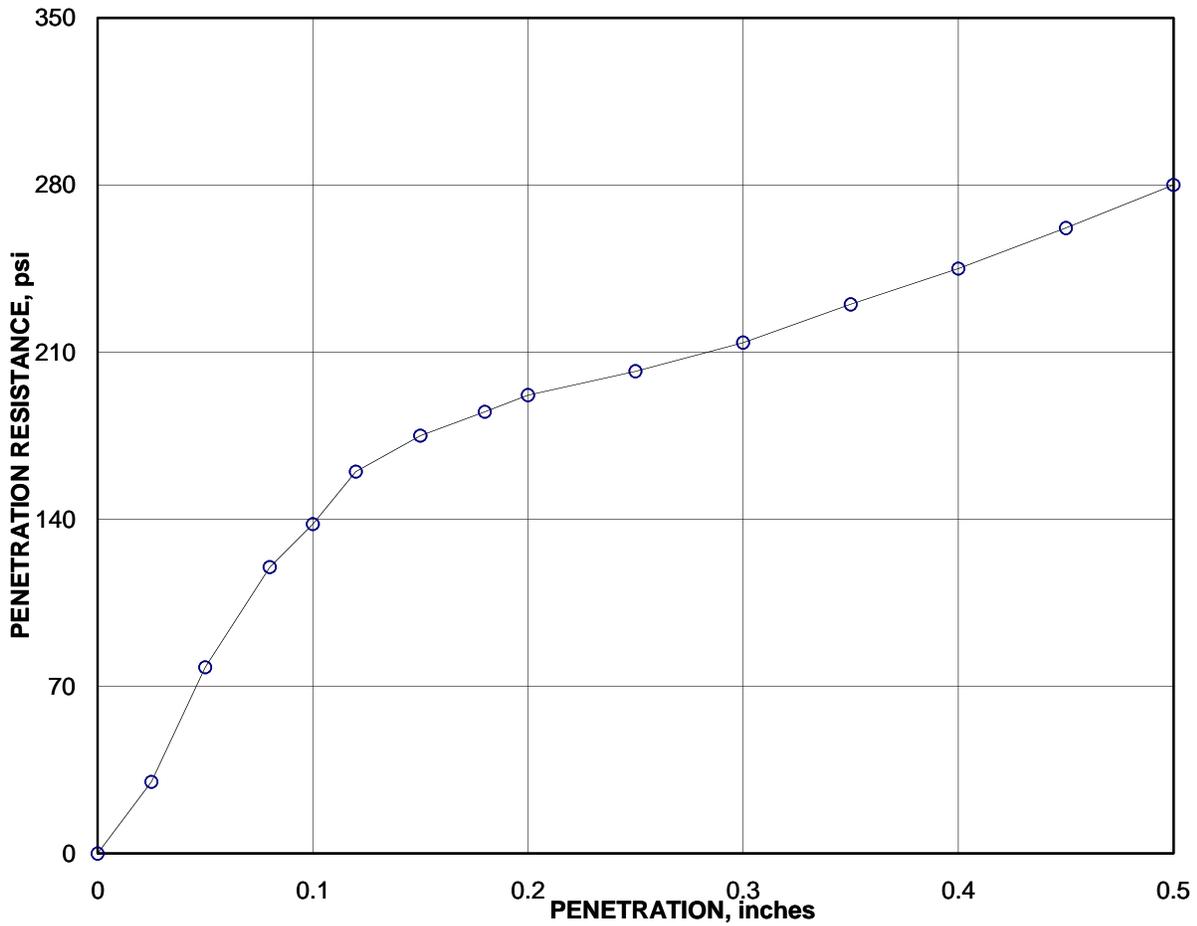
Location: Schofield Barracks, Oahu, Hawaii

Project Number: 10007

LABORATORY CBR TEST

FIGURE B-3





ASTM TEST SPECIFICATION: D 1883-07 Standard Test Method for CBR of Laboratory-Compacted Soil

| | | |
|--------------------|---------------------------------------|----------------------------|
| Boring | B-2 | Depth, 12 - 18 inch |
| Description | Fill: Reddish Brown Elastic Silt (MH) | |

| | |
|---|---|
| Modified Maximum Dry Density (ASTM D1557-07) (γ_{dmax} , pcf) | Optimum Moisture Content (w_{opt} , %) |
| 93.6 | 27.0 |

| Test No. | | 1 | 2 | 3 |
|----------------------------|---------------------|-------|---|---|
| Initial | Moisture Content, % | 26.3 | | |
| | Dry Density, pcf | 92.1 | | |
| Final | Moisture Content, % | 28.0 | | |
| | Dry Density, pcf | 91.0 | | |
| Linearity Correction (in.) | | 0.000 | | |
| Surcharge Weight, lbs | | 10 | | |
| Total Swell, % | | 1.2 | | |
| CBR Value @ 0.1" | | 14.4 | | |
| CBR Value @ 0.2" | | 12.6 | | |

Project: FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks

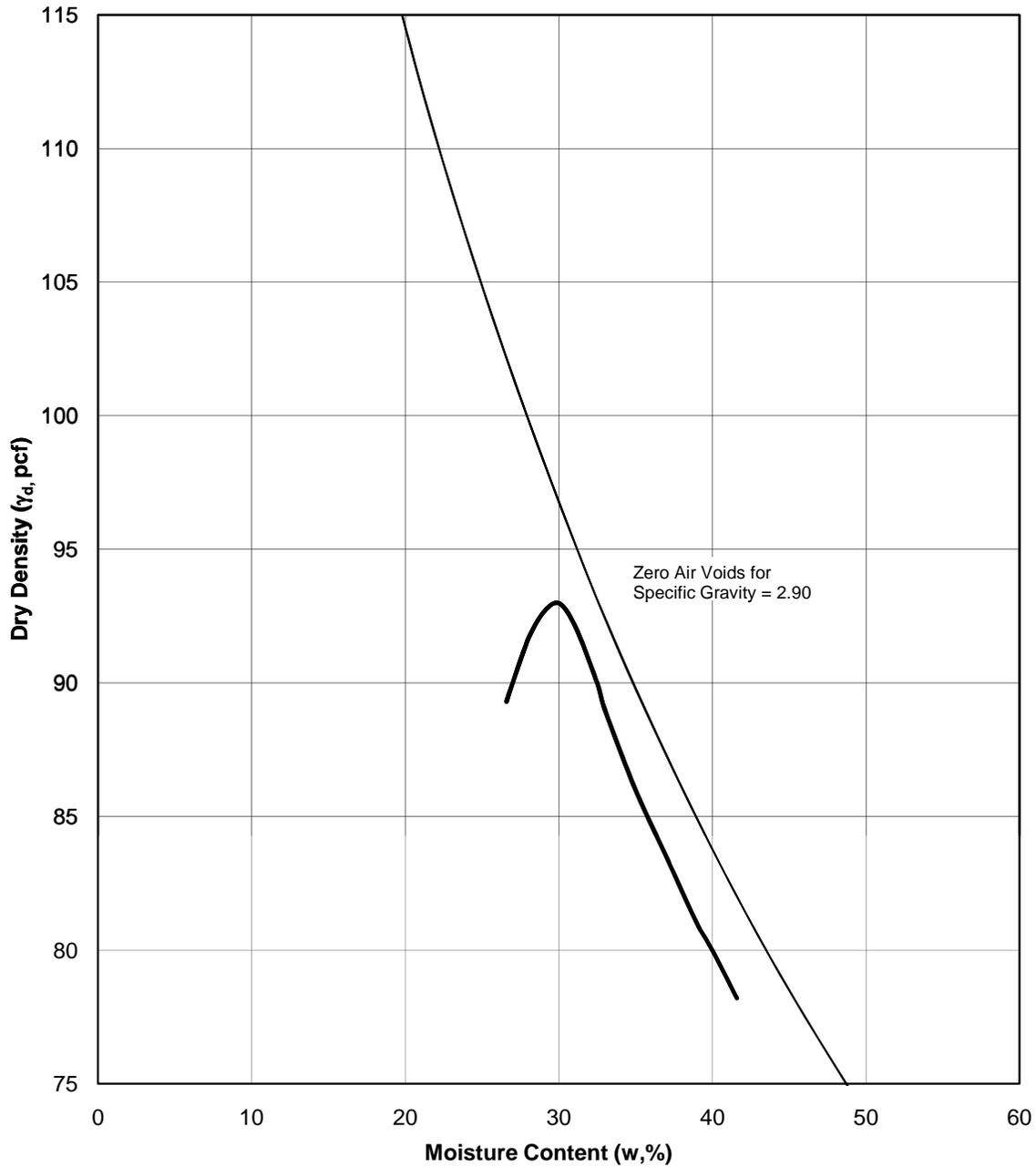
Location: Schofield Barracks, Oahu, Hawaii

Project Number: 10007

LABORATORY CBR TEST

FIGURE B-4





ASTM TEST SPECIFICATION: D 1557-07 Method B MODIFIED

| Boring Location / Depth | CLASSIFICATION | | PLASTICITY | | Specific Gravity | TEST RESULTS | |
|-------------------------|----------------|--------|------------|--------|------------------|--|---|
| | USCS | AASHTO | LL (%) | PI (%) | | Maximum Dry Density (γ_{dmax} , pcf) | Optimum Moisture Content (w_{opt} , %) |
| B-1 / 12 - 18" | MH | - | - | - | 2.90 | 93.0 | 29.8 |

Project: FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks

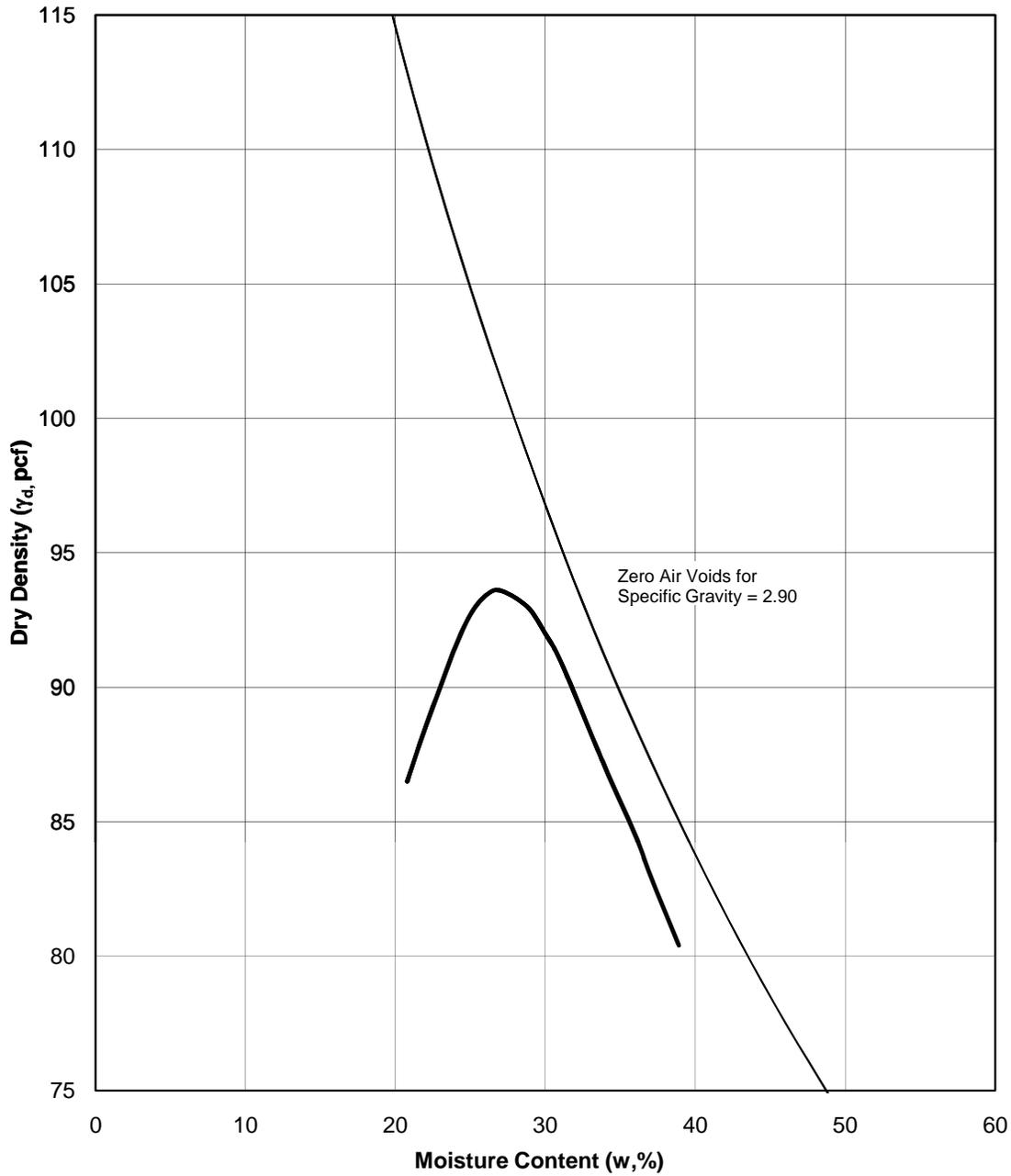
Location: Schofield Barracks, Oahu, Hawaii

MODIFIED PROCTOR COMPACTION TEST

Project Number: 10007



FIGURE B-5



ASTM TEST SPECIFICATION: D 1557-07 Method B MODIFIED

| Boring Location / Depth | CLASSIFICATION | | PLASTICITY | | Specific Gravity | TEST RESULTS | |
|-------------------------|----------------|--------|------------|--------|------------------|--|---|
| | USCS | AASHTO | LL (%) | PI (%) | | Maximum Dry Density (γ_{dmax} , pcf) | Optimum Moisture Content (w_{opt} , %) |
| B-2 / 12 - 18" | MH | - | - | - | 2.90 | 93.6 | 27.0 |

Project: FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks

Location: Schofield Barracks, Oahu, Hawaii

MODIFIED PROCTOR COMPACTION TEST

Project Number: 10007



FIGURE B-6

APPENDIX C

PHOTOGRAPHS OF SELECTED SOIL SAMPLES

(ADDITIONAL PHOTOGRAPHS INCLUDED ON CD COPY)



B-1, Sample 1, Depth 0.5' to 2'



B-1, Sample 1, Depth 0.5' to 2'



B-1, Sample 2, Depth 2' to 4'



B-1, Sample 2, Depth 2' to 4'



B-1, Sample 3, Depth 4' to 5.5'



B-1, Sample 4, Depth 5.5' to 7.5'

BORING B-1: SAMPLE PHOTOS

Project Name: FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks

Location: Schofield Barracks, Oahu, Hawaii

Project No.10007



FIGURE C-1



B-2, Sample 1, Depth 0.5' to 2'



B-2, Sample 1, Depth 0.5' to 2'



B-2, Sample 2, Depth 2' to 4'



B-2, Sample 2, Depth 2' to 4'



B-2, Sample 3, Depth 4' to 5.5'



B-2, Sample 4, Depth 5.5' to 7.5'

BORING B-2: SAMPLE PHOTOS

Project Name: FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks

Location: Schofield Barracks, Oahu, Hawaii

Project No.10007



FIGURE C-2



B-3, Sample 1, Depth 1' to 2.5'



B-3, Sample 2, Depth 2.5' to 4'



B-3, Sample 2, Depth 2.5' to 4'



B-3, Sample 3, Depth 5' to 6.5'



B-3, Sample 4, Depth 6.5' to 8.5'



B-3, Sample 4, Depth 6.5' to 8.5'

BORING B-3: SAMPLE PHOTOS

Project Name: FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks

Location: Schofield Barracks, Oahu, Hawaii

Project No.10007



FIGURE C-3



B-3, Sample 4, Depth 6.5' to 8.5'



B-3, Sample 5, Depth 10' to 11.5'



B-3, Sample 6, Depth 11.5' to 13.5'



B-3, Sample 6, Depth 11.5 to 13.5'



B-3, Sample 7, Depth 15' to 16.5'



B-3, Sample 8, Depth 16.5' to 18.5'

BORING B-3: SAMPLE PHOTOS

Project Name: FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks

Location: Schofield Barracks, Oahu, Hawaii

Project No.10007



FIGURE C-4



B-3, Sample 8, Depth 16.5' to 18.5'



B-3, Sample 8, Depth 16.5' to 18.5'



B-3, Sample 9, Depth 20' to 21.5'



B-3, Sample 9, Depth 20' to 21.5'



B-3, Sample 10, Depth 21.5' to 23.5'



B-3, Sample 10, Depth 21.5' to 23.5'

BORING B-3: SAMPLE PHOTOS

Project Name: FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks

Location: Schofield Barracks, Oahu, Hawaii

Project No.10007



FIGURE C-5



B-3, Sample 10, Depth 21.5' to 23.5'



B-3, Sample 11, Depth 25' to 26.5'



B-3, Sample 12, Depth 26.5' to 28.5'



B-3, Sample 12, Depth 26.5' to 28.5'



B-3, Sample 12, Depth 26.5' to 28.5'



B-3, Sample 13, Depth 30' to 31.5'

BORING B-3: SAMPLE PHOTOS

Project Name: FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks

Location: Schofield Barracks, Oahu, Hawaii

Project No.10007



FIGURE C-6



B-3, Sample 14, Depth 31.5' to 33.5'



B-3, Sample 14, Depth 31.5' to 33.5'



B-3, Sample 14, Depth 31.5' to 33.5'



B-3, Sample 15, Depth 35' to 36.5'



B-3, Sample 16, Depth 36.5' to 38.5'



B-3, Sample 16, Depth 36.5' to 38.5'

BORING B-3: SAMPLE PHOTOS

Project Name: FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks

Location: Schofield Barracks, Oahu, Hawaii

Project No.10007



FIGURE C-7



B-3, Sample 17, Depth 40' to 41.5'



B-3, Sample 17, Depth 40' to 41.5'



B-3, Sample 17, Depth 40' to 41.5'



B-3, Sample 18, Depth 41.5' to 43.5'



B-3, Sample 18, Depth 41.5' to 43.5'



B-3, Sample 18, Depth 41.5' to 43.5'. Boring

BORING B-3: SAMPLE PHOTOS

Project Name: FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks

Location: Schofield Barracks, Oahu, Hawaii

Project No.10007



FIGURE C-8



B-4, Sample 1, Depth 1' to 2.5'. First sample



B-4, Sample 1, Depth 1' to 2.5'



B-4, Sample 2, Depth 2.5' to 4.5'



B-4, Sample 2, Depth 2.5' to 4.5'



B-4, Sample 2, Depth 2.5' to 4.5'



B-4, Sample 2, Depth 2.5' to 4.5'

BORING B-4: SAMPLE PHOTOS

Project Name: FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks

Location: Schofield Barracks, Oahu, Hawaii

Project No.10007



FIGURE C-9



B-4, Sample 3, Depth 5' to 6.5'



B-4, Sample 3, Depth 5' to 6.5'



B-4, Sample 4, Depth 6.5' to 8.5'



B-4, Sample 4, Depth 6.5' to 8.5'



B-4, Sample 5, Depth 10' to 11.5'



B-4, Sample 5, Depth 10' to 11.5'

BORING B-4: SAMPLE PHOTOS

Project Name: FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks

Location: Schofield Barracks, Oahu, Hawaii

Project No.10007



FIGURE C-10



B-4, Sample 6, Depth 11.5' to 13.5'



B-4, Sample 6, Depth 11.5' to 13.5'



B-4, Sample 6, Depth 11.5' to 13.5'



B-4, Sample 7, Depth 15' to 16.5'



B-4, Sample 7, Depth 15' to 16.5'



B-4, Sample 8, Depth 16.5' to 18.5'

BORING B-4: SAMPLE PHOTOS

Project Name: FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks

Location: Schofield Barracks, Oahu, Hawaii

Project No.10007



FIGURE C-11



B-4, Sample 8, Depth 16.5' to 18.5'



B-4, Sample 8, Depth 16.5' to 18.5'



B-4, Sample 9, Depth 20' to 21.5'



B-4, Sample 9, Depth 20' to 21.5'



B-4, Sample 10, Depth 21.5' to 23.5'



B-4, Sample 10, Depth 21.5' to 23.5'

BORING B-4: SAMPLE PHOTOS

Project Name: FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks

Location: Schofield Barracks, Oahu, Hawaii

Project No.10007



FIGURE C-12



B-4, Sample 10, Depth 21.5' to 23.5'



B-4, Sample 11, Depth 25' to 26.5'



B-4, Sample 11, Depth 25' to 26.5'



B-4, Sample 12, Depth 26.5' to 28.5'



B-4, Sample 12, Depth 26.5' to 28.5'



B-4, Sample 12, Depth 26.5' to 28.5'

BORING B-4: SAMPLE PHOTOS

Project Name: FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks

Location: Schofield Barracks, Oahu, Hawaii

Project No.10007



FIGURE C-13



B-4, Sample 12, Depth 26.5' to 28.5'



B-4, Sample 13, Depth 30' to 31.5'



B-4, Sample 14, Depth 31.5' to 33.5'



B-4, Sample 14, Depth 31.5' to 33.5'. Boring



B-4, Sample 15, Depth 35' to 36.5'



B-4, Sample 15, Depth 35' to 36.5'

BORING B-4: SAMPLE PHOTOS

Project Name: FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks

Location: Schofield Barracks, Oahu, Hawaii

Project No.10007



FIGURE C-14



B-4, Sample 16, Depth 36.5' to 38.5'



B-4, Sample 16, Depth 36.5' to 38.5'



B-4, Sample 17, Depth 40' to 41.5'



B-4, Sample 17, Depth 40' to 41.5'



B-4, Sample 18, Depth 41.5' to 43.5'



B-4, Sample 18, Depth 41.5' to 43.5'

BORING B-4: SAMPLE PHOTOS

Project Name: FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks

Location: Schofield Barracks, Oahu, Hawaii

Project No.10007



FIGURE C-15



B-5, Sample 1, Depth 1' to 2.5'



B-5, Sample 1, Depth 1' to 2.5'



B-5, Sample 2, Depth 2.5' to 4.5'



B-5, Sample 2, Depth 2.5' to 4.5'



B-5, Sample 3, Depth 5' to 6.5'



B-5, Sample 4, Depth 6.5' to 8.5'

BORING B-5: SAMPLE PHOTOS

Project Name: FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks

Location: Schofield Barracks, Oahu, Hawaii

Project No.10007



FIGURE C-16



B-5, Sample 4, Depth 6.5' to 8.5'



B-5, Sample 4, Depth 6.5' to 8.5'



B-5, Sample 5, Depth 10' to 11.5'



B-5, Sample 5, Depth 10' to 11.5'



B-5, Sample 6, Depth 11.5' to 13.5'



B-5, Sample 6, Depth 11.5' to 13.5'

BORING B-5: SAMPLE PHOTOS

Project Name: FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks

Location: Schofield Barracks, Oahu, Hawaii

Project No.10007



FIGURE C-17



B-5, Sample 6, Depth 11.5' to 13.5'



B-5, Sample 7, Depth 15' to 16.5'



B-5, Sample 7, Depth 15' to 16.5'



B-5, Sample 8, Depth 16.5' to 18.5'



B-5, Sample 8, Depth 16.5' to 18.5'



B-5, Sample 8, Depth 16.5' to 18.5'

BORING B-5: SAMPLE PHOTOS

Project Name: FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks

Location: Schofield Barracks, Oahu, Hawaii

Project No.10007



FIGURE C-18



B-5, Sample 9, Depth 20' to 21.5'



B-5, Sample 9, Depth 20' to 21.5'



B-5, Sample 10, Depth 21.5' to 23.5'



B-5, Sample 10, Depth 21.5' to 23.5'



B-5, Sample 10, Depth 21.5' to 23.5'



B-5, Sample 10, Depth 21.5' to 23.5'

BORING B-5: SAMPLE PHOTOS

Project Name: FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks

Location: Schofield Barracks, Oahu, Hawaii

Project No.10007



FIGURE C-19



B-5, Sample 11, Depth 25' to 26.5'



B-5, Sample 12, Depth 26.5' to 28.5'



B-5, Sample 12, Depth 26.5' to 28.5'



B-5, Sample 12, Depth 26.5' to 28.5'



B-5, Sample 13, Depth 30' to 31.5'



B-5, Sample 14, Depth 31.5' to 33.5'

BORING B-5: SAMPLE PHOTOS

Project Name: FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks

Location: Schofield Barracks, Oahu, Hawaii

Project No.10007



FIGURE C-20



B-5, Sample 14, Depth 31.5' to 33.5'



B-5, Sample 14, Depth 31.5' to 33.5'



B-5, Sample 15, Depth 35' to 36.5'



B-5, Sample 15, Depth 35' to 36.5'



B-5, Sample 16, Depth 36.5' to 38.5'



B-5, Sample 16, Depth 36.5' to 38.5'

BORING B-5: SAMPLE PHOTOS

Project Name: FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks

Location: Schofield Barracks, Oahu, Hawaii

Project No.10007



FIGURE C-21



B-5, Sample 17, Depth 40' to 41.5'



B-5, Sample 18, Depth 41.5' to 43.5'



B-5, Sample 18, Depth 41.5' to 43.5'



B-5, Sample 18, Depth 41.5' to 43.5'

BORING B-5: SAMPLE PHOTOS

Project Name: FY11 MCA PN 52267 New Unaccompanied Enlisted Personnel Housing (UEPH) Barracks

Location: Schofield Barracks, Oahu, Hawaii

Project No.10007



FIGURE C-22

APPENDIX D

PREVIOUS LOG OF BORINGS AND LABORATORY TEST RESULTS

FY09 MCA PN 068823 UEPH

**FY09 MCA PN 068823
SCHOFIELD BARRACKS UEPH**

LOG OF BORING KEY

LOCATION:

GROUND SURFACE ELEVATION:

GROUNDWATER LEVEL / DATE:

CONTRACTOR:

DRILL EQUIP:

LOGGED BY:

HAMMER TYPE:

DRILLING METHOD:

BOREHOLE BACKFILL:

DATE(S) DRILLED:

CHECKED BY:

HAMMER WEIGHT/DROP:

| DEPTH (FT) | SAMPLE TYPE | SAMPLE NO. | DCP SAMPLING RESISTANCE | RECOVERY, % | RQD, % | GRAPHIC LOG | DESCRIPTION | WATER CONTENT, % | DRY UNIT WEIGHT, pcf | UCS, psf | LIQUID LIMIT | PLASTICITY INDEX | OTHER TESTS AND REMARKS |
|------------|-------------|------------|-------------------------|-------------|--------|---|---|------------------|----------------------|----------|--------------|------------------|-------------------------|
| 0 | | | | | | | STRATA SYMBOLS | | | | | | |
| | | | | | |  | Silt (ML) | | | | | | |
| | | | | | |  | Elastic silt (MH) | | | | | | |
| | | | | | |  | Fat clay (CH) | | | | | | |
| | | | | | |  | Boulders | | | | | | |
| | | | | | | | SAMPLER SYMBOLS | | | | | | |
| | | | | | | | Standard Penetration Test (SPT) sampler | | | | | | |
| | | | | | | | Dames and Moore (D&M) sampler | | | | | | |
| | | | 10 | | | | Number of blows to advance sampler 12 inches, or distance indicated | | | | | | |
| | | | | 87 | | | Percent Soil Recovery in Sampler | | | | | | |
| | | | | | | | Bulk sample | | | | | | |
| | | | | | | | Core sample | | | | | | |
| | | | | | 40 | | Rock Quality Designation, % of sample that is >4 inches | | | | | | |
| | | | | | | | ABBREVIATIONS FOR TESTS | | | | | | |
| | | | | | | | PP = Unconfined Compressive Strength from Pocket Penetrometer, tsf | | | | | | |
| | | | | | | | TV = Shear Strength from Torvane, tsf | | | | | | |
| | | | | | | | Swell = Swell Potential Test | | | | | | |
| | | | | | | | CON = One-Dimensional Consolidation Test | | | | | | |
| | | | | | | | CBR = California Bearing Ratio Test | | | | | | |
| | | | | | | | Mod. Proctor = Modified Proctor Compaction Test | | | | | | |
| | | | | | | | DS = Direct Shear Test | | | | | | |
| | | | | | | | Perched water | | | | | | |
| 30 | | | | | | | | | | | | | |



FY09 MCA PN 068823
SCHOFIELD BARRACKS UEPH

LOCATION: SCHOFIELD, WAHIAWA, HAWAII
GROUND SURFACE ELEVATION: +/- 924 FEET
GROUNDWATER LEVEL / DATE: SEE LOG
CONTRACTOR: HAWAII TEST BORINGS, INC.
DRILL EQUIP: MOBILE DRILL B-53

DATE(S) DRILLED: 4/05/08
LOGGED BY: K. SANDEFUR
HAMMER TYPE: SAFETY
DRILLING METHOD: 4-INCH SOLID STEM AUGERS, WASH BORING
BOREHOLE BACKFILL: CUTTINGS, GRAVEL, CONCRETE
CHECKED BY: J.KWONG
HAMMER WEIGHT/DROP: 140 LB / 30 IN

| DEPTH (FT) | SAMPLE TYPE | SAMPLE NO. | DCP SAMPLING RESISTANCE | RECOVERY, % | RQD, % | GRAPHIC LOG | DESCRIPTION | WATER CONTENT, % | DRY UNIT WEIGHT, pcf | UCS, psf | LIQUID LIMIT | PLASTICITY INDEX | OTHER TESTS AND REMARKS |
|------------|-------------|------------|-------------------------|-------------|--------|-------------|--|------------------|----------------------|----------|--------------|------------------|--|
| 0 | | | | | | | WEATHERED ALLUVIUM / FILL Brown elastic silt with roots (MH), moist, stiff | | | | | | |
| | | 1 | 19 | 100 | | | grades without roots | | | | | | |
| | | 2 | 28 | 94 | | | RESIDUAL SOIL Reddish brown elastic silt (MH), very stiff | 35.2 | | | | | |
| | | 3 | 128 | 78 | | | grades with some mottling, hard | 30.3 | 94.6 | 14387 | | | |
| | | 4 | 33 | 83 | | | becomes light orange-brown, very stiff | 34.9 | | | | | |
| | | 5 | 68 | 100 | | | becomes hard with some grey mottling | 30.7 | 93.3 | 9170 | 64.6 | 31.0 | |
| | | 6 | 15 | 83 | | | becomes stiff to very stiff | 36.1 | | | | | |
| | | 7 | 34 | 78 | | | very stiff | 42.4 | 75.3 | | | | |
| | | 8 | 13 | 75 | | | grades to soil-like extremely weathered basalt | 34.7 | | | | | |
| | | 9 | 96-6" | 100 | | | EXTREMELY TO HIGHLY WEATHERED BASALT (SAPROLITE) Light brown mottled elastic silt with spotted grey (MH), moist, stiff boulder | | | | | | Auger grinding Slow drilling Driller reports softer drilling at 20 feet |
| | | | | | | | becomes highly fractured highly weathered basalt | 27.4 | 91.8 | | | | |
| | | | | | | | grades to primarily soil-like extremely weathered basalt | | | | | | |
| | | 10 | 16 | 83 | | | becomes reddish brown elastic silt mottled with red and orange (MH), very stiff | 47.0 | | | | | TV = 0.53 tsf |

FY09 MCA PN 068823
SCHOFIELD BARRACKS UEPH

LOCATION: SCHOFIELD, WAHIAWA, HAWAII
GROUND SURFACE ELEVATION: +/- 924 FEET
GROUNDWATER LEVEL / DATE: SEE LOG
CONTRACTOR: HAWAII TEST BORINGS, INC.
DRILL EQUIP: MOBILE DRILL B-53

LOGGED BY: K. SANDEFUR
HAMMER TYPE: SAFETY
DRILLING METHOD: 4-INCH SOLID STEM AUGERS, WASH BORING
BOREHOLE BACKFILL: CUTTINGS, GRAVEL, CONCRETE

DATE(S) DRILLED: 4/05/08
CHECKED BY: J.KWONG
HAMMER WEIGHT/DROP: 140 LB / 30 IN

| DEPTH (FT) | SAMPLE TYPE | SAMPLE NO. | DCP SAMPLING RESISTANCE | RECOVERY, % | RQD, % | GRAPHIC LOG | DESCRIPTION | WATER CONTENT, % | DRY UNIT WEIGHT, pcf | UCS, psf | LIQUID LIMIT | PLASTICITY INDEX | OTHER TESTS AND REMARKS |
|------------|-------------|------------|-------------------------|-------------|--------|-------------|--|------------------|----------------------|----------|--------------|------------------|--|
| 30 | | 11 | 19 | 100 | | | grades to mottled greyish purple elastic silt to fat clay (MH to CH) | 45.1 | | | | | |
| 35 | | 12 | 15 | 83 | | | becomes mottled brownish purple, moist to wet, stiff becomes very stiff | 53.0 | | | | | TV = 0.50 tsf PP = 2.0 tsf TV = 0.80 tsf PP = 3.0 tsf |
| 40 | | 13 | 24 | 83 | | | becomes mottled purple | | | | 120.8 | 80.8 | TV = 1.0 tsf PP = 3.4 tsf |
| 45 | | 14 | 19 | 92 | | | moist to wet | 55.4 | | | | | TV = 1.13 tsf |
| 50 | | 15 | 22 | 83 | | | becomes mottled greyish purple, moist to wet | 56.3 | | | | | |
| 55 | | | | | | | Boring completed at 52 feet below existing ground surface on 4/05/08 | | | | | | |
| 60 | | | | | | | | | | | | | |

FY09 MCA PN 068823
SCHOFIELD BARRACKS UEPH

LOCATION: SCHOFIELD, WAHIAWA, HAWAII
GROUND SURFACE ELEVATION: +/- 924 FEET
GROUNDWATER LEVEL / DATE: SEE LOG
CONTRACTOR: HAWAII TEST BORINGS, INC.
DRILL EQUIP: MOBILE DRILL B-53

DATE(S) DRILLED: 3/28/08
LOGGED BY: K. SANDEFUR
HAMMER TYPE: SAFETY
DRILLING METHOD: 4-INCH SOLID STEM AUGERS, WASH BORING, NX CORE
BOREHOLE BACKFILL: CUTTINGS, GRAVEL, CONCRETE

DATE(S) DRILLED: 3/28/08

CHECKED BY: J.KWONG

HAMMER WEIGHT/DROP: 140 LB / 30 IN

| DEPTH (FT) | SAMPLE TYPE | SAMPLE NO. | DCP SAMPLING RESISTANCE | RECOVERY, % | RQD, % | GRAPHIC LOG | DESCRIPTION | WATER CONTENT, % | DRY UNIT WEIGHT, pcf | UCS, psf | LIQUID LIMIT | PLASTICITY INDEX | OTHER TESTS AND REMARKS |
|------------|-------------|------------|-------------------------|-------------|--------|-------------|---|------------------|----------------------|----------|--------------|------------------|------------------------------|
| 0 | | | | | | | WEATHERED ALLUVIUM / FILL Brown elastic silt with roots (MH), moist, hard | | | | | | Large root |
| | | 1 | 173-11' | 100 | | | becomes dark reddish brown contains hard cobbles | | | | | | 100 blows for final 5 inches |
| | | 2 | 65 | 100 | | | RESIDUAL SOIL Reddish brown elastic silt (MH), hard | 32.5 | | | | | |
| | | 3 | 137 | 100 | | | contains cobbles | 32.9 | 89.7 | | | | Swell |
| | | 4 | 42 | 71 | | | grades to brownish red with some brown mottling extremely weathered basalt | 34.9 | | | | | |
| | | 5 | 83 | 67 | | | contains cobbles | | | | | | |
| | | 6 | 26 | 100 | | | becomes orangish-brown, very stiff | 33.7 | 65.8 | 1392 | 85.5 | 41.0 | |
| | | 7 | 41 | 100 | | | becomes light reddish brown with brown silt layer or pocket | 33.4 | 75.9 | 6202 | 86.5 | 40.5 | |
| | | 8 | 13 | 88 | | | becomes stiff dark brown silt layer or pocket | 39.9 | | | | | |
| | | 9 | 20 | 92 | | | EXTREMELY TO HIGHLY WEATHERED BASALT (SAPROLITE) Mottled reddish purple elastic silt with light orange-brown spots (MH), moist, very stiff | 38.7 | | | | | |
| 30 | | | | | | | | | | | | | |



FY09 MCA PN 068823
SCHOFIELD BARRACKS UEPH

LOCATION: SCHOFIELD, WAHIAWA, HAWAII
GROUND SURFACE ELEVATION: +/- 924 FEET
GROUNDWATER LEVEL / DATE: SEE LOG
CONTRACTOR: HAWAII TEST BORINGS, INC.
DRILL EQUIP: MOBILE DRILL B-53

DATE(S) DRILLED: 3/28/08
LOGGED BY: K. SANDEFUR
HAMMER TYPE: SAFETY
DRILLING METHOD: 4-INCH SOLID STEM AUGERS, WASH BORING, NX CORE
BOREHOLE BACKFILL: CUTTINGS, GRAVEL, CONCRETE

DATE(S) DRILLED: 3/28/08

CHECKED BY: J.KWONG

HAMMER WEIGHT/DROP: 140 LB / 30 IN

| DEPTH (FT) | SAMPLE TYPE | SAMPLE NO. | DCP SAMPLING RESISTANCE | RECOVERY, % | RQD, % | GRAPHIC LOG | DESCRIPTION | WATER CONTENT, % | DRY UNIT WEIGHT, pcf | UCS, psf | LIQUID LIMIT | PLASTICITY INDEX | OTHER TESTS AND REMARKS |
|------------|-------------|------------|-------------------------|-------------|--------|-------------|--|------------------|----------------------|----------|--------------|------------------|--|
| 30 | | 10 | 91 | 100 | | | becomes hard | | | | | | |
| 35 | | 11 | 16 | 83 | | | becomes very stiff, moist to wet | 50.4 | | | | | TV = 0.75 tsf PP = 3.3 tsf |
| 40 | | 12 | 50-4" | 100 | | | becomes mottled light brown, hard | | | | | | Refusal |
| | | NX-1 | | 100 | 100 | | Unweathered basalt boulder, hard | | | | | | Wash boring with rockbit, driller reports soft drilling |
| 45 | | 13 | 50-4" | 100 | | | Unweathered basalt boulder, hard | | | | | | Refusal |
| | | NX-2 | | 100 | 83 | | Unweathered basalt boulder, hard | | | | | | Driller reports water flow plugging upon core run breakout |
| 50 | | 14 | 15 | 67 | | | becomes mottled purple elastic silt (MH), stiff to very stiff | | | | | | |
| | | | | | | | Boring completed at 50.5 feet below existing ground surface on 3/28/08 | | | | | | |
| 55 | | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | | |



FY09 MCA PN 068823
SCHOFIELD BARRACKS UEPH

LOG OF BORING B-3

LOCATION: SCHOFIELD, WAHIAWA, HAWAII
GROUND SURFACE ELEVATION: +/- 924 FEET
GROUNDWATER LEVEL / DATE: SEE LOG
CONTRACTOR: HAWAII TEST BORINGS, INC.
DRILL EQUIP: MOBILE DRILL B-53

DATE(S) DRILLED: 3/27/08 - 3/28/08
LOGGED BY: K. SANDEFUR
HAMMER TYPE: SAFETY
DRILLING METHOD: 4-INCH SOLID STEM AUGERS, NX CORE, WASH BORING
BOREHOLE BACKFILL: CUTTINGS, GRAVEL, CONCRETE

DATE(S) DRILLED: 3/27/08 - 3/28/08

CHECKED BY: J.KWONG

HAMMER WEIGHT/DROP: 140 LB / 30 IN

| DEPTH (FT) | SAMPLE TYPE | SAMPLE NO. | DCP SAMPLING RESISTANCE | RECOVERY, % | RQD, % | GRAPHIC LOG | DESCRIPTION | WATER CONTENT, % | DRY UNIT WEIGHT, pcf | UCS, psf | LIQUID LIMIT | PLASTICITY INDEX | OTHER TESTS AND REMARKS |
|------------|-------------|------------|-------------------------|-------------|--------|-------------|---|----------------------|----------------------|----------|--------------|------------------|--|
| 0 | | | | | | | WEATHERED ALLUVIUM / FILL Dark reddish brown elastic silt with roots (MH), moist, very stiff | | | | | | |
| 1 | | 1 | 63 | 78 | | | | 34.5 | 89.9 | | | | TV = 0.83 tsf Swell |
| 2 | | 2 | 23 | 83 | | | becomes hard, with trace black spots, without roots | 34.6 | | | | | PP = 4.5+ tsf |
| 3 | | 3 | 39 | 78 | | | RESIDUAL SOIL Reddish brown elastic silt mottled with some light brown (MH), moist, very stiff | 35.6 38.2 34.9 | 83.9 83.3 84.4 | | 58.8 | 23.1 | TV = 0.63 tsf DS |
| 4 | | 4 | 18 | 67 | | | becomes slightly mottled with grey-brown and some vesicular reminance | 37.8 | | | | | |
| 5 | | 5 | 69 | 78 | | | becomes brown with trace gravel, hard | 36.7 | 77.8 | | | | |
| 6 | | 6 | 21 | 63 | | | becomes very stiff | 38.7 | | | | | PP = 3.8 tsf Pause drilling 8/27 |
| 7 | | 7 | 37 | 72 | | | | 36.7 | 82.7 | 3515 | 68.6 | 30.1 | TV = 1.8 tsf |
| 8 | | 8 | 6 | 78 | | | becomes medium stiff | 42.6 | | | | | |
| 9 | | 9 | 19-3" 50-0" | 100 0 | | | EXTREMELY TO HIGHLY WEATHERED BASALT (SAPROLITE) Light brown mottled with greyish-brown elastic silt (MH), moist, medium stiff | | | | | | Sampler bounces Auger grinding to 21 feet |
| 10 | | NX-1 | | 100 | 100 | | Contain unweathered basalt boulder, hard | | | | | | Use NX core barrel Use wash boring |
| 10 | | 10 | 8 | 79 | | | grades to mottled brown elastic silt with light brown and reddish brown (MH), medium stiff, moist to wet, contains perched water | 61.2 | | | | | TV = 0.48 tsf PP = 1.75 tsf |



SCHOFIELD BARRACKS UEPH

LOCATION: SCHOFIELD, WAHIAWA, HAWAII
GROUND SURFACE ELEVATION: +/- 924 FEET
GROUNDWATER LEVEL / DATE: SEE LOG
CONTRACTOR: HAWAII TEST BORINGS, INC.
DRILL EQUIP: MOBILE DRILL B-53

LOGGED BY: K. SANDEFUR
HAMMER TYPE: SAFETY
DRILLING METHOD: 4-INCH SOLID STEM AUGERS, NX CORE, WASH BORING
BOREHOLE BACKFILL: CUTTINGS, GRAVEL, CONCRETE

DATE(S) DRILLED: 3/27/08 - 3/28/08
CHECKED BY: J.KWONG
HAMMER WEIGHT/DROP: 140 LB / 30 IN

| DEPTH (FT) | SAMPLE TYPE | SAMPLE NO. | DCP SAMPLING RESISTANCE | RECOVERY, % | RQD, % | GRAPHIC LOG | DESCRIPTION | WATER CONTENT, % | DRY UNIT WEIGHT, pcf | UCS, psf | LIQUID LIMIT | PLASTICITY INDEX | OTHER TESTS AND REMARKS |
|------------|-------------|------------|-------------------------|-------------|--------|-------------|--|------------------|----------------------|----------|--------------|------------------|-----------------------------------|
| 30 | | 11 | 16 | 100 | | | becomes mottled purple with some sand, stiff | | | | | | TV = 0.55 tsf |
| 35 | | 12 | 5 | 79 | | | becomes mottled grey, red, and light brown, moist to wet, stiff | 67.4 | | | | | |
| 40 | | 13 | 28 | 67 | | | becomes mottled purple | | | | | | TV = 0.75 tsf PP = 3.75 tsf |
| 45 | | 14 | 10 | 92 | | | becomes stiff with very stiff zones | 60.4 | | | | | PP = 1.7 tsf PP = 3.75 tsf |
| 50 | | 15 | 12 | 92 | | | becomes mottled reddish purple | | | | | | |
| 55 | | | | | | | Boring completed at 52 feet below existing ground surface on 3/28/08 | | | | | | |
| 60 | | | | | | | | | | | | | |



FY09 MCA PN 068823
SCHOFIELD BARRACKS UEPH

LOCATION: SCHOFIELD, WAHIAWA, HAWAII
GROUND SURFACE ELEVATION: +/- 925 FEET
GROUNDWATER LEVEL / DATE: SEE LOG
CONTRACTOR: HAWAII TEST BORINGS, INC.
DRILL EQUIP: MOBILE DRILL B-53

DATE(S) DRILLED: 3/29/08
LOGGED BY: K. SANDEFUR
HAMMER TYPE: SAFETY
DRILLING METHOD: 4-INCH SOLID STEM AUGERS
BOREHOLE BACKFILL: CUTTINGS, GRAVEL, CONCRETE
CHECKED BY: J.KWONG
HAMMER WEIGHT/DROP: 140 LB / 30 IN

| DEPTH (FT) | SAMPLE TYPE | SAMPLE NO. | DCP SAMPLING RESISTANCE | RECOVERY, % | RQD, % | GRAPHIC LOG | DESCRIPTION | WATER CONTENT, % | DRY UNIT WEIGHT, pcf | UCS, psf | LIQUID LIMIT | PLASTICITY INDEX | OTHER TESTS AND REMARKS |
|------------|-------------|------------|-------------------------|-------------|--------|-------------|---|------------------|----------------------|----------|--------------|------------------|--------------------------------|
| 0 | | | | | | | RESIDUAL SOIL / WEATHERED ALLUVIUM Reddish brown elastic silt with roots (MH), moist, stiff | | | | | | |
| | | 1 | 17 | 89 | | | contain large gravel or cobbles | 26.2 | 72.0 | 281 | | | Auger grinding |
| | | 2 | 47 | 92 | | | becomes light brownish red with some mottle, hard | 29.2 | | | | | |
| | | 3 | 70 | 44 | | | | | | | | | |
| | | 4 | 24 | 92 | | | becomes very stiff, grades with more mottle | 36.3 | | | | | |
| 10 | | 5 | 35 | 100 | | | EXTREMELY TO HIGHLY WEATHERED BASALT (SAPROLITE) Light brown silt to elastic silt mottled with brownish-red and grey with some weathered basalt gravel (ML to MH), moist, very stiff | 44.0 | 79.2 | 1409 | 43.3 | 13.1 | TV = 0.80 tsf PP = 1.25 tsf |
| | | 6 | 10 | 96 | | | becomes stiff with purple and wet zones or seams, contain perched water | 56.0 | | | | | TV = 0.63 tsf PP = 1.75 tsf |
| 15 | | 7 | 22 | 100 | | | | 55.2 | 67.0 | | | | CON |
| 20 | | 8 | 24 | 100 | | | | | | | | | TV = 0.61 tsf |
| 25 | | 9 | 7 | 50 | | | becomes medium stiff | 56.7 | | | | | |
| 30 | | | | | | | | | | | | | |

FY09 MCA PN 068823
SCHOFIELD BARRACKS UEPH

LOG OF BORING B-4

LOCATION: SCHOFIELD, WAHIAWA, HAWAII
GROUND SURFACE ELEVATION: +/- 925 FEET
GROUNDWATER LEVEL / DATE: SEE LOG
CONTRACTOR: HAWAII TEST BORINGS, INC.
DRILL EQUIP: MOBILE DRILL B-53

LOGGED BY: K. SANDEFUR
HAMMER TYPE: SAFETY
DRILLING METHOD: 4-INCH SOLID STEM AUGERS
BOREHOLE BACKFILL: CUTTINGS, GRAVEL, CONCRETE

DATE(S) DRILLED: 3/29/08
CHECKED BY: J.KWONG
HAMMER WEIGHT/DROP: 140 LB / 30 IN

| DEPTH (FT) | SAMPLE TYPE | SAMPLE NO. | DCP SAMPLING RESISTANCE | RECOVERY, % | RQD, % | GRAPHIC LOG | DESCRIPTION | WATER CONTENT, % | DRY UNIT WEIGHT, pcf | UCS, psf | LIQUID LIMIT | PLASTICITY INDEX | OTHER TESTS AND REMARKS |
|------------|-------------|------------|-------------------------|-------------|--------|-------------|--|------------------|----------------------|----------|--------------|------------------|--------------------------------|
| 30 | | 10 | 26 | 78 | | | becomes mottled brownish red and brownish grey, very stiff | | | | | | TV = 0.70 tsf PP = 4.45 tsf |
| 35 | | 11 | 17 | 54 | | | becomes mottled purple | 53.3 | | | | | TV = 0.78 tsf TV = 1.1 tsf |
| 40 | | 12 | 28 | 100 | | | with some vesicular remanence | | | | | | TV = 0.73 tsf PP = 3.5 tsf |
| 45 | | 13 | 25 | 75 | | | with gravelly zones | 40.7 | | | | | |
| 50 | | 14 | 12 | 50 | | | becomes stiff | 58.7 | | | | | |
| 55 | | | | | | | Boring completed at 52 feet below existing ground surface on 3/29/08 | | | | | | |
| 60 | | | | | | | | | | | | | |



FY09 MCA PN 068823
SCHOFIELD BARRACKS UEPH

LOCATION: SCHOFIELD, WAHIAWA, HAWAII

DATE(S) DRILLED: 3/27/08

GROUND SURFACE ELEVATION: +/- 924.5 FEET

LOGGED BY: K. SANDEFUR

CHECKED BY: J.KWONG

GROUNDWATER LEVEL / DATE: SEE LOG

HAMMER TYPE: SAFETY

HAMMER WEIGHT/DROP: 140 LB / 30 IN

CONTRACTOR: HAWAII TEST BORINGS, INC.

DRILLING METHOD: 4-INCH SOLID STEM AUGERS

DRILL EQUIP: MOBILE DRILL B-53

BOREHOLE BACKFILL: CUTTINGS, GRAVEL, CONCRETE

| DEPTH (FT) | SAMPLE TYPE | SAMPLE NO. | DCP SAMPLING RESISTANCE | RECOVERY, % | RQD, % | GRAPHIC LOG | DESCRIPTION | WATER CONTENT, % | DRY UNIT WEIGHT, pcf | UCS, psf | LIQUID LIMIT | PLASTICITY INDEX | OTHER TESTS AND REMARKS |
|------------|-------------|------------|-------------------------|-------------|--------|-------------|---|------------------|----------------------|----------|--------------|------------------|-------------------------|
| 0 | | | | | | | RESIDUAL SOIL / WEATHERED ALLUVIUM Reddish brown elastic silt with some grey-brown (MH), with roots, moist, very stiff | | | | | | |
| | | 1 | 47 | 72 | | | with lighter brown silt | 34.9 | 78.7 | 2938 | | | PP = 4.5 tsf |
| | | 2 | 104 | 100 | | | becomes hard, some mottling, without roots, probably contains cobbles | 27.9 | | | | | |
| 5 | | 3 | 79 | 78 | | | contain highly weathered basalt fragments | 30.8 | 95.4 | | | | Swell |
| | | 4 | 13 | 72 | | | silt becomes mottled with light brown, hard | | | | 60.9 | 28.7 | PP = 2.9 tsf |
| | | 5 | 28 | 100 | | | mottled with grey, light brown and black streaks, stiff | | | | | | CON |
| | | 6 | 11 | 42 | | | becomes very stiff with some gravel | 50.1 | 73.8 | | | | contains perched water |
| 10 | | | | | | | contain wet seams or zones | | | | | | TV = 0.28 tsf |
| | | | | | | | becomes stiff | 44.2 | | | | | |
| | | | | | | | contain wet seam or perched water | | | | | | |
| | | | | | | | EXTREMELY TO HIGHLY WEATHERED BASALT (SAPROLITE) Mottled light brown elastic silt with some orange-brown and red streaks (MH), moist to wet, stiff | 43.2 | 79.7 | | 57.5 | 19.0 | TV = 0.45 tsf |
| 15 | | 7 | 23 | 100 | | | becomes mottled purple-brown, wet | 45.3 | 77.5 | | | | DS |
| | | 8 | 14 | 67 | | | becomes mottled light brown | 51.1 | 72.2 | | | | |
| | | | | | | | becomes mottled purple-brown, wet | 49.8 | | | | | |
| | | | | | | | becomes mottled light brown | | | | | | |
| 20 | | 9 | 36 | 100 | | | with some friable gravel and remnants of highly weathered vesicular basalt in silt matrix, moist, very stiff | | | | | | |
| | | | | | | | becomes brown spotted with red, wet, stiff | | | | | | PP = 1.75 tsf |
| 25 | | 10 | 9 | 58 | | | becomes dark brown spotted with red | 54.1 | | | | | PP = 2.1 tsf |
| | | | | | | | reddish brown with orange-brown spots, very stiff | | | | | | PP = 4.25 tsf |
| 30 | | 11 | 29 | 89 | | | | | | | | | TV = 0.70 tsf |



FY09 MCA PN 068823
SCHOFIELD BARRACKS UEPH

LOCATION: SCHOFIELD, WAHIAWA, HAWAII
GROUND SURFACE ELEVATION: +/- 924.5 FEET
GROUNDWATER LEVEL / DATE: SEE LOG
CONTRACTOR: HAWAII TEST BORINGS, INC.
DRILL EQUIP: MOBILE DRILL B-53

LOGGED BY: K. SANDEFUR
HAMMER TYPE: SAFETY
DRILLING METHOD: 4-INCH SOLID STEM AUGERS
BOREHOLE BACKFILL: CUTTINGS, GRAVEL, CONCRETE
DATE(S) DRILLED: 3/27/08
CHECKED BY: J.KWONG
HAMMER WEIGHT/DROP: 140 LB / 30 IN

| DEPTH (FT) | SAMPLE TYPE | SAMPLE NO. | DCP SAMPLING RESISTANCE | RECOVERY, % | RQD, % | GRAPHIC LOG | DESCRIPTION | WATER CONTENT, % | DRY UNIT WEIGHT, pcf | UCS, psf | LIQUID LIMIT | PLASTICITY INDEX | OTHER TESTS AND REMARKS |
|------------|-------------|------------|-------------------------|-------------|--------|-------------|---|------------------|----------------------|----------|--------------|------------------|-------------------------|
| 30 | █ | | | | | | | | | | | | |
| 35 | █ | 12 | 12 | 50 | | | becomes mottled purple silt, wet, stiff | 57.2 | | | | | PP = 2.25 tsf |
| 40 | █ | 13 | 23 | 83 | | | contain large friable gravel and remnants of highly weathered vesicular basalt in silt matrix | | | | | | TV = 0.70 tsf |
| 45 | █ | 14 | 12 | 71 | | | | 51.4 | | | | | |
| 50 | █ | 15 | 36 | 78 | | | becomes very stiff becomes red | | | | | | |
| | | | | | | | Boring completed at 50.5 feet below existing ground surface on 3/27/08 | | | | | | |
| 55 | | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | | |

**FY09 MCA PN 068823
SCHOFIELD BARRACKS UEPH**

LOCATION: SCHOFIELD, WAHIAWA, HAWAII
GROUND SURFACE ELEVATION: +/- 925.5 FEET
GROUNDWATER LEVEL / DATE: NOT ENCOUNTERED
CONTRACTOR: HAWAII TEST BORINGS, INC.
DRILL EQUIP: MOBILE DRILL B-53
LOGGED BY: E. NG
HAMMER TYPE: SAFETY
DRILLING METHOD: 4-INCH SOLID STEM AUGERS
BOREHOLE BACKFILL: CUTTINGS, GRAVEL, CONCRETE
DATE(S) DRILLED: 3/28/08
CHECKED BY: J.KWONG
HAMMER WEIGHT/DROP: 140 LB / 30 IN

| DEPTH (FT) | SAMPLE TYPE | SAMPLE NO. | DCP SAMPLING RESISTENCE | RECOVERY, % | RQD, % | GRAPHIC LOG | DESCRIPTION | WATER CONTENT, % | DRY UNIT WEIGHT, pcf | UCS, psf | LIQUID LIMIT | PLASTICITY INDEX | OTHER TESTS AND REMARKS |
|------------|-------------|------------|-------------------------|-------------|--------|-------------|--|------------------|----------------------|----------|--------------|------------------|-------------------------|
| 0 | | 1 | 90 | 72 | | | RESIDUAL SOIL / WEATHERED ALLUVIUM Reddish brown elastic silt with roots (MH), moist, hard, probably include fills with some gravel and cobbles | 36.6 35.6 | 78.3 74.1 | | | | Mod. Proctor Swell |
| | | 2 | 40 | 75 | | | with less roots becomes light reddish brown without roots | 46.5 | | | | | |
| 5 | | 3 | 24 | 71 | | | becomes very stiff becomes brown slightly mottled | 37.0 | | | | | |
| | | | | | | | Boring completed at 7.0 feet below existing ground surface on 3/28/08 | | | | | | |
| 10 | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |

FY09 MCA PN 068823
SCHOFIELD BARRACKS UEPH

LOCATION: SCHOFIELD, WAHIAWA, HAWAII
GROUND SURFACE ELEVATION: +/- 920 FEET
GROUNDWATER LEVEL / DATE: NOT ENCOUNTERED
CONTRACTOR: HAWAII TEST BORINGS, INC.
DRILL EQUIP: MOBILE DRILL B-53

LOGGED BY: E. NG
HAMMER TYPE: SAFETY
DRILLING METHOD: 4-INCH SOLID STEM AUGERS
BOREHOLE BACKFILL: CUTTINGS, GRAVEL, CONCRETE

DATE(S) DRILLED: 3/28/08
CHECKED BY: J.KWONG
HAMMER WEIGHT/DROP: 140 LB / 30 IN

| DEPTH (FT) | SAMPLE TYPE | SAMPLE NO. | DCP SAMPLING RESISTENCE | RECOVERY, % | RQD, % | GRAPHIC LOG | DESCRIPTION | WATER CONTENT, % | DRY UNIT WEIGHT, pcf | UCS, psf | LIQUID LIMIT | PLASTICITY INDEX | OTHER TESTS AND REMARKS |
|------------|---|------------|-------------------------|-------------|--------|---|--|------------------|----------------------|----------|--------------|------------------|-------------------------|
| 0 |  | 1 | 58 | 89 | |  | WEATHERED ALLUVIUM / FILL Brown with some reddish brown elastic silt with trace roots (MH), moist, very stiff | 34.0 | 72.3 | | | | |
| | | 2 | 27 | 75 | | | RESIDUAL SOIL Reddish brown elastic silt (MH), moist, very stiff | 34.7 | | | | | |
| 5 | | 3 | 34 | 83 | | | becomes hard | 35.8 | | | | | |
| | | | | | | | Boring completed at 7.0 feet below existing ground surface on 3/28/08 | | | | | | |
| 10 | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |

FY09 MCA PN 068823
SCHOFIELD BARRACKS UEPH

LOCATION: SCHOFIELD, WAHIAWA, HAWAII
GROUND SURFACE ELEVATION: +/- 917.3 FEET
GROUNDWATER LEVEL / DATE: NOT ENCOUNTERED
CONTRACTOR: HAWAII TEST BORINGS, INC.
DRILL EQUIP: MOBILE DRILL B-53

LOGGED BY: E. NG
HAMMER TYPE: SAFETY
DRILLING METHOD: 4-INCH SOLID STEM AUGERS
BOREHOLE BACKFILL: CUTTINGS, GRAVEL, CONCRETE

DATE(S) DRILLED: 3/28/08
CHECKED BY: J.KWONG
HAMMER WEIGHT/DROP: 140 LB / 30 IN

| DEPTH (FT) | SAMPLE TYPE | SAMPLE NO. | DCP SAMPLING RESISTENCE | RECOVERY, % | RQD, % | GRAPHIC LOG | DESCRIPTION | WATER CONTENT, % | DRY UNIT WEIGHT, pcf | UCS, psf | LIQUID LIMIT | PLASTICITY INDEX | OTHER TESTS AND REMARKS | |
|------------|-------------|------------|-------------------------|-------------|--------|-------------|--|------------------|----------------------|----------|--------------|------------------|---------------------------|--|
| 0 | | 1 | 79 | 100 | | | RESIDUAL SOIL / WEATHERED ALLUVIUM Reddish brown elastic silt with roots (MH), moist, hard, probably include compacted fills becomes very stiff with trace roots | 34.5 33.3 | 72.7 75.5 | | 60 | 24 | Mod. Proctor Swell | |
| | | 2 | 28 | 75 | | | | | 39.4 | | | | | |
| -5 | | 3 | 25 | 67 | | | | | 43.4 | | | | | |
| | | | | | | | Boring completed at 7.0 feet below existing ground surface on 3/28/08 | | | | | | | |
| -10 | | | | | | | | | | | | | | |
| -15 | | | | | | | | | | | | | | |
| -20 | | | | | | | | | | | | | | |
| -25 | | | | | | | | | | | | | | |
| -30 | | | | | | | | | | | | | | |

FY09 MCA PN 068823
SCHOFIELD BARRACKS UEPH

LOCATION: SCHOFIELD, WAHIAWA, HAWAII
GROUND SURFACE ELEVATION: +/- 917.6 FEET
GROUNDWATER LEVEL / DATE: NOT ENCOUNTERED
CONTRACTOR: HAWAII TEST BORINGS, INC.
DRILL EQUIP: MOBILE DRILL B-53

LOGGED BY: E. NG
HAMMER TYPE: SAFETY
DRILLING METHOD: 4-INCH SOLID STEM AUGERS
BOREHOLE BACKFILL: CUTTINGS, GRAVEL, CONCRETE

DATE(S) DRILLED: 3/28/08
CHECKED BY: J.KWONG
HAMMER WEIGHT/DROP: 140 LB / 30 IN

| DEPTH (FT) | SAMPLE TYPE | SAMPLE NO. | DCP SAMPLING RESISTENCE | RECOVERY, % | RQD, % | GRAPHIC LOG | DESCRIPTION | WATER CONTENT, % | DRY UNIT WEIGHT, pcf | UCS, psf | LIQUID LIMIT | PLASTICITY INDEX | OTHER TESTS AND REMARKS |
|------------|-------------|------------|-------------------------|-------------|--------|-------------|---|------------------|----------------------|----------|--------------|------------------|-------------------------|
| 0 | | 1 | 40 | 56 | | | RESIDUAL SOIL / WEATHERED ALLUVIUM Brown elastic silt with roots (MH), moist, very stiff, probably include compacted fills | 29.9 | 71.4 | | | | |
| | | 2 | 32 | 83 | | | becomes reddish brown with trace roots, hard | 36.9 | | | | | |
| 5 | | 3 | 27 | 83 | | | becomes reddish brown slightly mottled, very stiff | 36.6 | | | | | |
| | | | | | | | Boring completed at 7.0 feet below existing ground surface on 3/28/08 | | | | | | |
| 10 | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |

FY09 MCA PN 068823
SCHOFIELD BARRACKS UEPH

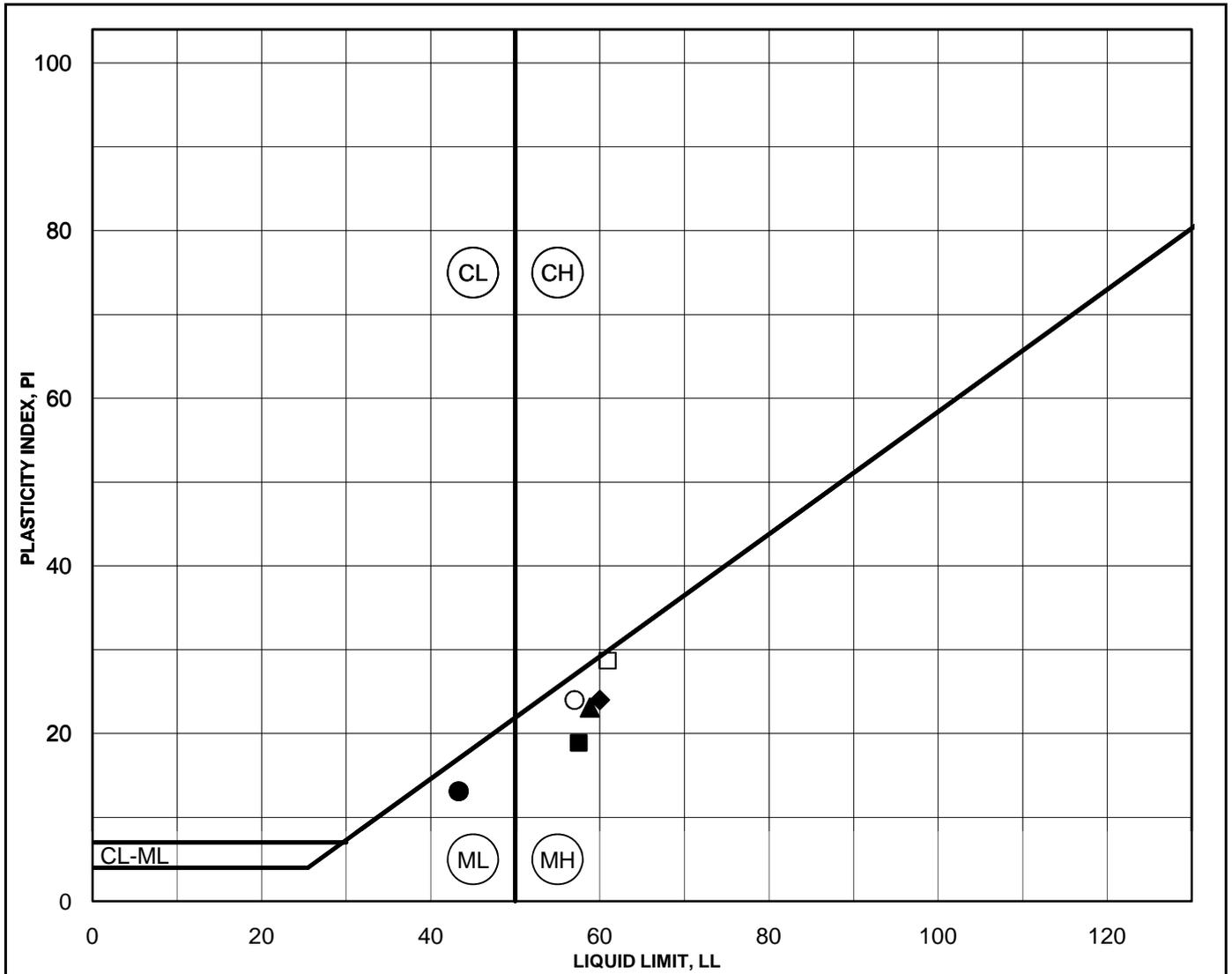
LOG OF BORING B-10

LOCATION: SCHOFIELD, WAHIAWA, HAWAII
GROUND SURFACE ELEVATION: +/- 920 FEET
GROUNDWATER LEVEL / DATE: NOT ENCOUNTERED
CONTRACTOR: HAWAII TEST BORINGS, INC.
DRILL EQUIP: MOBILE DRILL B-53

LOGGED BY: K. SANDEFUR
HAMMER TYPE: SAFETY
DRILLING METHOD: 4-INCH SOLID STEM AUGERS
BOREHOLE BACKFILL: CUTTINGS, GRAVEL, CONCRETE

DATE(S) DRILLED: 3/28/08
CHECKED BY: J.KWONG
HAMMER WEIGHT/DROP: 140 LB / 30 IN

| DEPTH (FT) | SAMPLE TYPE | SAMPLE NO. | DCP SAMPLING RESISTENCE | RECOVERY, % | RQD, % | GRAPHIC LOG | DESCRIPTION | WATER CONTENT, % | DRY UNIT WEIGHT, pcf | UCS, psf | LIQUID LIMIT | PLASTICITY INDEX | OTHER TESTS AND REMARKS | |
|------------|-------------|------------|-------------------------|-------------|--------|-------------|--|------------------|----------------------|----------|--------------|------------------|-------------------------|--|
| 0 | | 1 | 116 | 100 | | | RESIDUAL SOIL / WEATHERED ALLUVIUM Brown to reddish brown elastic silt with roots (MH), moist, hard, probably include compacted fills with gravel and cobbles | 31.8 31.7 | 77.7 83.7 | | 57 | 24 | Mod. Proctor Swell | |
| | | 2 | 19 | 50 | | | becomes reddish brown with out roots, very stiff | 37.6 | | | | | | |
| 5 | | 3 | 47 | 83 | | | becomes hard with some mottled | 34.5 | | | | | | |
| | | | | | | | Boring completed at 7.0 feet below existing ground surface on 3/28/08 | | | | | | | |
| 10 | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | | |



| Boring | Depth (ft) | LL % | PL % | PI % | Classification |
|--------|------------|------|------|------|-------------------|
| ● | B-4 | 43 | 30 | 13 | Silt (ML) |
| ■ | B-5 | 58 | 39 | 19 | Elastic Silt (MH) |
| ▲ | B-3 | 59 | 36 | 23 | Elastic Silt (MH) |
| ◆ | B-8 | 60 | 36 | 24 | Elastic Silt (MH) |
| ○ | B-10 | 57 | 33 | 24 | Elastic Silt (MH) |
| □ | B-5 | 61 | 32 | 29 | Elastic Silt (MH) |

Project: FY09 MCA PN 068823

Unaccompanied Enlisted Personnel Housing (UEPH)

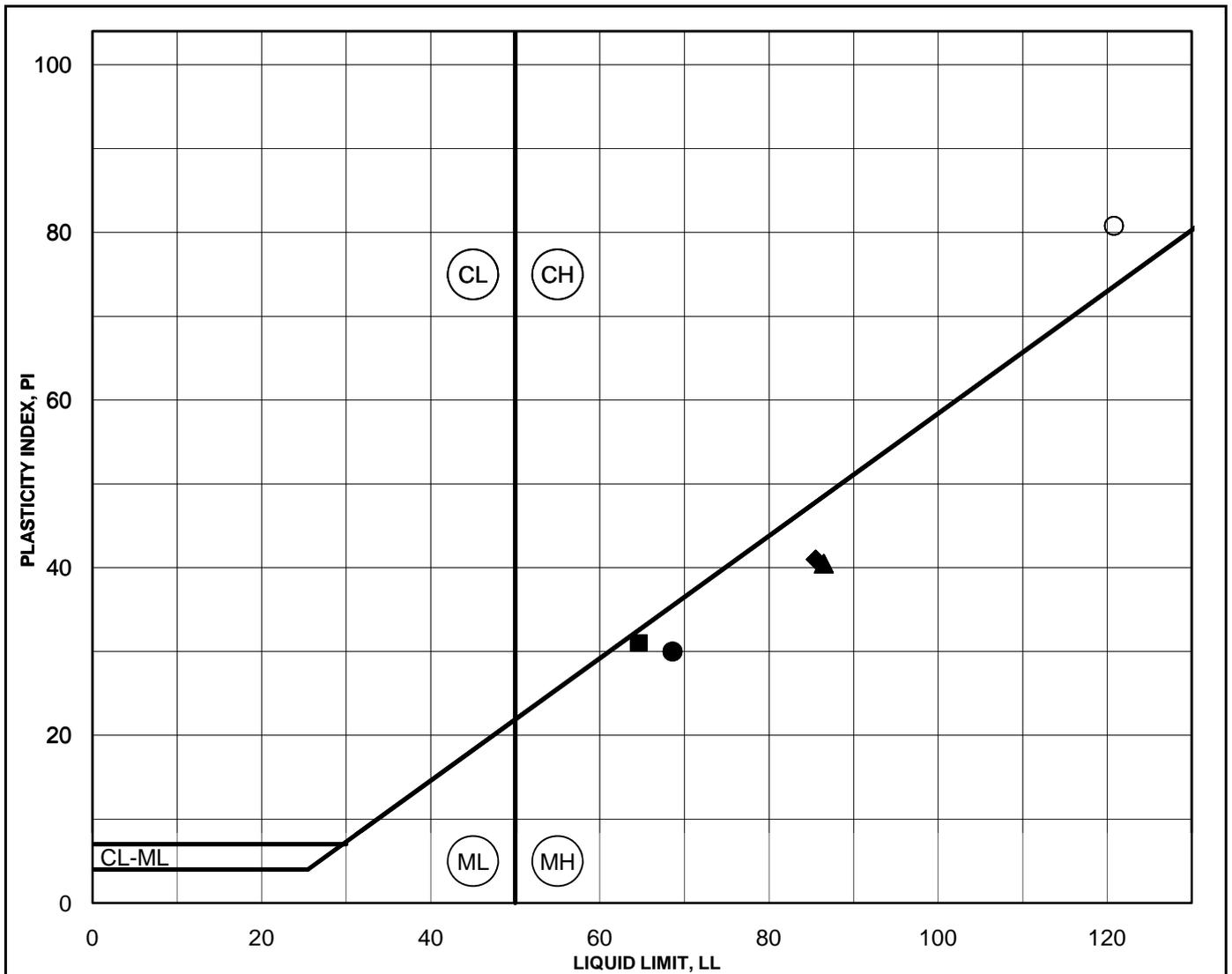
Location: Schofield Barracks, Oahu, Hawaii

Project Number: 10007

PLASTICITY CHART

FIGURE D-12





| Boring | Depth (ft) | LL % | PL % | PI % | Classification | |
|--------|------------|------|------|------|----------------|-------------------|
| ● | B-3 | 16.0 | 69 | 39 | 30 | Elastic Silt (MH) |
| ■ | B-1 | 11.0 | 65 | 34 | 31 | Elastic Silt (MH) |
| ▲ | B-2 | 21.0 | 87 | 46 | 41 | Elastic Silt (MH) |
| ◆ | B-2 | 16.0 | 86 | 45 | 41 | Elastic Silt (MH) |
| ○ | B-1 | 42.0 | 121 | 40 | 81 | Fat Clay (CH) |
| | | | | | | |

Project: FY09 MCA PN 068823

Unaccompanied Enlisted Personnel Housing (UEPH)

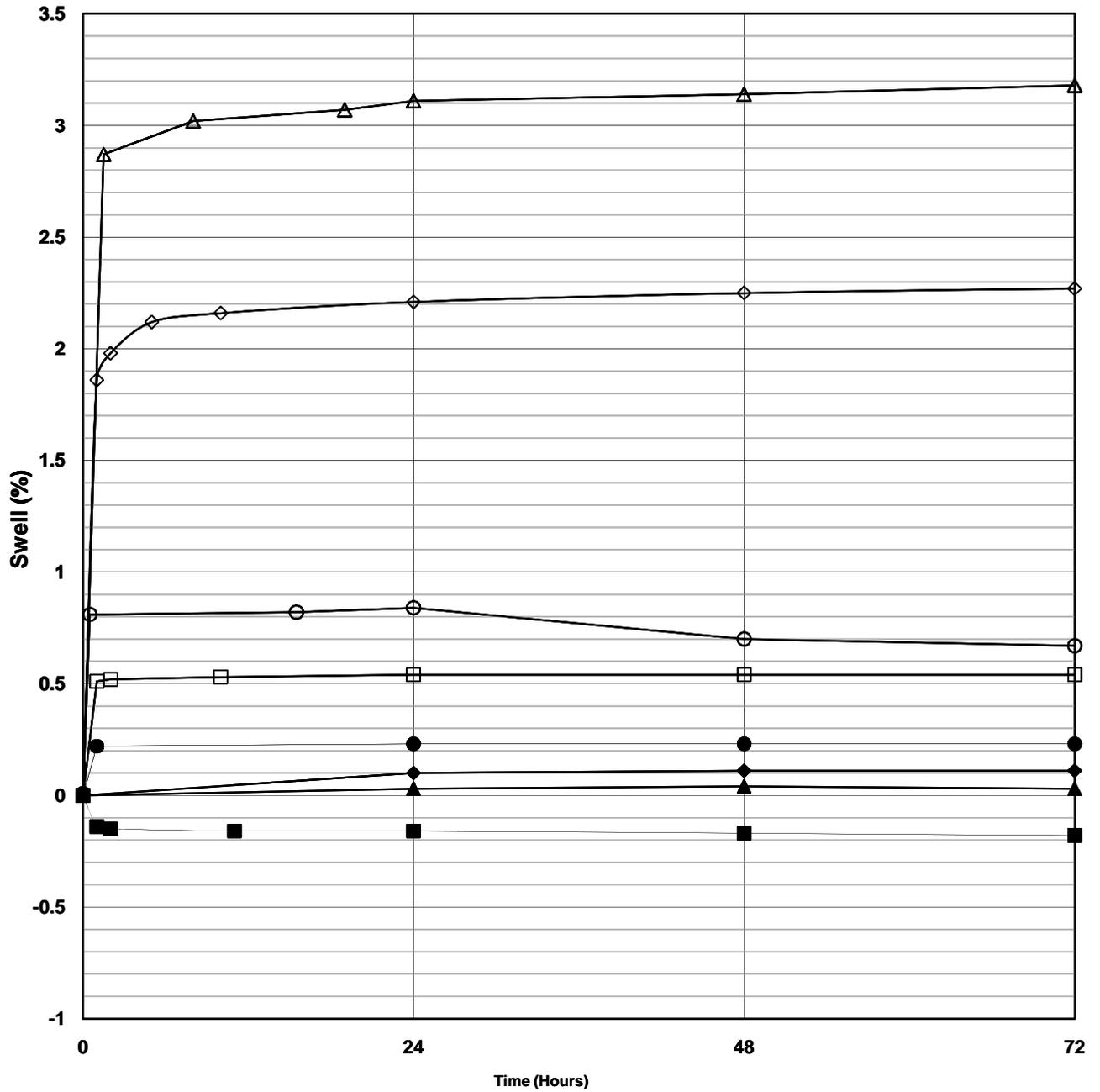
Location: Schofield Barracks, Oahu, Hawaii

Project Number: 10007

PLASTICITY CHART

FIGURE D-13





| Sample Information | | | | Initial | Air Dry | Soaked | TEST RESULTS | | | |
|--------------------|----------|-----------------|-------------|-------------------|-------------------|---------------|-------------------|--------------|-----------|-------|
| | Location | Depth (ft, bgs) | Description | Dry Density (pcf) | Water Content (%) | Water Content | Water Content (%) | Surface Load | Shrinkage | Swell |
| ● | B-3 | 3.0 | Undisturbed | 89.9 | 35% | N/A | 35% | 150 psf | 0.2% | 0.2% |
| ■ | B-5 | 6.0 | Undisturbed | 95.7 | 31% | N/A | 32% | 150 psf | 0.3% | 0.0% |
| ▲ | B-8 | 0.5 | Undisturbed | 75.5 | 33% | N/A | 46% | 20 psf | 1.4% | 0.0% |
| ◆ | B-6 | 1.5 | Undisturbed | 74.1 | 36% | N/A | 49% | 50 psf | 1.5% | 0.1% |
| □ | B-2 | 6.0 | Undisturbed | 89.0 | 34% | 24% | 37% | 150 psf | 1.9% | 0.5% |
| ○ | B-10 | 1.5 | Undisturbed | 82.1 | 34% | 23% | 43% | 50 psf | 0.4% | 0.8% |
| ◇ | B-7 | 1.5 | Remolded | 98.5 | 31% | 22% | 34% | 150 psf | 1.7% | 2.3% |
| △ | B-10 | 1.5 | Remolded | 90.2 | 33% | N/A | 40% | 50 psf | 1.5% | 3.2% |

Project: FY09 MCA PN 068823

Unaccompanied Enlisted Personnel Housing (UEPH)

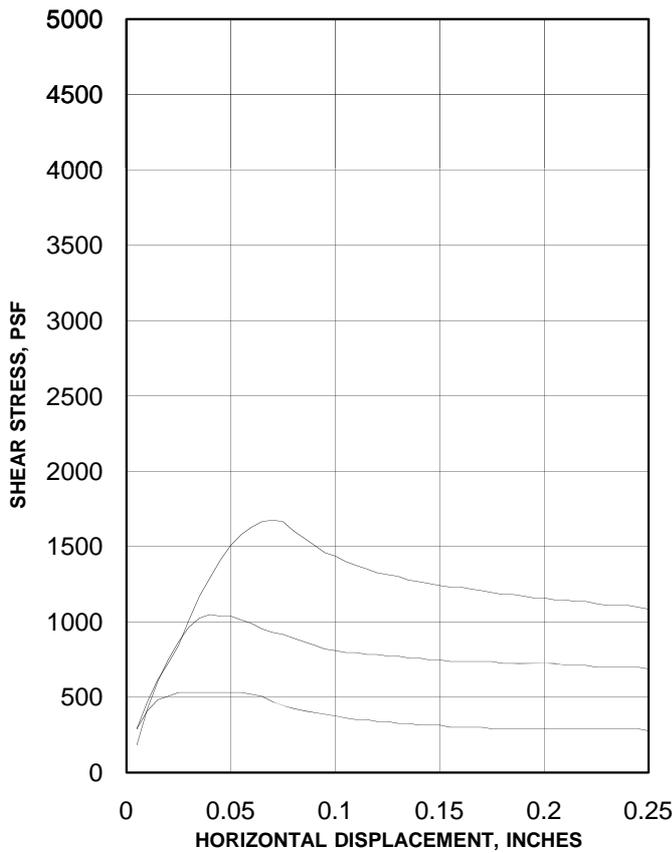
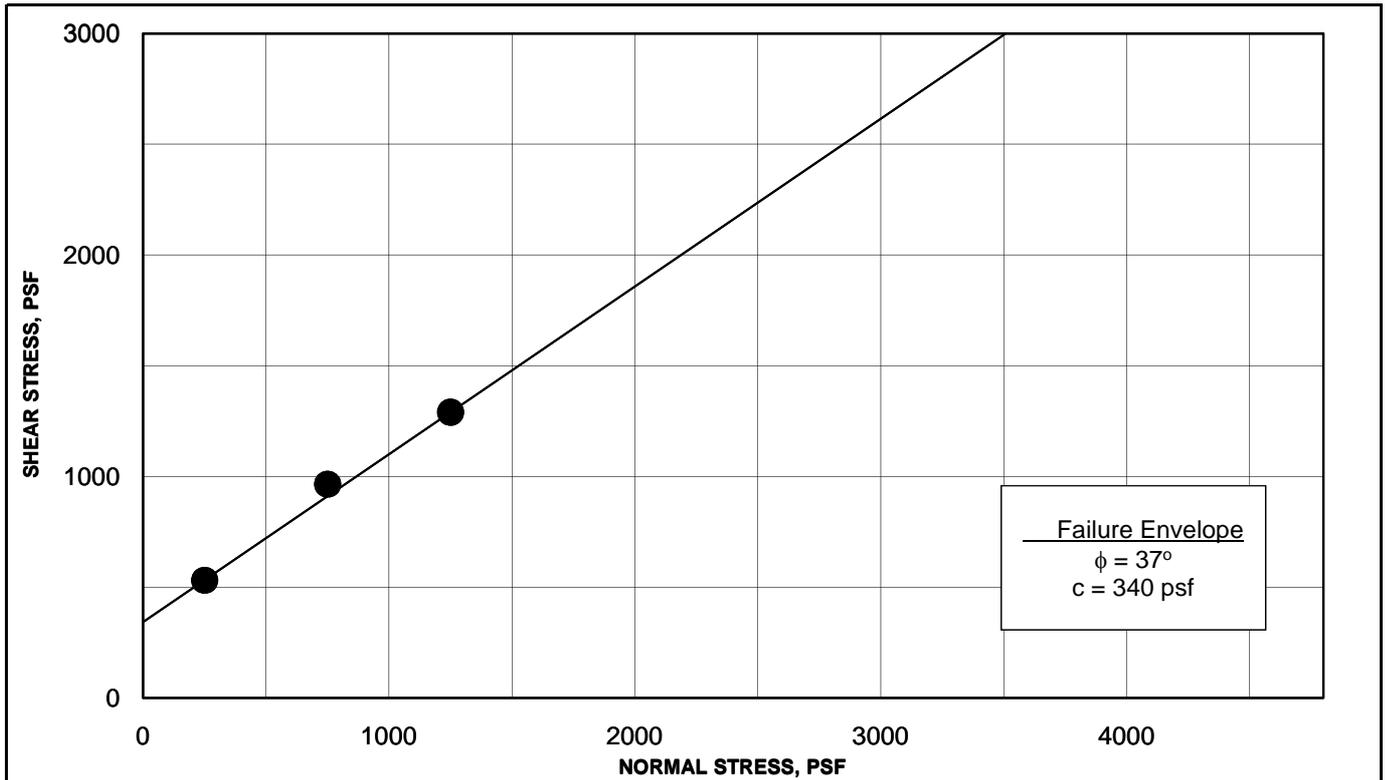
Location: Schofield Barracks, Oahu, Hawaii

Project Number: 10007

**ONE-DIMENSIONAL SWELL OR
SETTLEMENT POTENTIAL**



FIGURE D-14



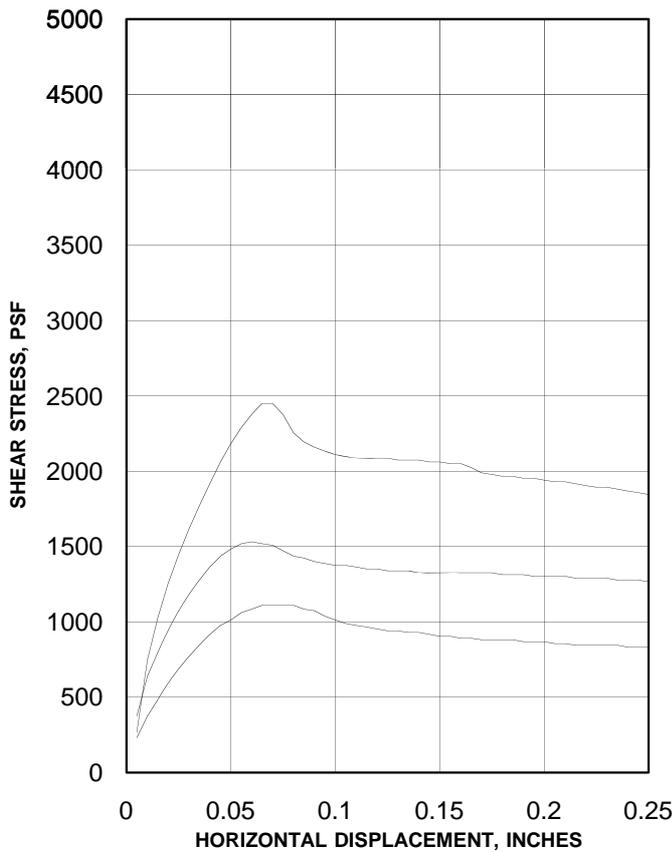
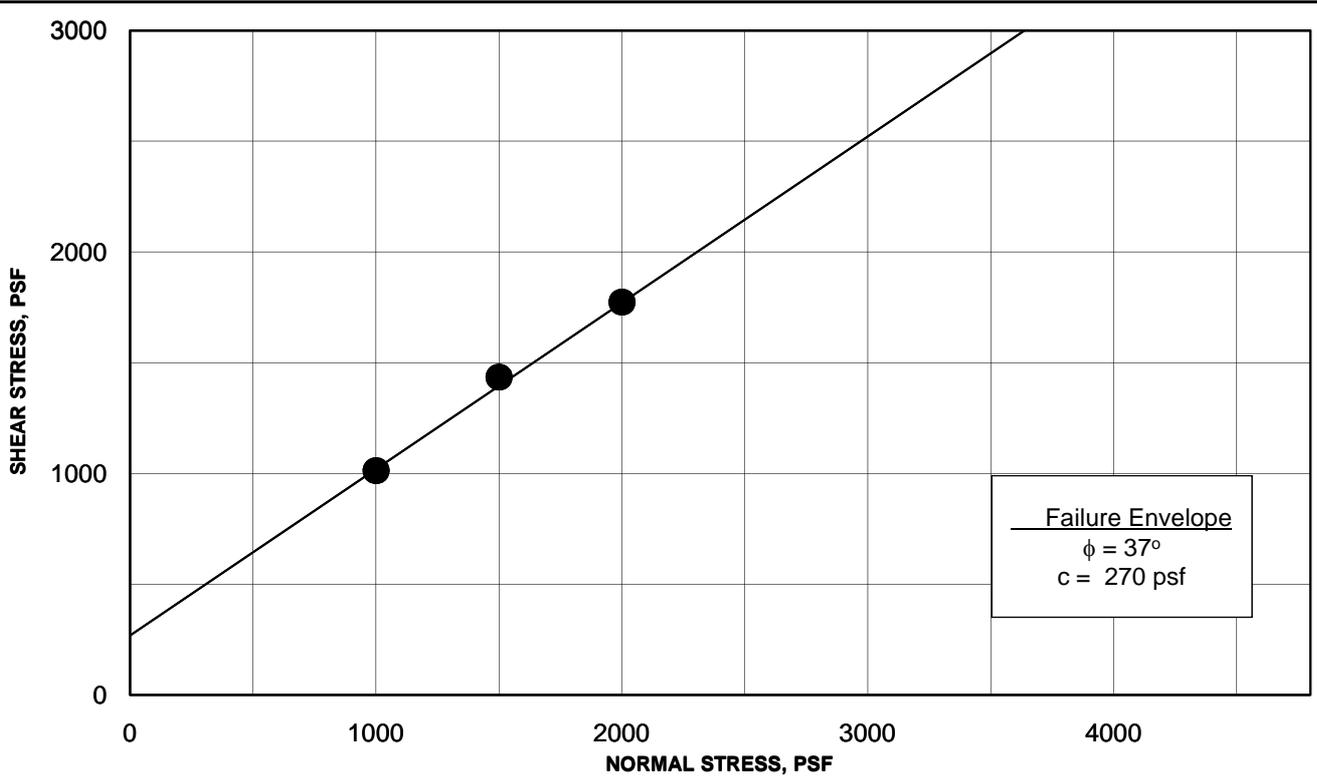
| | | | | |
|-----------------------------|---|--------------|------------|-------|
| Boring | B-3 | Depth | 7 ft | |
| Description | Elastic Silt (MH) LL = 59% PI = 23% N ₆₀ = 39 blows/foot | | | |
| Sample No. | 1 | 2 | 3 | |
| Initial | Water Content, % | 35.7 | 38.2 | 34.9 |
| | Dry Density, pcf | 83.8 | 83.3 | 84.4 |
| | Diameter, inches | 2.41 | 2.41 | 2.41 |
| | Height, inches | 1.0 | 1.0 | 1.0 |
| Final | Water Content, % | 40.6 | 41.6 | 40.8 |
| | Dry Density, pcf | 84.8 | 83.9 | 84.6 |
| | Diameter, inches | 2.41 | 2.41 | 2.41 |
| | Height, inches | 0.989 | 0.992 | 0.998 |
| Strain Rate, in./minute | 0.0008 | 0.0008 | 0.0008 | |
| Normal Stress, psf | 1250 | 750 | 250 | |
| Peak Stress, psf | 1290 | 965 | 531 | |
| Displacement, in. | 0.040 | 0.030 | 0.025 | |
| Ultimate Stress, psf | 1085 | 687 | 277 | |
| Displacement, in. | 0.250 | 0.250 | 0.250 | |

Project: FY09 MCA PN 068823
 Unaccompanied Enlisted Personnel Housing (UEPH)
Location: Schofield Barracks, Oahu, Hawaii
Project Number: 10007

DIRECT SHEAR TEST

FIGURE D-15





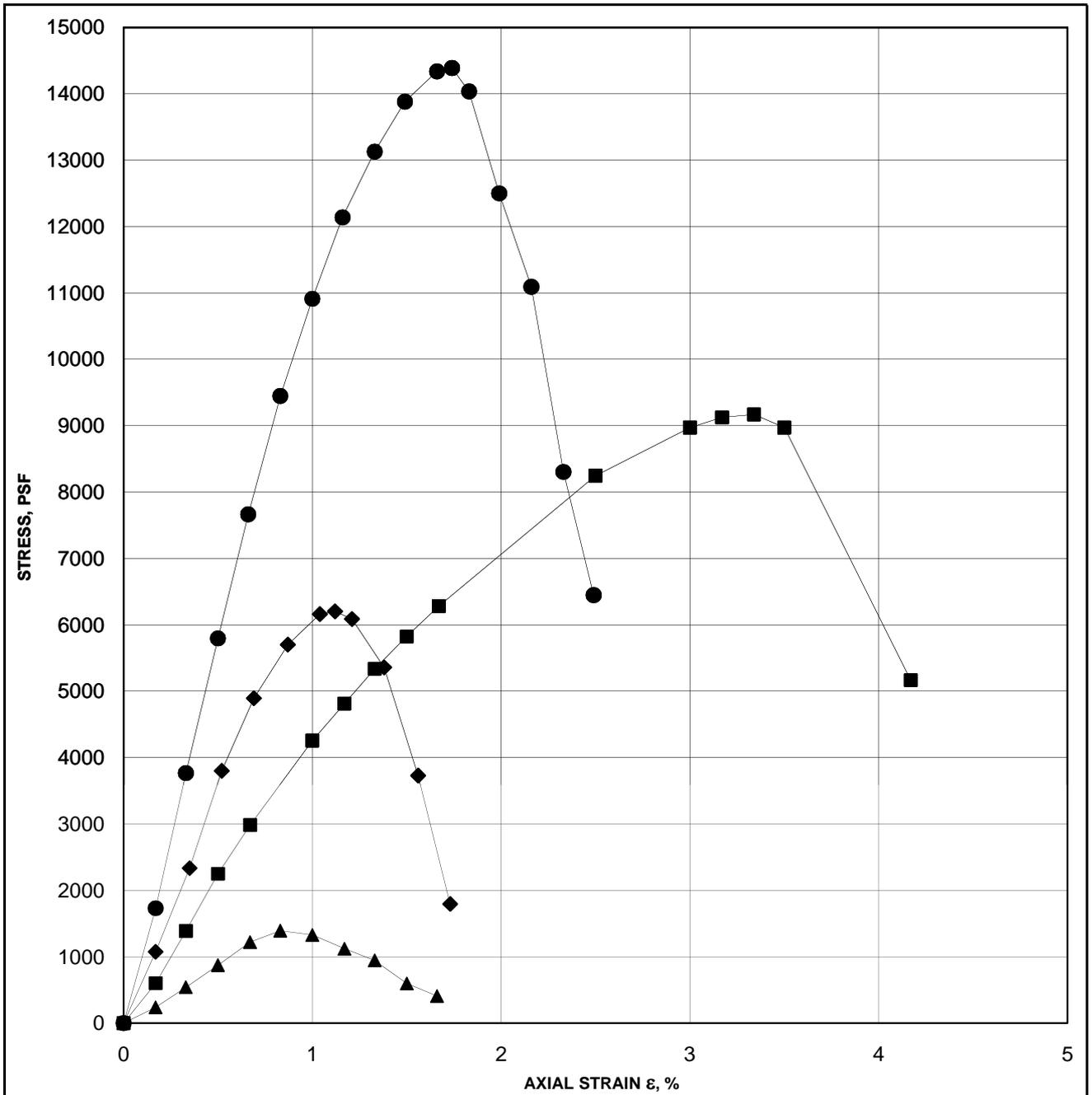
| | | | | |
|-----------------------------|---|--------------|-------------|-------|
| Boring | B-5 | Depth | 15 ft | |
| Description | Elastic Silt (MH) LL = 58% PI = 19% $N_u = 23 \text{ blows/foot}$ | | | |
| Sample No. | 1 | 2 | 3 | |
| Initial | Water Content, % | 43.2 | 45.4 | 51.0 |
| | Dry Density, pcf | 79.7 | 77.5 | 72.2 |
| | Diameter, inches | 2.41 | 2.41 | 2.41 |
| | Height, inches | 1.0 | 1.0 | 1.0 |
| Final | Water Content, % | 45.4 | 47.2 | 52.0 |
| | Dry Density, pcf | 81.4 | 78.6 | 73.1 |
| | Diameter, inches | 2.41 | 2.41 | 2.41 |
| | Height, inches | 0.979 | 0.986 | 0.987 |
| Strain Rate, in./minute | 0.0027 | 0.0027 | 0.0027 | |
| Normal Stress, psf | 2000 | 1500 | 1000 | |
| Peak Stress, psf | 1773 | 1435 | 1013 | |
| Displacement, in. | 0.035 | 0.045 | 0.050 | |
| Ultimate Stress, psf | 1845 | 1266 | 832 | |
| Displacement, in. | 0.250 | 0.250 | 0.250 | |

Project: FY09 MCA PN 068823
 Unaccompanied Enlisted Personnel Housing (UEPH)
Location: Schofield Barracks, Oahu, Hawaii
Project Number: 10007

DIRECT SHEAR TEST

FIGURE D-16





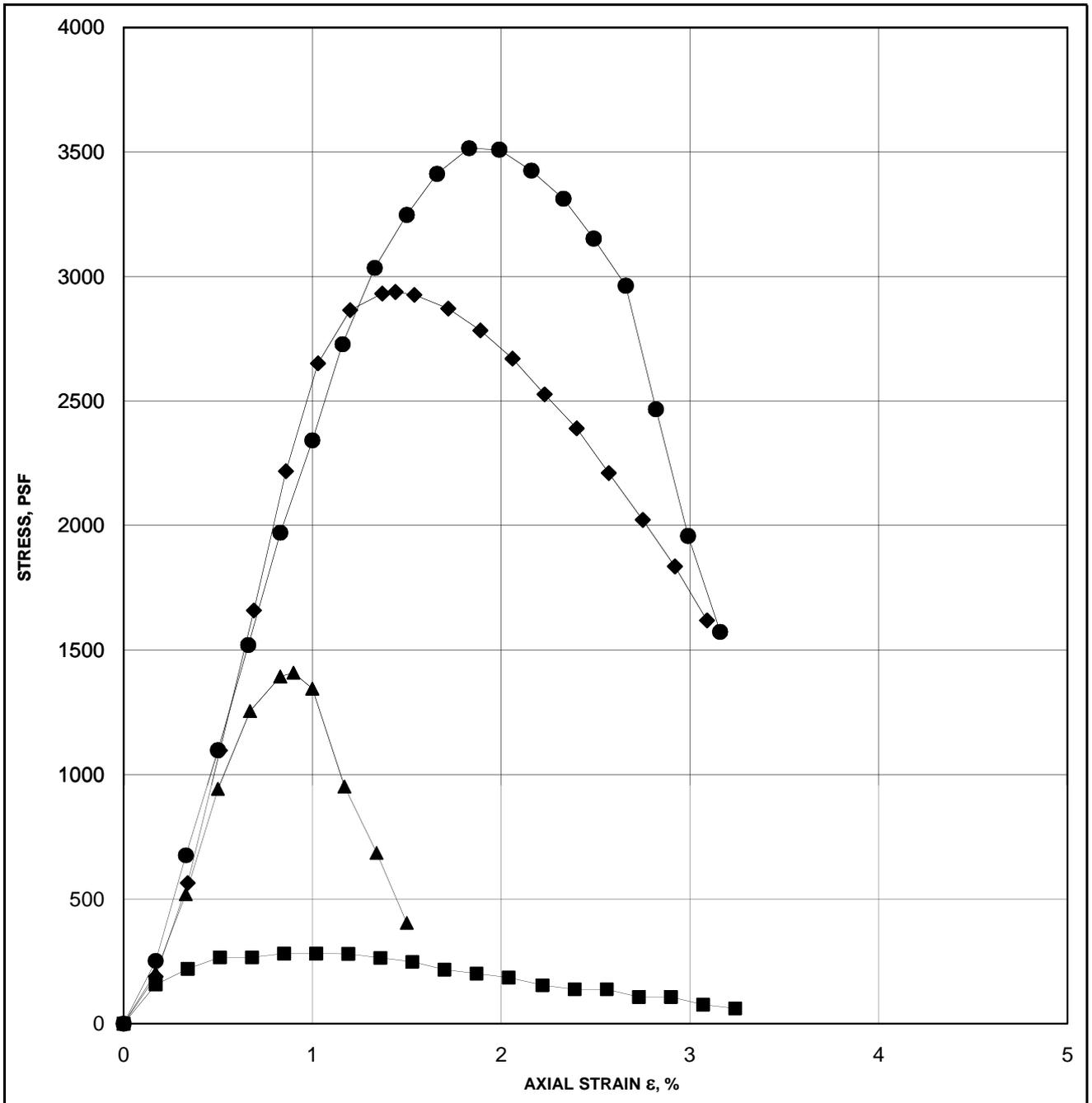
| Boring | Depth (ft) | USCS Classification | Type "U" Sampler Blow Counts | w _o (%) | γ _d (pcf) | ε _f (%) | UCS (psf) | |
|--------|------------|---------------------|------------------------------|--------------------|----------------------|--------------------|-----------|-------|
| ● | B-1 | 6.0 | Elastic Silt (MH) | 128 | 30.3 | 94.6 | 1.7 | 14387 |
| ■ | B-1 | 11.0 | Elastic Silt (MH) | 68 | 30.7 | 93.3 | 3.3 | 9170 |
| ▲ | B-2 | 16.0 | Elastic Silt (MH) | 26 | 33.7 | 65.8 | 0.8 | 1392 |
| ◆ | B-2 | 21.0 | Elastic Silt (MH) | 41 | 33.4 | 75.9 | 1.1 | 6202 |

Project: FY09 MCA PN 068823
Unaccompanied Enlisted Personnel Housing (UEPH)
Location: Schofield Barracks, Oahu, Hawaii
Project Number: 10007

UNCONFINED COMPRESSION TEST



Figure D-17



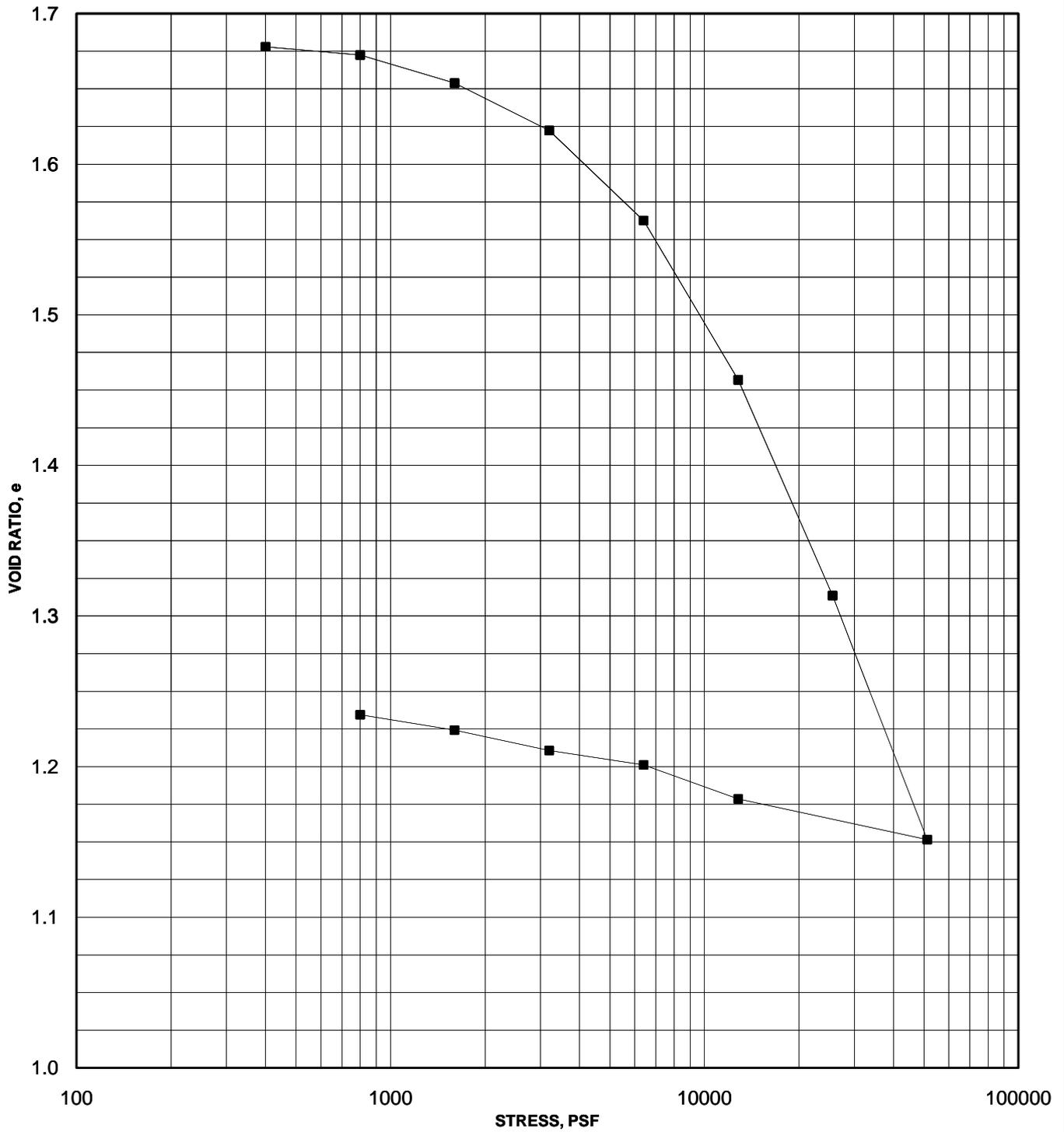
| Boring | Depth (ft) | USCS Classification | Type "U" Sampler Blow Counts | w _o (%) | γ _d (pcf) | ε _f (%) | UCS (psf) | |
|--------|------------|---------------------|------------------------------|--------------------|----------------------|--------------------|-----------|------|
| ● | B-3 | 16.0 | Elastic Silt (MH) | 37 | 36.7 | 82.7 | 1.8 | 3515 |
| ■ | B-4 | 3.0 | Elastic Silt (MH) | 17 | 26.2 | 72.0 | 0.9 | 281 |
| ▲ | B-4 | 11.0 | Silt (ML) | 35 | 44.0 | 79.2 | 0.9 | 1409 |
| ◆ | B-5 | 3.0 | Elastic Silt (MH) | 47 | 34.9 | 78.7 | 1.4 | 2938 |

Project: FY09 MCA PN 068823
Unaccompanied Enlisted Personnel Housing (UEPH)
Location: Schofield Barracks, Oahu, Hawaii
Project Number: 10007

UNCONFINED COMPRESSION TEST



Figure D-18



| Boring | Depth (ft) | Description | p_o (psf) | C_c | C_s | γ_d (pcf) | w (%) | LL % | PI % |
|--------|------------|-------------------|-------------|-------|-------|------------------|---------|------|------|
| 4 | 16.0 | Elastic Silt (MH) | 6150 | 0.414 | 0.049 | 67.0 | 44.5% | -- | -- |

Project: FY09 MCA PN 068823

Unaccompanied Enlisted Personnel Housing (UEPH)

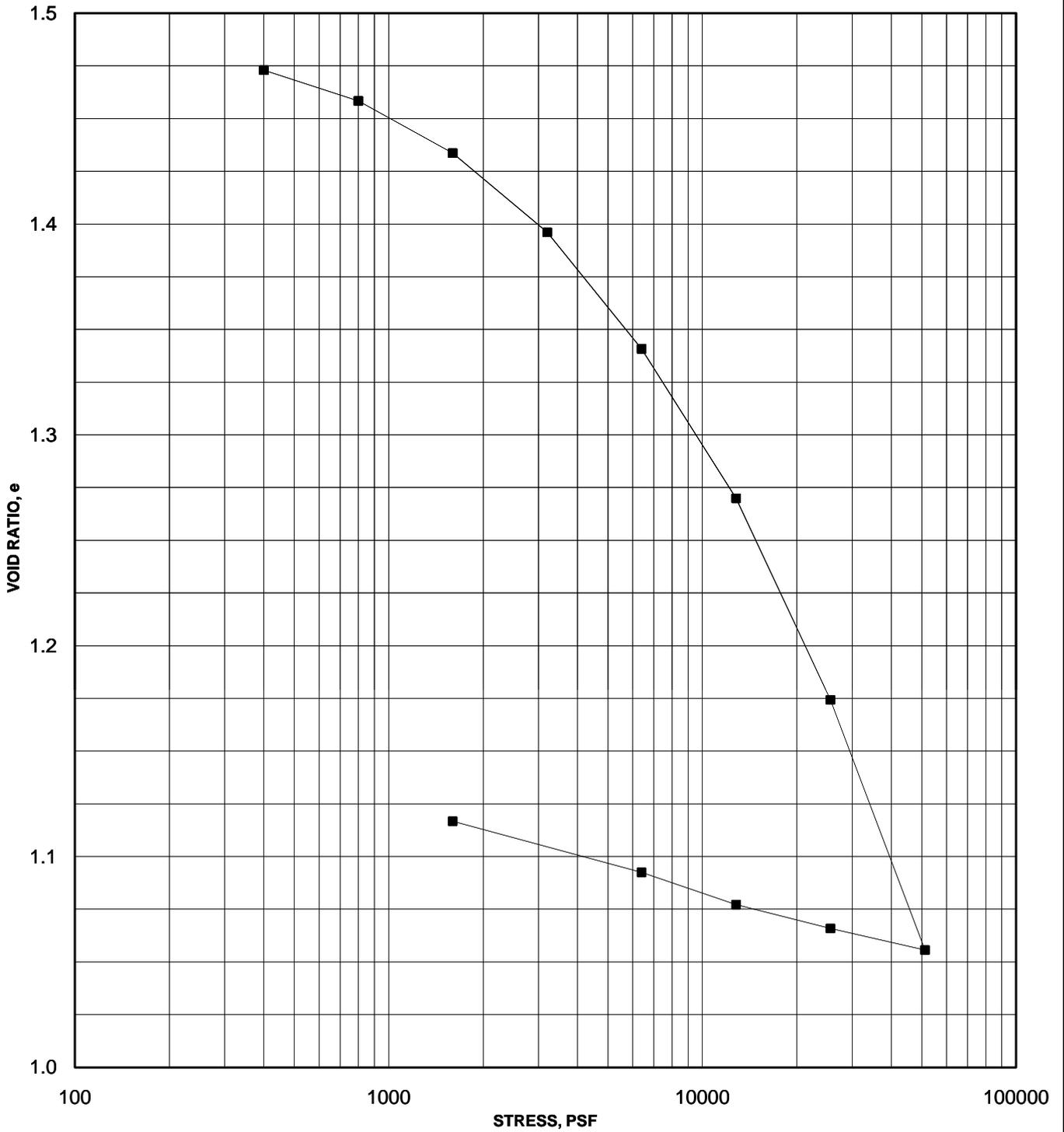
Location: Schofield Barracks, Oahu, Hawaii

Project Number: 10007

CONSOLIDATION TEST



FIGURE D-19



| Boring | Depth (ft) | Description | p_o (psf) | C_c | C_s | γ_d (pcf) | w (%) | LL % | PI % |
|--------|------------|-------------------|-------------|-------|-------|------------------|---------|------|------|
| 5 | 9.0 | Elastic Silt (MH) | 6250 | 0.394 | 0.044 | 72.3 | 53.1% | -- | -- |

Project: FY09 MCA PN 068823

Unaccompanied Enlisted Personnel Housing (UEPH)

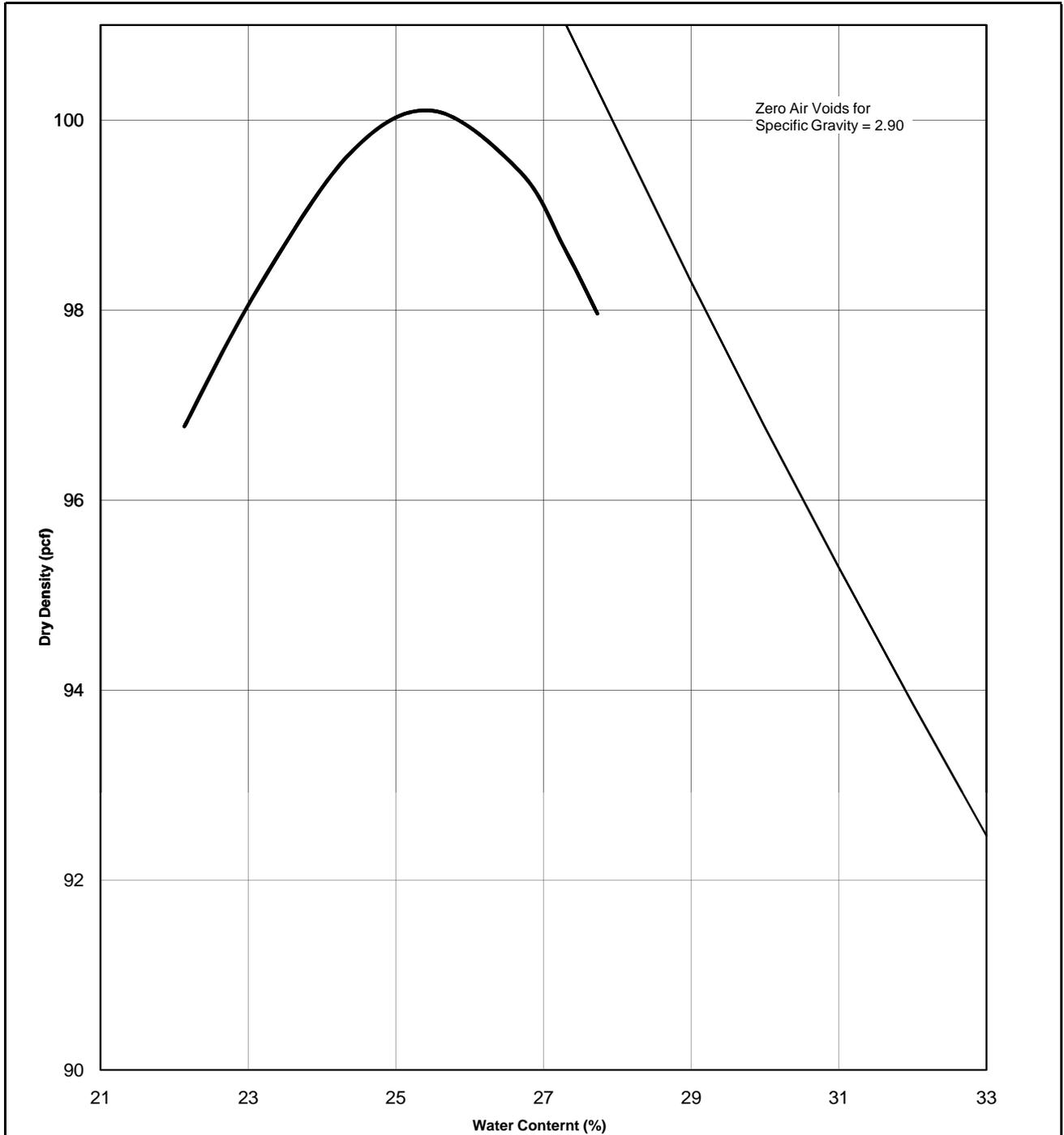
Location: Schofield Barracks, Oahu, Hawaii

Project Number: 10007

CONSOLIDATION TEST



FIGURE D-20



ASTM TEST SPECIFICATION: D 1557-00 Method A Modified

| Elevation / Depth | CLASSIFICATION | | PLASTICITY | | Specific Gravity | TEST RESULTS | |
|-------------------|----------------|--------|------------|--------|------------------|--|---|
| | USCS | AASHTO | LL (%) | PI (%) | | Maximum Dry Density (γ_d max, pcf) | Optimum Moisture Content (W_{opt} , %) |
| 0.5 to 2.0 | MH | | 57 | 24 | 2.9 | 100.1 | 25.5 |

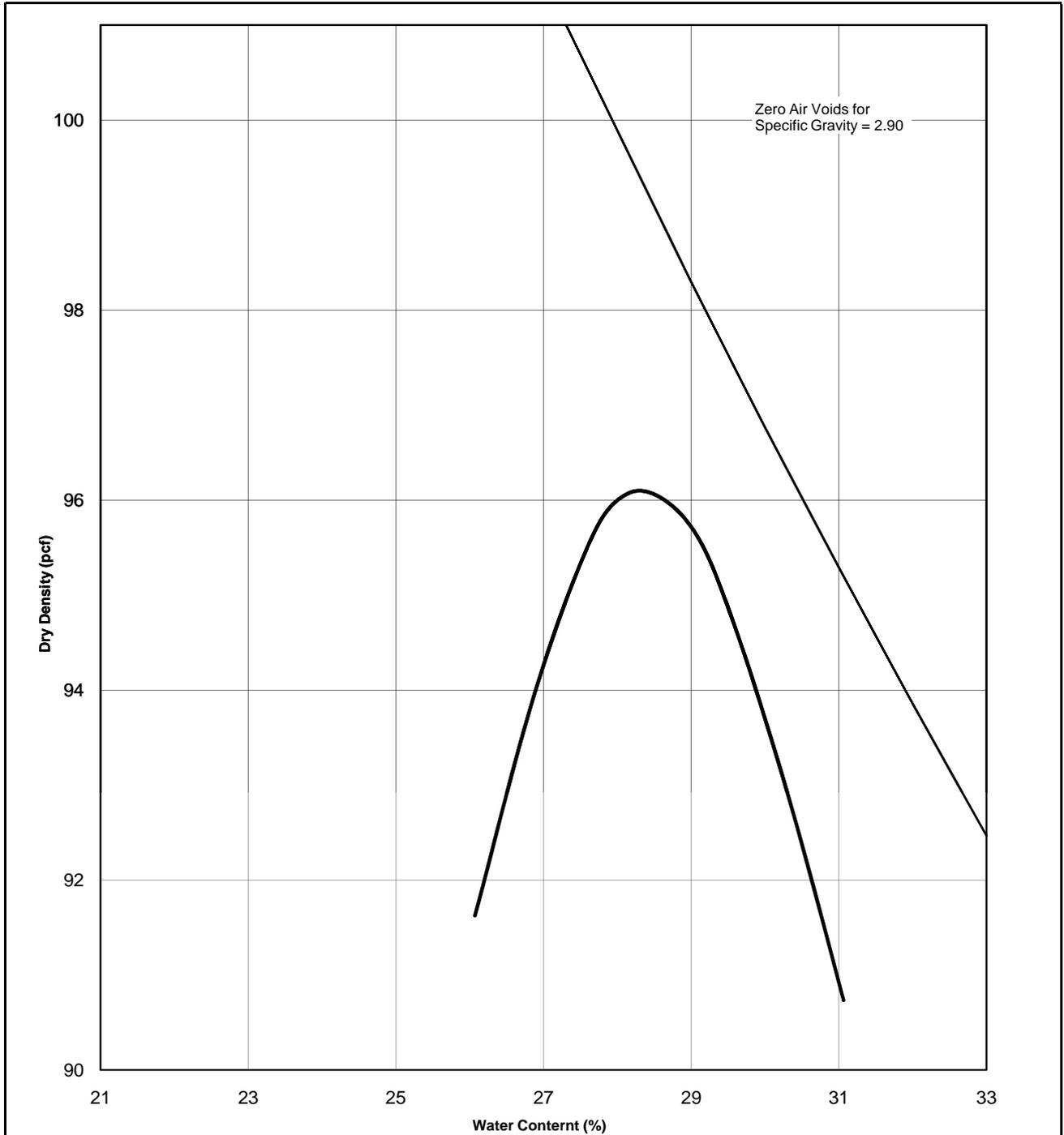
Project: FY09 MCA PN 068823
Unaccompanied Enlisted Personnel Housing (UEPH)
Location: Schofield Barracks, Oahu, Hawaii
Project Number: 10007

NOTES: Soil Sample Obtained At Boring B-10 Location

MODIFIED PROCTOR COMPACTION TEST

FIGURE D-21





ASTM TEST SPECIFICATION: D 1557-00 Method A Modified

| Elevation / Depth | CLASSIFICATION | | PLASTICITY | | Specific Gravity | TEST RESULTS | |
|-------------------|----------------|--------|------------|--------|------------------|--|---|
| | USCS | AASHTO | LL (%) | PI (%) | | Maximum Dry Density (γ_d max, pcf) | Optimum Moisture Content (W_{opt} , %) |
| 0.5 to 2.0 | MH | | 60 | 24 | 2.9 | 96.1 | 28.3 |

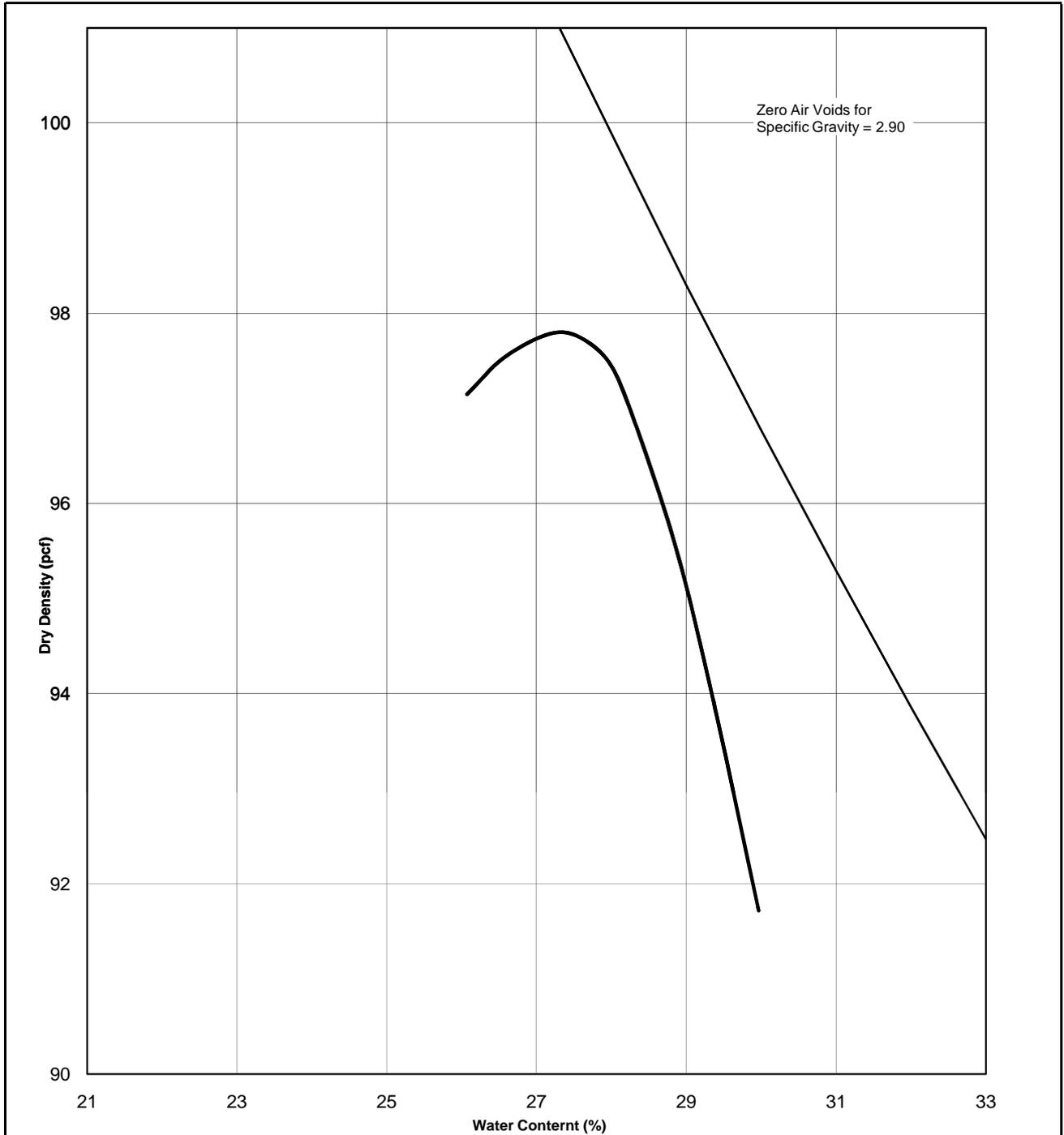
Project: FY09 MCA PN 068823
Unaccompanied Enlisted Personnel Housing (UEPH)
Location: Schofield Barracks, Oahu, Hawaii
Project Number: 10007

NOTES: Soil Sample Obtained At Boring B-8 Location

MODIFIED PROCTOR COMPACTION TEST

FIGURE D-22





ASTM TEST SPECIFICATION: D 1557-00 Method A Modified

| Elevation / Depth | CLASSIFICATION | | PLASTICITY | | Specific Gravity | TEST RESULTS | |
|-------------------|----------------|--------|------------|--------|------------------|--|---|
| | USCS | AASHTO | LL (%) | PI (%) | | Maximum Dry Density (γ_d max, pcf) | Optimum Moisture Content (W_{opt} , %) |
| 0.5 to 2.0 | MH | | 52 | 17 | 2.9 | 97.8 | 27.3 |

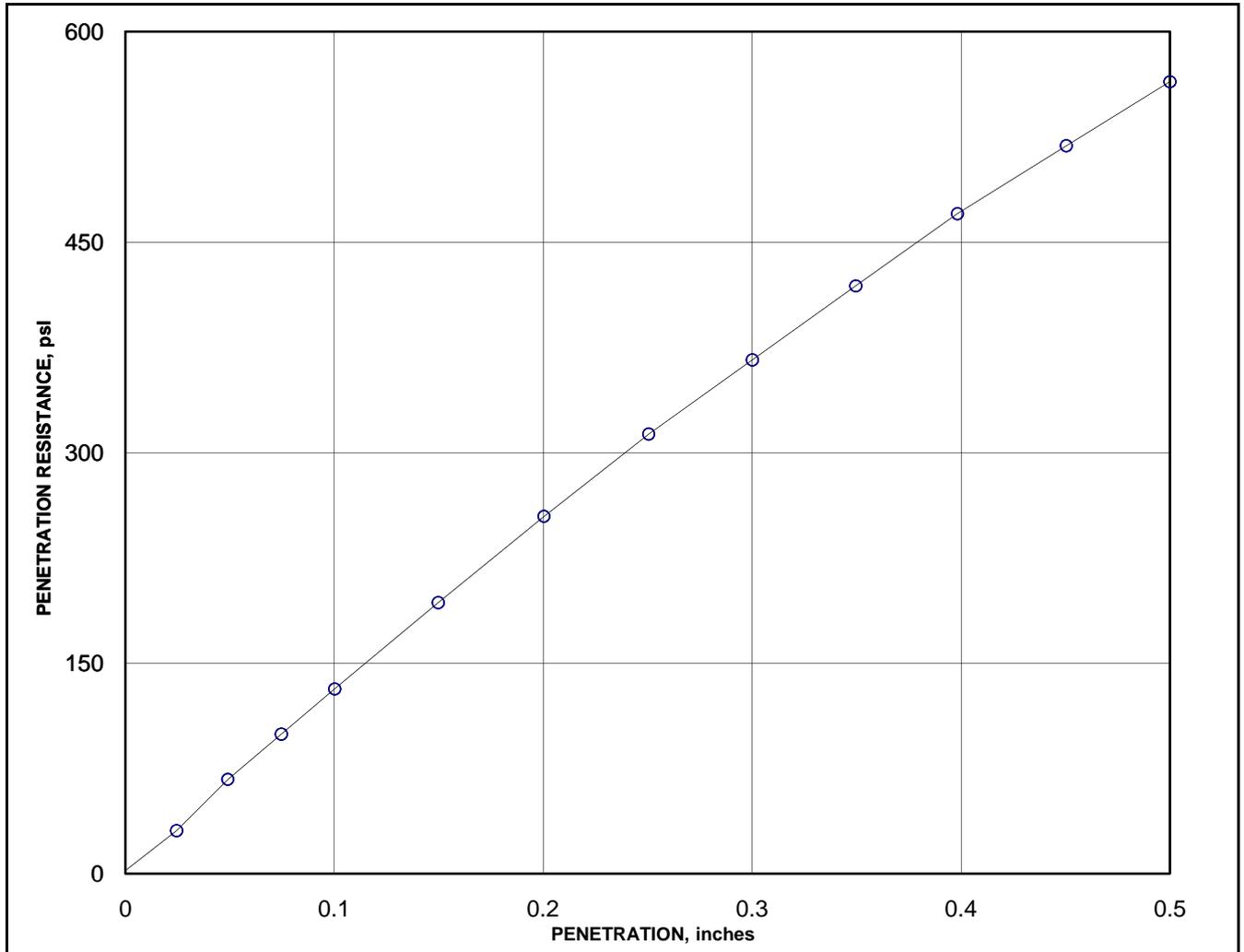
Project: FY09 MCA PN 068823
Unaccompanied Enlisted Personnel Housing (UEPH)
Location: Schofield Barracks, Oahu, Hawaii
Project Number: 10007

NOTES: Soil Sample Obtained At Boring B-6 Location

MODIFIED PROCTOR COMPACTION TEST

FIGURE D-23





| | |
|--------------------|---------------------------------|
| Boring B-6 | Depth 0.5 -2.0 |
| Description | Reddish Brown Elastic Silt (MH) |

| | |
|---|--|
| Modified Proctor Maximum Dry Density (γ_{dmax} , pcf) | Optimum Moisture Content (w_{opt} , %) |
| 97.8 | 27.3 |

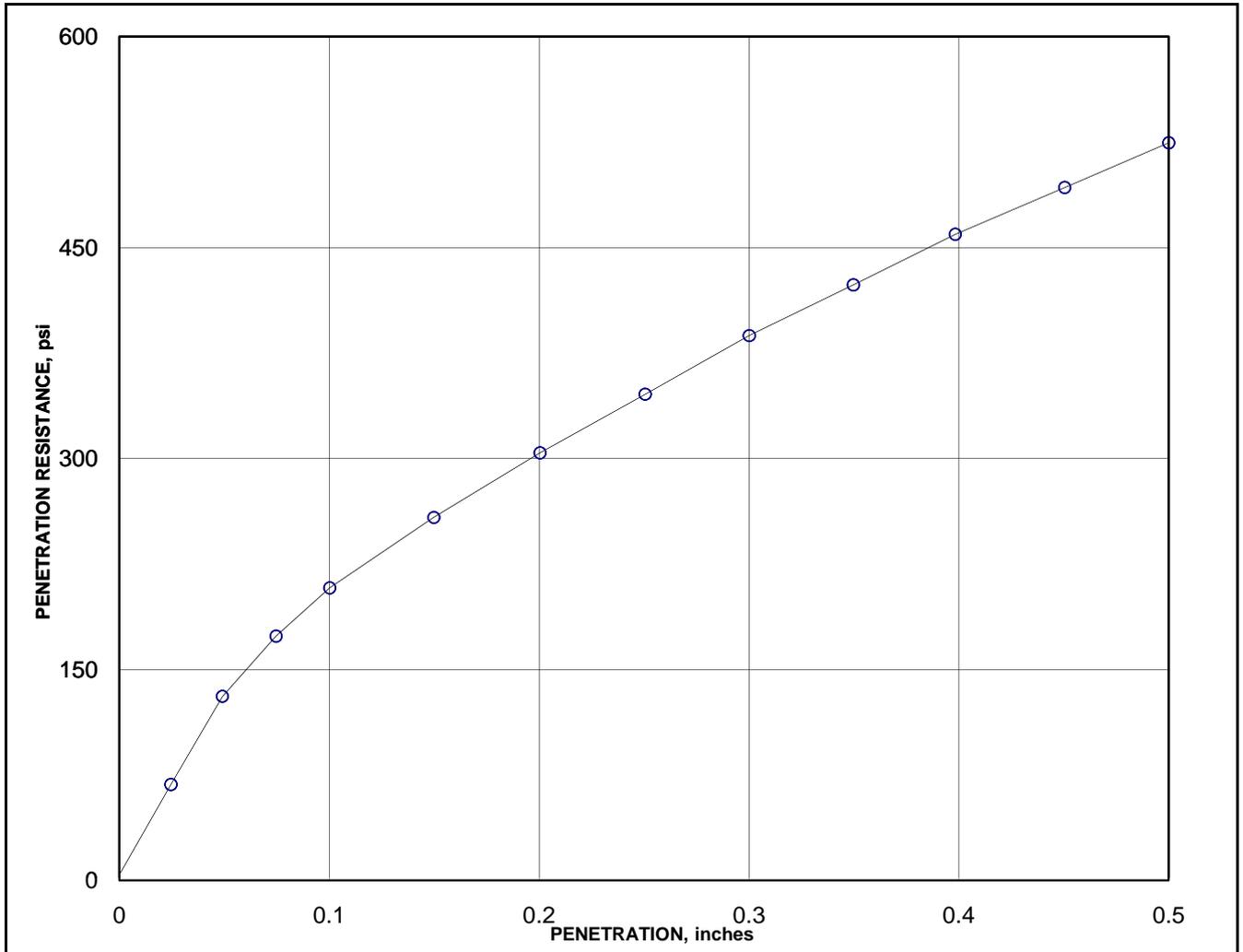
| Test No. | | 1 | 2 | 3 |
|----------------------------|------------------|-------|---|---|
| Initial | Water Content, % | 27.7 | | |
| | Dry Density, pcf | 97.3 | | |
| Final | Water Content, % | 28.2 | | |
| | Dry Density, pcf | 97.1 | | |
| Linearity Correction (in.) | | 0.004 | | |
| Surcharge Weight, lbs | | 10 | | |
| Total Swell, % | | 0.2 | | |
| CBR Value @ 0.1" | | 13.6 | | |
| CBR Value @ 0.2" | | 17.1 | | |

Project: FY09 MCA PN 068823
Unaccompanied Enlisted Personnel Housing (UEPH)
Location: Schofield Barracks, Oahu, Hawaii
Project Number: 10007

LABORATORY CBR TEST



FIGURE D - 24



| | |
|--------------------|---------------------------------|
| Boring B-8 | Depth 0.5 to 2 ft |
| Description | Reddish Brown Elastic Silt (MH) |

| | |
|---|--|
| Modified Proctor Maximum Dry Density (γ_{dmax} , pcf) | Optimum Moisture Content (w_{opt} , %) |
| 96.1 | 28.3 |

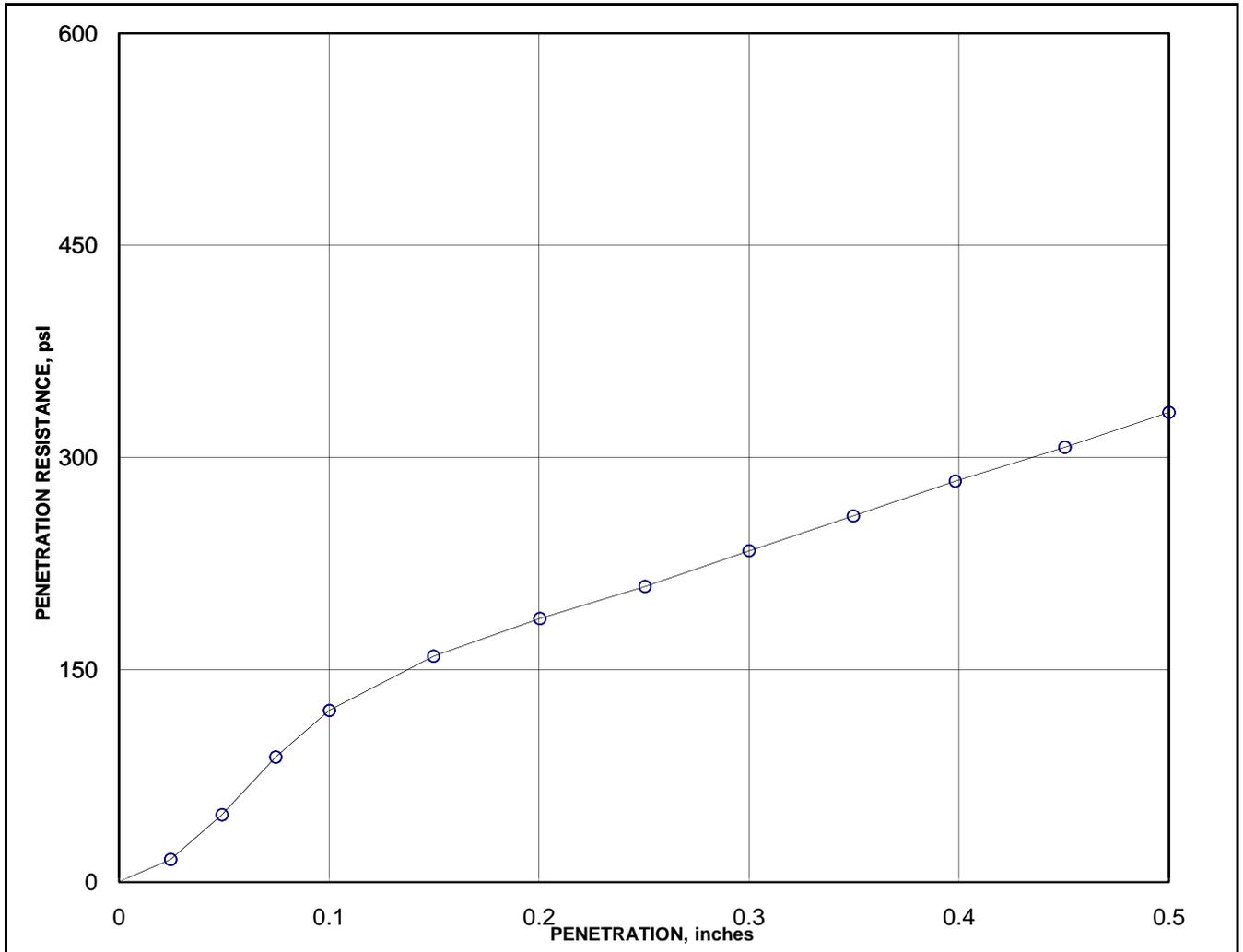
| Test No. | 1 | 2 | 3 | |
|----------------------------|------------------|------|---|--|
| Initial | Water Content, % | 28.3 | | |
| | Dry Density, pcf | 95.9 | | |
| Final | Water Content, % | 31.6 | | |
| | Dry Density, pcf | 95.4 | | |
| Linearity Correction (in.) | 0 | | | |
| Surcharge Weight, lbs | 10 | | | |
| Total Swell, % | 0.5 | | | |
| CBR Value @ 0.1" | 20.6 | | | |
| CBR Value @ 0.2" | 20.1 | | | |

Project: FY09 MCA PN 068823
Unaccompanied Enlisted Personnel Housing (UEPH)
Location: Schofield Barracks, Oahu, Hawaii
Project Number: 10007

LABORATORY CBR TEST

FIGURE D - 25





| | |
|--------------------|---------------------------------|
| Boring B-10 | Depth 0.5 to 2 ft |
| Description | Reddish Brown Elastic Silt (MH) |

| | |
|---|--|
| Modified Proctor Maximum Dry Density (γ_{dmax} , pcf) | Optimum Moisture Content (w_{opt} , %) |
| 100.1 | 25.2 |

| Test No. | 1 | 2 | 3 | |
|----------------------------|------------------|------|---|--|
| Initial | Water Content, % | 25.6 | | |
| | Dry Density, pcf | 99.7 | | |
| Final | Water Content, % | 26.3 | | |
| | Dry Density, pcf | 98.5 | | |
| Linearity Correction (in.) | 0.02 | | | |
| Surcharge Weight, lbs | 10 | | | |
| Total Swell, % | 1.1 | | | |
| CBR Value @ 0.1" | 13.6 | | | |
| CBR Value @ 0.2" | 13.0 | | | |

Project: FY09 MCA PN 068823
Unaccompanied Enlisted Personnel Housing (UEPH)
Location: Schofield Barracks, Oahu, Hawaii
Project Number: 10007

LABORATORY CBR TEST



FIGURE D - 26

APPENDIX B

LIST OF DRAWINGS:

See Appendix J cover sheet for list of drawings.

APPENDIX C

UTILITY CONNECTIONS:

See APPENDIX J - Drawings for utility connections.

APPENDIX D

Results of Fire Flow Tests

2010027.01 HED-Barracks Flow Test, Schofield, 2-12-10

S. S. DANNAWAY ASSOCIATES, INC.

Fire Protection Engineers/Building Code Consultants Test # 1 of 1

HYDRANT FLOW TEST REPORT

DATE: 12-Feb-10

LOCATION: Schofield Barracks
Wahiawa, HI

TIME: 10:00 AM

TEST MADE BY: Jay Higashi

REPRESENTATIVE OF: S. S. DANNAWAY ASSOCIATES, INC.

WITNESS: Paul Choi, S. S. Dannaway Associates, Inc.

STATE PURPOSES OF TEST: To determine the available water supply.

PRESSURE HYDRANT Fire Hydrant #R-11 on Sutton Street behind Building 1095.

(TEST HYDRANT)

GAGE ID/CALIB DATE SSDA - SN#1049939, 10/30/09

FLOW HYDRANT Fire Hydrant #K1-31 in front of residential house on Menoher Road.

PITOT GAGE ID/CALIB DATE SSDA #003, 10/30/09

FLOW HYDRANT DATA:

| | Flow 1 | | Flow 2 | | |
|-------------------------|--------|-------|--------|-------|--|
| No. & SIZE NOZZLE (in.) | 1 | 2 1/2 | 2 | 2 1/2 | Nozzle coefficients: flowtubes = 0.90 - 0.95 hydrant butts: rounded edge = 0.90 sharp edge = 0.80 inset edge = 0.70 smooth nozzle = 0.95 |
| PITOT READING(S) | 68 | | 45 | 34 | |
| | butt | | tube | tube | |
| DISCHARGE COEFF. | 0.90 | | 0.95 | 0.95 | |
| | | | | | |
| GPM | 1,384 | | 2,221 | | |

PRESSURE (TEST) HYDRANT DATA

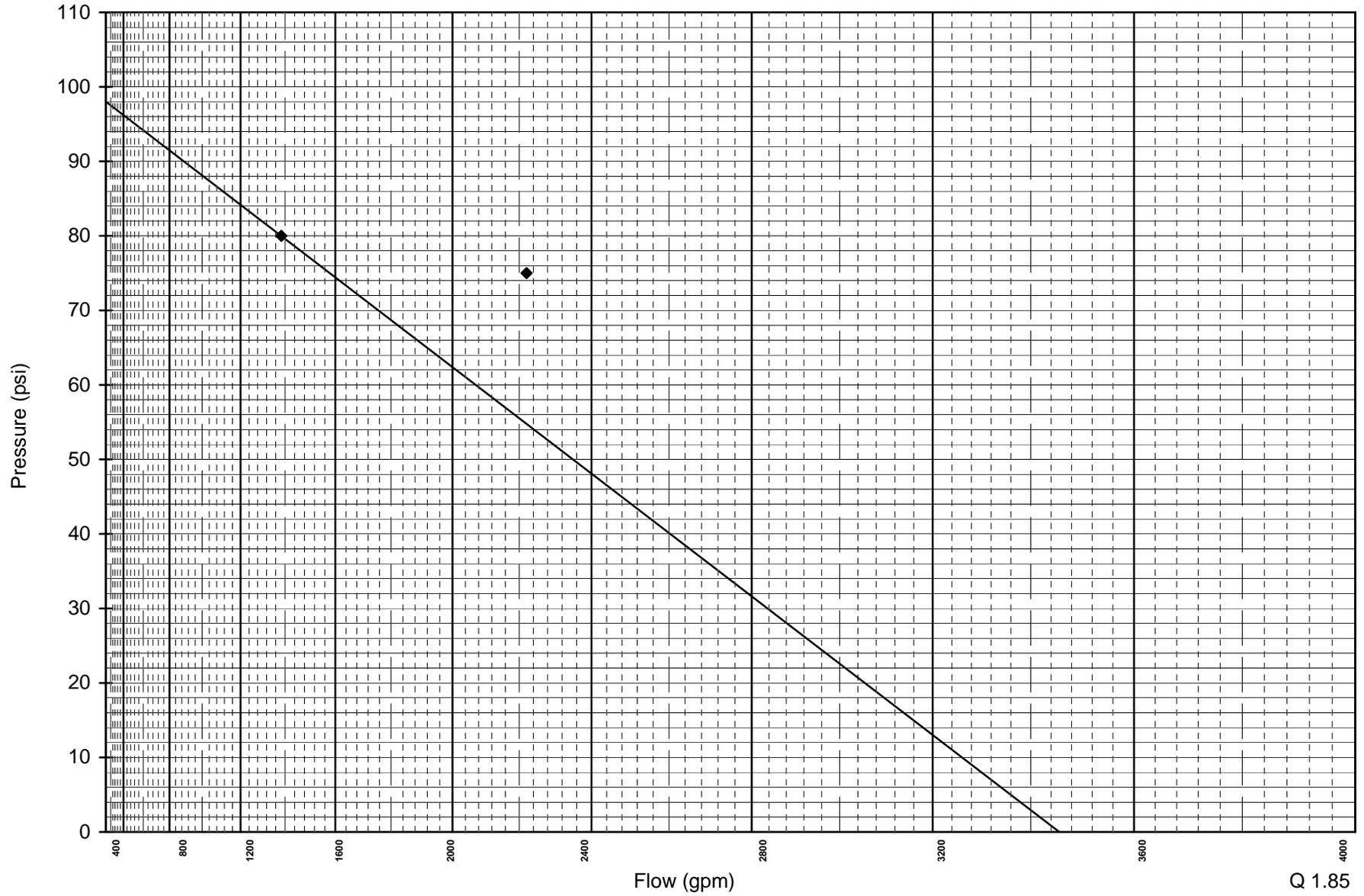
STATIC PRESSURE 98 psi RESIDUAL PRESSURE(S)
Flow 1 80 psi Flow 2 75 psi

PROJECTED AVAILABLE WATER SUPPLIES

@ 20 psi Residual 3,055 gpm or @ 30 psi Residual 2,837 gpm

REMARKS:

Pressure Hydrant - Clow #76, wet barrel, two 2 1/2", one pumper connection. Good condition
Flow Hydrant - Clow, wet barrel, two 2 1/2", one pumper connection, No. 76, 1997. No chain on one cap.
Pumps running. Tank levels at 10 ft. 6 in. and 9 ft. 4 in.



2010027.01 HED-Barracks Flow Test, Schofield, 2-12-10

S. S. DANNAWAY ASSOCIATES, INC.

Fire Protection Engineers/Building Code Consultants

Test # 1 of 1

HYDRANT FLOW TEST REPORT

DATE: 12-Feb-10

LOCATION: Schofield Barracks
Wahiawa, HI

TIME: 10:00 AM

TEST MADE BY: Jay Higashi

REPRESENTATIVE OF: S. S. DANNAWAY ASSOCIATES, INC.

WITNESS: Paul Choi, S. S. Dannaway Associates, Inc.

STATE PURPOSES OF TEST: To determine the available water supply.

PRESSURE HYDRANT (TEST HYDRANT) Fire Hydrant #R-11 on Sutton Street behind Building 1095.

GAGE ID/CALIB DATE SSDA - SN#1049939, 10/30/09

FLOW HYDRANT Fire Hydrant #K1-31 in front of residential house on Menoher Road.

PITOT GAGE ID/CALIB DATE SSDA #003, 10/30/09

FLOW HYDRANT DATA:

| | Flow 1 | | Flow 2 | | |
|------------------------|--------|--------|--------|--------|--|
| No. & SIZE NOZZLE (mm) | 1 | 63 1/2 | 2 | 63 1/2 | Nozzle coefficients: flowtubes = 0.90 - 0.95 hydrant butts: rounded edge = 0.90 sharp edge = 0.80 inset edge = 0.70 smooth nozzle = 0.95 |
| PITOT READING(S) | 468.8 | | 310.3 | 234.4 | |
| | butt | | tube | tube | |
| DISCHARGE COEFF. | 0.90 | | 0.95 | 0.95 | |
| LPM | 5,233 | | 8,400 | | |

PRESSURE (TEST) HYDRANT DATA

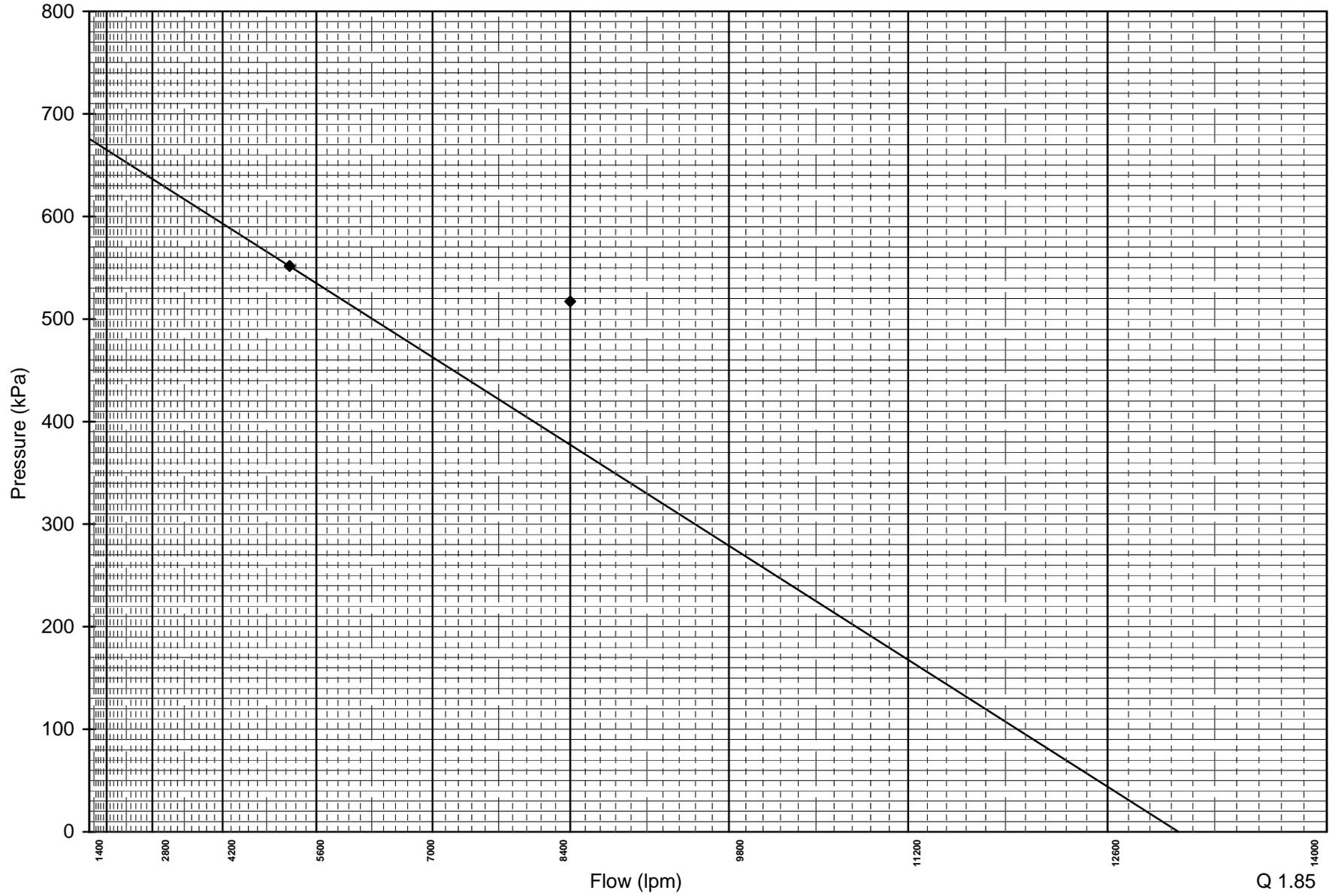
STATIC PRESSURE 675.7 kPa RESIDUAL PRESSURE(S)
Flow 1 551.6 kPa Flow 2 517.1 kPa

PROJECTED AVAILABLE WATER SUPPLIES

@ 135 kPa Residual 11,586 lpm or @ 207 kPa 10,727 lpm

REMARKS:

Pressure Hydrant - Clow #76, wet barrel, two 65mm, one pumper connection. Good condition
Flow Hydrant - Clow, wet barrel, two 65mm, one pumper connection, No. 76, 1997. No chain on one cap.
Pumps running. Tank levels at 3.200 m. and 2.819 m.



Schofield Barracks

Flow 1 of 1

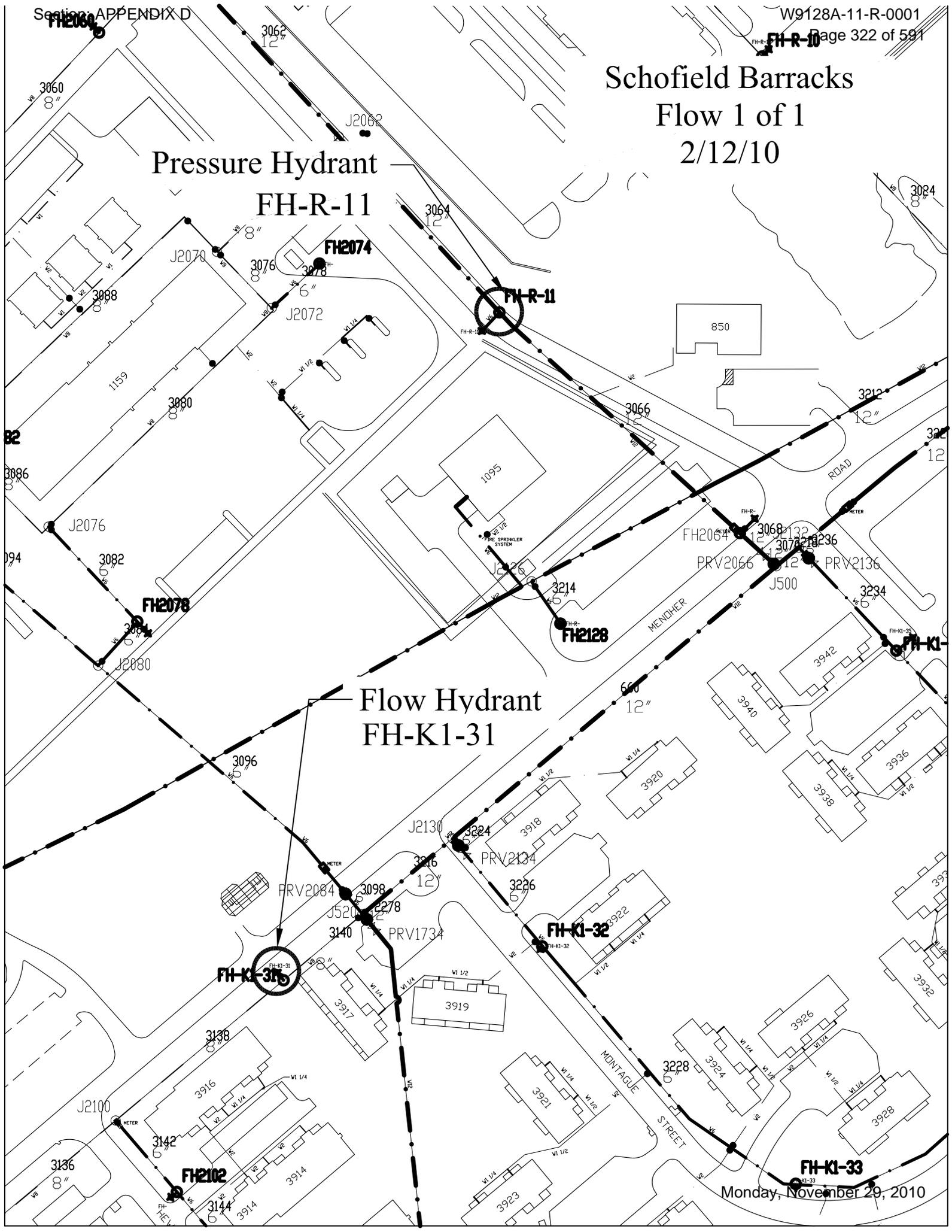
2/12/10

Pressure Hydrant

FH-R-11

Flow Hydrant

FH-K1-31



APPENDIX E

ENVIRONMENTAL INFORMATION:

- Specifications Division 1
Section 01 57 23 Storm Water Pollution Prevention Measures
- Excerpts from Final Site Characterization Report, May 2009
(Full report is available upon request)
- Pest Management Report, DD Form 1352

- 3.6.4 Diversion Dike Maintenance
- 3.7 INSPECTIONS
 - 3.7.1 General
 - 3.7.2 Inspections Details
 - 3.7.3 Inspection Reports

-- End of Section Table of Contents --

Handling of Geosynthetic Rolls and Samples

1.2 GENERAL

The Contractor shall implement the storm water pollution prevention measures specified in this section in a manner which will meet the requirements of Section 01 57 20 ENVIRONMENTAL PROTECTION, and the requirements of the National Pollution Discharge Elimination System (NPDES) permit attached to that Section.

1.3 SUBMITTALS

NOTE: Submittals must be limited to those necessary for adequate quality control. The importance of an item in the project should be one of the primary factors in determining if a submittal for the item should be required.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy projects.

Submittal items not designated with a "G" are considered as being for information only for Army projects and for Contractor Quality Control approval for Navy projects.

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-07 Certificates

Mill Certificate or Affidavit

Certificate attesting that the Contractor has met all specified requirements.

1.4 EROSION AND SEDIMENT CONTROLS

Typical controls and measures practicable for use by the Contractor are described below.

1.4.1 Stabilization Practices

NOTE: Describe interim stabilization practices, including site-specific scheduling of the implementation of the practices. Plans should ensure that existing vegetation is preserved where attainable and disturbed areas are stabilized. Show locations for stabilization practices on the drawings.

The stabilization practices to be implemented shall include temporary seeding, mulching, geotextiles, sod stabilization, vegetative buffer strips, erosion control matts, protection of trees, preservation of mature vegetation, etc. On his daily CQC Report, the Contractor shall 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, stabilization practices shall be initiated as soon as practicable, but no more than 14 calendar days, in any portion of the site where construction activities have temporarily or permanently ceased.

1.4.1.1 Unsuitable Conditions

Where the initiation of stabilization measures by the fourteenth day after construction activity temporarily or permanently ceases is precluded by unsuitable conditions caused by the weather, stabilization practices shall be initiated as soon as practicable after conditions become suitable.

1.4.1.2 No Activity for Less Than 21 Days

Where construction activity will resume on a portion of the site within 21 days from when activities ceased (e.g., the total time period that construction activity is temporarily ceased is less than 21 days), then stabilization practices do not have to be initiated on that portion of the site by the fourteenth day after construction activity temporarily ceased.

1.4.2 Structural Practices

NOTES: Describe structural practices to divert flows from exposed soils, store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site to the degree attainable. A permit under Section 404 of the Clean Water Act may be required for certain structural practices. Check with Permits Branch.

For common drainage locations that serve a disturbed area of 4 or more hectares (10 or more acres) at one

time, a temporary or permanent detention basin providing 252 cubic meters of storage per hectare (3,600 cubic feet of storage per acre) drained, or equivalent control measures, shall be provided where attainable until stabilization of the site. The 252 cubic meters of storage per hectare (3,600 cubic feet of storage per acre) drained does not apply to flows from offsite areas and flows from onsite areas that are either undisturbed or have undergone final stabilization where such flows are diverted around the sediment basin. For drainage locations which serve a disturbed area of 4 or more hectares (10 or more acres) at one time and where a temporary sediment basin providing 252 cubic meters of storage per hectare (3,600 cubic feet of storage per acre) drained, or equivalent sediment controls, is not attainable, sediment controls are required for all sideslope and downslope boundaries of the construction area.

For drainage locations serving less than 4 hectares (10 acres), sediment traps, silt fences, or equivalent sediment controls are required for all sideslope and downslope boundaries of the construction area unless a sediment basin providing storage for 252 cubic meters of storage per hectare (3,600 cubic feet of storage per acre) drained is provided.

Structural practices shall be implemented to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Structural practices shall be implemented in a timely manner during the construction process to minimize erosion and sediment runoff. Structural practices shall include the following devices.

NOTE: Listed are examples of typical structural devices. Requirements for Silt Fences, Straw Bales, and Diversion Dikes are contained within this Guide Specification. Specifications for other structural practices used in the project must be added to this section.

- a. Silt fences.
- b. Straw bales.
- c. Diversion dikes.
- d. Drainage swales.
- e. Check dams.
- f. Subsurface drains.
- g. Pipe Slope drains.
- h. Level spreaders.
- i. Storm drain inlet protection.
- j. Rock outlet protection.
- k. Sediment traps.
- l. Reinforced soil retaining systems.
- m. Gabions.
- n. Sediment basins.

o. .

The permanent stabilization practices which are to be installed under the contract should be specified in other section of the specifications. These are measures that will be installed during the construction process to control pollutants in storm water discharges that will occur after construction operations have been completed. Structural measures should be placed on upland soils to the degree attainable. The installation of these devices may be subject to Section 404 of the Clean Water Act.

A goal of 80 percent removal of total suspended solids from these flows which exceed predevelopment levels should be used in designing and installing storm water management controls (where practicable). Where this goal is not met, the permittee shall provide justification for rejecting each practice listed above based on site conditions.

Velocity dissipation devices shall be placed at discharge locations and along the length of any outfall channel as necessary to provide a non-erosive velocity flow from the structure to a water course so that the natural physical and biological characteristics and functions are maintained and protected.

1.4.2.1 Silt Fences

The Contractor shall provide silt fences as a temporary structural practice to minimize erosion and sediment runoff. Silt fences shall be properly installed 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). Silt fences shall be installed in the locations indicated on the drawings. Final removal of silt fence barriers shall be upon approval by the Contracting Officer.

1.4.2.2 Straw Bales

The Contractor shall provide bales of straw as a temporary structural practice to minimize erosion and sediment runoff. Bales shall be properly placed to 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, bales shall be placed as work progresses, bales shall be removed/replaced/relocated as needed for work to progress in the drainage area). Areas where straw bales are to be used are shown on the drawings. Final removal of straw bale barriers shall be upon approval by the Contracting Officer. Rows of bales of straw shall be provided 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.

NOTE: Space rows a maximum of 60 meters (200 feet) apart in drains with slopes equal to or less than 5 percent and 30 meters (100 feet) apart in drains with slopes steeper than 5 percent. If drainage ditches have slopes above and below the 5 percent limit the spacing should be shown on the drawings.

- 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. Rows shall be spaced a maximum of 60 meters (200 feet) 200 feet apart in drains with slopes equal to or less than 5 percent and 30 meters (100 feet) 100 feet apart in drains with slopes steeper than 5 percent unless otherwise shown on the drawings.
- e. Perpendicular to the flow in the bottom of new drainage ditches, channels, and swales. Rows shall be spaced a maximum of 60 meters (200 feet) 200 feet apart in drains with slopes equal to or less than 5 percent and 30 meters (100 feet) 100 feet apart in drains with slopes steeper than 5 percent unless otherwise shown on the drawings.
- f. At the entrance to culverts that receive runoff from disturbed areas.

1.4.2.3 Diversion Dikes

Diversion dikes shall have a maximum channel slope of 2 percent and shall be adequately compacted to prevent failure. Unless otherwise shown on the drawings, the minimum height measured from the top of the dike to the bottom of the channel shall be 0.5 m (18 inches) 18 inches. The minimum base width shall be 1.8 m (6 feet) 6 feet and the minimum top width shall be 0.6 m. (2 feet) 2 feet. The Contractor shall ensure that the diversion dikes are not damaged by construction operations or traffic.

1.4.2.4 Fiber Rolls

The Contractor shall provide fiber rolls as a temporary structural practice to reduce water velocity, minimize erosion, and reduce sediment runoff. Rolls shall be properly placed to 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, rolls shall be placed as work progresses, rolls shall be removed/replaced/relocated as needed for work to progress in the drainage area). Final removal of fiber rolls barriers shall be upon approval by the Contracting Officer. Rows of fiber rolls shall be provided 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.

NOTE: Space rows a maximum of 60 meters (200 feet) apart in drains with slopes equal to or less than 5 percent and 30 meters (100 feet) apart in drains with slopes steeper than 5 percent. If drainage ditches have slopes above and below the 5 percent limit the spacing should be shown on the drawings.

- 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. Rows shall be spaced at distances not to exceed 10.7 m35 feet.
- e. Perpendicular to the flow in the bottom of new drainage ditches, channels, and swales. Rows shall be spaced at distances not to exceed 10.7 m35 feet.
- f. At the entrance to culverts that receive runoff from disturbed areas.
- g. On steep slopes fiber rolls shall be trenched in slightly and spaced at distances not to exceed 10.7 m35 feet. Rolls shall be placed at the same elevation contour by survey methods. Placement by survey methods will reduce the possibility of a rill developing along a sloping roll. On steep slopes fiber rolls shall be used with erosion control blankets.

The Contractor may use either wooden stakes or steel posts for fence construction. Wooden stakes utilized for silt fence construction, shall have a minimum cross section of 50 mm by 50 mm2 inches by 2 inches and shall have a minimum length of 1524 mm5 feet. Steel posts (standard "U" or "T" section) utilized for silt fence construction, shall have a minimum weight of mass of 1.98 kg per linear meter (weight of 1.33 pounds per linear foot)weight of 1.33 pounds per linear foot and a minimum length of 1524 mm5 feet.

NOTE: For small projects less than 1 acre use Figure 3. For large projects greater than 1 acre use Figure 4.

1.4.3 Minimum BMP Checklist

Development of contract-specific Best Management Practices shall consider the checklist applicable to the size of the project.

NOTE: Oahu Only. Attach figure when applicable.

See Attachment Rules Relating to Soil Erosion Standards & Guidelines, Department of Planning & Permitting, City and County of Honolulu, [(Figure 3)] [(Figure 4)]

PART 2 PRODUCTS

2.1 COMPONENTS FOR SILT FENCES

2.1.1 Filter Fabric

The geotextile shall comply with the requirements of ASTM D 4439, and shall consist 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 shall contain stabilizers and/or inhibitors added to the base plastic to make the filaments resistance to deterioration due to ultraviolet and heat exposure. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of -18 to 49 degrees C (0 to 120 degrees F) 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 (%) | | 30 % 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 (%) | | 30 % 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

The Contractor may use either wooden stakes or steel posts for fence construction. Wooden stakes utilized for silt fence construction, shall have a minimum cross section of 50 mm by 50 mm (2 inches by 2 inches) 2 inches by 2 inches when oak is used and 100 mm by 100 mm (4 inches by 4 inches) 4 inches by 4 inches when pine is used, and shall have a minimum length of 1.5 m (5 feet) 5 feet. Steel posts (standard "U" or "T" section) utilized for silt fence construction, shall have a minimum mass of 1.98 kg per linear meter (weight of 1.33 pounds per linear foot) weight of 1.33 pounds per linear foot and a minimum length of 1.5 m (5 feet) 5 feet.

2.1.3 Mill Certificate or Affidavit

A mill certificate or affidavit shall be provided attesting that the fabric and factory seams meet chemical, physical, and manufacturing requirements specified above. The mill certificate or affidavit shall specify the actual Minimum Average Roll Values and shall identify the fabric supplied by roll identification numbers. The Contractor shall submit a mill certificate or affidavit signed by a legally authorized official from the company manufacturing the filter fabric.

2.1.4 Identification Storage and Handling

Filter fabric shall be identified, stored and handled in accordance with ASTM D 4873.

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. The bales shall have a standard cross section of 350 mm by 450 mm (14 inches by 18 inches)14 inches by 18 inches. All bales shall be either wire-bound or string-tied. The Contractor may use either wooden stakes or steel posts to secure the straw bales to the ground. Wooden stakes utilized for this purpose, shall have a minimum dimensions of 50 mm by 50 mm (2 inches x 2 inches)2 inches x 2 inches in cross section and shall have a minimum length of 1 m (3 feet)3 feet. Steel posts (standard "U" or "T" section) utilized for securing straw bales, shall have a minimum mass of 1.98 kg per linear meter (weight of 1.33 pounds per linear foot) weight of 1.33 pounds per linear foot and a minimum length of 1 m (3 feet)3 feet.

2.3 COMPONENTS FOR FIBER ROLLS

A fiber roll consists of straw, flax, or other similar materials that are rolled and bound into a tight tubular roll and placed on the face of slopes at regular intervals to intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide some removal of sediment from the runoff.

PART 3 EXECUTION

3.1 CONTRACTOR RESPONSIBILITY

NOTE: Bracket Army Only

The Contractor is responsible for complying with all terms of the [US Garrison, Hawaii's] NPDES permit and shall employ any or all of the devices described in this specification, the ECP and the BMP, necessary to ensure compliance with applicable regulations concerning water pollution and water quality standards.

Any fines or citations issued by the DOH against the Government resulting directly or indirectly from the Contractor's failure to adequately comply with the State of Hawaii Department of Health water pollution and/or water quality standards during execution of the contract shall be the full and complete responsibility of the Contractor.

3.2 BMP IMPLEMENTATION

Temporary sedimentation basins and gravel entrances and exits are required for construction sites greater than 1 acre in size. The Contractor shall phase his site construction as much as possible to reduce the total amount of exposed areas subject to erosion. A vegetative buffer downstream of graded areas shall be used as much as possible.

3.3 INSTALLATION OF SILT FENCES

Silt fences shall extend a minimum of 400 mm (16 inches) 16 inches above the ground surface and shall not exceed 860 mm (34 inches) 34 inches above the ground surface. Filter fabric shall be from a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are unavoidable, filter fabric shall be spliced together at a support post, with a minimum 150 mm (6 inch) 6 inch overlap, and securely sealed. A trench shall be excavated approximately 100 mm (4 inches) 4 inches wide and 100 mm 4 inches deep on the upslope side of the location of the silt fence. The 100 mm by 100 mm (4-inch by 4-inch) 4-inch by 4-inch trench shall be backfilled and the soil compacted over the filter fabric. Silt fences shall be removed upon approval by the Contracting Officer.

3.4 INSTALLATION OF STRAW BALES

Straw bales shall be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another. Straw bales shall be installed 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. The barrier shall be entrenched and backfilled. A trench shall be excavated the width of a bale and the length of the proposed barrier to a minimum depth of 100 mm (4 inches) 4 inches. After the bales are staked and chinked (gaps filled by wedging with straw), the excavated soil shall be backfilled against the barrier. Backfill soil shall conform to the ground level on the downhill side and shall be built up to 100 mm (4 inches) 4 inches against the uphill side of the barrier. Loose straw shall be scattered over the area immediately uphill from a straw bale barrier to increase barrier efficiency. Each bale shall be securely anchored by at least two stakes driven through the bale. The first stake or steel post in each bale shall be driven toward the previously laid bale to force the bales together. Stakes or steel pickets shall be driven a minimum 450 mm (18 inches) 18 inches deep into the ground to securely anchor the bales.

3.5 INSTALLATION OF FIBER ROLLS

Locate fiber rolls on level contours spaced 2.4 to 6.0 m (8 to 20 ft) along the face of slope, or as required by Contracting Officer. Stake fiber rolls into a 50 to 100 mm (2 to 4 inch) 2 to 4 inch trench. Drive stakes at the end of each fiber roll. Space stakes 1.2m (4 ft) maximum on center. Use wood stakes (minimum length 600 mm (24 inch) 24 inch), with a nominal classification of 19 by 19 mm (3/4 by 3/4-inch) 3/4 by 3/4-inch. If more than one fiber roll is placed in a row, the rolls shall be butted, not overlapped. See Caltrans Storm Water quality Handbook Typical Fiber Roll Installation Detail, SC-5 (Attached).

Fiber rolls are typically left in place, however if they are removed, collect and dispose of sediment accumulation and fill and compact holes, trenches, depressions or any other ground disturbance to blend with adjacent ground.

3.6 MAINTENANCE

NOTE: Describe the procedures to be follow during construction to maintain the vegetation, erosion and sediment control measures, and other protective measures in good and effective operating condition.

The Contractor shall 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. The following procedures shall be followed to maintain the protective measures.

3.6.1 Silt Fence Maintenance

Silt fences shall be inspected in accordance with paragraph INSPECTIONS. Any required repairs shall be made promptly. Close attention shall be paid 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, the fabric shall be replaced promptly. Sediment deposits shall be removed when deposits reach one-third of the height of the barrier. When a silt fence is no longer required, it shall be removed. 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 as specified in the contract.

3.6.2 Straw Bale Maintenance

Straw bale barriers shall be inspected in accordance with paragraph INSPECTIONS. Close attention shall be paid to the repair of damaged bales, end runs and undercutting beneath bales. Necessary repairs to barriers or replacement of bales shall be accomplished promptly. Sediment deposits shall be removed when deposits reach one-half of the height of the barrier. Bale rows used to retain sediment shall be turned uphill at each end of each row. When a straw bale barrier is no longer required, it shall be removed. The immediate area occupied by the bales and any sediment deposits shall be shaped to an acceptable grade. The areas disturbed by this shaping shall be seeded as specified in the contract.

3.6.3 Fiber Roll Maintenance

Repair or replace split, torn, unraveling, or slumping fiber rolls. Inspect fiber rolls when rain is forecast. Perform maintenance as needed or as required by the Contracting Officer. Inspect fiber rolls following rainfall events and at least daily during prolonged rainfall. Perform maintenance as needed or as required by the Contracting Officer.

3.6.4 Diversion Dike Maintenance

Diversion dikes shall be inspected in accordance with paragraph INSPECTIONS. Close attention shall be paid to the repair of damaged diversion dikes and necessary repairs shall be accomplished promptly. When diversion dikes are no longer required, they shall be shaped to an

acceptable grade. The areas disturbed by this shaping shall be seeded as specified in the contract.

3.7 INSPECTIONS

3.7.1 General

The Contractor shall inspect disturbed areas of the construction site, areas used for storage of materials that are exposed to precipitation that have not been finally stabilized, stabilization practices, structural practices, other controls, and area where vehicles exit the site at least once every seven (7) calendar days and within 24 hours of the end of any storm that produces 13 mm (0.5 inch) or more rainfall at the site. Where sites have been finally stabilized, such inspection shall be conducted at least once every month.

3.7.2 Inspections Details

Disturbed areas and areas used for material storage that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Erosion and sediment control measures identified in the Erosion and Sediment Control Plan shall be observed to ensure that they are operating correctly. Discharge locations or points shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

Locations where vehicles exit the site shall be inspected for evidence of offsite sediment tracking.

3.7.3 Inspection Reports

The Contractor shall develop an Inspection Checklist based on its site specific BMPs. The checklist shall include a list of the structural practices employed, maintenance performed, and action taken. For each inspection conducted, the Contractor shall 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 Erosion and Sediment Control Plan, and the inspection checklist. The report shall be furnished to the Contracting Officer within 24 hours of the inspection as a part of the Contractor's daily CQC REPORT. A copy of the inspection report shall be maintained on the job site.

-- End of Section --

Final Site Characterization PN 68823 – UEPH Barracks Complex

Schofield Barracks Oahu, Hawaii



Prepared for:



**US Army Corps
of Engineers.**

U.S. Army Corps of Engineers
Honolulu Engineer District
Contract No: W9128A-07-P-0049

Prepared by:



element environmental llc
environmental · engineering · water resources
62-180 Emerson Road
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May 2009

Executive Summary

Element Environmental, LLC (E2) completed an environmental site characterization of the PN 68823 – UEPH Barracks Complex project site. The site currently consists of a one-block area within the Porter Village housing area located within Schofield Barracks on the island of Oahu, Hawaii.

The project site is currently under consideration for redevelopment as a barracks. A conceptual site model (CSM) developed for the site identified future construction workers and residents as potential receptors that may be exposed to soils that have been impacted by historical uses as a golf course and residential housing. The results of this site characterization may be used to help determine if design considerations and/or other precautions must be implemented to protect human health during the construction phase and future use of the site due to the presence of contamination.

Three multi-incremental soil sampling strategies, one for each of the historical use concerns, were employed to characterize the project site. Decision units were selected based on the historical uses at the site and encompassed areas where chemical releases would likely migrate and/or accumulate. A systematic random sampling scheme was utilized to determine the increment sampling locations and multi-increment soil samples were collected as follows:

- Pesticide Decision Unit – This decision unit encompassed the area potentially impacted by pesticide application related to the former golf course. Multi-increment soil samples were collected analyzed for organochlorine pesticides and arsenic.
- Building Decision Units – These decision units encompassed the area around the multi-family building foundations potentially impacted by chlordane application. Surface and subsurface multi-increment soil samples were collected and analyzed for technical chlordane.
- Transformer Decision Units – These decision units encompassed the areas beneath each of the four the pole mounted transformers potentially impacted by leaks. A multi-increment sample was collected from each area and analyzed for Polychlorinated Biphenyls (PCBs).

On January 12, 2009, the increment sample locations were located; the boring locations were cleared of subsurface utilities by Hawaii Geophysical Services through the use of electromagnetic toning and ground penetrating radar; and the surface soil samples for the Building and Transformer Decision Units were collected. The subsurface soil samples from the Pesticide and Building Decision Units were collected on January 13, 2009 through January 16, 2009 through the use of a direct push rig operated by ESN Pacific.

Statistical analysis of the multi-increment soil samples were completed per State of Hawaii, Department of Health (HDOH)'s *Technical Guidance Manual for the Implementation of the Hawaii State Contingency Plan* (HDOH, 2008b). In accordance with the guidance document, the average, standard deviation and 95% Upper Confidence Limit (UCL) of the mean were calculated for each analyte detected in each decision unit. In addition, an estimation of the upper end of the variation from the mean (mean plus one standard deviation) was also calculated. The results of the analysis indicated the following:

Pesticide Decision Unit

- Four organochlorine pesticides (4,4'-DDE, 4,4'-DDT, Dieldrin, and Technical Chlordane) were detected in at least one of the three samples. The 95% UCLs for these pesticides were all below U.S. Environmental Protection Agency (EPA) Residential Regional Screening Levels (RSLs) and HDOH Unrestricted Land Use Environmental Action Levels (EALs).
- Arsenic was detected in all three samples. The 95% UCL (5.76 milligrams per kilogram [mg/kg]) exceeded the EPA Residential RSL (0.39 mg/kg) and the HDOH Unrestricted Land Use EAL (0.43 mg/kg). However, the detected arsenic concentrations do not exceed the HDOH assumed background level of 20 mg/kg.

Building Decision Units

- Technical Chlordane was detected in all three surface samples. The 95% UCL (0.2697 mg/kg) was below the EPA Residential RSL (1.6 mg/kg) and the HDOH Unrestricted Land Use EAL (7.0 mg/kg).
- Technical Chlordane was detected in all three subsurface samples. The 95% UCL (0.02955 mg/kg) was below the EPA Residential RSL (1.6 mg/kg) and the HDOH Unrestricted Land Use EAL (7.0 mg/kg).

Transformer Decision Units

- PCB Aroclor 1260 was detected in the sample collected from Transformer Number 1. The detected PCB Aroclor 1260 level (0.023 mg/kg) was below the EPA Residential RSL (0.22 mg/kg) and the HDOH Unrestricted Land Use EAL (1.1 mg/kg).
- PCB Aroclor 1268 was detected in the sample collected from Transformer Number 4. The detected PCB Aroclor 1268 level (0.16 mg/kg) was below the HDOH Unrestricted Land Use EAL (1.1 mg/kg). There is no EPA Residential RSL for PCB Aroclor 1268.

In conclusion, multi-incremental soil sample results indicate that low levels of organochlorine pesticides are present within the subsurface throughout the project site. These residual levels are likely due to the application of pesticides for maintenance of the former golf course or housing area. Chlordane is present within the soil throughout the site, although it is more prevalent in surface soils around the perimeter of the buildings. These residual levels are likely due to the application of chlordane as a ground termite inhibitor. PCBs are also present in surface soils beneath two of the four electrical transformers. These levels indicate that the transformers may have once held PCB or PCB contaminated dielectric fluid and could possibly have leaked sometime in the past. The levels of organochlorine pesticides, chlordane, and PCBs are all below the EPA Region IX Residential RSLs and HDOH Unrestricted Land Use EALs.

Arsenic was also detected in soils throughout the site. However, the concentrations present do not indicate a significant presence of arsenic-based pesticides as the levels detected are below the HDOH accepted naturally occurring background concentration.

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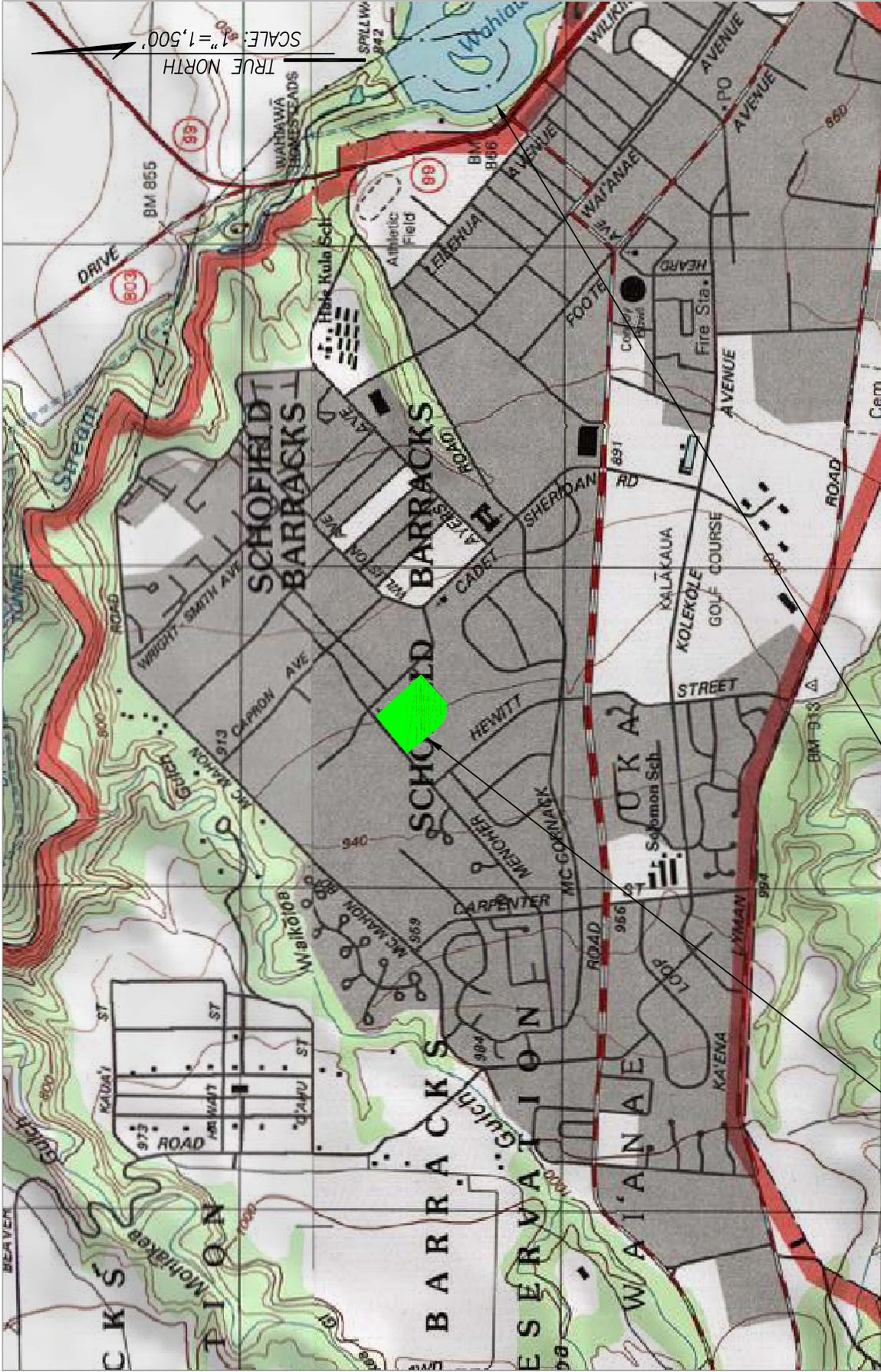
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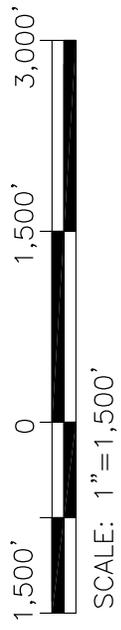


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TRUE NORTH

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PN 68823
UEPH BARRACKS COMPLEX

WAHIAWA
RESERVOIR





TRUE NORTH
SCALE: 1"=100'

ELECTRICAL TRANSFORMER
NUMBER 4

LEGEND

-  PN 68823 PROJECT BOUNDARY
-  PESTICIDE DECISION UNIT
-  BUILDING DECISION UNIT
-  TRANSFORMER DECISION UNIT

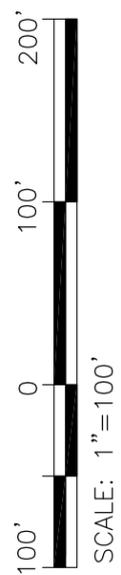
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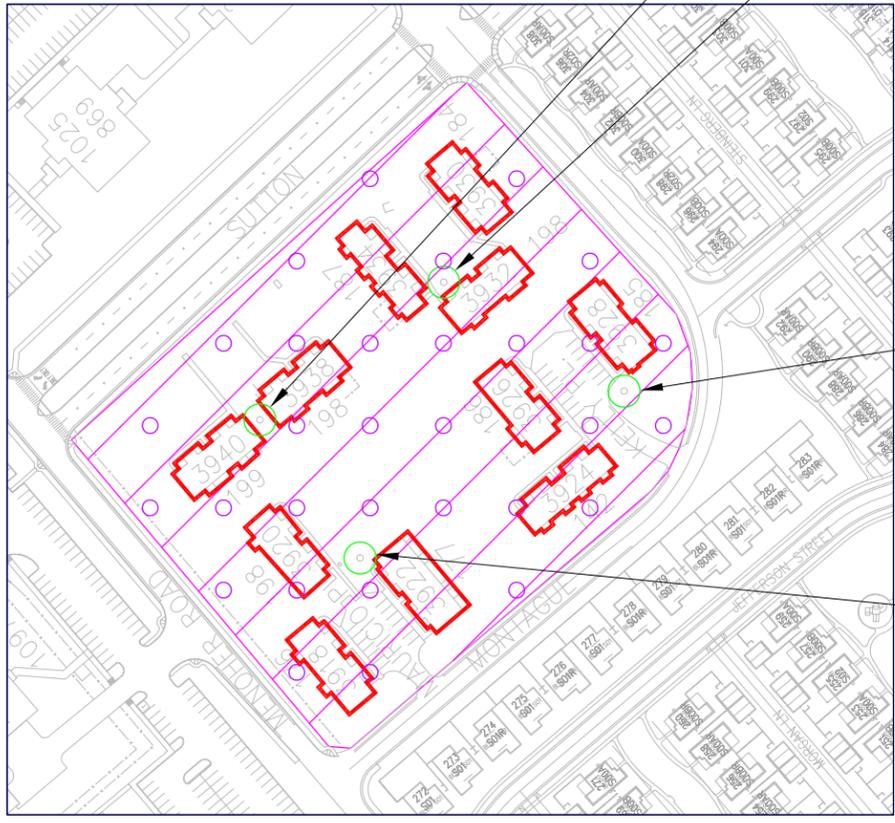
FY08 PN 68823
PROJECT BOUNDARY

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NUMBER 2

ELECTRICAL TRANSFORMER
NUMBER 3

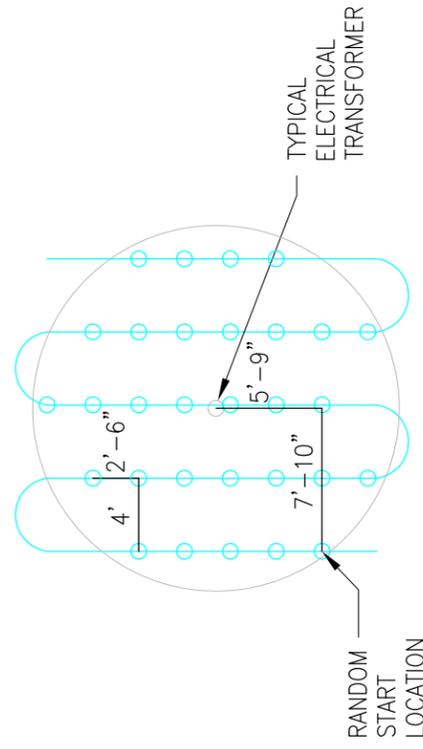
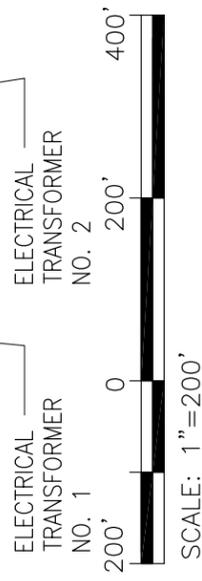
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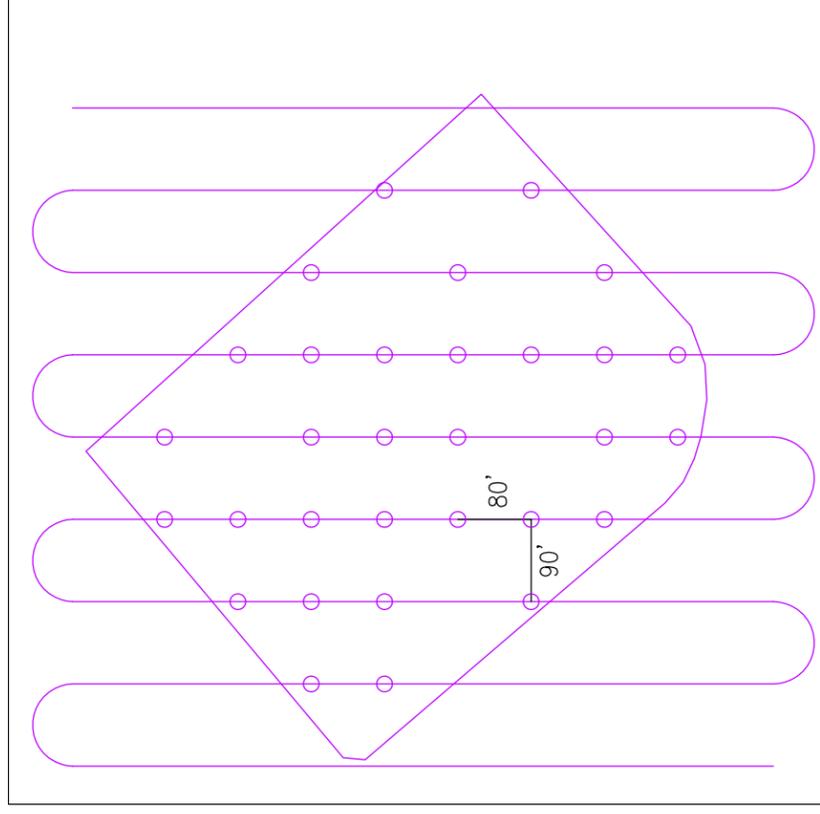
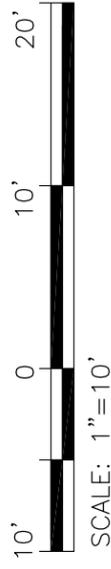


LEGEND

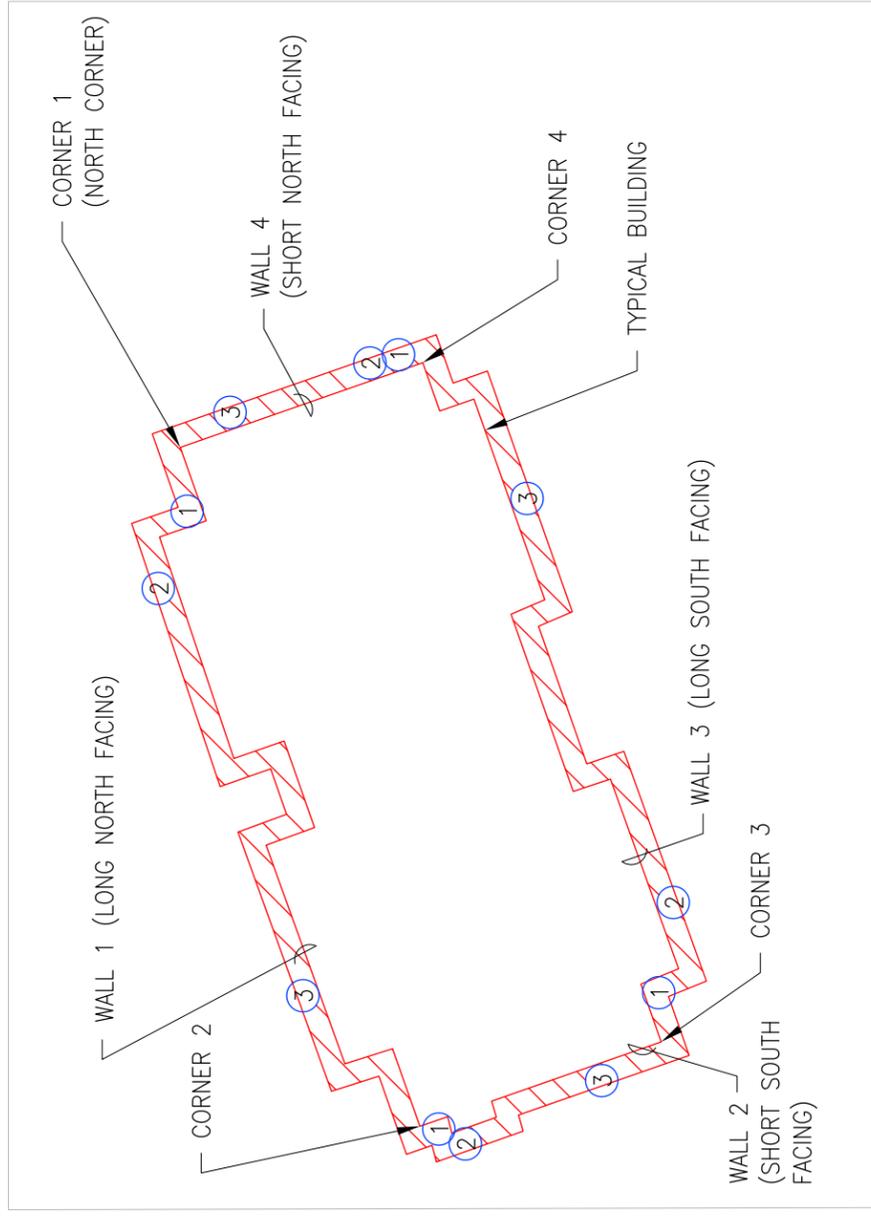
- TRANSFORMER DECISION UNIT
- TRANSFORMER
- TRANSFORMER MI SYSTEMATIC-RANDOM PATH INCREMENT SAMPLE LOCATIONS
- BUILDING DECISION UNIT
- CHLORDANE MI SYSTEMATIC-RANDOM DISTANCE INCREMENT SAMPLE LOCATIONS
NOTE: MI-1 IS THE LOCATION OF SUBSURFACE SOIL SAMPLES
- PESTICIDE DECISION UNIT
- PESTICIDE MI SYSTEMATIC-RANDOM PATH INCREMENT SAMPLE LOCATIONS
- ELECTRICAL TRANSFORMER NO. 3
- ELECTRICAL TRANSFORMER NO. 4



TYPICAL TRANSFORMER MI SAMPLE



PESTICIDE MI SAMPLE

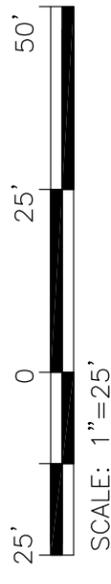


TYPICAL CHLORDANE MI SAMPLE

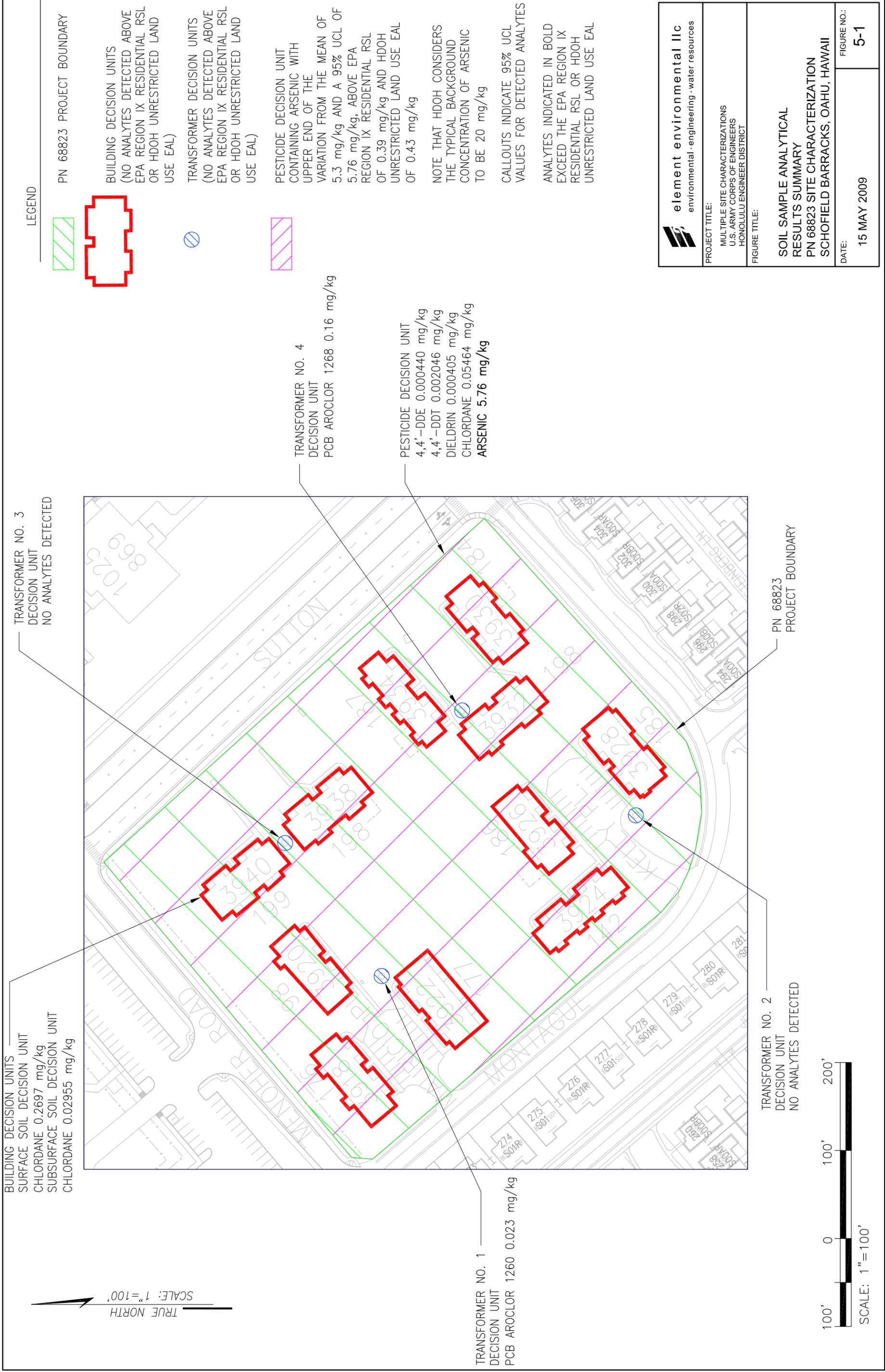
BUILDING SAMPLE KEY

INCREMENT SAMPLE LOCATIONS WERE BASED ON A PERCENTAGE (%) OF THE ENTIRE WALL. EACH WALL WAS MEASURED FROM THE RESPECTIVE CORNER.

- 8%
- 19%
- 77%



| | |
|---|--------------------|
| | |
| PROJECT TITLE: MULTIPLE SITE CHARACTERIZATIONS U.S. ARMY CORPS OF ENGINEERS HONOLULU ENGINEER DISTRICT | |
| FIGURE TITLE: SAMPLING LOCATIONS PN 68823 SITE CHARACTERIZATION SCHOFIELD BARRACKS, OAHU, HAWAII | |
| DATE: 15 MAY 2009 | FIGURE NO.: 3-3 |



| PEST MANAGEMENT REPORT | | | | | | | | | | C.D. CODE | | UIC | | | | | | | | | | Form Approved OMB No. 0704-0188 | |
|--|------------------------|------------------------|--|------------------------|------------------------|------------------------|------------------------|--------------------------|------------------------|------------------------------------|---------------------------|------|---|-------------------------|---------------------|---|------------|---|----|----|----|------------------------------------|--|
| | | | | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | REPORT CONTROL SYMBOL | |
| <small>The public reporting burden for this collection of information is estimated to average 6 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to the Department of Defense, Executive Services Directorate (0704-0188). Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ORGANIZATION.</small> | | | | | | | | | | | | | | | | | | | | | | | |
| 1. MAJOR OR REVIEWING COMMAND | | | | | | | | | | | 2. REPORTING INSTALLATION | | | | | | | | | | | | |
| a. NAME | | | | | | b. ADDRESS | | | | | a. NAME | | | | | | b. ADDRESS | | | | | | |
| NO. | TARGET PEST | | OPERATION | | | PESTICIDE | | | | | | TIME | | | | | | | | | | | |
| | Name (a) 13 - 15 | Name (b) 17 - 19 | Total Units Treated (c) 20 - 24 | Unit (d) 25 - 27 | Site (e) 28 - 30 | Name (f) 31 - 33 | Form (g) 34 - 36 | APPLICATION | | Final Conc. % (j) 44 - 49 | RATE (Per Area Unit) | | SUPPLY SOURCE Enter S,N,G,C (m) 68 | Hours (n) 69 - 71 | | | | | | | | | |
| | | | | | | | | Amount (h) 37 - 41 | Unit (i) 42 - 43 | | Lbs. (k) 50 - 55 | | | | % (l) 56 - 58 | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | | | | | | | | | | | | | | | | | | | | | | | |

| NO. | TARGET PEST | OPERATION | | | | PESTICIDE | | | | | | | TIME | |
|-----|------------------------|------------------------|---------------------------------------|------------------------|------------------------|------------------------|------------------------|--------------------------|------------------------|---------------------------------|------------------------|---------------------|---------------------------------------|-------------------------|
| | Name (a) 13 - 15 | Name (b) 17 - 19 | Total Units Treated (c) 20 - 24 | Unit (d) 25 - 27 | Site (e) 28 - 30 | Name (f) 31 - 33 | Form (g) 34 - 36 | APPLICATION | | Final Conc. % (j) 44 - 49 | RATE (Per Area Unit) | | SUPPLY SOURCE Enter S,N,G,C (m) 68 | Hours (n) 69 - 71 |
| | | | | | | | | Amount (h) 37 - 41 | Unit (i) 42 - 43 | | Lbs. (k) 50 - 55 | % (l) 56 - 58 | | |
| | | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | | |
| 19 | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | |
| 21 | | | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | | | |
| 23 | | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | | |
| 27 | | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | | |
| 29 | | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | | |

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|--------------------------|---|
| <p>3. REMARKS</p> | <p>INSTRUCTIONS FOR USE</p> <p>1. Detailed instructions of the implementing department directive shall be used in the preparation of this report.</p> <p>2. Military installations shall prepare this report by the 15th day after the end of each month. The report shall be prepared and signed by the DOD certified pest management supervisor, applicator or inspector and by the installation engineer.</p> <p>3. Three copies shall be signed and distributed as follows:</p> <p>a. Copy No. 1. To the appropriate pest management professional in accordance with implementing department directives for technical review.</p> <p>b. Copy No. 2. Record to the installation surgeon.</p> <p>c. Copy No. 3. Record copy to the installations engineer for two year retention in accordance with Public Law 92-516.</p> |
|--------------------------|---|

| | | | | | |
|---|--------------|--------------------|---|--------------|--------------------|
| 4. INSTALLATION ENGINEER (Reviewing Officer) | | | 5. INSTALLATION CERTIFIED PEST MANAGEMENT SUPERVISOR, APPLICATOR, OR INSPECTOR | | |
| a. TYPED NAME | b. SIGNATURE | c. DATE (YYYYMMDD) | a. TYPED NAME | b. SIGNATURE | c. DATE (YYYYMMDD) |
| | | | | | |

APPENDIX F
CONCEPTUAL AESTHETIC CONSIDERATIONS
PHOTOS of SURROUNDING BUILDINGS



Corner of Sutton and Menoher Northeast



Corner of Sutton and Menoher



Corner of Sutton and Menoher



Menoher Northeast



Corner of Sutton and Montague



Southwest



Southeast



Southeast



Menoher Northeast



Montague Northwest

APPENDIX G

GIS Data

Appendix G

Spatial Data Standard for Facilities, Infrastructure and Environment (SDSFIE) Guide for GIS Deliverables Created as Part of Military Design and Construction Projects

Army Installations & Land, O‘ahu, Hawai‘i

Introduction

This Appendix provides guidance for implementing Engineering and Construction Bulletin (ECB) No. 2006-15, “Standardizing Computer Aided Design (CAD/CADD) and Geographic Information Systems (GIS) Deliverables for all Military Design and Construction Projects” (http://www.wbdg.org/ccb/ARMYCOE/COEECB/ecb_2006_15.pdf). This guidance establishes the requirements for geospatial data deliverables produced as part of design, design-build, or design-bid-build contracts for U.S. Army installations and lands on the island of O‘ahu, Hawai‘i. It includes description of the:

- Coordinate System and Datums;
- Data Quality Standard;
- Deliverables;
- SDSFIE-Compliant GIS Deliverable Specification; and
- Metadata.

Coordinate System and Datums

All geospatial deliverables (CADD or GIS format), whether obtained via survey or any other data collection process, shall be measured in meters. The coordinate system for all geospatial data will be Hawai‘i State Plane Zone 3. The vertical datum, if applicable, will be Mean Sea Level (MSL) referenced to Hawai‘i’s local tidal datum on the 1983-2001 tidal epoch. The horizontal datum will be North American Datum of 1983 (NAD83), High Accuracy Reference Network (HARN) 1993.

Precise specifications of the State Plane Coordinate System, are as follows:

Grid Coordinate System Name: Hawai‘i State Plane

State Plane Zone Number: 3

Transverse Mercator Projection

Scale Factor at Central Meridian: 0.999990

Longitude of Central Meridian: -158.000000

Latitude of Projection Origin: 21.166667

False Easting: 500000.000000

False Northing: 0.000000

Geodetic Model

Horizontal Datum Name: D_North_American_1983_HARN

Spheroid Name: GRS_1980

Semi-major Axis: 6378137.000000

Denominator of Flattening Ratio: 298.257222101

Data Quality Standard

As Built Survey

An as-built condition survey should be performed to capture the information listed in this Appendix. All relevant features shall be identified on as-built drawings and shall be GPS or conventional surveyed to the level of accuracy specified below.

Coordinate Accuracy

The Contractor shall use conventional surveying and other methods, such as a total station or GPS for field data collection at an accuracy level in accordance with “Geospatial Positioning Accuracy Standards, Part 4: Architecture, Engineering Construction, and Facilities Management. Published by the FGDC and available at http://www.fgdc.gov/standards/standards_publications/index.html.

Horizontal and vertical accuracy of features, where vertical coordinates are collected, shall be +/- 2cm.

Surveyor Certification Requirement

The surveyor shall verify the survey for accuracy and a statement will be provided to the government stating the level of accuracy for the data being reported (in metric units). In addition to the accuracy statement, the following information should be provided in a survey report:

- Coordinate system & datum used;
- Projection;
- Units of measure (vertical and horizontal);
- Attribute description (GPS data dictionary—features, attributes and attribute values);
- Source - Receiver type, antenna type, receiver serial number, antenna serial number, receiver settings, number of positions per point feature, correction method and any field other relevant field procedures utilized;
- Survey method;

- Equipment list;
- Calibration documentation;
- Description of control points and control diagrams;
- Field notes; and
- Field-collected data (in addition to the post-processed final data used to prepare the geospatial data deliverable).

Utilities

Underground and aboveground utility lines shall be surveyed at a minimum of two points along every straight run, at every change of direction, at every tie in point, and at any change in line size.

Deliverables

The intent of the deliverable set is to provide the Installation with comprehensive geospatial information about the facility footprint and site features that exist outside the building(s). The electronic deliverables must be in the file format and data standard used by the Installation's Operations and Maintenance System (as noted in "Coordinate System and Datums", above).

The Installation requires deliverables in the following software formats:

- GIS Files
 - ESRI shape file.
 - The coordinate system, projection, datum(s) and units will be defined for the layer and will be documented in the metadata.
 - Where captured, vertical coordinate information will be stored as a feature attribute as meters above mean sea level. Polygon-z, polyline-z, and point-z formatted files are not requested.
- CADD Files
 - MicroStation DGN files in A/E/C CADD format, using the coordinate system, projection, datum, and units specified in the RFP.

100% Design (Design Complete)

Final design deliverables for each design package should consist of (A) the drawings and specifications, and (B) the GIS file(s):

- 100% complete drawings, specifications, calculations/design analysis, and a list of all comments and their resolution for that work package. All final design drawings will be in the A/E/C CADD Standard format, current version as agreed upon by the government

and the contractor. The A/E/C CADD Standard is available at <https://tsc.wes.army.mil/products/standards/aec/aecstdweb.asp>. Metadata shall be delivered with each CADD file, and will meet the standard specified in this Appendix.

- A corresponding SDSFIE-compliant GIS deliverable for the feature layers listed in Table 1 of this Appendix. For each listed layer the contractor should provide either a GIS deliverable or a statement that no features in that layer will be constructed, be modified, or pose a design constraint for the project. The SDSFIE standard is available at <http://www.sdsfie.org>. Metadata shall be delivered with each GIS data layer and will meet the standard specified in this Appendix.

As-Built (Construction Complete)

Final construction deliverables shall consist of (A) the as built drawings and specifications, and (B) the GIS file(s). The contractor will provide a submittal of the CADD and GIS files that depict the as-built condition of the site. The data layers to be delivered, the coordinate accuracy of the features, the required attribution, and the metadata will meet the standards specified in this Appendix.

For each layer listed in Table 1, the contractor will provide either a GIS deliverable or a statement that no features in that layer were constructed or modified. The tie in to a utility main line is considered a modification of the utility main line, and the portions of main lines that were exposed should therefore be included in the deliverable.

SDSFIE-Compliant Deliverable Specification

Geodatabase Template

Upon request the government will provide the contractor with an SDSFIE-compliant GIS layer template to be used for populating the GIS deliverables required under the contract. The contractor shall populate the layers without modifying the template. The contractor shall ensure that layers to be delivered but not included in the template, should the template not be complete, are fully compliant with the current SDSFIE standard.

There may be circumstances in which SDSFIE compliance cannot be maintained. In such circumstances, proposed deviations with the standard must be communicated by the contractor and reviewed by the government. Approval for the deviation shall be documented.

Data Integrity Check

The contractor shall utilize a topology build and clean routine and assure the following:

- No erroneous overshoots, undershoots, dangles or intersections in the line work;

- Lines should all be continuous, i.e. do not create dashed lines with many small line segments;
- Point features should be digitized as points, not graticules, cells, symbols or icons;
- No sliver polygons;
- All polygons completely close and have a single unique centroid; and
- Digital representation of the common boundaries for all graphic features must be coincident, regardless of feature layer.

Required GIS Data Layers and Required Attributes

Table 1 lists the SDSFIE-compliant GIS data layers that are to be delivered as part of this contract. The list is based on a review of the type(s) of facility(s) being constructed. However, it is possible that some layers in the list will not be used.

Metadata

The contractor shall prepare metadata conforming to the most current version of the Federal Geospatial Data Committee's (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM) at http://www.fgdc.gov/standards/standards_publications. Appendix A of the ECB, http://www.wbdg.org/ccb/ARMYCOE/COEECB/ecb_2006_15.pdf, is the FGDC metadata profile for Army Installations and should be followed as closely as possible. An ESRI Metadata Stylesheet for Army Geospatial Data is posted at <https://gis.hqda.pentagon.mil>. Metadata content will accompany all electronic geospatial data submissions. This includes both CADD and GIS formats. A metadata file shall accompany, at minimum, each CADD data set and/or each GIS data set. Metadata should be prepared to FGDC standards and delivered in XML format readable by software applications that use the FGDC XML format standard (such as ESRI ArcMap 9.x).

Table 1. SDSFIE Layer Names and Required Attributes.

Note: Required attributes, where specified, are listed following the SDSFIE layer name. Elevation information, reported as meters above mean sea level, is required for layers where “coord_z” is listed as a required attribute.

airfield_light_point

airfield_surface_centerline

airfield_surface_edge_line

airfield_surface_marking_area

airfield_surface_marking_line

airfield_surface_site

area_size (acres); area_u_d (area unit of measure, acres); perim (meters); perim_u_d (perimeter unit of measure, meters); coord_x (centroid, NAD83 HARN HSP); coord_y (centroid, NAD83 HARN HSP); paved_d (paved code, Yes/No); feat_name (airfield name)

athletic_court_area

athletic_field_area

athletic_miscellaneous_area

borrow_area

breakline

building_floor_area

building_room_area

building_space_area

canopy_pavilion_site

communications_amplifier_point

communications_antenna_site

coord_X (NAD83 HARN HSP), coord_y (NAD83 HARN HSP), area_size(acres), area_u_d(area unit of measure), perim(perimeter dimension, meters), perim_u_d(perimeter unit of measure, meters)

communications_coaxial_line

communications_device_point

communications_equip_point

communications_fiber optic_line

communications_handhole_point

communications_manhole_site

communications_pedestal_site

communications_splitter_point

communications_telephone_point

communications_terminator_point

communications_twisted_pair_line

Table 1. Continued

communications_vault_site
compressed_air_pipe_line
control_point
culvert_centerline
curb_line
digital_elevation_model_point
easement_right_of_way_area
electrical_cable_line
 dispostn_d (disposition code, domain); instl_ty_d (installation type code, domain)
electrical_capacitor_point
electrical_ductbank_line
electrical_generator_point
electrical_junction_site
electrical_meter_point
electrical_motor_point
electrical_pedestal_point
electrical_regulator_point
electrical_substation_site
 dispostn_d (disposition code, domain); sst_ty_d (type of service label, domain)
electrical_switch_point
electrical_transformer_bank_point
electrical_transformer_vault_point
elevation_contour_line
fence_line
fuel_fitting_point
fuel_flow_direction_arrow
fuel_hydrant_point
fuel_junction_site
fuel_line
fuel_meter_point
fuel_pump_booster_station_point
fuel_source_point
fuel_tank_site
gate_line
gate_point
hazardous_materiels_storage_area
 hsb_cat_d (the general nature of hazardous waste, domain); area_size (acres);
 area_u_d (area unit of measure, acres); perim (perimeter dimension), perim_u_d (meters);

Table 1. Continued

coord_x (NAD83 HARN HSP); coord_y (NAD83 HARN HSP);
 hazardous_materiels_storage_location_site
 heat_cool_anchor_point
 heat_cool_flow_direction_arrow
 heat_cool_junction_site
 heat_cool_line
 heat_cool_marker_point
 heat_cool_meter_point
 heat_cool_plant_area
 heat_cool_pump_point
 heat_cool_rectifier_point
 heat_cool_regulator_point
 heat_cool_valve_point
 hospital_structure_site
 industrial_waste_fitting_point
 industrial_waste_flow_direction_arrow
 industrial_waste_grit_chamber_point
 industrial_waste_junction_point
 industrial_waste_lagoon_area
 industrial_waste_line
 industrial_waste_meter_point
 industrial_waste_neutralizer_point
 industrial_waste_oil_water_separator_site
 industrial_waste_tank_point
 industrial_waste_treatment_plant_area
 industrial_waste_valve_point
 natural_gas_fitting_point
 natural_gas_flow_direction_arrow
 natural_gas_junction_point
 natural_gas_light_point
 natural_gas_line
 natural_gas_marker_point
 natural_gas_meter_point
 natural_gas_rectifier_point
 natural_gas_regulator_reducer_point
 natural_gas_valve_point
 pedestrian_sidewalk_centerline
 pipeline_line

Table 1. Continued

piprod_d (pipeline product code, domain); oper_nm (operator name, mixed case)
 radar_site
 railroad_bridge_centerline
 railroad_centerline
 tot_len (total length of track, meters); length_u_d (length unit of measure, meters);
 feat_name (name of railroad, mixed case); cond_d (condition
 code, domain); traf_vol_d (traffic volume code, domain)
 railroad_feature_point
 railroad_station_site
 railroad_yard_area
 recreation_park_area
 recreation_trail_centerline
 regulated_aboveground_storage_tank_site
 regulated_storage_tank_farm_area
 regulated_underground_storage_tank_site
 road_bridge_area
 road_bridge_centerline
 road_centerline
 category_d; num_lanes; feat_len; length_u_d; feat_name; road_name; alt_name;
 rou1_typ_d; rou1_name; rou2_typ_d; rou2_name; rou3_typ_d; rou3_name
 road_feature_point
 road_guardrail_line
 road_site
 slab_area
 solid_waste_compactor_point
 solid_waste_dump_area
 solid_waste_incinerator_point
 solid_waste_landfill_area
 solid_waste_material_recovery_facility_point
 solid_waste_stockpile_area
 solid_waste_transfer_station_point
 spill_containment_feature_area
 spill_containment_tank_point
 spot_elevation_point
 storm_culvert_site
 storm_sewer_armor_point
 storm_sewer_culvert_line
 storm_sewer_downspout_point

Table 1. Continued

storm_sewer_fitting_point
storm_sewer_flood_area
storm_sewer_flow_direction_arrow
storm_sewer_headwall_line
storm_sewer_inlet_point
storm_sewer_junction_point
storm_sewer_line
storm_sewer_oil_water_seperator_site
storm_sewer_open_drainage_area
storm_sewer_open_drainage_line
storm_sewer_pump_point
storm_sewer_reservoir_point
structure_existing_site
structure_future_site
tower_site
tunnel_centerline
utility_electric_utility_site
utility_pole_guy_point
utility_pole_tower_point
utility_pole_tower_site
vehicle_parking_area
wastewater_discharge_point
wastewater_filtration_bed_area
wastewater_fitting_point
wastewater_flow_direction_arrow
wastewater_grease_trap_point
wastewater_grit_chamber_point
wastewater_junction_point
wastewater_lagoon_area
wastewater_line
wastewater_neutralizer_point
wastewater_oil_water_separator_site
wastewater_pump_ejector_station_site
wastewater_pump_point
wastewater_septic_tank_point
wastewater_treatment_plant_site
wastewater_valve_point
water_fire_connection_point

Table 1. Continued

water_fitting_point
water_hydrant_point
water_junction_point
water_line
water_marker_point
water_meter_point
water_pump_point
water_regulator_reducer_point
water_reservoir_area
water_tank_site
water_valve_point
water_vent_point

APPENDIX H

Exterior Signage

Schofield Barracks

11.3.17 Drinking Fountains

Outdoor drinking fountains should not be provided, except to support larger playgrounds, outdoor recreation facility complexes, and outlying recreation areas if convenient to a potable water supply line. Steps should be provided for children, and the [Americans with Disabilities Act Accessibility Guidelines \(ADAAG\)](#) and [Uniform Federal Accessibility Standards \(UFAS\)](#) standards should be met.

11.4 EXTERIOR SIGNS

Signs have a major effect on the appearance of Schofield Barracks and the professionalism of its units. Only signs that professionally communicate directions and location to those functions and activities that truly warrant identification shall be used. See Figure 11.4a. The number of signs on the installation shall be held to the absolute minimum required for directions, identification, and customer service. This section establishes guidelines for standardizing sign material, color, style, types, and placement throughout the installation.

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 Schofield Barracks' 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. See Figure 11.4b. The standards to apply for signage color, type, and sizing is found in [Technical Manual \(TM\) 5-807-10, Signage](#).

11.4.1 Sign System Characteristics

There are several basic design characteristics that, by serving to convey necessary information clearly and attractively, are an integral part of any successful signage system.

- **Simplicity.** An effective strategy provides only needed information, avoids redundancy, and eliminates over-signing with resultant clutter and visual confusion. Sign



▲ **Figure 11.4a**
*Identification Sign Exemplifies
Pride and Professionalism*



▲ **Figure 11.4b**
*Gate Installation Identification Sign
Does Not Create Attractive,
Inviting, or Unified First Impression*

Schofield Barracks

messages must be clear, simple, and easy for motorists to process quickly without overburdening them. See Figure 11.4c. A confused driver is a hazard to himself and others. Irrelevant and ineffective signs are costly to maintain and add more fixed-object hazards along the roadway.

- **Continuity.** It is essential that the orientation system be applied uniformly and consistently throughout the entire installation. The importance of consistent implementation extends from the larger issues of sign type and size down to accurate color continuity and matching timesteps. It is also important to keep names of destinations consistent throughout the orientation system, including the names on maps and the names used by security forces when directing visitors to a point of destination on the installation. A direction sign pointing the way to the Headquarters Building should lead to a building that is called the Headquarters Building and not something else.
- **Visibility.** Visibility, both day and night, through good clearances, contrasts, and lighting should be the first consideration before sign placement is undertaken. Sign location is a very important ingredient within the orientation system. Signs must be located at significant decision points and oriented to provide clear sight lines for the intended user and should permit ample time for the viewer to respond to the message. 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 and safety. See Figure 11.4d.
- **Legibility.** Sign typestyle, line spacing, color, and size all combine to create the crucial design characteristics of legibility. See Figure 11.4e. 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.
- **Aesthetic.** Signs are an important part of the impression made by installation. Use signs of high quality, design, construction, and maintainability in order to present a professional image of Schofield Barracks.

11.4.2 Vocabulary-Communications

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.



▲ **Figure 11.4c**
More Information than can be Processed



▲ **Figure 11.4d**
Installation Warning Sign Visibility Restricted by Landscaping



▲ **Figure 11.4e**
Identification Sign Legibility Impacted by Too Much Information

The creation of a "signing language" helps generate a unified bond within sign types that make up a signing family. This includes:

- Information/Message
- Typography
- Presentation
- Architectural Influence
- Graphic Architecture

11.4.3 Visual Hierarchy

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.

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.

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.

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.

11.4.4 Types of Exterior Signs

There are six basic categories of exterior signs: Identification, Motivation, Guide, Mandatory/Prohibitory, Information, and Regulatory Signs.

11.4.4.1 Identification Signs. There are four basic types of identification signs: Installation, Military Headquarters, Military Facility, and Community Facility Identification Signs. These are signs that identify entrances to the installation, areas within the installation, major tenants, buildings, and organizational or functional components. 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.

Wall mounted identification signs may be used instead of freestanding exterior signs. Wall mounted signs eliminate visual clutter and minimize maintenance.

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These signs are designed to include the following:

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

Color:

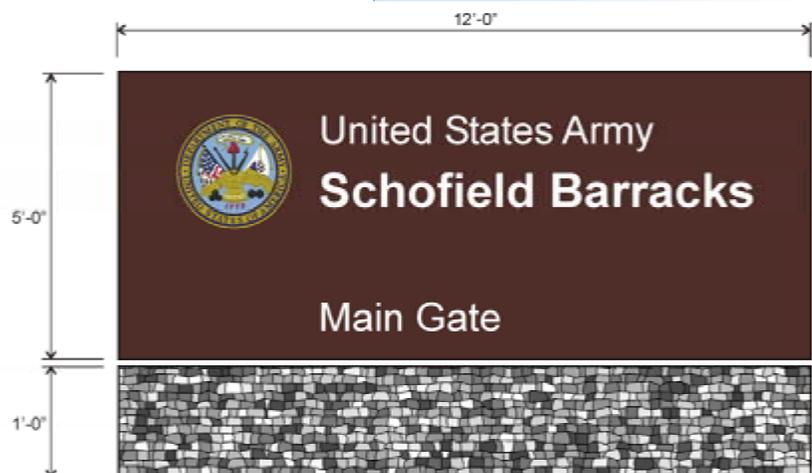
- Panel: Dark Brown (High Intensity)
3M Color Code – Brown #2279/36" Heat Activated
Engineering Grade or approved equivalent
- Lettering: Beige (Engineering Grade)
GSB-Vinyl-Vei-501-220/15" or approved equivalent
- Post: Black
- Exposed panel backs and edges: Dark Brown
- All paint: Semi gloss

Materials: Black steel signposts are encouraged. Black vinyl sleeves for signpost and dark brown adhesive vinyl sheeting for the backs of signs provide a low-maintenance option.

- Panel: Double-face 1/8" thick aluminum
- Post: Steel pipe
- Foundation: Concrete pier or direct burial

See [Technical Manual \(TM\) 5-807-10, Signage](#), for further sign specifications and for sign placement guidelines.

Installation Identification Signs. Installation identification signs name the installation and display the official US Army plaque. The designation "United States Army" must appear at the top of the sign in accordance with [AR 420-70](#), paragraph 2-7h. Every installation entrance shall have an installation identification sign displaying only the U.S. Army plaque, with the words "United States Army, Fort (Name of Fort), and gate name as indicated in Figure 11.4f, Installation Identification Sign. The placement of Senior Mission Commander logo, unit crest, and other installation identification signs, monuments, or displays shall be located inside the installation beyond the cleared area of the Access Control Point of entry. When used service-wide, these signs convey a



▲ **Figure 11.4f**
U.S. Army Standard Installation
Identification Sign

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uniform image of strength and stability to the public. Emblems, branch colors, unit mottos, names, and titles of individuals are not to be displayed.

Installation identification signs consist of three types:

- Sign Type A1 – Main Entrance Sign identifies the principal visitor entrance.
- Sign Type A2 – Secondary Entrance Sign identifies entry points with relatively high volumes of visitor traffic.
- Sign Type A3 – Limited Access Entry Gate Sign identifies entry points with limited public access.

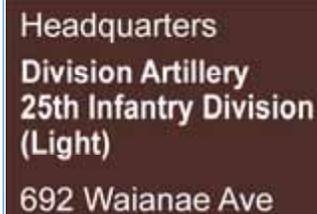
Military Headquarters Identification Signs. Military headquarters identification signs identify military activities and facilities and carry unit name information and street addresses; Figure 11.4g.

Military headquarters identification signs consist of four types:

- Sign Type B1 – Installation Headquarters Sign identifies the central administration of the installation.
- Sign Type B2 – Command, Division, and Brigade Headquarters Sign.
- Sign Type B3 – Battalion Headquarters Sign.
- Sign Type B4 – Headquarters Building Entrance Sign identifies the building entrance for all levels of authority. In addition, Type B4 is used to identify a unit headquarters that has a special entry point other than the main entrance of a building.

Name plate attachments are prohibited. Insignias, emblems, branch colors, unit mottos, names, or titles of individuals will not be used on these signs unless approved by DPW.

Identify buildings with either a free-standing or building-mounted sign, but not both. Building mounted signs are preferred. Free-standing building identification signs should be kept to a minimum. A primary objective of the installation orientation system is to reduce the number of signs and to eliminate the visual clutter that results from the over use of signage. See Figure 11.4h. Locate signs only where they are needed to provide orientation. As a general rule, provide one sign for each building. An option to the standard building identification sign is the use of facility-mounted, individual



Headquarters
Division Artillery
25th Infantry Division
(Light)
692 Waianae Ave

▲ **Figure 11.4g**
*U.S. Army Standard Military
Headquarters Identification Sign*



▲ **Figure 11.4h**
*Attractive Wall Mounted Building
Identification Signs Reduce Visual
Clutter*

letter-type signs affixed to the buildings. The size and location of these signs should be standardized throughout the installation, normally over the building main entrance. See Figure 11.4i.

These signs are designed to include the following:

Typeface: The letter shall be mounted to the wall according to the manufacturers' specifications.

- Building Lettering Size: 2mm to 25mm ($1/16$ " to 1") deep, Helvetica medium typeface.
- The depth separates them from the plane of the wall and gives them a crisp appearance, while the Helvetica medium typeface relates to other Army signs.

Color:

- The color or finish of the letters should compliment the predominant color of the building while providing enough contrast with the background for visibility.
- Use a light-color or bright metallic finish for the lettering on dark buildings and a standard brown or dark bronze finish for the lettering on light colored buildings.

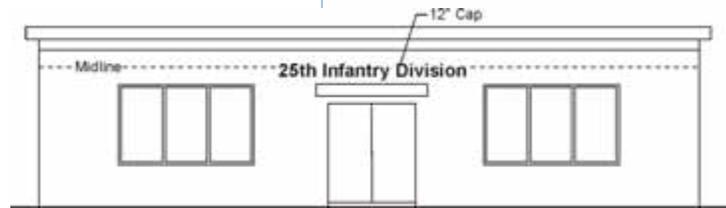
Materials:

- Several letter materials are available through sign manufacturers; however, rigid foam with aluminum facing is the preferred letter material.
- Letter materials should be selected based on durability, architectural compatibility, and cost effectiveness.

Military Facility Identification Signs. Military facility identification signs are used to identify company level organizations and other military facilities not included in the installation identification or military headquarters sign types. Insignias, emblems, branch colors, unit mottos, names, or titles of individuals will not be used on these signs unless approved by DPW.

Military facility identification signs consist of seven types:

Sign Type C1 – Centralized Primary Facilities Sign, identifies multiple service units in one or a complex of buildings. In addition, one service unit comprised of sub-services which are used by a large volume of military and civilian personnel may be identified by Type C1.



▲ **Figure 11.4i**
Wall Mounted Building
Identification Sign Location

- Sign Type C2 – Centralized Secondary Facility Sign, may be used where the volume of civilian traffic does not warrant the use of sign Type C1, such as military unit storage facilities.
- Sign Type C3 – Primary Facility Sign, identifies a large scale facility serving a large volume of military and civilian personnel, but does not list individual services units or sub-services.
- Sign Type C4 – Secondary Facility Sign identifies company level organizations and individual service units.
- Sign Type C5 – Primary Entrance Sign identifies the main entry points of a service facility.
- Sign Type C6 – Secondary Entrance Sign, identifies the same information as Type C5, but is smaller in size.
- Sign Type C7 – Restricted Facility Sign identifies the facility name or area which is restricted.

Community Facility Identification Signs. These identify activities and facilities used for non-military purposes. The standards for community signs also apply to signs for private firms operating on base. AAFES facilities and nationally recognized food chain franchises operated by AAFES may utilize their individual registered trademark signage in general compliance with these standards. These signs should be kept at a low profile and design and color should match the installation-wide system.

Community identification signs consist of seven types:

- Sign Type D1 – Centralized Primary Facility Sign identifies several activities or organizations in one or a complex of buildings.
- Sign Type D2 – Primary Facility with Changeable Message Board identifies an individual organization or facility and provides a changeable message board for information on activities.
- Sign Type D3 – Primary Facility Sign identifies an organization.
- Sign Type D4 – Secondary Facility Sign, identifies the same information as Type D3, but is smaller in size.
- Sign Type D5 – Building Entrance Sign identifies the facility entrance and hours of operation.

Sign Type D6 – Recreation Facility Sign identifies an outdoor recreation or park facility and hours of operation.

Sign Type D7 – Bus Stop Sign identifies bus routes, stops, and schedules.

When using wheeled electrical signs they 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 or DPW. No sign of this type will be left in place for longer than six months. After which time, the sign will be removed or turned into a permanent sign.

11.4.4.2 Motivation Signs. These signs are used to boost morale, improve safety, aid in recruiting, and accomplish other special objectives. Motivation signs are unique in appearance and do not have specified graphic layouts.

Motivation signs include three types:

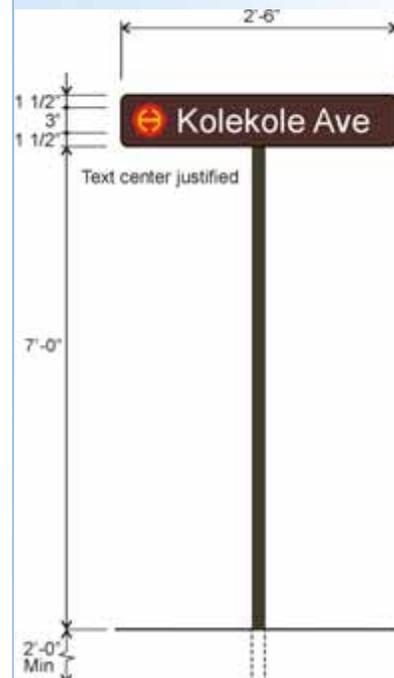
Sign Type E1 – Installation Motivation Sign identifies the principal commands or divisions stationed at the installation.

Sign Type E2 – Standard Motivation Sign is used to support campaigns and special events.

Sign Type E3 – Unit Motivation Sign is used to express unit pride and display organizational insignias, emblems, and mottos.

11.4.4.3 Guide Signs. These signs are the essential means for locating destinations and routing travel to those destinations within a military installation. This includes site directory map signs at all entrance gates and other key points with the installation, large street name signs at all intersections, and large-lettered destination signs of not more than three lines. These signs provide the most efficient means of guiding traffic to destinations within the installation.

Destination and Street Name Signs. Street name identification signs should be designed with the same lettering, color, and materials as other information signs and will display the U.S. Army Garrison, Hawaii shield to the left of the street name. See Figure 11.4j.



▲ **Figure 11.4j**
Street Identification Sign Detail

The procedures for street addresses 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 Kolekole Avenue, Figure 11.4k) 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 Foot Street" are not a valid address format and shall not be used (C3.3.2.2.6).

The placement of addresses should follow the following guidelines:

- 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 (Figure 11.4k).
- Buildings without identification signs shall have the address number and street name centered above the main entrance or located to the right side (Figure 11.4k).

Street and address identification signs within family housing areas should be complimentary to the architectural setting of the housing area and approved by the installation Real Property Planning Board. Housing numbers should be placed on the letter box of the respective house, if the box is freestanding, and on the house where lighting will effectively light the numbering.



▲ **Figure 11.4k**
Street Address Placement Detail

Site Directory Map. Type F1 site directory map signs provide visitors with a simplified site map of the installation for orientation and directional guidance. Site maps identify all street names and indicate the location of the person using the directory. Major streets and destinations, which frequently receive non-repeat visitors, should be graphically emphasized and include an address directory next to the map face.

11.4.4.4 Mandatory/Prohibitory Signs. This category of signage is intended to maintain security and safety on the installation perimeter and at other specific secure areas. These signs notify visitors of restrictions, as well as other security procedures. The guidelines for design, fabrication, and placement of warning signs are found in [Technical Manual \(TM\) 5-807-10, Signage](#), paragraph 3-9.

There are several types of installation warning signs as follows:

- Sign Type G1 – Warning Sign is intended as a search and authorized personnel warning sign.
- Sign Type G2 – Warning Sign is intended as a restricted area warning sign.
- Sign Type G3 – Warning Sign, identifies general hazards, regulations and security information as Type G2, but is smaller in size.
- Sign Type G4 – Safety Sign identifies specific dangers and warns personnel and visitors of physical hazards and unsafe practices.
- Sign Types G5 and G6 – Parking Sign, Figure 11.4I.
Handicapped parking signs should show the international handicapped symbol in white on the required blue background. Strictly limit reserved parking signs to visitors, customers, handicapped, key officials, and incentive award winners (NCO of the quarter). Use metal signs approximately 4" high and mechanically fastened to the vertical curb face. Design and color should match the installation-wide system.
- Sign Type G7 – Special Traffic Conditions Sign, such as tactical equipment limits and trail crossings, follow guidelines established in [MTMC Pamphlet 55-14, Traffic Engineering for Better Signs and Markings](#) and standards in the [Manual of Uniform Traffic Control Devices \(MUTCD\)](#).



▲ **Figure 11.4I**
Standard Parking Sign Face Plates

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11.4.4.5 Information Signs. These are used to provide educational information and directional guidance for visitors. These signs is used to give priority to the destinations of facilities that are likely to have a great deal of first time traffic include the Commissary, Base Exchange, Clinic, Community Center, clubs, billeting, and major army activities.

These signs are designed to include the following:

Typeface: Lettering is self-adhesive backing material.

- Helvetica Medium, upper and lower case

Arrow:

- Place at end indicating direction.
- Stroke width: Helvetica Medium cap

Color:

- Panel: Dark Brown (High Intensity)
3M Color Code – Brown #2279/36" Heat Activated Engineering Grade or approved equivalent
- Lettering: Beige (Engineering Grade)
GSB-Vinyl-Vei-501-220/15" or approved equivalent
- Post: Black
- Exposed panel backs and edges: Dark Brown
- All paint: Semi gloss

Materials:

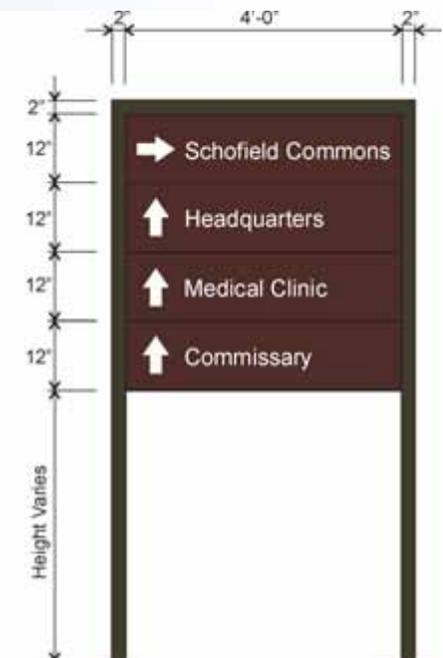
- Panel: Double-face, 1/8" thick aluminum
- Post: Black steel signposts are encouraged. Black vinyl sleeves for signpost and dark brown adhesive vinyl sheeting for the backs of signs provide a low-maintenance option.
- Foundation: Concrete pier or direct burial

There are two types of information signs:

Sign Type H1 – Exhibit Information Sign.

Sign Type H2 – Guidance Sign provides direction guidance motorist or pedestrian in, around, and out of the installation. The legibility and placement of this sign, as well as the order of information, is critical to their effectiveness. These signs should be placed in central locations and at major decision points along circulation routes. See Figure 11.4m.

11.4.4.6 Regulatory Signs. These signs provide the rules for travel and parking on the installation. They include highway signs, warning signs, parking control signs, etc. Related to these signs are pavement markings and traffic signals. [Manual of Uniform Traffic Control Devices \(MUTCD\)](#) standardizes



▲ **Figure 11.4m**

*Standard U.S. Army Direction Sign
Detail*

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regulatory devices throughout the country to ensure that they mean the same to, and require the same action by, all motorists. See Figure 11.4n. Therefore, compliance with the MUTCD will contribute to the safe, orderly, and efficient movement of traffic.

These signs are designed to include the following:

Typeface: Lettering is self-adhesive backing material.

- Helvetica Medium, upper and lower case

Color:

- Panel: Sign color, size and shape prescribed by the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD)
- Post: Black
- Exposed panel backs and edges: Dark Brown

Materials:

- Panel: Double-face, 1/8" thick aluminum
- Post: Steel breakaway pipe
- Foundation: Concrete pier or direct burial

11.4.5 Sign Placement

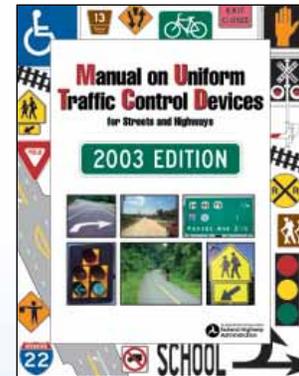
Placement of signs differs according to the type of sign and the specific site constraints, Figure 11.4o. The following guidelines apply to placement of the majority of signs.

- Do not place more than one sign at any location. Traffic rules are the exception to this rule.
- Place signs in areas free of visual clutter and landscape materials.
- Place signs in locations that allow enough time for the user to read and react to the message.
- Signs should not be placed to block sight lines at intersections.
- Place signs approximately 1.2 meters (4 feet) above ground level to be within 10 degrees the driver's line of vision. Provide proper placement to avoid a hazard to children.

11.4.6 Sign System Typography

The term typography describes the style, size, and spacing of letters. Different styles of letters are referred to as fonts or typefaces. Two typefaces are used in the Army signage system: Helvetica Medium and Helvetica Regular.

11.4.6.1 Military Emblems. The Army has a rich tradition of military heraldry. Military emblems are an important part of the



▲ **Figure 11.4n**
*Manual of Uniform
Traffic Control
Devices*



▲ **Figure 11.4o**
*Installation Identification Sign
Placement Visually Restricted by
Landscaping*

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. The use of emblems must be approved by DPW.

11.4.6.2 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.

11.4.6.3 Insignias. The use of branch insignia, shoulder sleeve insignia, coat of arms, and/or distinctive insignia on headquarters signs is not permitted unless approved by DPW. All military emblems must appear in full color. Motivational symbols or motifs will not be used.

11.4.7 Reduce Visual Clutter

Over-signing detracts from a uniform sign system and if left uncontrolled will eventually destroy the integrity of the system.

Clutter creates confusion and ineffectiveness. Often motorists and pedestrians are confused by the bombardment of messages that have no relationship to each other, or the communication is on such a minimal level that the sign serves no purpose. See Figure 11.4p.



▲ **Figure 11.4p**

Sign System Presents Confusion and Visual Clutter Affecting Both Quality of Life and Professional Image

APPENDIX I

ACCEPTABLE PLANTS LIST—NOTE: THE
ACCEPTABLE PLANT LIST FOR THIS PROJECT
CONSISTS OF THE SCHOFIELD BARRACKS
INSTALLATION DESIGN GUIDE (IDG)
APPENDIX O – PLANT SELECTION LIST AND
IS EXCERPTED AS FOLLOWS:

| Appendix O - Plant Selection List Plant Material Suitability Matrix | | Growth | | | Flower | | Interest | | | Light | | | Salt Tolerant | | | Resistant | | Soil Moisture | | | Function | | | | | | | | |
|--|--------------------------|-----------------|--------|------|--------|--------|----------|--------|------|---------|-------|-----------|---------------|-----|--------|-----------|---------|---------------|-------|---------|----------|-------------|------------|--------|---------|-----------|-------|------------|----------|
| | | Slow | Medium | Fast | Fall | Summer | Spring | Flower | Bark | Foliage | Shade | Sun/shade | Sun | Low | Medium | High | Drought | Pest | Moist | Average | Dry | Street Tree | Shade Tree | Screen | Massing | Windbreak | Hedge | Bank cover | Specimen |
| Botanical Name | Common Name | Characteristics | | | | | | | | | | | Culture | | | | | | Use | | | | | | | | | | |
| SMALL CANOPY TREES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BAUHINIA BINATA | Alibangbang | | ■ | | | | | ■ | | ■ | | | | | | | | | | | | ■ | | | | | | | |
| BAUHINIA BLAKEANA | Hong Kong Orchid Tree | | ■ | ■ | | | | ■ | | ■ | | | | ■ | | | ■ | ■ | | | | ■ | ■ | ■ | | | | | ■ |
| CALLISTEMON CITRINUS | Red Bottle Brush | | ■ | | | | | ■ | | ■ | | | | | | ■ | ■ | | | | | ■ | ■ | ■ | | | | | ■ |
| CASSIA GLAUCA | Kalamona, Scrambled Eggs | | ■ | | | | | ■ | | ■ | | | | | | ■ | ■ | | | | | ■ | ■ | ■ | | | | | |
| CLUSIA ROSEA | Autograph Tree | | | | | | | ■ | | ■ | | | | | | ■ | ■ | | | | | ■ | ■ | ■ | | | | | |
| COCCOLOBA UVIFERA | Sea Grape | | ■ | | | | | ■ | | ■ | | | | | | ■ | ■ | | | | | ■ | ■ | ■ | | | | | |
| COCHLOSPERMUM VITIFOLIUM | Buttercup Tree | | ■ | | | | | ■ | | ■ | | | | ■ | | | ■ | ■ | | | | | ■ | ■ | ■ | | | | ■ |
| CONOCARPUS ERECTUS VAR. ARGENTEUS | Silver Button Wood | ■ | | | | | | ■ | | ■ | | | | | | ■ | ■ | | | | | ■ | ■ | ■ | | | | | ■ |
| CORDIA SEBESTENA | Kou-Haole, Geiger Tree | | ■ | | | | | ■ | | ■ | | | | | | ■ | ■ | | | | | ■ | ■ | ■ | | | | | |
| CORDIA SUBCORDATA | True Kou | | ■ | | | | | ■ | | ■ | | | | | | ■ | ■ | | | | | ■ | ■ | ■ | | | | | |
| CUPANIOPIS ANACARDIOIDES | Carrot Wood, Tuckeroo | | ■ | | | | | ■ | | ■ | | | | | | ■ | ■ | | | | | ■ | ■ | ■ | | | | | |
| ELAEODENDRON ORIENTALE | False Olive | | ■ | | | | | ■ | | ■ | | | | | | ■ | ■ | | | | | ■ | ■ | ■ | | | | | |
| ERYTHRINA CRISTA-GALLI | Coral Tree | | ■ | ■ | | | | ■ | | ■ | | | | | | ■ | ■ | | | | | ■ | ■ | ■ | | | | | ■ |
| GUAIACUM OFFICINALE | Lignum Vitae | ■ | | | | | | ■ | | ■ | | | | | | ■ | ■ | | | | | ■ | ■ | ■ | | | | | ■ |
| HIBISCUS TILIACEUS | Hau Tree | | ■ | | | | | ■ | | ■ | | | | | | ■ | ■ | | | | | ■ | ■ | ■ | | | | | |
| MESSERSCHMIDIA ARGENTEA | Beach Heliotrope | | ■ | | | | | ■ | | ■ | | | | | | ■ | ■ | | | | | ■ | ■ | ■ | | | | | |
| PANDANUS ODORATISSIMUS | Hala | | ■ | | | | | ■ | | ■ | | | | | | ■ | ■ | | | | | ■ | ■ | ■ | | | | | ■ |
| PIMENTA DIOICA | All Spice | ■ | | | | | | ■ | | ■ | | | | | | ■ | ■ | | | | | ■ | ■ | ■ | | | | | |
| PLUMERIA ACUMINATA | White Plumeria | | ■ | | | | | ■ | | ■ | | | | | | ■ | ■ | | | | | ■ | ■ | ■ | | | | | ■ |
| PLUMERIA OBTUSA | Singapore Plumeria | | ■ | | | | | ■ | | ■ | | | | | | ■ | ■ | | | | | ■ | ■ | ■ | | | | | ■ |
| PLUMERIA RUBRA | Red Plumeria | | ■ | | | | | ■ | | ■ | | | | | | ■ | ■ | | | | | ■ | ■ | ■ | | | | | ■ |
| PODOCARPUS MACROPHYLLUS | Podocarpus | ■ | | | | | | ■ | | ■ | | | | ■ | | | ■ | ■ | | | | ■ | ■ | ■ | | | | | ■ |
| SCHINUS TEREBINTHIFOLIUS | Christmas Berry | | ■ | | | | | ■ | | ■ | | | | | | ■ | ■ | | | | | ■ | ■ | ■ | | | | | |
| STEMMADENIA GALEOTTIANA | Lechoso, Tree Gardenia | | ■ | | | | | ■ | | ■ | | | | | | ■ | ■ | | | | | ■ | ■ | ■ | | | | | ■ |
| TABEBUIA ARGENTEA | Silver Trumpet Tree | | ■ | | | | | ■ | | ■ | | | | | | ■ | ■ | | | | | ■ | ■ | ■ | | | | | ■ |

■ Excellent ■ Fair ■ Poor □ Not Applicable

| Appendix O - Plant Selection List (continued) Plant Material Suitability Matrix | | Growth | | | Flower | | | Interest | | | Light | | | Salt Tolerant | | | Resistant | | Soil Moisture | | | Function | | | | | | | |
|--|------------------------|-----------------|--------|------|--------|--------|--------|----------|------|---------|-------|-----------|---------|---------------|--------|------|-----------|------|---------------|---------|-----|-------------|------------|--------|---------|-----------|-------|------------|----------|
| | | Slow | Medium | Fast | Fall | Summer | Spring | Flower | Bark | Foliage | Shade | Sun/shade | Sun | Low | Medium | High | Drought | Pest | Moist | Average | Dry | Street Tree | Shade Tree | Screen | Massing | Windbreak | Hedge | Bank cover | Specimen |
| Botanical Name | Common Name | Characteristics | | | | | | | | | | | Culture | | | | | | Use | | | | | | | | | | |
| MEDIUM CANOPY TREES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ACACIA CONFUSA | Formosa Koa | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ARTOCARPUS INCISUS | Breadfruit, 'Ulu | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BRASSAIA ACTINOPHYLLA | Brassaia, Octopus Tree | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CALOPHYLLUM INOPHYLLUM | True Kamani | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CASSIA FISTULA | Golden Shower | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CASSIA GRANDIS | Coral Shower | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CASSIA HYBRID | Lemon Shower | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CASSIA JAVANICA | Pink and White Shower | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CASSIA JAVANICA X CASSIA FISTULA | Rainbow Shower | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CHRYSOPHYLLUM OLIVIFORME | Satin Leaf | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CINNAMOMUM CAMPHORA | Camphor Tree | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CINNAMOMUM ZEYLANICUM | Cinnamon Tree | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CITHAREXYLUM SPINOSUM | Fiddlewood | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DELONIX REGIA | Royal Poinciana | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ERYTHRINA VARIEGATA VAR. ORIENTALIS | Tigers Claw | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ERYTHRINA SANDWICENSIS | Wili-wili | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FICUS LYRATA | Fiddle Leaf Fig | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FILICIUM DECIPIENS | Fern Tree | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HARPULLIA PENDULA | Tulipwood | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| JACARANDA ACUTIFOLIA | Jacaranda | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NORONHIA EMARGINATA | Madagascar Olive | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PITHECELLOBIUM DULCE | Opiuma | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PTEROCARPUS INDICUS | Narra | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SCHINUS MOLLE | California Pepper | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Excellent
 Fair
 Poor
 Not Applicable

| Appendix O - Plant Selection List (continued) Plant Material Suitability Matrix | | Growth | | | Flower | | | Interest | | | Light | | | Salt Tolerant | | | Resistant | | Soil Moisture | | | Function | | | | | | | |
|--|----------------------|-----------------|--------|-------|--------|--------|--------|----------|------|---------|-------|-----------|---------|---------------|--------|--------|-----------|------|---------------|---------|-------|-------------|------------|--------|---------|-----------|-------|------------|----------|
| | | Slow | Medium | Fast | Fall | Summer | Spring | Flower | Bark | Foliage | Shade | Sun/shade | Sun | Low | Medium | High | Drought | Pest | Moist | Average | Dry | Street Tree | Shade Tree | Screen | Massing | Windbreak | Hedge | Bank cover | Specimen |
| Botanical Name | Common Name | Characteristics | | | | | | | | | | | Culture | | | | | | Use | | | | | | | | | | |
| MEDIUM CANOPY TREES (continued) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TABEBUIA CHRYSANTHA | Chrysantha | Green | | | | | | Yellow | Red | | | | | Green | | Yellow | Yellow | | | | Green | Green | | | | | | | Green |
| TABEBUIA PENTAPHYLLA | Pink Tecoma | | Green | | | | Green | Green | | | | | | Green | | Yellow | Yellow | | | | Green | Green | Green | | | | | | Green |
| THESPESIA POPULNEA | Milo | | | Green | | | Green | Green | | | | | | | Green | Yellow | Green | | | | Green | Green | Green | | | | | | |
| LARGE CANOPY TREES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ALEURITES MOLLUCANA | Kukui | | | Green | | | Yellow | Green | | | | | Green | | | Yellow | Red | | | | | Green | | | | | | | Green |
| FICUS BENJAMINA | Weeping Banyan | | Green | | | | Red | Green | | | | | | Green | | Yellow | Yellow | | | | | Green | | | | | | | Green |
| FICUS BENGHALENSIS | Indian Banyan | | | Green | | | Red | Green | | | | | | Green | | Yellow | Yellow | | | | | Green | | | | | | | |
| FICUS ELASTICA | Indian Rubber Tree | | Green | | | | Red | Green | | | | | | Green | | Red | Yellow | | | | | Green | | | | | | | Green |
| FICUS RELIGIOSA | Bo Tree | | | Green | | | Red | Green | | | | | | Green | | Red | Yellow | | | | | Green | | | | | | | Green |
| FICUS RETUSA | Chinese Banyan | | | Green | | | Red | Green | | | | | | Green | Green | Green | Yellow | | | | | Green | | | | | | | Green |
| SAMANEA SAMAN | Monkeypod | | Green | | | | Yellow | Yellow | | | | | | Green | | Yellow | Yellow | | | | Green | Green | | | | | | | Green |
| TERMINALIA CATAPPA | False Kamani | | Green | | | | Red | Yellow | | | | | | Green | Green | Red | Yellow | | | | | Green | Green | | | | | | Green |
| VERTICAL TREES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AGATHIS ROBUSTA | Queensland Kauri | Green | | | | | Red | Green | | | | | Green | | | Yellow | Green | | | | Green | | | | | | | | Green |
| ARAUCARIA COLUMNARIS | Captain Cook Pine | Green | | | | | | Green | | | | | | Green | | Yellow | Green | | | | Green | Green | | | | | | | Green |
| ARAUCARIA EXCELSA | Norfolk Island Pine | | Green | | | | | Green | | | | | | Green | | Yellow | Green | | | | Green | Green | | | | | | | Green |
| CASUARINA EQUISETIFOLIA | Ironwood | | | Green | | | Red | Green | | | | | | Green | | Green | Yellow | | | | | Green | Green | | | | | | Green |
| CIBOTIUM CHAMISSOI | Hapuu Tree Fern | | Green | | | | | Green | | | | | | Green | | Red | Yellow | | | | | Green | | | | | | | Green |
| CUPRESSUS SEMPERVIRENS | Italian Cypress | | Green | | | | | Green | | | | | | Green | | Yellow | Red | | | | | Green | | | | | | | Green |
| CYATHEA AUSTRALIS | Australian Tree Fern | | Green | | | | | Red | | | | | | Green | | Red | Yellow | | | | | Green | | | | | | | Green |
| EUCALYPTUS MACULATA VAR. CITRIODORA | Lemon-Scented Gum | | | Green | | | Red | Green | | | | | | Green | | Yellow | Green | | | | | Green | Green | | | | | | Green |
| EUCALYPTUS DEGLUPTA | Mindanao Gum | | | Green | | | Red | Green | | | | | | Green | | Yellow | Green | | | | | Green | Green | | | | | | Green |

Excellent
 Fair
 Poor
 Not Applicable

| Appendix O - Plant Selection List (continued) Plant Material Suitability Matrix | | Growth | | | Flower | | | Interest | | | Light | | | Salt Tolerant | | | Resistant | | Soil Moisture | | | Function | | | | | | | |
|--|--------------------------|-----------------|--------|------|--------|--------|--------|----------|------|---------|-------|-----------|---------|---------------|--------|------|-----------|------|---------------|---------|-----|-------------|------------|--------|---------|-----------|-------|------------|----------|
| | | Slow | Medium | Fast | Fall | Summer | Spring | Flower | Bark | Foliage | Shade | Sun/shade | Sun | Low | Medium | High | Drought | Pest | Moist | Average | Dry | Street Tree | Shade Tree | Screen | Massing | Windbreak | Hedge | Bank cover | Specimen |
| Botanical Name | Common Name | Characteristics | | | | | | | | | | | Culture | | | | | | Use | | | | | | | | | | |
| VERTICAL TREES (continued) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| EUCALYPTUS SIDEROXYLON | Red Ironbark | | | ■ | | | | ■ | | | | | | ■ | | ■ | ■ | | | | | | ■ | ■ | | | | | |
| GREVILLEA ROBUSTA | Silk Oak | | | ■ | | | | ■ | | | | | | ■ | | ■ | ■ | | | | | | ■ | ■ | | | | | |
| MELALEUCA LEUCADENDRA | Paperbark | | ■ | | | | | ■ | | | | | | ■ | | ■ | ■ | | | | | | ■ | ■ | | | | | ■ |
| PODOCARPUS NERIIFOLIUS | Podocarpus | | ■ | | | | | ■ | | | | | | ■ | | ■ | ■ | | | | | | ■ | ■ | | | | | ■ |
| SPATHODEA CAMPANULATA | African Tulip | | ■ | | | | | ■ | | | | | | ■ | | ■ | ■ | | | | | | ■ | ■ | | | | | ■ |
| TABEBUIA DONNELL-SMITHII | Gold Tree | | ■ | | | | | ■ | | ■ | | | ■ | | | ■ | ■ | | | | | ■ | ■ | | | | | | ■ |
| PALMS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ARCHONTOPHOENIX ALEXANDRAE | Alexander Palm | ■ | | | | | | ■ | ■ | | | ■ | ■ | | | ■ | ■ | | | | | ■ | | | | | | | ■ |
| ARECA CATECHU | Betel-Nut Palm | ■ | | | | | | ■ | ■ | | | ■ | ■ | | | ■ | ■ | | | | | ■ | | | | | | | ■ |
| CARLUDOVICA PALMATA | Panama Hat Palm | | ■ | | | | | ■ | ■ | ■ | | | ■ | | | ■ | ■ | | | | | ■ | | | | | | | ■ |
| CARYOTA MITIS | Dwarf Fishtail Palm | ■ | | | | | | ■ | ■ | | ■ | | | ■ | | ■ | ■ | | | | | ■ | | | | | | | ■ |
| CARYOTA URENS | Fishtail Palm, Wine Palm | | ■ | | | | | ■ | ■ | | | ■ | | | ■ | ■ | | | | | | ■ | | | | | | | ■ |
| CHRYSALIDOCARPUS LUTESCENS | Areca Palm | | ■ | | | | | ■ | ■ | | ■ | | | ■ | | ■ | ■ | | | | | | ■ | | | | | | ■ |
| COCOS NUCIFERA | Coconut Palm | ■ | | | | | | ■ | ■ | | | ■ | | | ■ | ■ | | | | | | ■ | | | | | | | ■ |
| CYCAS CIRCINALIS | Cycad Palm | ■ | | | | | | ■ | ■ | ■ | | | ■ | | | ■ | ■ | | | | | | ■ | | | | | | ■ |
| CYCAS REVOLUTA | Sago Palm | ■ | | | | | | ■ | ■ | | | ■ | | | ■ | ■ | | | | | | ■ | | | | | | | ■ |
| DICTYOSPERMA ALBUM | Princess Palm, Red Palm | ■ | | | | | | ■ | ■ | | | ■ | | | ■ | ■ | | | | | | ■ | | | | | | | ■ |
| HOWEIA FOSTERIANA | Thatch Palm | ■ | | | | | | ■ | ■ | | ■ | | | ■ | | ■ | ■ | | | | | ■ | | | | | | | ■ |
| LICUALA GRANDIS | Licuala Palm | ■ | | | | | | ■ | ■ | | | ■ | | | ■ | ■ | | | | | | ■ | | | | | | | ■ |
| LIVISTONA CHINENSIS | Chinese Fan Palm | ■ | | | | | | ■ | ■ | | | ■ | | | ■ | ■ | | | | | | ■ | | | | | | | ■ |
| PHOENIX DACTYLIFERA | Date Palm | ■ | | | | | | ■ | ■ | | | ■ | | | ■ | ■ | | | | | | ■ | | | | | | | ■ |
| PHOENIX ROEBELINII | Dwarf Date Palm | ■ | | | | | | ■ | ■ | ■ | | | ■ | | | ■ | ■ | | | | | | ■ | | ■ | | | | ■ |
| PRITCHARDIA PACIFICA | Fiji Fan Palm | ■ | | | | | | ■ | ■ | | ■ | | | ■ | | ■ | ■ | | | | | ■ | | | | | | | ■ |
| PRITCHARDIA THURSTONII | Loulu Palm | ■ | | | | | | ■ | ■ | | | ■ | | | ■ | ■ | | | | | | ■ | | | | | | | ■ |

■ Excellent ■ Fair ■ Poor □ Not Applicable

| Appendix O - Plant Selection List (continued) Plant Material Suitability Matrix | | Growth | | | Flower | | | Interest | | | Light | | | Salt Tolerant | | | Resistant | | Soil Moisture | | | Function | | | | | | | |
|--|--------------------------|-----------------|--------|------|--------|--------|--------|----------|------|---------|-------|-----------|---------|---------------|--------|------|-----------|------|---------------|---------|-----|-------------|------------|--------|---------|-----------|-------|------------|----------|
| | | Slow | Medium | Fast | Fall | Summer | Spring | Flower | Bark | Foliage | Shade | Sun/shade | Sun | Low | Medium | High | Drought | Pest | Moist | Average | Dry | Street Tree | Shade Tree | Screen | Massing | Windbreak | Hedge | Bank cover | Specimen |
| Botanical Name | Common Name | Characteristics | | | | | | | | | | | Culture | | | | | Use | | | | | | | | | | | |
| PALMS (continued) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PTYCHOSPERMA MACARTHURII | Macarthur Palm | | █ | | | | | | █ | █ | | █ | | | █ | | █ | █ | | | | | | | | | | | |
| RHAPIS EXCELSA | Rhapis Palm | █ | | | | | | | █ | █ | | | █ | | | █ | █ | | | | | | | | | | | | |
| ROYSTONEA REGIA | Royal Palm | █ | | | | | | | █ | █ | | █ | | | █ | | | | | | | █ | | | | | | | |
| VEITCHIA MERRILLII | Manila Palm | █ | | | | | | | █ | █ | | █ | | | █ | | | | | | | █ | | | | | | | |
| SHRUBS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ACALYPHA HISPIDA | Chenille Plant | | | █ | | | | █ | | █ | | | | █ | | █ | █ | | | | | | | | | | | | |
| ACALYPHA WILKESIANA | Beefsteak Plant | | | █ | | | | █ | | █ | | | | | | █ | █ | | | | | | | | | | | | |
| ALOCASIA CUCULLATA | Chinese 'Ape | | | █ | | | | █ | | █ | | | | | | █ | █ | | | | | | | | | | | | |
| ALOCASIA MACRORRHIZA | Elephant Ear 'Ape | | | █ | | | | █ | | █ | | | | | | █ | █ | | | | | | | | | | | | |
| ALPINIA NUTANS | Shell Ginger | | | █ | | | | █ | | █ | | | | | | █ | █ | | | | | | | | | | | | |
| ALPINIA PURPURATA | Red Ginger | | | █ | | | | █ | | █ | | | | | | █ | █ | | | | | | | | | | | | |
| BAMBUSA VULGARIS VAR. AUREO-VARIEGATA | Golden Bamboo | | █ | | | | | █ | | █ | | | | | | █ | █ | | | | | | | | | █ | | | |
| BELOPERONE GUTTATA | Shrimp Plant | | | | | | | █ | | █ | | | | | | █ | █ | | | | | | | | | | | | |
| CARISSA GRANDIFLORA | Natal Plum | | | █ | | | | █ | | █ | | | | | | █ | █ | | | | | | | | | | | | |
| CARISSA GRANDIFLORA 'BOX-WOOD BEAUTY' | Carissa | | | █ | | | | █ | | █ | | | | | | █ | █ | | | | | | | | | | | | |
| CODIAEUM VAR. | Croton | | | | | | | █ | | █ | | | | | | █ | █ | | | | | | | | | █ | | | |
| CORDYLINE TERMINALIS | Green Ti | | | █ | | | | █ | | █ | | | | | | █ | █ | | | | | | | | | | | | |
| CORDYLINE TERMINALIS 'PETER BUCK' | Peter Buck' Ti | | | █ | | | | █ | | █ | | | | | | █ | █ | | | | | | | | | | | | |
| CRINUM ASIATICUM | Spider Lily | | | █ | | | | █ | | █ | | | | | | █ | █ | | | | | | | | | | | | |
| DICHORISANDRA THYRSIFLORA | Blue Ginger | | | | | | | █ | | █ | | | | | | █ | █ | | | | | | | | | | | | |
| DIEFFENBACHIA PICTA | Dieffenbachia | | | | | | | █ | | █ | | | | | | █ | █ | | | | | | | | | | | | |
| DIEFFENBACHIA 'RUDOLPH ROEHERS' | Variegated Dieffenbachia | | | | | | | █ | | █ | | | | | | █ | █ | | | | | | | | | | | | |
| DRACAENA FRAGRANS | Fragrant Dracaena | | | | | | | █ | | █ | | | | | | █ | █ | | | | | | | | | | | | |

Excellent
 Fair
 Poor
 Not Applicable

| Appendix O - Plant Selection List (continued) Plant Material Suitability Matrix | | Growth | | | Flower | | | Interest | | | Light | | | Salt Tolerant | | | Resistant | | Soil Moisture | | | Function | | | | | | | |
|--|--------------------------------|-----------------|-----------|-----------|--------|--------|--------|-----------|-----------|-----------|-------|-----------|-----------|---------------|-----------|-----------|-----------|------|---------------|---------|-----|-------------|------------|--------|---------|-----------|-----------|------------|-----------|
| | | Slow | Medium | Fast | Fall | Summer | Spring | Flower | Bark | Foliage | Shade | Sun/shade | Sun | Low | Medium | High | Drought | Pest | Moist | Average | Dry | Street Tree | Shade Tree | Screen | Massing | Windbreak | Hedge | Bank cover | Specimen |
| Botanical Name | Common Name | Characteristics | | | | | | | | | | | Culture | | | | | | Use | | | | | | | | | | |
| SHRUBS (continued) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DRACAENA MARGINATA | Halapepe, Money Tree | | Excellent | | | | | Poor | Fair | | | Excellent | | Excellent | | Fair | Excellent | | | | | | Excellent | | | | | | Excellent |
| DRACAENA MASSANGIANA | Dracaena | | Excellent | | | | | Poor | Excellent | | | Excellent | | Excellent | | Fair | Fair | | | | | | Excellent | | | | | | Excellent |
| EUPHORBIA SPLENDENS | Crown of Thorns | | Excellent | | | | | Excellent | Poor | | | Excellent | | Excellent | | Fair | Excellent | | | | | | Excellent | | | | | | Excellent |
| ERVATAMIA DIVARICATA VAR. FLORE-PLENO | Crepe Gardenia | | Excellent | | | | | Excellent | Fair | | | Excellent | | Excellent | | Poor | Fair | | | | | | Excellent | | | | | | Excellent |
| GARDENIA TAITENSIS | Tiare Gardenia | | Excellent | | | | | Excellent | Fair | | | Excellent | | Excellent | | Fair | Fair | | | | | | Excellent | | | | | | Excellent |
| HELICONIA HUMILIS | Lobster Claw | | | Excellent | | | | Fair | Excellent | | | Excellent | | Excellent | | Poor | Fair | | | | | | Excellent | | | | | | Excellent |
| HELICONIA PSITTACORUM | Parrot's Beak Heliconia | | | Excellent | | | | Fair | Excellent | | | Excellent | | Excellent | | Fair | Fair | | | | | | Excellent | | | | | | Excellent |
| HELICONIA ROSTRATA | Hanging Heliconia | | | Excellent | | | | Fair | Excellent | | | Excellent | | Excellent | | Fair | Fair | | | | | | Excellent | | | | | | Excellent |
| HIBISCUS CAMERONII | Pink Hibiscus | | Excellent | | | | | Excellent | Fair | | | Excellent | | Excellent | | Fair | Fair | | | | | | Excellent | | | | | | Excellent |
| HIBISCUS ROSA-SINENSIS | Red Hibiscus, Chinese Hibiscus | | Excellent | | | | | Excellent | Fair | | | Excellent | | Excellent | | Fair | Fair | | | | | | Excellent | | | | | | Excellent |
| HIBISCUS SCHIZOPETALUS | Coral Hibiscus | | Excellent | | | | | Excellent | Fair | | | Excellent | | Excellent | | Fair | Fair | | | | | | Excellent | | | | | | Excellent |
| IXORA CHINENSIS | Dwarf Ixora | | Excellent | | | | | Excellent | Poor | | | Excellent | | Excellent | | Poor | Fair | | | | | | Excellent | | | | | | Excellent |
| LIGUSTRUM OVALIFOLIUM | California Privet | | | Excellent | | | | Fair | Fair | | | Excellent | | Excellent | | Fair | Excellent | | | | | | Excellent | | | Excellent | | | Excellent |
| MALVAVISUS ARBOREUS | Turks Cap, Sleeping Hibiscus | | | Excellent | | | | Excellent | Fair | | | Excellent | | Excellent | | Fair | Fair | | | | | | Excellent | | | | | | Excellent |
| MURRAYA PANICULATA | Mock Orange | Excellent | | | | | | Fair | Poor | | | Excellent | | Excellent | | Fair | Excellent | | | | | | Excellent | | | Excellent | | | Excellent |
| NANDINA DOMESTICA | Nandina, Heavenly Bamboo | Excellent | | | | | | Poor | Poor | | | Excellent | | Excellent | | Poor | Excellent | | | | | | Excellent | | | | | | Excellent |
| PHILODENDRON SELLOUM | Philodendron | | | Excellent | | | | Poor | Excellent | Excellent | | | Excellent | | Excellent | | Poor | Fair | | | | | Excellent | | | | | | Excellent |
| PITTIOSPORUM TOBIRA | Pittosporum | | Excellent | | | | | Poor | Fair | | | Excellent | | Excellent | | Excellent | Fair | | | | | | Excellent | | | | | | Excellent |
| PLUMBAGO CAPENSIS | Plumbago | | Excellent | | | | | Excellent | Poor | | | Excellent | | Excellent | | Fair | Fair | | | | | | Excellent | | | | | | Excellent |
| PSEUDERANTHEMUM RETICULATUM | Golden Eranthemum | | Excellent | | | | | Excellent | Fair | | | Excellent | | Excellent | | Poor | Excellent | | | | | | Excellent | | | | | | Excellent |
| RHAPHIOLEPIS UMBELLATA VAR. OVATA | Rhaphiolepis | Excellent | | | | | | Fair | Fair | | | Excellent | | Excellent | | Excellent | Excellent | | | | | | Excellent | | | | | | Excellent |
| RHODODENDRON SP. | Azalea | Excellent | | | | | | Excellent | Poor | Excellent | | | Excellent | | Excellent | | Poor | Fair | | | | | Excellent | | | | | | Excellent |
| SCAEVOLA FRUTESCENS | Beach Naupaka | | | Excellent | | | | Poor | Fair | | | Excellent | | Excellent | | Excellent | Excellent | | | | | | Excellent | | | | Excellent | | Excellent |
| STRELITZIA REGINAE | Bird of Paradise | | Excellent | | | | | Excellent | Excellent | | | Excellent | | Excellent | | Excellent | Poor | | | | | | Excellent | | | | | | Excellent |
| THRYALLIS GLAUCA | Spray of Gold, Galphimia | | Excellent | | | | | Excellent | Poor | | | Excellent | Excellent | | | Fair | Excellent | | | | | | Excellent | | | | | | Excellent |

Excellent
 Fair
 Poor
 Not Applicable

| Appendix O - Plant Selection List (continued) Plant Material Suitability Matrix | | Growth | | | Flower | | | Interest | | | Light | | | Salt Tolerant | | | Resistant | | Soil Moisture | | | Function | | | | | | | |
|--|----------------------------|-----------------|--------|-------|--------|--------|--------|----------|--------|---------|-------|-----------|---------|---------------|--------|--------|-----------|------|---------------|---------|-----|-------------|------------|--------|---------|-----------|-------|------------|----------|
| | | Slow | Medium | Fast | Fall | Summer | Spring | Flower | Bark | Foliage | Shade | Sun/shade | Sun | Low | Medium | High | Drought | Pest | Moist | Average | Dry | Street Tree | Shade Tree | Screen | Massing | Windbreak | Hedge | Bank cover | Specimen |
| Botanical Name | Common Name | Characteristics | | | | | | | | | | | Culture | | | | | | Use | | | | | | | | | | |
| GROUND COVERS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AGAPANTHUS UMBELLATUS | Blue African Lily | Green | | | | | | | Yellow | Green | | Green | | | | Red | Green | | | | | | | | | | | | Green |
| AGLAONEMA MODESTUM | Chinese Aglaonema | | Green | | | | | | Red | Green | Green | | | | | Yellow | Green | | | | | | | | | | | | |
| AGLAONEMA 'SILVER QUEEN' | Silver Queen Aglaonema | | Green | | | | | | Red | Green | Green | | | | | Yellow | Green | | | | | | | | | | | | |
| ALTERNANTHERA AMOENA | Red Joyweed | | | Green | | | | | Red | Green | | | | | | Yellow | Red | | | | | | | | | | | | |
| ASPARAGUS SPRENGERI | Asparagus Fern | | | Green | | | | | Red | Green | | Green | | | | Red | Green | | | | | | | | | | | | Green |
| BACOPA MONNIERI | Bacopa, Water Hyssop | | | Green | | | | | Red | Green | | Green | | | | Red | Red | | | | | | | | | | | | Green |
| CANNA INDICA | Canna Lily | | Green | | | | | | Green | Green | | | | | | Yellow | Green | | | | | | | | | | | | Green |
| CARISSA GRANDIFLORA 'PROSTRATA' | Dwarf Carissa | | Green | | | | | | Yellow | Green | | | | | | Yellow | Green | | | | | | | | | | | | Green |
| CARPOBROTUS EDULIS | Hottentot Fig | | | Green | | | | | Yellow | Green | | Green | | | | Green | Yellow | | | | | | | | | | | | |
| CATHARANTHUS ROSEUS | Madagascar Periwinkle | | | Green | | | | | Green | Green | | | | | | Red | Yellow | | | | | | | | | | | | Green |
| CHLOROPHYTUM COMOSUM | Spider Plant, Ribbon Plant | | Green | | | | | | Red | Green | | Green | | | | Yellow | Green | | | | | | | | | | | | Green |
| DISSOTIS PLUMOSA | Dissotis | | | Green | | | | | Green | Red | | | | | | Red | Green | | | | | | | | | | | | Green |
| FICUS TIKUOA | Waipahu Fig | | Green | | | | | | Red | Green | | Green | | | | Yellow | Red | | | | | | | | | | | | Green |
| GAZANIA RIGENS | Pied Gazania | | | Green | | | | | Green | Yellow | | Green | | | | Green | Yellow | | | | | | | | | | | | |
| GAZANIA UNIFLORA LEUCOLEANA | Trailing Gazania | | | Green | | | | | Green | Yellow | | Green | | | | Green | Yellow | | | | | | | | | | | | Green |
| HELICONIA SP. CV. 'DWARF HUMILIS' | Jamaican Heliconia | | Green | | | | | | Yellow | Green | Green | | | | | Red | Yellow | | | | | | | | | | | | |
| HEMEROCALLIS SP. | Day Lily | | | Green | | | | | Green | Yellow | Green | | | | | Red | Green | | | | | | | | | | | | Green |
| HEMIGRAPHIS COLORATA | Hemigraphis | | Green | | | | | | Red | Yellow | | Green | | | | Yellow | Yellow | | | | | | | | | | | | |
| HYLOCEREUS UNDATUS | Night Blooming Cereus | Green | | | | | | | Yellow | Green | | Green | | | | Green | Green | | | | | | | | | | | | Green |
| IMPATIENS SULTANI | Impatiens | | | Green | | | | | Green | Yellow | Green | | | | | Red | Green | | | | | | | | | | | | Green |
| LANTANA CAMARA | Lantana | | | Green | | | | | Green | Red | | Green | | | | Green | Yellow | | | | | | | | | | | | |
| LANTANA SELLOWIANA | Trailing Lantana | | | Green | | | | | Green | Red | | Green | | | | Green | Yellow | | | | | | | | | | | | Green |
| LIGULARIA KAEMPFERI | Ligularia | | Green | | | | | | Yellow | Green | Green | | | | | Red | Yellow | | | | | | | | | | | | |
| LIRIOPE SPICATA | Liriope, Creeping Lilyturf | Green | | | | | | | Red | Red | Green | | | | | Green | Green | | | | | | | | | | | | Green |

Excellent
 Fair
 Poor
 Not Applicable

| Appendix O - Plant Selection List (continued) Plant Material Suitability Matrix | | Growth | | | Flower | | | Interest | | | Light | | | Salt Tolerant | | | Resistant | | Soil Moisture | | | Function | | | | | | | |
|--|------------------------------|-----------------|--------|------|--------|--------|--------|----------|------|---------|-------|-----------|---------|---------------|--------|------|-----------|------|---------------|---------|-----|-------------|------------|--------|---------|-----------|-------|------------|----------|
| | | Slow | Medium | Fast | Fall | Summer | Spring | Flower | Bark | Foliage | Shade | Sun/shade | Sun | Low | Medium | High | Drought | Pest | Moist | Average | Dry | Street Tree | Shade Tree | Screen | Massing | Windbreak | Hedge | Bank cover | Specimen |
| Botanical Name | Common Name | Characteristics | | | | | | | | | | | Culture | | | | | | Use | | | | | | | | | | |
| Vines | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ALLAMANDA CATHARTICA VAR. HENDERSONII | Yellow Allamanda | | █ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ANTIGONON LEPTOPUS | Mexican Creeper | | | █ | | | | | | | | | | | | | | | | | | | | | | | | | |
| FICUS PUMILA | Creeping Fig | | █ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BAUHINIA GALPINII | Red Bauhinia Vine | | █ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BAUHINIA CUMINGIANA | Yellow Bauhinia | | █ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BIGNONIA MAGNIFICA | Purple Bignonia | | | █ | | | | | | | | | | | | | | | | | | | | | | | | | |
| BIGNONIA UNGUS-CATI | Cat's Claw Climber | | | █ | | | | | | | | | | | | | | | | | | | | | | | | | |
| BOUGAINVILLEA 'MARY PALMER' | Mary Palmer Bougainvillea | | █ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BOUGAINVILLEA 'MISS MANILA' | Miss Manila Bougainvillea | | █ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BOUGAINVILLEA 'SPECTABILIS' | Purple Bougainvillea | | █ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IPOMOEA HORSFALLIAE | Kuhio Vine | | | █ | | | | | | | | | | | | | | | | | | | | | | | | | |
| IPOMOEA PES-CAPRAE | Beach Morning Glory | | | █ | | | | | | | | | | | | | | | | | | | | | | | | | |
| LONICERA JAPONICA | Honeysuckle | | █ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MONSTERA DELICIOSA | Monstera | | █ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| POTHOS AUREUS | Pothos | | █ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PYROSTEGIA IGNEA | Huapala, Orange Trumpet Vine | | | █ | | | | | | | | | | | | | | | | | | | | | | | | | |
| STEPHANOTIS FLORIBUNDA | Stephanotis Vine | | █ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| THUNBERGIA ALATA | Black-eyed Susan | | | █ | | | | | | | | | | | | | | | | | | | | | | | | | |
| THUNBERGIA GRANDIFLORA ALBA | White Thunbergia | | | █ | | | | | | | | | | | | | | | | | | | | | | | | | |
| THUNBERGIA FRAGRANS | Small White Thunbergia | | █ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| THUNBERGIA LAURIFOLIA | Laurel-leaved Thunbergia | | █ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TRISTELLATEIA AUSTRALASIAE | Bagnit, Galphimia Vine | | █ | | | | | | | | | | | | | | | | | | | | | | | | | | |

Excellent
 Fair
 Poor
 Not Applicable

APPENDIX J DRAWINGS:

Solicitation Files (22 x 34 inch sheets bound separately)

Contractor shall incorporate the requirements shown on the Appendix J sheets into the Final Design for this project.

APPENDIX J LIST OF DRAWINGS

| SHEET NUMBER | DESCRIPTION OF DRAWINGS |
|--------------|---|
| | |
| G-001 | TITLE SHEET, LOCATION MAP AND VICINITY MAP |
| G-002 | SCHEDULE OF DRAWINGS |
| | |
| | <u>CIVIL DRAWINGS</u> |
| | |
| C-001 | LOCATION MAP & VICINITY MAP & NOTES TO THE CONTRACTOR |
| CS-101 | DEMOLITION & REMOVAL PLAN |
| CS-102 | SITE PLAN |
| CU-101 | UTILITIES POINTS-OF-CONNECTION PLAN |
| | |
| | |
| | |
| | |
| | <u>ELECTRICAL DRAWINGS</u> |
| | |
| E-101 | ELECTRICAL SITE PLAN |
| T-101 | TELECOMMUNICATION SITE PLAN I |
| T-102 | TELECOMMUNICATION SITE PLAN II |
| | |
| | |
| | |
| | |
| | |

APPENDIX K
Life Cycle Cost Analysis Fuel Cost Information
(REV 1.0, 25 Jan 2007)

The following utility rates for this installation are provided for the purpose of performing life cycle cost calculations in response to this solicitation and for design development in accordance with Section 01012 Design After Award:

Electrical:

Demand Charge - \$7.8373329 per kilowatt (SB)

Energy Charge - \$0.1453693 per kilowatt-hour Blended Rate - \$0.1598331 per kilowatt-hour (blended annual energy and demand cost)(SB)

Synthetic Natural Gas (SNG):

N/A

LPG:

SB \$2.321 per gallon

Water:

Commodity Charge Rate - \$2.24 per KGal Rate A
\$2.83 per KGal Rate B

Sewer:

Commodity Charge Rate - \$6.443 per KGal Rate A
\$7.725 per KGal Rate B

Purchased/Central Steam:

Commodity Charge Rate – N/A

Purchased High Temperature Water:

Commodity Charge Rate – N/A

Purchased Chilled Water:

Commodity Charge Rate – N/A

LEED Project Credit Guidance (OCT 09)

This spreadsheet indicates Army required credits, Army preferred credits, project-specific ranking of individual point preferences, assumptions guidance for individual credits, and references to related language in the RFP for individual credits.

| | | | | |
|---------------------------|---|---|-----|--|
| LEED 2.2 Credit Paragraph | LEED Project Credit Guidance | Army Guidance: Required - Preferred - Avoid | | Project Preference Ranking: (1 =most preferred, blank=no preference, X=preference not applicable to this credit, Rqd=required) |
| PAR | FEATURE | | | REMARKS |
| SUSTAINABLE SITES | | | | |
| SSPR1 | Construction Activity Pollution Prevention (PREREQUISITE) | Rqd | Rqd | All LEED prerequisites are required to be met. |
| SS1 | Site Selection | | X | See paragraph LEED CREDITS COORDINATION. |
| 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 | | |
| WATER EFFICIENCY | | | | |
| WEPR1 | Water Use Reduction (Version 3 only) | Rqd | Rqd | All LEED prerequisites are required to be met. |
| WE1.1 | Water Efficient Landscaping: Reduce by 50% | Pref | | See paragraph IRRIGATION. Project must include landscaping to be eligible for this credit. |
| WE1.2 | Water Efficient Landscaping: No Potable Water Use or No Irrigation | Pref | | Project must include landscaping to be eligible for this credit. |
| WE2 | Innovative Wastewater Technologies - OPTION 1 | | | |
| WE2 | Innovative Wastewater Technologies - OPTION 2 | | | |
| WE3 | Water Use Reduction | Pref | | See paragraph BUILDING WATER USE REDUCTION. |
| ENERGY AND ATMOSPHERE | | | | |

| | | | | |
|--------------------------------|---|------|-----|---|
| EAPR1 | Fundamental Commissioning of the Building Energy Systems (PREREQUISITE) | Rqd | Rqd | All LEED prerequisites are required to be met. |
| EAPR2 | Minimum Energy Performance (PREREQUISITE) | Rqd | Rqd | All LEED prerequisites are required to be met. |
| EAPR3 | Fundamental Refrigerant Management (PREREQUISITE) | Rqd | Rqd | All LEED prerequisites are required to be met. |
| EA1 | Optimize Energy Performance | Rqd | 1 | Earning of LEED EA1 points as indicated in paragraph ENERGY CONSERVATION , as a minimum, is required. |
| EA2.1 | On-Site Renewable Energy | Pref | | See paragraph ENERGY CONSERVATION . |
| EA3 | Enhanced Commissioning | | | The Commissioning Authority may be provided through the Design-Build Contractor only if in accordance with USGBC Credit Interpretation Ruling (CIR) dated 9/15/06. Commissioning Authority activities begin during design phase and continue well beyond beneficial occupancy. Assume Government will not provide CxA post-occupancy activities unless indicated otherwise. |
| EA4 | Enhanced Refrigerant Management | | | |
| EA5 | Measurement & Verification | | | Assume Government will not provide post-occupancy activities unless indicated otherwise. |
| EA6 | Green Power | | X | See paragraph LEED CREDITS COORDINATION . |
| 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 | Pref | | See paragraph APPLICABLE CRITERIA |
| 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

Owner's Project Requirement Document for LEED Fundamental Commissioning

Owner's Project Requirements Document for LEED Fundamental Commissioning

Project : FY11 PN52267 228 PN UEPH, Schofield Barracks

Approved: _____
 Name Owner's Representative Date

Name Design Agent's Representative Date

Overview and Instructions

The purpose of this document is to provide clear and concise documentation of the Owner's goals, expectations and requirements for commissioned systems, and shall be utilized throughout the project delivery and commissioning process to provide an informed baseline and focus for design development and for validating systems' energy and environmental performance.

The Owner's Project Requirements Document is a required document for LEED Version 2.2 EA Prerequisite 1, Fundamental Commissioning of the Building Energy Systems. It shall be completed by the Corps District/Design Agent based on coordination with the Installation/User/Proponent and shall be approved by the Installation/User/Proponent representative.

Use of this template is not required, nor are there any restrictions on editing of it. It is provided simply as a tool to assist project teams in meeting the documentation requirements for LEED Fundamental Commissioning.

The intent of the Owner's Project Requirements Document, per the LEED v2.2 Reference Guide, is to detail the functional requirements of a project and the expectations of the building's use and operation as it relates to commissioned systems. This template contains the basic recommended components indicated in the LEED v2.2 Reference Guide. It should be adapted as needed to suit the project, remaining reflective of the LEED intent.

The Owner's Project Requirements Document should ideally be completed before the start of design and furnished to the design team. It must be completed prior to the approval of Contractor submittals of any commissioned equipment or systems to meet LEED requirements.

Updates to the Owner's Project Requirements Document throughout the course of project delivery shall be made by the Corps District/Design Agent based on decisions and agreements coordinated with and agreed to by the Installation/User/Proponent.

The Owner's Project Requirements Document shall be included in the project's LEED documentation file under EA PR1, Fundamental Commissioning of the Building Energy Systems.

Owner's Project Requirements Document for LEED Fundamental Commissioning

Table of Contents

1. Owner and User Requirements
 - Primary Purpose, Program and Use
 - Project History
 - Broad Goals
2. Environmental and Sustainability Goals
 - Energy Efficiency Goals
 - General
 - Siting
 - Building Façade
 - Building Fenestration
 - Building Envelope
 - Roof
 - Other
3. Indoor Environmental Quality Requirements
 - Intended Use
 - Occupancy Schedule
 - Accommodations for After-Hours Use
 - Lighting, Temperature, Humidity, Air Quality, Ventilation, Filtration
 - Acoustics
 - Occupant Ability to Adjust System Controls
 - Types of Lighting
4. Equipment and Systems Expectations
 - Space Heating
 - Ventilation
 - Air Conditioning
 - Refrigeration
 - HVAC Controls
 - Domestic Hot Water
 - Lighting Controls
 - Daylighting Controls
 - Emergency Power
 - Other
5. Building Occupant and O&M Personnel Requirements
 - Facility Operation
 - EMCS
 - Occupant Training and Orientation
 - O&M Staff Training and Orientation

TABLE 1

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1. **Owner and User Requirements**

What is the primary purpose, program and use of this project? (example: office building with data center)

Unaccompanied Enlisted Personnel Housing (UEPH) facilities will house single soldiers and is intended to be similar both functionally and technically to apartment type housing in the private sector. The soldier's room shall include, but not be limited to: private sleeping areas, walk-in closets, a shared bathroom and kitchenette. Additional facility and functional support amenities shall be provided as outlined in the project Scope of Work. The varying components for this facility will be: building occupancy requirements, regional soils and climatic conditions, facility structural considerations, HVAC systems, and the exterior architectural features. Therefore, the overall building design and configurations will vary as required to meet project specific requirements.. These components are more fully described in Paragraph 3 of Section 01 10 00.

Describe pertinent project history. (example: standard design development)

It is the intent of Government to issue design-build Request for Proposals (RFPs) under the contracts awarded as a result of this solicitation, which may be used as the basis for subsequent RFPs/task orders at the same or other installations within the region, i.e., "adapt-build" and/or as fully-designed RFP/task orders.

Broad Goals

What are the broad goals relative to program needs?

Design objective of the UEPH is to provide a flexible facility suitable to housing single soldiers while utilizing a modular approach. To provide economical, standardized facilities that meet the basic functional needs of Army units and can be easily adapted to changing needs

What are the broad goals relative to future expansion?

Design objective of the UEPH is to provide a flexible facility suitable to housing single soldiers while utilizing a modular approach. To provide economical, standardized facilities that meet the basic functional needs of Army units.

What are the broad goals relative to flexibility?

The goal is to allow adaptability in response to changes in force structure, equipment and doctrine.

What are the broad goals relative to quality of materials?

Similar to a representative facility in the private sector, 25-year life with normal maintenance. 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

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50-year life expectancy with industry-accepted maintenance and repair cycles. _____

What are the broad goals relative to construction costs?

The government places value in methods that streamline construction, manage labor and other resource constraints in an effort to reduce costs and support an aggressive schedule, including such things as fast-tracking, using factory built modules or assemblies, panelization, pre-cast, standard designs, etc., while meeting contract and quality requirements. Facility must meet budget. _____

What are the broad goals relative to operational costs?

Meet EPAct (reduce water, energy consumption). Minimize operating costs as much as possible

Within first cost budget. _____

What are the broad goals relative to life cycle of the equipment?

Equipment should have life similar to that in the private sector. _____

Other broad goals: *(Insert as applicable)*

To provide essentially the same functional facility components at all locations (site-adapt) to the

Extent possible to facilitate unit mobility and to reduce repetitive design costs. _____

2. Environmental and Sustainability Goals

What are the project goals relative to sustainability and environmental issues? (example: LEED Silver rating)

The project goals relative to sustainability and environmental issues are to achieve LEED Silver rating.

What are the project goals relative to energy efficiency? (example: Meet EPACT)

The project goals relative to energy efficiency are to meet EPACT. _____

What are the project goals and requirements for building siting that will impact energy use?

Same facility must be site adapted nationwide. Consistent building orientation cannot be expected.

Variations in availability of fuel sources. Special local requirements are indicated in Paragraph 6 of Section 10 10 00, Statement Of Work. _____

What are the project goals and requirements for building facade that will impact energy use?

Same facility must be site-adapted worldwide. Exterior appearance will vary to be compatible with adjoining environment's architectural theme. Special local requirements are indicated in

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Paragraph 6 of Section 01 10 00, Statement of Work

What are the project goals and requirements for building fenestration that will impact energy use?

Same facility must be site-adapted worldwide. Fenestration will vary to be compatible with adjoining environment's architectural theme and Antiterrorism/Force Protection requirements. Consistent building orientation cannot be expected at all sites. All room modules must have windows, although size of windows may vary. Antiterrorism/Force Protection criteria (UFC 4-010-01) must be met.

What are the project goals and requirements for building envelope that will impact energy use?

ASHRAE 90.1 and EPACT are required. Special local requirements are indicated in paragraph 6 of Statement of Work.

What are the project goals and requirements for building roof that will impact energy use?

Special local requirements are indicated in paragraph 6 of Section 01 10 00, Statement of Work

3. Indoor Environmental Quality Requirements

What is the intended use for all spaces? For all spaces that have an intended use that is not readily apparent from the space name, provide this information in Table 1.

See Paragraph 3 of Section 01 10 00,

What is the anticipated occupancy schedule (numbers of occupants and time frames) for all occupied spaces? Indicate the default occupancy schedule below and for all spaces that have an occupancy schedule that differs from the default, provide this information in Table 1.

Typical occupancy schedule is similar to residential apartment buildings. See statement of work

What accommodations for after-hours use are required? (example: access control, lighting controls, HVAC controls) Indicate general accommodations required below and for all spaces that have special requirements, provide this information in Table 1.

Accommodations for after-hours will require access control, lighting controls and HVAC controls.
Special local requirements are indicated in Paragraph 6 of Section 0110 00.

What are the lighting, temperature, humidity, air quality, ventilation and filtration requirements for all spaces? Indicate the default requirements below and for all spaces that have a requirement that differs from the default, provide this information in Table 1.

Lighting: IESNA Lighting Handbook, IESNA RP-1-04, ASHRAE 90.1

Temperature: see Statement of Work of RFP

Humidity: 50%

Air Quality: ASHRAE 62.1

Ventilation: ASHRAE 62.1

Filtration: ASHRAE 52.1 and 52.2

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What are the acoustical requirements for all spaces? Indicate the default acoustical requirements below and for all spaces that have a requirement that differs from the default, provide this information in Table 1.

See Paragraph 3 of Section 01 10 00. _____

What is the desired level of occupant ability to adjust systems controls? Indicate the default desired levels below and for all spaces that have a desired level that differs from the default, provide this information in Table 1.

Lighting: IESNA Lighting Handbook, IESNA RP-1-04, ASHRAE 90.1 and is indicated in Statement of Work _____

Temperature: _____

Humidity: _____

Air Quality: _____

Ventilation: _____

What, if any, specific types of lighting are desired? (example: fluorescent in 2x2 grid, accent lighting, particular lamps)

As specified in the Statement of Work _____

4. Equipment and System Expectations

(Complete for each category as applicable or indicate "none identified" or "N/A". Add desired features information for other anticipated commissioned systems as applicable)

Indicate desired features for the following commissioned system: Space Heating

Desired Type: _____

Quality: _____

Preferred Manufacturer: _____

Reliability: _____

Automation: _____

Flexibility: _____

Maintenance Requirements: _____

Efficiency Target: _____

Desired Technologies: _____

Indicate desired features for the following commissioned system: Ventilation

Desired Type: Per Statement of Work _____

Quality: _____

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Preferred Manufacturer: _____
 Reliability: _____
 Automation: _____
 Flexibility: _____
 Maintenance Requirements: _____
 Efficiency Target: _____
 Desired Technologies: _____

Indicate desired features for the following commissioned system: Air Conditioning

Desired Type: Per Statement of Work _____
 Quality: _____
 Preferred Manufacturer: _____
 Reliability: _____
 Automation: _____
 Flexibility: _____
 Maintenance Requirements: _____
 Efficiency Target: _____
 Desired Technologies: _____

Indicate desired features for the following commissioned system: Refrigeration

Desired Type: Per Statement of Work _____
 Quality: _____
 Preferred Manufacturer: _____
 Reliability: _____
 Automation: _____
 Flexibility: _____
 Maintenance Requirements: _____
 Efficiency Target: _____
 Desired Technologies: _____

Indicate desired features for the following commissioned system: HVAC Controls

Desired Type: Per Statement of Work _____
 Quality: _____
 Preferred Manufacturer: _____
 Reliability: _____
 Automation: _____

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Flexibility: _____
Maintenance Requirements: _____
Efficiency Target: _____
Desired Technologies: _____

Indicate desired features for the following commissioned system: Domestic Hot Water

Desired Type: Per Statement of Work _____
Quality: _____
Preferred Manufacturer: _____
Reliability: _____
Automation: _____
Flexibility: _____
Maintenance Requirements: _____
Efficiency Target: _____
Desired Technologies: _____

Indicate desired features for the following commissioned system: Lighting Controls

Desired Type: As indicated in Statement of Work _____
Quality: None identified _____
Preferred Manufacturer: None identified _____
Reliability: _____
Automation: As indicated in Statement of Work _____
Flexibility: None identified _____
Maintenance Requirements: None identified _____
Efficiency Target: None identified _____
Desired Technologies: As indicated in Statement of Work _____

Indicate desired features for the following commissioned system: Daylighting Controls

Desired Type: _____
Quality: _____
Preferred Manufacturer: _____
Reliability: _____
Automation: _____
Flexibility: _____
Maintenance Requirements: _____
Efficiency Target: _____
Desired Technologies: _____

01 FEB 07

Indicate desired features for the following commissioned system: Emergency Power

Desired Type: _____

Quality: _____

Preferred Manufacturer: _____

Reliability: _____

Automation: _____

Flexibility: _____

Maintenance Requirements: _____

Efficiency Target: _____

Desired Technologies: _____

Indicate desired features for the following commissioned system: Other - _____

Desired Type: _____

Quality: _____

Preferred Manufacturer: _____

Reliability: _____

Automation: _____

Flexibility: _____

Maintenance Requirements: _____

Efficiency Target: _____

Desired Technologies: _____

5. Building Occupant and O&M Personnel Requirements

How will the facility be operated? Who will operate the facility?

Varies; DPW Contractor or staff. All references to the owner shall be coordinated with and approved by the Contracting Officer _____

Will the facility be connected to an EMCS? If so, what are the interface requirements? (example: monitoring points, control points, scheduling)

N/A _____

What is the desired level of training and orientation for building occupants to understand and use the building systems?

01 FEB 07

Minimal for occupants. Per RFP _____

What is the desired level of training and orientation for O&M staff to understand and maintain the building systems?

As indicated in Section Construction Closeout and Statement of Work. _____

APPENDIX N
LEED Requirements for Multiple Contractor Combined Projects

Not Used

APPENDIX O
LEED Strategy Tables

Not Used

APPENDIX P

LEED Registration of Army Projects

15 April 2010

Number of Registrations

Each building must be registered separately, except multiple instances of a standard building on a shared site may be registered as a single project. If a single registration for multiple buildings is chosen, all buildings under the single registration must earn exactly the same points. Do not register buildings that are exempt from a specific LEED achievement requirement.

Typical Registration Procedure

1. Login, complete the online registration form (see guidance below) at the GBCI LEED Online website <http://www.gbci.org/DisplayPage.aspx?CMSPageID=174> and submit it online.
2. Pay the registration fee via credit card (USACE staff: credit card PR&C is funded by project design or S&A funds).
3. GBCI will follow up with a final invoice, the LEED-online passwords and template information.
4. The individual who registers the project online is, by default, the Project Administrator.

Completing the Registration Form

BEFORE YOU BEGIN:

Create a personal account with USGBC if you do not have one.

You will need the following information:

Project name as it appears in P2 (obtain from USACE Project Manager)

Building number/physical address of project

Zip code for Installation/project location

Anticipated construction start and end dates

Total gross area all non-exempt buildings in registration

Total construction cost all non-exempt buildings only (see Project Details Section instructions below)

ACCOUNT/LOGIN INFORMATION

1. The person registering the project **must have an account with USGBC** (login and password) to complete the form. Go to <http://www.gbci.org/>, click on "register a project" at the drop-down menu for project certification (at the top of the page) and select "register now for LEED 2009" to start the project registration process. If you have an account, login with your email address and password and select "register new project" to proceed. If you do not have an account, you may select "register a new account" and follow the instructions. It is recommended that you create an account separately on the USGBC website before you start the form. **IMPORTANT: USACE team members are members of USGBC and are eligible for Member prices. USACE team members registering projects should be sure to include the USACE Corporate Access ID in their personal account profile (if you do not have it contact richard.l.schneider@usace.army.mil or judith.f.milton@usace.army.mil for the number).**
2. The Account/Login Information section is filled out by the person registering the project. It may be a Contractor or a USACE staff member.

ELIGIBILITY SECTION

Follow directions (accepting the terms and conditions)

Review your profile information and make corrections if needed

RATING SYSTEM SELECTION SECTION

Select single project registration and I know which rating system.

Select the rating system - currently only LEED-NC and LEED for Homes are approved for Army use without special approval.

LEED Minimum Program Requirements: select YES

RATING SYSTEM RESULTS SECTION

Confirm selected rating system.

PROJECT INFORMATION SECTION

Project Title: Begin the project title with a one-word identifier for the Installation. Do not include the word "Fort". After this match the project name used in P2 (contact the USACE Project Manager for this information) and identify the building being registered. Example: "Stewart 4th IBC - DFAC".

Project Address 1 and 2: This is the physical location of the project. Provide building number, street address, block number or whatever is known to best describe the location of the project on the Installation.

Project City: Installation Name

State, Country, Zip Code: Self-explanatory

Anticipated Construction Start and End Dates: Self-explanatory – give your best guess if unknown. Note that required data entry format is: 1 or 2 digit month/1 or 2 digit date/4 digit year (example 3/23/2010)

Gross Square Footage: Provide total area all buildings in LEED project. Exclude the area of any buildings that are exempt from the LEED achievement requirement (for example, exclude an unconditioned storage shed to be constructed with a barracks complex).

Is Project Confidential: Indicate NO except, if project has security sensitivity (elements that are FOUO or higher security), indicate YES.

Notification of Local Chapter: Indicate NO unless Government/USACE Project Manager requests you to indicate YES.

Anticipated Project Type: Select the most appropriate option from the drop-down menu.

Anticipated Certification Level: Select the applicable option from the drop-down menu (Silver is the usual level).

PROJECT OWNER INFORMATION SECTION

Project Owner First Name, Last Name, email, phone, address: The Project Owner is the USACE Project Manager. Obtain this info from the USACE Project Manager.

Organization: U.S. Army Corps of Engineers. This field MUST be completed this way because it will be used as a search field by higher HQ to find all USACE registered projects. You may supplement it with district name at the end but DO NOT revise or use an acronym.

May we publish Owner information: Indicate NO

Owner Type: Pick Federal Government from drop-down menu.

Project Owner Assertion: Check the box

PAYMENT INFORMATION

Self-explanatory

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

| RMS SUBMITTAL REGISTER INPUT FORM | | | CONTRACT NUMBER | | DELIVERY ORDER | | | | | | | | | | | | | | | | | | | | |
|-----------------------------------|------------------------------------|---|------------------------|--------------------|-------------------|--------------|------------------|-------------------|-------------------|------------------------|------------------------|---------------|--------------------------|---------------------------|--------------------------|----------------------------------|-------------------------|---------|---------|----------------------|------------------|----------------------|---------------------|-------------------------|---------------------------|
| TITLE AND LOCATION | | | | | | | | | | | | | | | | | | | | | | | | | |
| Button | <-----Right click for Instructions | | TYPE OF SUBMITTAL | | | | | | | | CLASSIFICATION | | | | REVIEWING OFFICE | | | | | | | | | | |
| SECTION | PARAGRAPH NUMBER | DESCRIPTION OF ITEM SUBMITTED | 01 - PRECON SUBMITTALS | 02 - SHOP DRAWINGS | 03 - PRODUCT DATA | 04 - SAMPLES | 05 - DESIGN DATA | 06 - TEST REPORTS | 07 - CERTIFICATES | 08 - MFRS INSTRUCTIONS | 09 - MFRS FIELD REPORT | 10 - O&M DATA | 11 - CLOSEOUT SUBMITTALS | FO - FOR INFORMATION ONLY | GA - GOVERNMENT APPROVED | DA - DESIGNER OF RECORD APPROVAL | CR - CONFORMANCE REVIEW | DA / CR | DA / GA | DO - DISTRICT OFFICE | AO - AREA OFFICE | RO - RESIDENT OFFICE | PO - PROJECT OFFICE | DR - DESIGNER OF RECORD | AE - ARCHITECT / ENGINEER |
| 00 72 00 | 52.236-13 | Accident Prevention Plan | X | | | | | | | | | | | | | X | | | | | | | | | |
| 00 73 00 | 1.11 | Dev. From Accept. Design. No Deviation from Contract | | | | | X | | | | | | | | | | | X | | | | | | X | |
| 00 73 00 | 1.11 | Dev. From Accepted Design - Deviates from Contract | | | | | X | | | | | | | | | | | X | | | | | | X | |
| 00 73 00 | 1.17 | Supplemental Price Breakdown | X | | | | | | | | | | | X | | | | | | | | | | | |
| 00 73 00 | 1.18 | SSHO Qualifications | X | | | | | | | | | | | | X | | | | | | | | | | |
| 01 10 00 | 5.2.3.1 | (if concrete pavement) Joint Layout Plan with design drawings | | | | | X | | | | | | | | | X | | | | | | | | | |
| 01 10 00 | 5.5.2 | Building Envelope Sealing Performance Testing | | | | | | X | | | | | | X | | | | | | | | | | | |
| 01 10 10 | *** | Tests as Req by Codes - DOR Develops Test Program | | | | | | X | | | | | | X | | | | | | | | | | X | |
| 01 10 00 | 5.8.3 | BAS Review Information | | X | | | | | | | | | | | | | X | | | X | X | | | | X |
| 01 10 00 | 5.8.3 | BAS Performance Verification Test | | | | | | X | | | | | | X | | | | | | X | X | | | | X |
| 01 10 00 | 5.8.4 | Testing Adjusting and Balancing | | | | | | X | | | | | | X | | | | | | X | X | | | | X |
| 01 10 00 | 5.8.5 | Commissioning | | | | | | X | | | | | | X | | | | | | X | X | | | | X |
| 01 10 00 | 6.15 | Environmental As Required for Site Specific | | | | | X | | | | | | | | | X | | | | X | X | | | | X |
| 01 10 00 | 6.16 | Permits as required for Site specific | | | | | X | | | | | | | | | X | | | | X | X | | | | X |
| 01 10 00 | 5.10.2 | Fire Protection Tests | | | | | | X | X | | | | | X | | | | | | X | X | | | | X |
| 01 32 01.00 10 | 3.4.1 | Preliminary Project Schedule | X | | | | | | | | | | | | X | | | | | X | X | | | | |
| 01 32 01.00 10 | 3.4.2 | Initial Project Schedule | X | | | | | | | | | | | | X | | | | | X | X | | | | |
| 01 32 01.00 10 | 3.4.3 | Design Package Schedule | X | | | | | | | | | | | | X | | | | | X | X | | | | |
| 01 32 01.00 10 | 3.6.1 | Periodic schedule updates from the Contractor | X | | | | | | | | | | | | X | | | | | X | X | | | | |
| 01 32 01.00 10 | 3.7 | Time Extension Request (Schedule) | X | | | | | | | | | | | | X | | | | | X | X | | | | |
| 01 33 00 | 1.8 | Submittal Register - DOR Input Required | X | | | | | | | | | | | | X | | | | | X | X | | | | X |
| 01 33 00 | 1.8 | Submittal Register Updates (Design Packages, etc.) | X | | | | | | | | | | | | X | | | | | X | X | | | | X |
| 01 33 00 | 1.3.1 | Substitution of Manuf or Model Named in Proposal | | X | X | | | | | | | | | | | | X | | | X | X | | | | X |
| 01 33 16 | 1.2 | Identify Designer(s) of Record | X | | | | | | | | | | | | X | | | | | X | X | | | | X |
| 01 33 16 | 1.1.2 / 3.2.4 | Fast Track Design Package(s) | | | | | X | | | | | | | | | X | | | | X | X | | | | |
| 01 33 16 | 1.2 | Identification of all Designers of Record | X | | | | | | | | | | | | | X | | | | X | X | | | | |
| 01 33 16 | 3.2.1 | Site and Utility Des Package, incl. Substantiation | | | | | X | | | | | | | | | X | | | | X | X | | | | |
| 01 33 16 | 3.2.2/3.5 | Interim Des Subm Package(s), incl. Substantiation | | | | | X | | | | | | | | | X | | | | X | X | | | | |
| 01 33 16 | 3.5.1 | Drawings | | | | | X | | | | | | | | | X | | | | X | X | | | | |
| 01 33 16 | 3.5.2.2 | Sitework Design Analyses | | | | | X | | | | | | | | | X | | | | X | X | | | | |
| 01 33 16 | 3.5.2.3 | Structural Design Analyses | | | | | X | | | | | | | | | X | | | | X | X | | | | |
| 01 33 16 | 3.5.2.4 | Security Design Analyses | | | | | X | | | | | | | | | X | | | | X | X | | | | |
| 01 33 16 | 3.5.2.5 | Architectural Design Analyses | | | | | X | | | | | | | | | X | | | | X | X | | | | |
| 01 33 16 | 3.5.2.6 | Mechanical Design Analyses | | | | | X | | | | | | | | | X | | | | X | X | | | | |
| 01 33 16 | 3.5.2.7 | Life Safety Design Analyses | | | | | X | | | | | | | | | X | | | | X | X | | | | |
| 01 33 16 | 3.5.2.8 | Plumbing Design Analyses | | | | | X | | | | | | | | | X | | | | X | X | | | | |
| 01 33 16 | 3.5.2.9 | Elevator Design Analyses (as Applicable) | | | | | X | | | | | | | | | X | | | | X | X | | | | |
| 01 33 16 | 3.5.2.10 | Electrical Design Analyses | | | | | X | | | | | | | | | X | | | | X | X | | | | |
| 01 33 16 | 3.5.2.11 | Telecommunications Design Analyses | | | | | X | | | | | | | | | X | | | | X | X | | | | |
| 01 33 16 | 3.5.2.12 | Cathodic Protection Design Analyses | | | | | X | | | | | | | | | X | | | | X | X | | | | |
| 01 33 16 | 3.5.3 | Geotechnical Investigations and Reports | | | | | X | | | | | | | | | X | | | | X | X | | | | |
| 01 33 16 | 3.5.4 | LEED Submittals | | | | | X | | | | | | | | | X | | | | X | X | | | | |
| 01 33 16 | 3.5.5 | Energy Conservation Documentation | | | | | X | | | | | | | | | X | | | | X | X | | | | |
| 01 33 16 | 3.5.6 | Specifications | | | | | X | | | | | | | | | X | | | | X | X | | | | |
| 01 33 16 | 3.5.7 | Building Rendering | | | | | X | | | | | | | | | X | | | | X | X | | | | |
| 01 33 16 | 3.2.4/3.7 | Final Des Submittal Package(s), incl. Substantiation | | | | | X | | | | | | | | | X | | | | X | X | | | | |
| 01 33 16 | 3.7.5 | DD Form 1354 (Transfer of Real Property) | | | | | | | | | | X | | | | X | | | | X | X | | | | |
| 01 33 16 | 3.2.5/3.8 | Design Complete Submittal Package(s) | | | | | X | | | | | | | | | X | | | | X | X | | | | |
| 01 33 16 | 3.3.3 | Design and Code Review Checklists | | | | | X | | | | | | | | | X | | | | X | X | | | | |
| 01 33 16 | A-2.0 | SID - Interim and Final (as applicable) | | X | X | | X | | | | | | | | X | | | | | X | X | | | | |
| 01 33 16 | B-2.0 | FFE (as Applicable) | | | | | X | | | | | | | | X | | | | | X | X | | | | |
| 01 45 04.00 10 | 3.2 | Design and Construction QC Plan | X | | | | | | | | | | | | | X | | | | X | X | | | | |
| 01 57 20.00.10 | 1.2 | Environmental Protection Plan | X | | | | | | | | | | | | | X | | | | X | X | | | | |
| 01 78 02.00 10 | 1.2.1 | Final as-Built Drawings | | | | | | | | | | | X | | X | | | | | X | X | | | | |
| 01 78 02.00 10 | 1.2.3.11 | Non-Hazardous Solid Waste Diversion Reports | | | | | | X | | | | | | X | | | | | | X | X | | | | |
| 01 78 02.00 10 | 1.2.7 | Provide final as-built CADD and BIM Model files | | | | | | | | | | | X | | X | | | | | X | X | | | | |
| 01 78 02.00 10 | 1.2.9 | Provide scans of all other docs in Adobe.pdf format | | | | | | | | | | | X | | X | | | | | X | X | | | | |
| 01 78 02.00 10 | 1.3.1 | Equip-in-Place list of all installed equip and cost | | | | | | | | | | | X | | X | | | | | X | X | | | | |
| 01 78 02.00 10 | 1.3.2 | Data on equip not addressed in O&M manuals | | | | | | | | | | | X | | X | | | | | X | X | | | | |
| 01 78 02.00 10 | 1.3.3 | Final as-built specs - electronic files | | | | | | | | | | | X | | X | | | | | X | X | | | | |
| 01 78 02.00 10 | 1.4.2.1 | Warranty management plan - FAR 52.246-21 | | | | | | | | | | | X | | X | | | | | X | X | | | | |
| 01 78 02.00 10 | 1.4.2.1 | Certificates of Warranty for extended warranty items | | | | | | | | | | | X | | X | | | | | X | X | | | | |
| 01 78 02.00 10 | 1.4.2.1 | Contractor's POCs for implementing warranty process | | | | | | | | | | | X | | X | | | | | X | X | | | | |
| 01 78 02.00 10 | 1.4.2.1 | List of each warranted equip, item, feature or system | | | | | | | | | | | X | | X | | | | | X | X | | | | |
| 01 78 02.00 10 | 1.5 | See also Section 01 10 00 par. 5.8.4 and 5.8.5 | | | | | | | | | | | X | | X | | | | | X | X | | | | |
| 01 78 02.00 10 | 1.6.1.2 | Equipment O&M Manuals - 1 electronic / 2 hard copies | | | | | | | | | | | X | | X | | | | | X | X | | | | |
| 01 78 02.00 10 | 1.7 | Field Training DVD Videos | | | | | | | | | X | | | X | | | | | | X | X | | | | |
| 01 78 02.00 10 | 1.8 | Pricing of CF/CI and GF/CI Property | | | | | | | | | | | X | | X | | | | | X | X | | | | |
| 01 78 02.00 10 | 1.11 | List of Completed Cleanup Items | | | | | | | | | | | X | | | | X | | | X | X | | | | |

APPENDIX AA

DPW CONDITIONAL RELEASE FORM

Contractor shall completely fill in the attached “CADD/GIS Information Release Request” form to request Installation Master Plans for Site, Topography, Storm Drainage, Water, Sewer, Gas, Electrical and Telecom Plans.

**US Army Garrison Hawaii
 Directorate of Public Works
 CADD/GIS INFORMATION RELEASE REQUEST**



Instructions: Please print in ink or type and send completed form with attachments to DPW Systems Engineering Branch, CADD/GIS Section
 Directorate of Public Works
 Business Operations Division (IMPC-HI-PWB), Systems Engineering Branch, CADD/GIS Section
 947 Wright Avenue
 Wheeler Army Airfield
 US Army Garrison, Hawaii
 Schofield Barracks, Hawaii 96857-5013

Or fax form to facsimile to (808) 656-5851, or email form to Channing.Y.Fukuda@us.army.mil

Please complete the information below to request a release of CADD/GIS utility information in the form of maps, database information, and file documents. Upon submission, the DPW CADD/GIS staff shall review the request prior to delivery of the requested information.

| |
|--|
| Name: |
| Company & Mailing Address: |
| Company Phone, Fax, Email: |
| Specific Information Desired: |
| List all uses of the data and why you want the data: |
| Identify all persons and subcontractors the information will be provided to: |
| Army Project Name & Contract No: |
| Army Project Manager, Phone, Fax, Email: |

Approval is based on your agreement to the following understandings and conditions:

- 1 Due to security concerns, the infrastructure information is for your use only. Any utility information provided by DPW to the requestor shall not be viewed or given out to others not listed in this request by the requestor.
- 2 The infrastructure information is periodically reviewed and updated by DPW. DPW does not certify or imply that the any information provided to you is completely correct. Any use of the data contained therein shall be at your own risk.
- 3 After the completion of your work for the Army, all electronic data stored on portable media (CD's, external hard drives, thumb drives, DVD's, tapes, etc.) and on your companies file server, or pc hard drives shall be deleted.

If you agree to the above understandings and conditions, please signify your agreement by signing below and returning this request/agreement to DPW. Upon receipt of the signed agreement, DPW will send the requested information to you.

I agree to the above understanding and conditions:

Signature _____ **Date** _____

For Official Use Only:
 DPW staff providing information:
 Date information provided:

Monday, November 29, 2010

APPENDIX BB

DPW EXCAVATION PERMIT

U S Army Garrison Hawaii
Directorate of Public Works
EXCAVATION PERMIT
Request and Approval Sheet
May 10, 2010

Date Prepared: _____

1. General Information (To be completed by requesting Contractor, Unit or Individual):

- a. Contractor, Unit or Individual Name: _____
b. POC: _____
c. Phone Number: _____
d. Location of Excavation: _____
e. Project Title: _____
f. DPW FEWR Number: _____
g. Contract Number, COR & Phone Number: _____
h. Brief Description: _____

NOTES on final page apply to all who request permission to excavate on US Army Property.

2. Are there any proposed excavation or construction activity within 100 feet of the Housing Ground Lease boundaries?

Yes / No

Requestor's Remarks: _____

If Answer is Yes to item 2 above, proceed to item 3 below. AHFH approval is required. If answer is no, continue to item 4 below.

3. Army Hawaii Family Housing (AHFH): The Contractor/Unit shall review Boundary Maps of the Housing Ground Lease at Enclosure 1. The Contractor shall attain concurrence or non-concurrence signature for excavation within the Housing Ground Lease boundaries PRIOR to submittal to AHFH. Contact the RCI Housing Office: Mr. Michael Andres (275-3118) michael.b.andres@us.army.mil or Mr. Allen Wolfe (275-3112) allen.wolfe@us.army.mil.

Remarks: _____ Date: _____

Concur: _____ Non-concur: _____ Notice Received: _____

Please provide a copy of this completed and signed request (as notice only) to: AHFH, Attn: Lee Cranmer, 687-8334, Business Hours: Mon-Fri, 0800-1600 215 Duck Road, Bldg 950, Schofield Barracks, HI 96757

Page 2 of 4 Project Name: _____ RAS Revised: 10, May 2010

4. Telecommunications (Telephone, Data & Cable Systems) and Gas Utility Coordination:

The Contractor/Unit shall verify and coordinate all underground utilities prior to any excavation work with the following maintenance and service departments listed below. Maintenance or service departments must sign on approval line or attach document verifying they reviewed and agree to excavation as noted above. **Processing Note: Completion of paragraphs 4a, 4b, 4c, 4d, and 4e AND "original" signatures are required for the submittal to the office listed in paragraph 4f. Consolidate all "original" signatures into "one" permit application for paragraph 4f, 7 & 8 and remove any blank pages.**

- a. **AT&T (JHITS)**, 3375 Koapaka Street, Suite D120, OSP ENGR., 659-1400.
Business Hours: Mon.-Fri. 0730-1630. *AT&T JHITS requires four (4) copies of drawings, application and POC information, in individual sets, for submission to office reception.*

Remarks: _____

Approve: _____ Disapprove: _____ Date: _____

- b. **Hawaiian Telcom, Inc.**, Permit Section, 1177 Bishop Street, 546-7746.
Business Hours: Reception Desk Mon.-Fri. 0800-1630.
Hawaiian Telcom, Inc. requires three (3) copies of drawings for submission to their office. The required form must be filled out by requestor prior to submission to HTI and is available at the following website: http://www.hawaiiantel.com/CustomerService_Excavation.htm

Remarks: _____

Approve: _____ Disapprove: _____ Date: _____

- c. **Oceanic Cable**, Engineering and Construction Division, 200 Akamainui St. (Mililani Tech Park), 625-8570. Submit original and one (1) copy. Business Hours: Mon.-Fri. 0800-1430.

Remarks: _____

Approve: _____ Disapprove: _____ Date: _____

- d. **The Gas Company**, Locating Utility Services, 515 Kamakee St., Maps and Records, 594-5575, Business Hours: Mon.-Fri. 0730-1500.
(Note: Provide two (2) copies of construction drawings and permit.)

Remarks: _____

Approve: _____ Disapprove: _____ Date: _____

Page 3 of 4 Project Name: _____ RAS Revised: 10, May 2010

e. Tripler AMC, FOR TRIPLER/SB MEDICAL CLINIC EXCAVATIONS ONLY

Business Hours: Mon - Fri. 0630-1500, Circle appropriate location number.

- 1. TAMC Telecommunications Section, Room G1A393,
Telephone Control Officer Mr. Jon Divine, 433-1728 ext. 7.
- 2. Schofield Barracks Medical Clinic, Bldg 685, Room 222
Information Management Office, Mr. Robert Grant, 433-8770

Remarks: _____

Approve: _____ Disapprove: _____ Date: _____

f. 30th Signal Battalion/Network Enterprise Center-Hawaii (NEC-HI), EMC, IMG (Army Telephone, Data/LAN): Bldg 600, Room 157, 148 Curtis Loop, Wheeler Army Air Field. Marion F. Robinson, Jr., 656-1765 (Primary AO); Mr. Eugene Brown, 656-6656 (Alt AO) Business Hours: Mon - Fri. 0830-1700. **SEE PROCESSING NOTE IN PARAGRAPH 4 AND NOTE 1 BELOW.**

Remarks: _____

Approve: _____ Disapprove: _____ Date: _____

5. Aqua Engineers: Provide two (2) copies of construction drawings and permit. Business Hours: Mon.- Fri. 0800 -1530 Circle appropriate location number. .

- a. Schofield Barracks, SBER, Wheeler AAF and Helemano Military Reservation ONLY. Schofield Wastewater Treatment Plant, Building 345 Airdrome Road, Wheeler Army Air Field, 621-3098.
- b. Fort Shafter, AMR, Coast Guard, Waianae Rec. Ctr., Fort DeRussy & Hale Koa Hotel, SBER-Light Fighter School Bld'g. 8008 (WWPS), TAMC ONLY. Oahu Wastewater, 900 Kukui Drive, Aliamanu Military Reservation, 685-7345.

Remarks: _____

Approve: _____ Disapprove: _____ Date: _____

6. Directorate of Public Works, Environmental Section, 948 Santos Dumont Avenue, 3rd Floor, Wheeler Army Air Field. POC: Dale Kanehisa (NEPA Coordinator), 656-5670. Business Hours: Mon.- Fri. 0800-1530.

Remarks: _____

Approve: _____ Disapprove: _____ Date: _____

Page 3 of 4 Contractor's Name: _____

Page 4 of 4 Project Name: _____ RAS Revised: 10, May 2010

7. Directorate of Public Works, Engineering Section, 742 Santos Dumont Avenue, 2nd Floor Wheeler Army Air Field. Russell T Segawa, Engineering Tech (Approving Authority), 656-2474. Business Hours: Mon.-Fri. 0730-1600.

The Contractor/Unit shall perform a general site survey and locate all utilities within the affected area prior to excavation. The Contractor/Unit shall verify that there are no known existing utilities in question for the affected area by using the current utility drawings and toning prior to excavation. All utilities that are not shown on the plans, but have been located in the field shall be shown on the construction as-built drawings. The Contractor/Unit shall verify that all water, sewer, electrical, gas, and drainage utilities have been identified.

The equipment operator shall closely monitor excavated material for significant changes in color, size (gradation), and type of material. Such changes may indicate the presence of an unmarked utility. If such changes are noted, the Contractor/Unit shall cease all excavation by equipment, and probe by hand. If any questions arise, the Contractor/Unit shall contact the undersigned.

Remarks: _____

Approve: _____ Disapprove: _____ Date: _____

8. Contracting Officer or Project Representative: The Contractor/Unit shall submit a completed and approved Exaction Permit form, with attachments, to the Contracting Officer or Project Representative assigned to this project prior to any excavation. The Contractor/Unit shall maintain this permit on site at all times during excavation. This application becomes a certified excavation permit only after all utility agencies have approved the appropriate sections and the Contracting Officer or Project Representative has signed below.

Completed Permit Application Received By:

_____ Date _____
Contracting Officer or Project Representative

-----Date _____

NOTES:

1. Only original documents with stamps and/or comments will be accepted for processing.
2. Should the requestor elect to not receive toning services, they become liable for all costs, fees and repair actions necessary to restore any interrupted facilities or service outages.
3. The Army does not currently subscribe to the One-Call service.
4. Joint Trunking System (JTS) is an Army owned and controlled telecommunications system that resides on and off base and is not supported under the One Call System.
5. Should Contracting Officer (KO) require the use of One Call, please contact the approving authority for more specific instructions.

APPENDIX CC

Landscaping and Trash Dumpster Guidance

Section 10.0

Landscape Design Standards

10.1 INTRODUCTION

The Landscape Design Standards provide an overview of the necessary components of a successful landscape design. Included is the selection of plant material, irrigation design standards and guidelines, plant material installation guidelines, and maintenance procedures to be implemented on Schofield Barracks. A successful landscape design can provide a simple and cost effective enhancement to the general appearance of the installation. See Figure 10.1a.

The visual image of Schofield Barracks is defined not just by architectural character and site organization, but also by an attractive, organized landscape design. The identification of visual zones within the installation can benefit from development of landscape designs that address the objectives in this section. Preservation and creation of open space and traditional space, and the visual enhancement of dominant features on Schofield Barracks can be achieved through successful implementation of landscape principles. See Figure 10.1b.



▲ **Figure 10.1a**
Kolekole Avenue Entry Sign



▲ **Figure 10.1b**
Macomb Avenue

Schofield Barracks



▲ **Figure 10.1c**

Ear Pod Trees

The presence of selected, quality plant material on Schofield Barracks can greatly enhance the visual character and environmental quality of the installation. Preservation of Heritage and Exceptional Trees within the installation, the creation and use of the landscape palette, listed in [Appendix O](#), and improved maintenance programs will add visual appeal to the environment and establish a higher value to the installation. Schofield Barracks is fortunate to have a tropical climate which supports a large variety of plant species to choose from, Figures 10.1c and 10.1d provide examples of the local type and variety of plant material to be found on the installation

Plantings add an element of human scale to open spaces and can be used functionally to screen undesirable views, reinforce the hierarchy of circulation system, or provide a visual transition between dissimilar land uses. See Figure 10.1e.

A well designed irrigation system will improve plant habitat, reduce maintenance, and provide a regulated growing media for plant material and turf grass creating a healthy, groomed appearance throughout the installation.

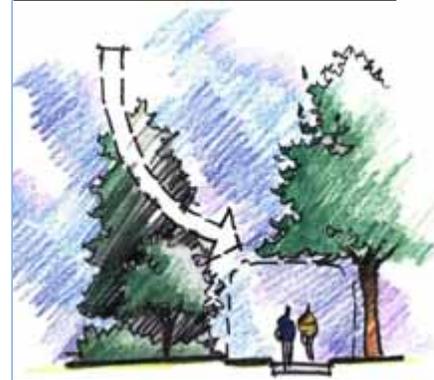
10.2 LANDSCAPE OBJECTIVES

The overall objective of the use of plant material within Schofield Barracks is to improve the physical and psychological well being of the people who live and work on Schofield Barracks.



▲ **Figure 10.1d**

Example of Local Plant Material



▲ **Figure 10.1e**

Human Scale

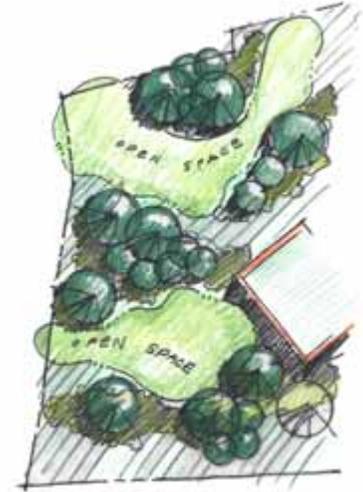
Schofield Barracks

This is achieved through the following objectives:

- Preserve and enhance civic open space, focal points, and architectural features through proper placement of selected urban trees, forest lands, and detailed planting features such as shrubs and groundcovers. Shape open space to accent an architectural feature and to create interest. See Figure 10.2a.
- Improve the overall visual quality of Schofield Barracks through the use of selected native and other adapted tropical plant material to create a sense of place within the installation, frame views and vistas, accent key facilities and entrances, and provide pleasing visual and sensory experiences. See Figure 10.2b.
- Improve the circulation system of pedestrian walkways and bikeways by reinforcing and defining the system with plant material.
- Define a standard by which landscape plant material is used to screen undesirable views or structures, buffer non-compatible land uses, and establish scale to open spaces and built structures. See Figure 10.2c.
- Minimize maintenance operations through the use of mass plantings, central control irrigation systems, better organized landscape developments, and a greater use of native material.
- Establish a standard plant palette to enhance force protection measures, as well as incorporate force protection requirements into the landscape design.



▲ **Figure 10.2b**
Using Native Plants



▲ **Figure 10.2a**
Create or Accent Open Space



▲ **Figure 10.2c**
Create Attractive, Comfortable Approaches

10.3 PRINCIPLES OF LANDSCAPE DEVELOPMENT

Creation of a quality landscape design is based on the following artistic principles which should be applied in the development of all landscape designs:

Proportion and Scale. A visually pleasing and functional relationship should exist between the three dimensions of length, width, and height. See Figure 10.3a.



▲ **Figure 10.3a**
Proportions and Scale

Balance. Accents should be carefully distributed in the design to provide an aesthetically pleasing integration of elements. Both formal and informal planting and site amenities can achieve balance in the design solution.

Unity. Fitting together the component parts to form a pleasing whole results in unity.

Harmony. The aesthetic integration of diverse elements results in harmony. Within a design, harmony can be accomplished through the use of site amenities of a similar style and character, as well as a community of indigenous and compatible plant material.

Line. As part of the landscape design, the creation of lines should be pleasing and proportionate. Lines are expressed

Schofield Barracks

through paths, walls, fences, and planting masses. In a landscape composition, lines will direct the movement or sight to a particular area of interest. The use of a strong axis line in a design should be used sparingly as it invokes the need for a strong focal point at the termination of the axis. See Figure 10.3b. Most successful designs using this approach can be seen in large formal settings where the axis is reinforced with proportional planting designs. Figure 10.3c shows the use of a bent axis in the same context as the strong axis. The bent axis is more successful when used in proportion to smaller scale buildings.

Emphasis. Emphasis is directing attention to one object or portion of a composition. Vertical elements in open areas, such as Royal Palms lining a primary circulation corridor, can be dramatic and create interesting focal points.

Contrast. Contrast is the diversity of adjacent elements in terms of color, texture, or tone. The designer integrates plant material with distinctly different foliage color, texture, or form to highlight and draw attention.

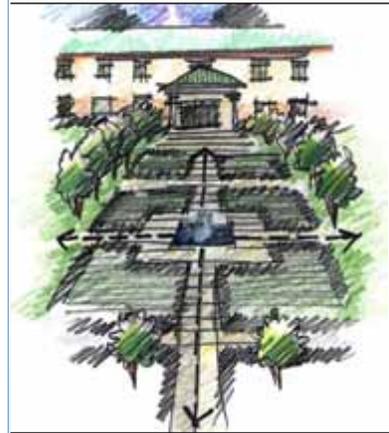
Variety. Variety is created by introducing different forms or types of elements. Too little variety leads to monotony. Introducing too many elements can create a chaotic, unmanageable environment. A fine balance between extremes produces a pleasant sense of unity in the landscape design.

Repetition. Repetition is achieved by massing or grouping individual plants or site amenities. Repetitive elements in the landscape reflect or amplify architectural geometry and can improve the connection between indoor and outdoor space.

Form. The trunk, branches, and leaves together create the form of a tree and give definition to its shape. The different plant forms are: columnar, round, vase, pyramidal, oval, and irregular. Structures, landforms, and plant materials all contribute to the composite form of a landscape design.

Texture. Seen close up, texture is defined by the size, surface, and spacing of small detailed components that create diverse and varied patterns of light and shade when seen from afar.

Color. A harmonious design in terms of color is most easily obtained by providing dominance in one color. Color is introduced through the selection of plant materials and site amenities.



▲ **Figure 10.3b**
Line – Strong Axis



▲ **Figure 10.3c**
Line - Bent Axis

Schofield Barracks

10.4 SUSTAINABLE LANDSCAPE DESIGN

The use of plant material on Schofield Barracks promotes the sustainability of the installation and its development. Trees, shrubs, groundcover, and vines provide aesthetic appeal as well as preservation of fauna and flora, conservation, climate modification, erosion control, air purification, and noise abatement. See Figures 10.4a and 10.4b.

The tropical climate of Schofield Barracks provides both opportunity and challenge to the landscape designer. Selection of plant material must address climate conditions and the year-round growth cycle of the region. Knowledge of annual precipitation rates specific to the installation, soil conditions, and maintenance practices is needed to develop a sustainable landscape design.

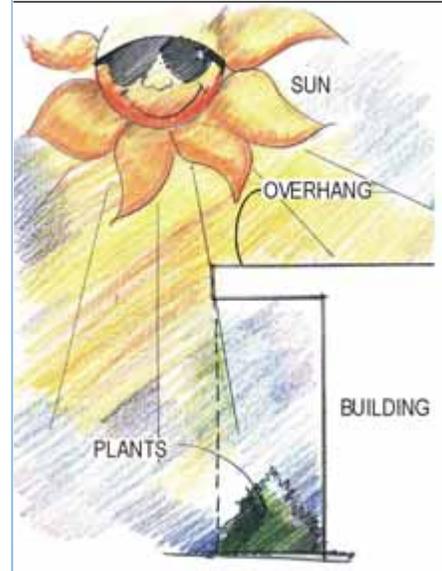
Reuse of materials such as wood chips, recycled paper, and discarded construction materials can be an effective way to enhance the design and preserve the environment.

Proper use and documentation of herbicide and pesticide during maintenance operations promotes environmental quality. The proper use and placement of plant material can reduce the need for herbicide and pesticide in the landscape as well.

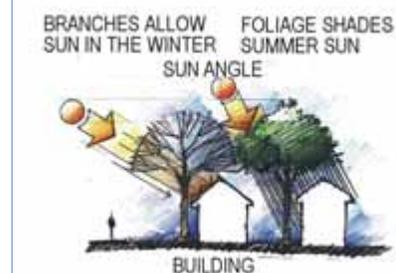
10.5 LANDSCAPE DESIGN GUIDELINES

Design guidelines are provided to define appropriate uses for plant material within the design solution of a site development. Proposed landscape designs must be reviewed by a qualified person knowledgeable of soils, topography, climate, horticulture, land use, force protection, and landscape architecture. The design solution should be compatible with Schofield Barracks' current master plan and should consider the use and function of the facility.

Consideration should be given to the historical elements of Schofield Barracks and to identified Exceptional and Heritage Trees on the installation. Preservation of Exceptional and Heritage Trees is required. Trees registered as Exceptional by the City and County of Honolulu are protected by ordinance. A permit is required to perform any work within the vicinity of a registered Exceptional Tree. Heritage Trees, which are under consideration as Exceptional, are to be regarded as Exceptional. Work performed in the vicinity of an Exceptional



▲ **Figure 10.4a**
Avoid Building Overhangs



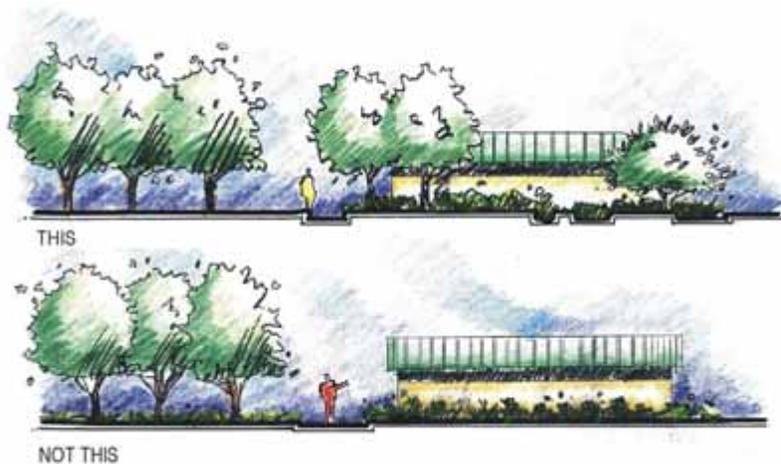
▲ **Figure 10.4b**
Energy Conservation

Tree shall be coordinated with the Mayor's Arborist Advisory Committee prior to performing work. Refer to tree preservation and removal guidelines in this section.

Landscape design solutions should address design themes established in this document and those presently existing. New design solutions should not be considered as isolated installation entities, but as a component of a larger environment. To blend with the surrounding environment, they should be compatible with the existing architectural context of the district or theme area in which they are located.

10.5.1 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 plantings plans consideration should be given to force protection measures. A thorough knowledge of plant material characteristics and force protection requirements is needed. See Figure 10.5a.



▲ **Figure 10.5a**
Foundation Planting

Accent should be given to entry points for pedestrian interest and as part of a wayfinding system to identify key points on Schofield Barracks.

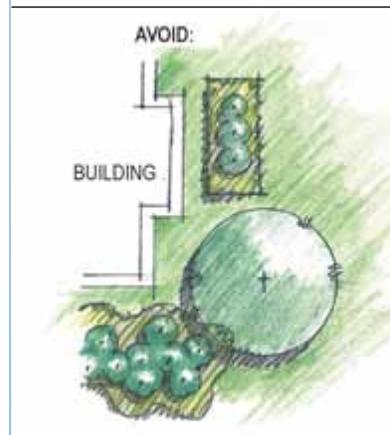
Use the architecture and function of the building to evaluate the planting design and selection of plant material. Identify key pedestrian corridors and linkages to adjacent buildings and land uses.

Schofield Barracks

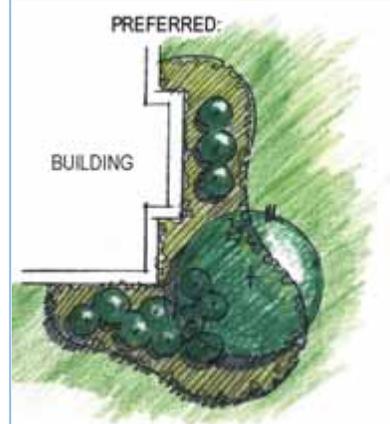
Incorporation of mass plantings and accent shrubs at key points simplify the design and improve maintenance procedures. The proper design and installation of planting beds to eliminate weeds and other invasive plants is key to successful foundation plantings. See Figures 10.5b and 10.5c.

Use trees along walkways to frame the corridor and to accent design elements of the landscape and building. Allow space for mature growth and development of root systems. Careful consideration should be given to Banyan trees specifically for this reason. Consider using tree groupings to frame or accent walkways and streetscapes as shown in Figure 10.5d.

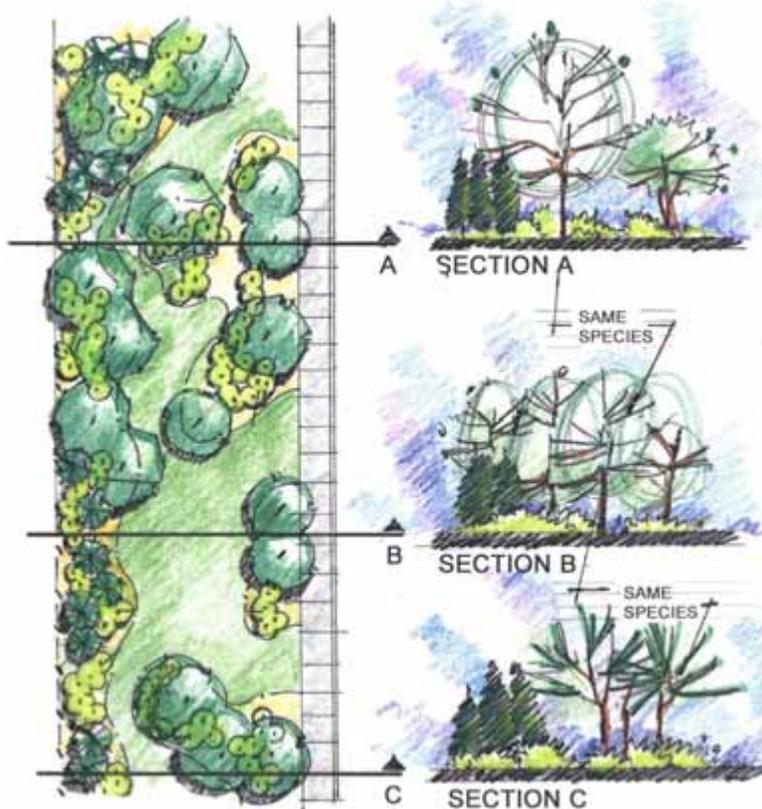
Consideration should also be given to tree selections that do not promote insect infestation or fruits and flowers that attract nesting birds.



▲ **Figure 10.5b**
Avoid Small Planting Areas



▲ **Figure 10.5c**
Prefer Massing Plantings



▲ **Figure 10.5d**
Tree Grouping

Schofield Barracks

10.5.2 Screening

Plant material is often used to screen undesired winds. Schofield Barracks has a tropical climate that has trade winds which vary in direction throughout the year. Screening of these winds is not required. Channeling of trade winds can be useful to produce a cooling effect in the landscape. Screening unwanted views or structures is commonly done with plant material. Figure 10.5e identifies different types of screening methods. Selection of the proper type is important to ensure the maturity of the plant still provides the desired screen. In many cases, trimming or hedging is required to keep the screen effective.

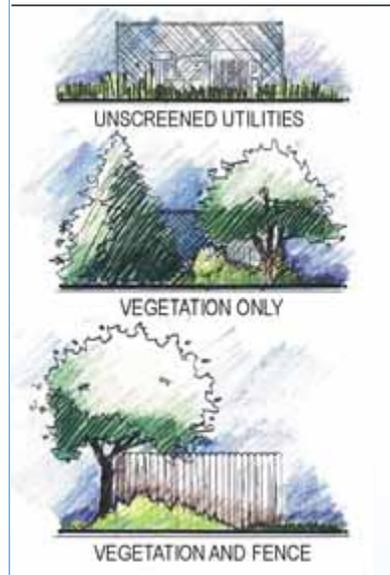
Screening can also be accomplished with wooden or masonry walls. Parking lots should be screened from view using plant material whenever possible. Figure 10.5f shows the desired effect proper screening can have on parking lot design. Proper placement of trees along parking lot edges can provide shade and develop a pleasing landscape element as shown in Figure 10.5g. Utility transformers and dumpsters should have a fence or masonry enclosure provided. The trash enclosure should match the building materials used on the adjoining structure and utility transformers should, as a minimum, have a wooden enclosure with plant material compatible with the landscape design of the facility.

10.5.3 Buffer Planting

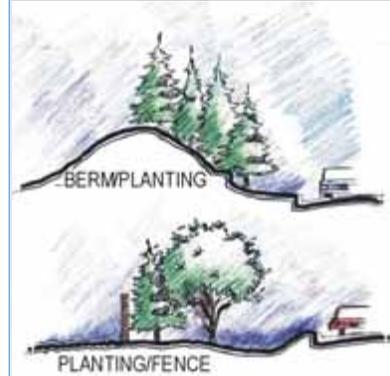
Use buffer planting to visually separate land uses and to frame visual zones established on Schofield Barracks. Buffer planting is recommended along primary roadways to screen the roadway corridor from adjacent housing or other non-compatible land uses. Plant buffers help reduce noise pollution, filter air, and provide security. Buffer plantings should consist of shrubs or other plant material with a dense branching growth habit to prevent trespass through the area. See Figure 10.5h.



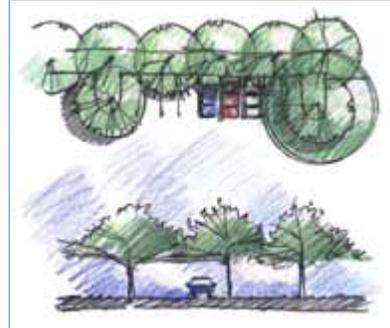
▲ **Figure 10.5h**
Buffering



▲ **Figure 10.5e**
Screening Types



▲ **Figure 10.5f**
Parking Lot Screening



▲ **Figure 10.5g**
Parking Lot Trees

Schofield Barracks

10.5.4 Open Space Planting

Enhance open space areas with planting. Select trees, shrubs and ground cover that accent views, points of interest or attractions. See Figure 10.5i.

10.5.5 Street Trees

Street tree plantings should be used to reinforce vehicular hierarchy, orient and direct traffic, frame views and vistas, and visually de-emphasize parking areas. In the design of a street tree plantings, separate plant species may be used to identify distinctive details or circulation corridors on Schofield Barracks. Heritage Tree species can be used in landscape developments within the Historical District to continue the historic theme of the area. Selection of street trees can define a particular land use or particular entity. Site furnishings and other related design elements should be considered in the placement of street trees.

Use formal street trees in single rows to visually reinforce primary and secondary roads. Use regularly spaced and uniformly sized trees or palms to provide a regimented appearance. The following is the standard design element for roadways on Schofield Barracks:

Primary Roadway. Use Royal Palms between the curb and walkway and Queen Palms between the walkway and the right-of-way line spaced 60 feet on center along each side of a primary roadway. See Figure 10.5j.



▲ **Figure 10.5i**
Shaping Open Space



▲ **Figure 10.5j**
Primary Roadway Street Trees

Secondary Roadway. Use canopy trees on each side of secondary roadways to identify and establish scale within the right-of-way. Placement of the canopy tree should be uniform on each side at intervals of no less than 60 feet on center and no more than 100 feet to provide unity of design. Accent and screen with shrub plantings to address land uses where necessary. See Figure 10.5k.



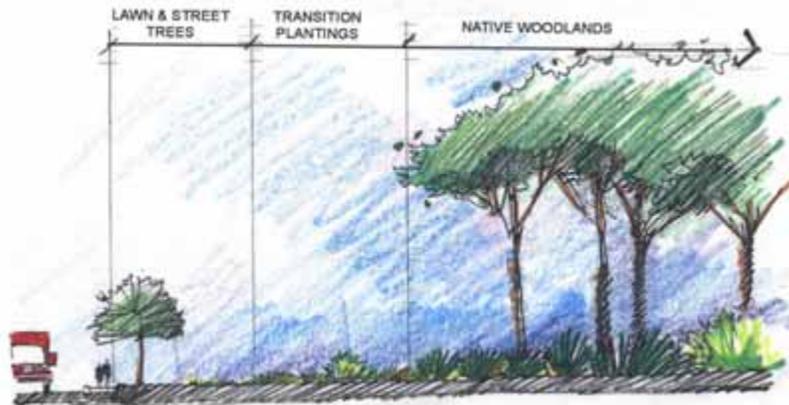
▲ **Figure 10.5k**
Secondary Roadway Street Trees

Tertiary Roadway. Use informal groupings of street trees along tertiary routes. See Figure 10.5l. Utilize smaller ornamental trees to screen adjoining land uses and establish scale, define entries, and accent points of arrival or interest.



▲ **Figure 10.5l**
Tertiary Roadway Street Trees

A street tree plan should provide for a clear unobtrusive view of the roadway and adjoining facilities. Preservation of lines of sight is important to include in the design and layout. Street light locations should also be coordinated with the street tree plan. See Figure 10.5m.



▲ **Figure 10.5m**
Transition Zone

10.5.6 Parking Lot Planting

Parking lots are the least attractive elements on Schofield Barracks. The use of landscape plant material and earthen berms can greatly improve the appearance of these areas as well as help define circulation and improve aesthetics. See Figure 10.5n.

Section 9.8 provides guidance in the location, design, and sizing of parking areas. Compliance with the planting area requirements will ensure sufficient landscape material to screen and improve the visual appearance of the area. As a minimum, 10 percent of the total parking area shall be dedicated to landscape planting within and around the parking lot. This should include one 2" caliper tree planted for each 12 parking spaces. The use of parking lot islands is encouraged to breakup the paving pattern and add interest to the space. Islands also assist in defining parking spaces and assist with traffic movement. Where islands are used in the parking lot, a combination of trees, shrubs, and ground cover is recommended to reduce maintenance and provide a visually appealing planting design. Provide drip or spray irrigation to islands. The use of turf grass in islands is discouraged due to high maintenance requirements.

Use selected shade tree plantings at parking lots to reduce glare and moderate heat gain. Provide landscape screening,



▲ **Figure 10.5n**
Earth Berms Provide Screening

berming, or fencing around the perimeter of a parking lot to screen from adjacent land use. Select plant material at entries to accent parking lots. These plantings should not block sight distances or create distractions.

10.5.7 Environmental Control Planting

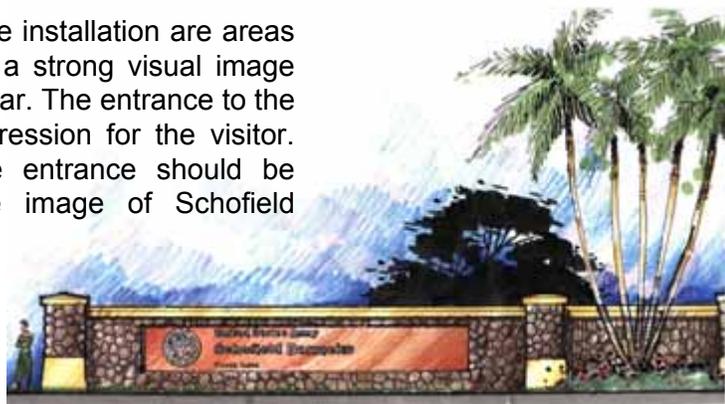
When properly placed, plants can provide environmental benefits as well as address visual concerns. The use of selected plant material or shrubs at courtyards, buildings, and along streets can provide shade, moderate temperatures, or provide visual pleasure such as the thoughtful placement of tropical flowering plants. Use mixes of plant material to provide contrast and interest at points of interest or to highlight important areas. The careful selection of plant material to fulfill more than one function, such as weed control, can improve environmental quality by reducing maintenance practices and improve the appearance of mass plantings.

10.5.8 Image Planting

The image of Schofield Barracks is formed by the visual impressions that exist upon arrival and 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. Schofield Barracks lacks image plantings at key locations such as Foote Gate and Lyman Gate. To be successful, the image planting must be properly maintained through a regiment of care and knowledge of horticultural practices.

10.5.9 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 the year. The entrance to the installation creates the first visual impression for the visitor. The visual zone associated with the entrance should be defined and preserved to keep the image of Schofield Barracks intact. Open space adjacent to the entrance should be preserved to create an image of grandeur and to serve as an announcement of arrival. Commercial or any other development placed in close proximity to an entrance detracts from the mission of the installation by presenting an image of disorganization and clutter. See Figure 10.5o.



▲ **Figure 10.5o**
Landscaping Provides a Strong Visual Image at Installation Entrances

Landscape plant materials and planting areas should be proportional in scale to the hierarchy of the street on which they are located. Foote Gate and Lyman Gate are located on primary roadways leading into the installation. Each gate should receive special consideration to create a sense of arrival by establishing ample open space, establishing street trees to frame and accenting each entrance, and providing shrubs and ground cover that accent the point of arrival.

Force protection requirements discussed in [Section 12](#) must be incorporated into the landscape design of the entrance. The design must maintain open lines of sight to observe pedestrian and vehicular traffic entering the installation.

10.5.10 Xeriscape

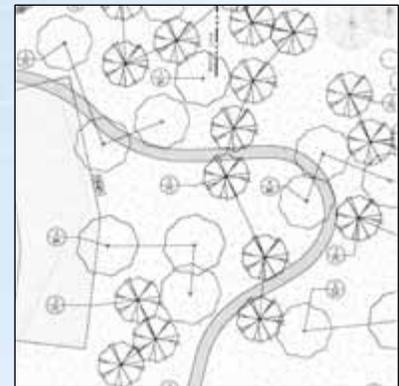
Xeriscape is the conservation of water and energy through creative and adaptive solutions that save money, water, and maintenance. The following website provides guidance on specific design principles on the xeriscape design process and xeriscape design application: [USAF Landscape Design Guide, Xeriscape](#).

10.6 PLANTING PLAN

The planting plan is the essential element of the landscape construction package. The planting plan depicted in Figure 10.6a shows typical delineation of the location and types of proposed plant material in the project as noted in the plant material schedule. The plant schedule contains the following information:

- Common and botanical names of all plant material to be used.
- Plant size, height, width, and caliper.
- Container grown (specify size).
- Balled and burlapped (field grown).
- Bare root.
- Quantities.
- Notes and special requirements.

A grassing or turf plan should be part of the planting plan depending on the scope of the project. Included in the landscape design project is the irrigation plan showing a diagrammatic layout of the system with information and notes necessary to properly install equipment and related system materials. Specification documents typically included in a



▲ **Figure 10.6a**
*Planting Plans Delineate
Location and Type of
Proposed Plant Material*

landscape design include planting procedures and methods, seeding or sod installation procedures with specified information on the type of grass to be installed, and detailed specifications related to the irrigation system equipment and materials to be installed.

Schofield Barracks and the island of Oahu benefit from a tropical climate with a large palette of plant material from which to choose. The variety of structure, color, and growth habits of the plant material available to use on Schofield Barracks provides the designer with many options to solving design issues. Basic plant selection criteria should consider creating a unified composition utilizing native and approved 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.

The ability of plant material to provide lasting benefit is dependent upon the plant's ability to adapt to new surrounding and site conditions. Major factors affecting plant survivability are soil hardness and organic content, temperature, moisture, and light. These climatic and environmental conditions can be modified to some extent by specific site conditions such as wind protection, solar orientation, and planting design to create microclimates. Tropical plants requiring shade and moist conditions would not be suited to plantings in a parking lot or in a full sun exposure location.

Selecting appropriate plant material 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: canopy, barrier, screen, and ground cover.

10.7 PLANT PALETTE AND PLANT CATEGORIES

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 ability to survive on Schofield Barracks. To use them effectively, the design requirements must be well defined for the specific site.

10.7.1 Plant Palette

Refer to [Appendix O](#) for a complete list of plant material and turf grasses compatible to the Schofield Barracks environ. The plant palette lists the plants in alphabetical order by their botanical name, followed by their common name, design characteristics, cultural information, recommended use, and miscellaneous information.

10.7.2 Plant Categories

Plants from the plant palette with similar characteristics are catalogued into plant categories. These characteristics could be cultural, environmental, ornamental, or functional.

10.8 IRRIGATION PLAN

An irrigation plan is a schematic representation of the equipment and materials necessary to efficiently provide water to plant material and turfgrass. Standardized symbols should be used to depict irrigation elements. They should be listed and described in an irrigation schedule or legend as well as cross-referenced to the appropriate irrigation details.

Regional climatic conditions influence the requirement for an irrigation system. The designer must determine if the short-term construction costs and the long-term maintenance costs of the irrigation system are justified. If the planting plan is complex, or the project is highly visible and important to the perceived aesthetic quality of the installation, then an irrigation system should be part of the project as shown in Figure 10.8a.

A properly designed irrigation plan identifies and locates the following irrigation features:

- Point of connection
- Meter location
- Back flow device location
- Diagrammatic layout of irrigation pipe
- Control valve location with zone and controller identification, Figure 10.8b
- Isolation valve location
- Location and description in table form of irrigation heads
- Quick coupler valve location, Figure 10.8c
- Emitter line location and spacing with low pressure valve location



▲ **Figure 10.8a**
High Profile Median Irrigation System in Operation

- Irrigation controller location and type, Figure 10.8d
- Power source
- Rain gage, moisture sensor, Figure 10.8e
- Drain valve locations
- Pipe sleeves



▲ **Figure 10.8b**
*Irrigation
Control Valve*



▲ **Figure 10.8c**
*Irrigation Quick
Coupler Valve*



▲ **Figure 10.8d**
*Pedestal Mounted
Irrigation Controller*



▲ **Figure 10.8e**
*Irrigation Rain
Sensor*

All irrigation designs should include a demand analysis of the system with a breakdown of water allocation by zone. In table form, the designer should provide sprinkler head flow rates, the spray pattern to be used as shown in Figure 10.8f, and recommended nozzle size. All piping on the plan should be sized from the point of connection to the one inch lateral lines. No irrigation lines should be installed smaller than one inch.

Irrigation details provide specific information for the irrigation contractor to follow during the installation of the system. Construction details should include installation of valve boxes, trenching details, wiring location within the trench, thrush block details and sizing chart, typical installation details for each irrigation head and valve type used in the system, and a typical detail addressing system grounding as per NEC and IEEE standards.

10.9 LANDSCAPE INSTALLATION

How a landscape plan is established is important with respect to long-term results. Whether the project is constructed with in-house personnel or by contract, establishment procedures are the designer's quality guarantee.

Establishment specifications ensure proper installation of plant material, irrigation equipment, turf areas, and other project elements by requiring specific and constant attention to the project landscape elements immediately after installation.



▲ **Figure 10.8f**
Irrigation Spray Pattern

Since a large percentage of plant loss and irrigation system failure occurs in the first year, establishment specifications greatly increase long-term project success.

A key step in assuring successful planting is to select plants of the highest quality, as shown in Figure 10.9a. 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.

As part of the design process and prior to plant installation, review the installation’s Master Plans, Basic Information Maps, or As Built drawings for utility locations and verify with the Directorate of Public Works or equivalent.

The planting and establishment of trees, shrubs, ground covers, and vines is detailed in [TM 5-803-13](#), Chapter 3.

10.9.1 General Guidelines for Plant Installation

Install plant material during periods recommended for transplantation. Specific times during the Spring or Fall of every year are recommended, however, the tropical climate of Oahu generally allows year-round planting operations.

Planting specifications should provide for recommended planting soil mixes for plant specific applications. Fertilization and applications of pre-emergence herbicide is required based on soil reports and plant material tolerance.

Applications of an antidesiccant to plant material are recommended as required, within the first 24 hours after installation. Planting specifications should provide direction as to the type of plant material to be treated.

Installation of plant material should follow the installation and punch list of the irrigation system. The only exception would be the installation of a drip emitter system. All planting should be completed before the emitter pipe is installed. As a general rule, shrub and ground cover beds should have a weed barrier with pre-emergence herbicide placed prior to installation of the drip system. Once completed, the planter bed should be mulched as specified with approved wood mulch.

Mulch should be specified for all trees, shrubs, and ground cover planter beds identified on the planting plan. All trees should receive a minimum of 4” of approved wood mulch in a 5’-0” diameter ring around each tree. Mass planting of shrubs should also receive 4” of mulch within the boundaries of each



▲ **Figure 10.9a**
Tagging High Quality Plant Material

planter bed. Ground cover and vine plantings require 3" of approved wood mulch placed within the boundaries of the planter bed. Individual plantings of shrubs should receive 4" of mulch in a 3'-0" ring around each plant unless specified differently on the planting plan. Approved wood mulch shall be a fibrous, shaven hardwood material, uniformly sized and shaped, and free of weeds, leaves, and bark.

10.9.2 Installation of Lawn Areas

Installation techniques for turf are detailed in [TM 5-803-13](#), Chapter 4. The details include site evaluation, site preparation, and selection of turf and maintenance requirements. [Appendix O](#) provides a listing of locally acceptable turf grasses for the installation. All turf grass selected to be installed on the installation shall be required to show proof of species purity by presenting a certification document with delivery of the selected plant material.

10.10 MAINTENANCE OF PLANT MATERIAL

The ease of maintenance should be one of the primary goals when considering the success of any planting design. Each landscape design should include a recommended maintenance plan discussing recommended maintenance procedures for the care of all plant material, recommendations for fertilization, pesticide applications, and herbicide treatments, and timetables for each activity. Points of contact should be included with the maintenance plan for each specific area of care. New landscape developments should require a minimum one year maintenance program to include fertilization, water management, herbicide, and pesticide programs as well as lawn care, using equipment similar to the ones shown in Figures 10.10a, 10.10b, and 10.10c.

10.11 TREE PROTECTION AND PRESERVATION

Schofield Barracks is responsible for the stewardship of registered Exceptional Trees by the City and County of Honolulu. These trees are protected by city ordinance. Federal Historic Preservation law requires the installation to protect the landscape of historic properties which includes very large, broad spreading trees. Compliance to the existing Historic Preservation Landscape Program is required. Protection and preservation of these and the other quality trees is a key



▲ **Figure 10.10a**
Maintenance Equipment –
Tri-Plex Mower



▲ **Figure 10.10b**
Maintenance Equipment –
Overseeder-Dethatcher



▲ **Figure 10.10c**
Maintenance Equipment -
Aerator

Schofield Barracks

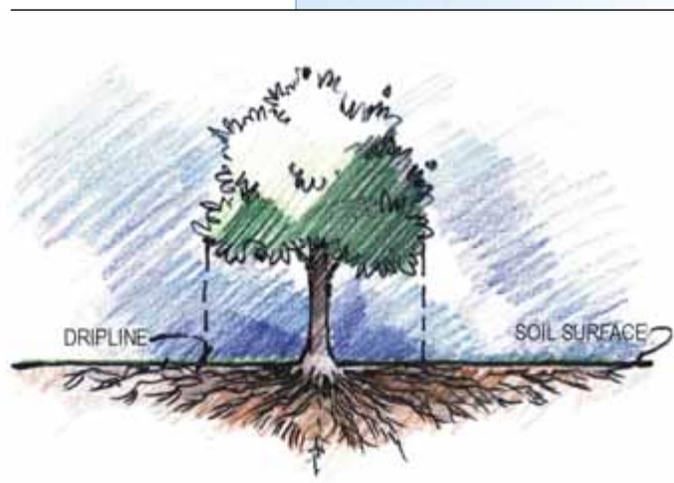
element in meeting sustainability goals. A *Technical Guide to Preservation of Trees During Land Development*, Nelda Matheny and James Clark, 1998, addresses basic tree preservation practices. As a standard practice it is mandatory to provide a Tree Preservation and Removal Plan with each project on Schofield Barracks.

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 placed around each tree to be preserved, or around a group of trees designated to remain, at the drip line. Additional protection may be required if determined by the Mayor's Arborist Advisory Committee. As a standard guide, no construction material, equipment, chemicals, or vehicles shall be allowed within the drip line of any tree designated to remain. Any damage to the barricade shall be repaired immediately. Existing trees that cannot be preserved should be considered for transplanting to a different location on site or to a different site.

Changes in the grade of the soil around trees can cause extensive root damage and eventually death of the tree. Care should be taken to protect roots and existing grade around all trees designated to remain. Avoid all trenching under tree drip lines, as shown in Figure 10.10d. To prevent damage to the tree, it is important to maintain the existing grade for least the size of the canopy (the drip line), Figure 10.10e.



▲ **Figure 10.10d**
Tree Protection – Avoid Trenching Under Drip Line of Trees



▲ **Figure 10.10e**
Tree Protection – Maintain Existing Grade around Trees

10.12 ANTITERRORISM/FORCE PROTECTION CONSIDERATIONS

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.

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 preparation of landscape planting plans to meet force protection requirements shall comply with current publications and the provisions addressed in [Section 12](#) of this Installation Design Guideline and should work closely with installation force protection experts to design a landscape plan that provides visual screening without compromising antiterrorism measures.

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 all personnel. Planting designs should provide for a clear zone within the 10 meter area that provides ground cover plantings which do not exceed 6" in height or placement of trees with mature trunk diameters of no more than 6". Multi-trunk plant species and plant material with large foliage which can obscure vision within the 10 meter area is not to be used.
- Planting designs beyond the 10 meter (33 feet) limit should provide groupings of larger plant material including shrubs and trees to provide accent to the building and site as well as 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.
- Planting designs within the clear zone of security fencing shall not exceed a mature height of 4".
- Section 12.4 Landscape Considerations further define guidelines to consider during the design process.

10.13 ARMY STANDARDS

The cited Army Standards shall be met

- [Army Regulation \(AR\) 420-70, *Buildings and Structures*](#)
- [Technical Manual \(TM\) 5-630, *Natural Resources Land Management*](#)
- [Technical Manual \(TM\) 5-803-13, *Landscape Design and Planting*](#)
- American Standard for Nursery Stock, ANSI Z60.1

10.14 REFERENCES

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.
- N. Matheny and J. Clark. *Technical Guide to Preservation of Trees During Land Development*, 1998.

Schofield Barracks

Trash receptacles in the historic community areas should be a styled as *Landscape Forms, Inc.* "Plainwell" series (Figure 11.3j) top-opening litter receptacle constructed of aluminum and powder coated with black and adorned in Jarrah or Red Oak or approved equal, Figure 11.3j.

11.3.8 Dumpsters

11.3.8.1 Dumpster Location. 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. To the greatest extent possible, incorporate dumpster placement into areas screened with walls, fencing, or plant material. Avoid locating dumpsters along major circulation or use areas. Dumpsters should be directly accessible by way of a paved service drive or parking lot with adequate overhead clearance for collection vehicles. Antiterrorism/force protection requirements restrict the location of dumpsters to a minimum of 10 meters (33 feet) from inhabited buildings and 25 meters (82 feet) from billeting and primary gathering areas ([Unified Facilities Criteria \(UFC\) 4-010-01, DoD Minimum Antiterrorism Standards for Buildings, Table B-1](#)).

11.3.8.2 Dumpster Site Design. Incorporate plantings to buffer the visual impact of screen walls. Walls or fencing should be a maximum 6'-0" in height. Provide a minimum 3'-0" clearance on each side between screen walls and dumpsters to allow adequate pedestrian and truck access. All dumpsters should be placed on concrete pads with aprons large enough to encompass the bearing points of the service vehicle.

11.3.9 Flagpoles

The standard flagpole for Schofield Barracks will be tapered mill finish aluminum fitted with a gold anodized finish "ball" finial, Figure 11.3k. The mounting detail should be simple with a concrete base flush at grade. A concrete pad should be used when poles are located in lawn areas. In plaza areas, flagpole locations and mounting detail should be integrated into the paving pattern. Flagpoles should include lighting and may be accented with planting beds around the base of the flagpole.

11.3.10 Movable Planters

Movable pre-cast concrete planters may be used outside building entrances to provide seasonal color and interest and function as security threat barriers. Planters should be located so they block uninterrupted vehicular access to a building, but



▲ **Figure 11.3j**
*Trash Receptacle-
Historic, Landscape
Forms, Inc.*



▲ **Figure 11.3k**
Flagpole

not so they excessively impede pedestrian movement. Several planters of various sizes should be grouped together to produce an aesthetically pleasing display.

Movable pre-cast concrete planters should be *DuraArt Stone, Inc.*, “Camponile” series or approved equal and may be used outside building entrances to provide seasonal color and interest and function as security threat barriers, Figure 11.3l.

11.3.11 Bicycle Racks

Bicycle racks should be provided at key destination locations. They should be located on a concrete surface where they will not impede pedestrian movement or block building entrances.

A ribbon type tubular aluminum bike rack with an anodized dark bronze finish *Ribbon Rack, Inc.*, or approved equal, is the garrison standard, Figure 11.3m. Bicycle storage areas near barracks should be covered.

11.3.12 Tree Grates

Tree grates should be used when installing trees in large paved areas such as pedestrian plazas, walks, and ceremonial entrance courts. Tree grates and planting pits should be a minimum of 5'-0" by 5'-0".

11.3.13 Bollards

Bollards are utilized to separate vehicular and pedestrian traffic, to direct access, or as decorative elements in pedestrian areas.

Cast concrete bollards should be incorporated in areas where pedestrian traffic is desired but vehicular traffic is prohibited. Use *Wausau Tile, Inc.*, style TF 6050, 18" wide by 48" height, cast concrete bollard, smooth finish with integral B-7 color or approved equal; Figure 11.3n.

11.3.14 Play Equipment

11.3.14.1 Playgrounds/Tot Lots. The playgrounds and tot lots within the installation should use equipment that is consistent throughout the installation or that meets specific criteria of materials, color, and design preferably *Landscape Structures, Inc.* or approved equal; Figure 11.3o.

11.3.14.2 Playground Planning and Design. Guidance for planning and designing unsupervised outdoor play areas that meet child safety and child development requirements is found in [Technical Manual \(TM\) 5-803-11, Children's Outdoor Play](#)



▲ **Figure 11.3l**
Movable Planter



▲ **Figure 11.3m**
Bicycle Rack



▲ **Figure 11.3n**
Bollards



▲ **Figure 11.3o**
Play Equipment

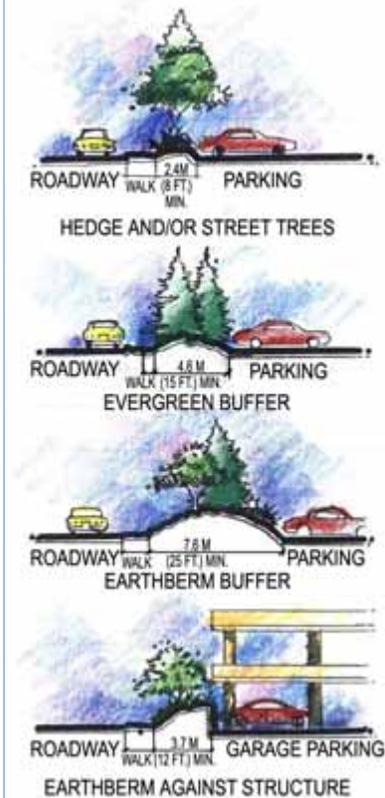
9.8.3 Parking Lot Location and Design

Parking areas can be designed and enhanced to provide a more pleasing impact and a more comfortable physical experience for the user. The following design techniques should be used to create more aesthetically pleasing, physically comfortable parking lots:

- Locate parking lots between and behind buildings to reduce the visual impact from the circulation system.
- Locate parking lots on relatively level areas to avoid excessive cut and fill.
- Design parking lots to be efficient in the design and placement of access drives and parking spaces. All drives providing direct access to parking spaces should provide spaces on both sides of the drive.
- Provide planting areas at the ends of all rows of parking spaces. Provide islands with trees and ground cover within the main parking lot to soften the visual expanse of the parking lot and provide shade and/or wind breaks. One 2-inch caliper tree shall be provided for every 12 parking spaces within the parking lot area. A parking lot island should be equivalent in size to one parking space or 9 feet wide by 18 feet long.
- Use natural topography and existing trees to visually screen parking areas from adjacent facilities and other parking bays; Figure 9.8d.
- Design parking lots to preserve significant existing trees. Provide a planting area around the tree that is equal to the existing dripline of the tree. Provide adequate ventilation and an irrigation system to allow water to the root system.
- On-street parking on primary and secondary streets is not allowed.
- Parking lots should be designed to minimize paved surfaces where possible by incorporating provisions for pervious paving materials to reduce stormwater runoff. Where practical, provide surface drainage to parking lot islands to water trees and island plant material. Recommended paving materials for driving lanes should be concrete, asphalt, or other paving material.
- Parking stalls should be designed at 90 degrees to the drive aisle. This is the most efficient parking lot layout.

9.8.4 Parking Area Design Guide

A comprehensive parking area design guide including siting, parking area types, geometry (parallel, perpendicular, angled), access, and maintenance consideration is located at the



▲ Figure 9.8d

*Trees/Berms/Walls Screen
Parking Lot*

APPENDIX DD

U.S. ARMY GARRISON HAWAII NPDES PERMIT NO. HI S000090

MS 4 PERMIT

LINDA LINGLE
GOVERNOR OF HAWAII



CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801-3378

In reply please refer to
EMD / CWB

02014PKP.07

February 7, 2007

CERTIFIED MAIL
RETURN RECEIPT REQUESTED
7005 1820 0005 8414 3275

Colonel Howard J. Killian
Commander
Headquarters, United States Army Garrison, Hawaii
Department of the Army
Schofield Barracks, HI 96857-5000

Attention: Mr. Russel Leong
Environmental Division
Directorate of Public Works

Dear Col. Killian:

In accordance with the provisions of the Clean Water Act, Hawaii Revised Statutes, Chapter 342D, and Hawaii Administrative Rules, Chapters 11-54 and 11-55, the Department of Health, has reviewed the following application for a National Pollutant Discharge Elimination System (NPDES) permit to discharge storm water runoff, including storm water runoff associated with industrial activities, and certain non-storm water discharges:

Facility
U.S. Army Garrison Hawaii

NPDES Permit No.
HI S000090

A public notice of our proposed action regarding the above application was published in the Honolulu Star-Bulletin on December 19, 2006.

After consideration of the expressed views of all other interested persons and agencies, and pertinent Federal and State statutes and rules regarding the discharge, the Department hereby issues the enclosed NPDES permit for the discharge referred to above. This action does not constitute a significant change from the tentative determination set forth in the public notice.

The enclosed NPDES permit will take effect 30 days after the permit issuance date.

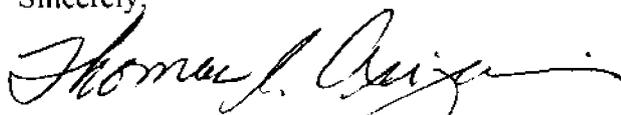
Colonel Howard J. Killian

February 7, 2007

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Should you have any questions, please contact Ms. Kris Poentis of the Engineering Section, CWB, at 586-4309.

Sincerely,

A handwritten signature in black ink, appearing to read "Thomas E. Arizumi". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

THOMAS E. ARIZUMI, P.E., CHIEF
Environmental Management Division

KP:cu

Enclosure: NPDES Permit

c: CWA Standards and Permits Office (WTR-5), Water Division, EPA, Region 9 (w/enclosure)

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STANDARD NPDES PERMIT CONDITIONS (ATTACHED)

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Page 3

A. COVERAGE LIMITATIONS

1. Areas of Applicability

During the period beginning with the effective date of this permit and lasting until **August 31, 2011**, the Permittee is authorized to discharge storm water, including storm water associated with industrial activities, NPDES-permitted discharges, and non-storm water discharges identified in Part A.2 of this permit from the Permittee's small MS4 at the following locations:

- a. Schofield Barracks, Wahiawa.
- b. Wheeler Army Airfield, Wahiawa.
- c. Fort Shafter, Honolulu.
- d. Helemano Military Reservation, Wahiawa.
- e. Aliamanu Military Reservation, Honolulu.
- f. Tripler Army Medical Center, Honolulu.

2. Authorized Discharges

The Permittee is authorized to discharge storm water, including storm water associated with industrial activities, NPDES-permitted discharges, and non-storm water discharges identified in Part A.3 of this permit through the Permittee's small MS4. This permit does not authorize discharges of storm water associated with construction activities disturbing one (1) acre or more.

3. Authorized Non-Storm Water Discharges

The Permittee is authorized to discharge the following non-storm water discharges into the Permittee's small MS4 provided that the Permittee determines that such **discharges do not contain pollutants in amounts that will cause or contribute to a violation of an applicable water quality standard.**

- a. Spring water and flows from riparian habitats and wetlands.
- b. Fire fighting activities, including fire hydrant testing, fire sprinkler testing, and fire fighting training activities.
- c. Air-conditioning condensate.

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- d. Individual residential car washing, including apartment areas or on public streets, and charity car washes, using Best Management Practices per the Permittee's directives/memos.
- e. Dechlorinated swimming pool water.
- f. Street wash water (water only, without detergents), including wash water from sidewalks, plazas, and driveways, but excluding parking lots.
- g. **Emergency pipe and tank hydrotesting and disinfecting.**
- h. Emergency trench dewatering.
- i. Pier, wharf, and exterior building wash water (water only, without detergents).
- j. Discharges from potable water sources, including waterline flushing, emergency eye wash basins and showers, and drinking fountains on piers.
- k. Lawn watering, landscape irrigation, planter box runoff, and irrigation water, **excluding runoff from commercial agriculture.**
- l. Uncontaminated ground water, foundation and footing drains, **not including construction related dewatering activities.**
- m. Water from crawl space pumps, including discharge from buildings with basements, and crawl space pumps used by utility companies to dewater utility manholes and other maintenance and operations substructure facilities.

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B. DISCHARGE LIMITATIONS AND MONITORING REQUIREMENTS

1. Numerical Limitations

- a. The discharge shall be limited and monitored as specified in the table below.

| Parameter | Discharge Limitation ¹ | Unit | Monitoring Frequency | Type of Sample ² |
|------------------------------------|-----------------------------------|----------------|---------------------------------|-----------------------------|
| Total Suspended Solids | N/L | mg/l | Once/Calendar Year ³ | Composite ⁴ |
| Total Dissolved Solids | N/L | mg/l | Once/Calendar Year ³ | Composite ⁴ |
| Total Nitrogen ⁵ | N/L | mg/l | Once/Calendar Year ³ | Composite ⁴ |
| Total Phosphorus | N/L | mg/l | Once/Calendar Year ³ | Composite ⁴ |
| Oil and Grease | 15 | mg/l | Once/Calendar Year ³ | Grab ⁶ |
| pH Range | 5.5 - 8.0 | Standard Units | Once/Calendar Year ³ | Grab ⁶ |
| Pollutants of Concern ⁷ | ⁸ | mg/l | Once/Calendar Year ³ | Composite ^{4,9} |

N/L No limitation
mg/l Milligrams per liter

NOTES:

¹ Pollutant concentration levels shall not exceed the discharge limitations or be outside the ranges indicated in the table above. The Permittee shall report actual or measured levels which exceed those discharge limitations or are outside those ranges to the Director of Health (Director) as required in Part D.3 of this permit.

² The Permittee shall collect samples for analysis from a discharge resulting from a representative storm. A representative storm means a rainfall that accumulates more than 0.1 inch of rain and occurs at least 72 hours after the previous measurable (greater than 0.1 inch) rainfall event.

“Grab sample” means a sample collected during the first 15 minutes of the discharge.

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“Composite sample” means a combination of at least two (2) sample aliquots, collected at periodic intervals. The composite shall be flow proportional; either the time interval between each aliquot or the volume of each aliquot must be proportional to the total flow of storm water discharge flow since the collection of the previous aliquot. The Permittee may collect aliquots manually or automatically.

Samples for analysis shall be collected during the first 15 minutes of the discharge and at 15-minute intervals thereafter for the duration of the discharge, as applicable. If the discharge lasts for over an hour, sample collection may cease.

- ³ The Permittee shall monitor storm water runoff from each industrial activity at least once during the effective period of this permit
- ⁴ If the duration of the discharge event is less than 30 minutes, the sample collected during the first 15 minutes of the discharge shall be analyzed as a grab sample and reported toward the fulfillment of this composite sample specification. If the duration of the discharge event is greater than 30 minutes, the Permittee shall analyze two (2) or more sample aliquots as a composite sample.
- ⁵ The total nitrogen parameter is a measure of all nitrogen compounds in the sample (nitrate, nitrite, ammonia, dissolved organic nitrogen, and organic matter present as particulates).
- ⁶ The Permittee shall measure pH within the first 15 minutes of taking the grab sample
- ⁷ Pollutants of concern include those listed in Appendix D of 40 CFR Part 122 (for U.S. facilities whose storm water discharges are associated with industrial activity listed in 40 CFR Section 122.26(b)(14)) and as listed in the Final Reissuance of NPDES Storm Water Multi-Sector General Permit for Industrial Activities (Federal Register, Vol. 65, No. 210 dated October 30, 2000, pages 64800-64877). The Permittee shall identify the pollutants of concern for each of the sampling locations and include a discussion of the pollutants and its sources in the Storm Water Pollution Control Plan. The Permittee shall analyze metals for the dissolved fraction and total recoverable portion.
- ⁸ Effluent limitations are the acute water quality standards established in HAR, Section 11-54-04. For pollutants which do not have established acute water quality standards, the Permittee shall report any detected concentration greater than 0.01 mg/l.

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- ⁹ The Permittee shall collect grab samples to measure concentrations of cyanide and the volatile fraction of the toxic organic compounds. The Permittee shall use composite samples to test for all other pollutants.
- b. The Permittee shall conduct monitoring in accordance with test procedures approved under 40 CFR Part 136, or unless otherwise specified, with detection limits low enough to measure compliance with the discharge limitations specified in Part B.1.a.. For cases where the discharge limitation is below the lowest detection limit of the appropriate test procedure, the Permittee shall use the test method with the lowest detection limit.
- c. The Permittee shall use EPA Method 1664, Revision A, approved on May 14, 1999, and effective on June 14, 1999, to measure oil and grease concentrations.
2. Narrative Limitations
- a. The Permittee shall ensure that discharges from the Permittee's small MS4 are free of substances attributable to domestic, industrial, or other controllable sources of pollutants, including the following:
- i. Materials that will settle to form objectionable sludge or bottom deposits.
 - ii. Floating debris, oil, grease, scum, or other floating materials.
 - iii. Substances in amounts sufficient to produce taste in the water or detectable off-flavor in the flesh of fish, or in amounts sufficient to produce objectionable color, turbidity, or other conditions in the receiving waters.
 - iv. High or low temperatures, biocides, pathogenic organisms, toxic, radioactive, corrosive, or other deleterious substances at levels or in combinations sufficient to be toxic or harmful to human, animal, plant, or aquatic life, or in amounts sufficient to interfere with any beneficial use of the water.
 - v. Substances or conditions or combinations thereof in concentrations which produce undesirable aquatic life.
 - vi. Soil particles resulting from erosion on land involved in earthwork, such as the construction of public works, highways, subdivisions, recreational, commercial, or industrial developments, or the cultivation and management of agricultural lands.

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- b. The discharge shall not cause or contribute to a violation of any of the applicable beneficial uses or water quality objectives contained in HAR, Chapter 11-54, Water Quality Standards.
- c. The discharge of pollutants from storm water runoff from areas of industrial activity shall be reduced using the “**best available technology economically achievable (BAT)**” and the “**best conventional pollution control technology (BCT)**” standards as required by HAR, Section 11-55-15(b)(1) and 40 CFR Section 125.3.
- d. The discharge of pollutants from all other areas of the Permittee’s facility shall be reduced to the “**maximum extent practicable (MEP)**” as required by CWA Section 402(p)(3)(B)(iii) and 40 CFR Section 122.26(d)(2)(iv).

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C. STORM WATER MANAGEMENT PROGRAM

1. Requirements

The Permittee shall develop, implement, and enforce by use of installation-wide instructions, directives, or other regulatory mechanism, a Storm Water Management Program (SWMP) designed to reduce the discharge of pollutants from the Permittee's small MS4 to the maximum extent practicable in order to protect water quality and satisfy the appropriate water quality requirements of the Clean Water Act. **The SWMP shall be submitted to the Director within 90 days from the issuance date of this permit** and include the minimum control measures identified in Part C.2 and measurable goals in Part C.3 of this permit. The Permittee shall continue to implement its current SWMP until the updated version is approved by the Director.

2. Minimum Control Measures

a. Public Education and Outreach

- i. The Permittee shall develop and implement a public education program to distribute educational materials to Army personnel and dependents, or equivalent outreach activities emphasizing the following:
 - (1) Impacts of storm water discharges on water bodies.
 - (2) Hazards associated with illicit discharges.
 - (3) Measures Army personnel and dependents can take to reduce pollutants in storm water runoff, including, but not limited to, minimizing fertilizer application and practicing proper storage and disposal of chemicals and wastes.
- ii. Upon written request by the Permittee and written approval by the Director, or upon request by the Director, the Permittee shall partner with other MS4 agencies for public outreach activities.

b. Public Involvement/Participation

The Permittee shall include Army personnel and dependents in developing, implementing, and reviewing the SWMP.

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c. **Illicit Discharge Detection and Elimination**

The Permittee shall develop, implement, and enforce a program to detect and eliminate illicit discharges that, at a minimum, includes the following:

- i. Establishment of installation-wide instructions, directives, or other regulatory mechanism, including enforcement procedures and actions, that prohibit non-storm water discharges into the Army storm water system.
- ii. Procedures to detect and eliminate illicit discharges (as defined in 40 CFR Section 122.26(b)(2)).
- iii. Compilation of a list of non-storm water discharges or flows specified in Part A.3 of this permit that are considered to be significant contributors of pollutants to the system and measures to be taken to prevent these discharges into the Permittee's small MS4, or reduce the amount of pollutants in these discharges.

d. **Construction Site Runoff Control**

The Permittee shall develop, implement, and enforce a program to reduce pollutants in storm water runoff from construction activities disturbing one (1) acre or more, including construction activities less than one (1) acre that are part of a larger common plan of development or sale that would disturb one (1) acre or more, that, at a minimum, includes the following:

- i. Establishment of installation-wide instructions, directives, or other regulatory mechanism, including enforcement procedures and actions, that require erosion and sediment controls.
- ii. Requirements for construction site operators to implement appropriate erosion and sediment control best management practices.
- iii. Requirements for construction site operators to control waste such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste at the construction site that may cause adverse impacts to water quality.
- iv. Procedures for site plan review which incorporate consideration of potential water quality impacts.
- v. Procedures for receipt and consideration of information submitted by the public.

PART C
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- vi. Procedures for site inspection and enforcement of control measures.
- e. **Post-Construction Storm Water Management in New Development and Redevelopment**

The Permittee shall develop, implement, and enforce a program to reduce pollutants in storm water runoff from new development and redevelopment projects that disturb greater than or equal to one (1) acre, including construction sites less than one (1) acre that are part of a larger common plan of development or sale that would disturb one (1) acre or more, that, at a minimum, includes the following:

- i. Establishment of installation-wide instructions, directives, or other regulatory mechanism, including enforcement procedures and actions, that address post-construction runoff from new development and redevelopment projects.
 - ii. Structural and/or non-structural Best Management Practices appropriate for each installation to minimize water quality impacts and attempt to maintain pre-development runoff conditions.
 - iii. Procedures for long-term operation and maintenance of Best Management Practices.
- f. **Pollution Prevention/Good Housekeeping**
 - i. The Permittee shall develop, implement, and enforce a Storm Water Pollution Control Plan (SWPCP) that has the ultimate goal of preventing or reducing pollutant runoff and, at a minimum, includes the following:
 - (1) Establishment of installation-wide instructions, directives, or other regulatory mechanism, including enforcement procedures and actions, that require activities to comply with the SWPCP and prevent the discharge of pollutants into the Permittee's small MS4.
 - (2) Storm water system map, showing the location of all outfalls and the names and locations of all State waters that receive discharges from those outfalls.
 - (3) List of all industrial activities, as defined in 40 CFR Sections 122.26(b)(14)(i) through 122.26(b)(14)(ix) and 122.26(b)(14)(i), including their Standard Industrial Classification (SIC) Codes.

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- (4) Potential storm water pollutants and their sources for each type of facility/activity.
- (5) Site-specific Best Management Practices, good housekeeping procedures, and pollutant control procedures for the operation and maintenance of each type of facility/activity whose storm water discharges into the Permittee's small MS4 and/or directly enters receiving State waters.
- (6) Spill prevention and response procedures.
- (7) Pesticide, herbicide, and fertilizer application procedures.
- (8) Procedures to conduct inspections of industrial facilities at least once per calendar year.
- (9) Training for military personnel, civilian workers, contractors, and other individuals associated with the facility to ensure familiarity with the operation and maintenance programs.

g. Monitoring

The Permittee shall develop and implement a storm water monitoring plan in accordance with Part A of this permit, that, at a minimum, includes the following:

- i. Description of sampling locations, including justification for site selection.
- ii. Sampling location map.
- iii. Monitoring parameters.
- iv. Preservation techniques.
- v. Sample holding time.
- vi. Test method and method detection limit for each parameter.
- vii. Quality Assurance/Quality Control (QA/QC) measures.
- viii. Procedures for measuring rainfall depth, duration, location, and storm event return time.

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- ix. Format for reporting monitoring results.
- x. Outfall and industrial activity monitoring schedule as required by Note 3 under Part B.1.a of this permit.

h. Maintenance

The Permittee shall develop and implement a small MS4 maintenance program that, at a minimum, includes the following:

- i. Annual inspections of debris basins performed before October 1st of each year.
- ii. Annual inspections of storm drainage lines, inlets, catch basins, and flood control structures at least once per calendar year.
- iii. Maintenance and clearing of debris basins, storm drainage lines, inlets, catch basins, and flood control structures as necessary.
- iv. Documentation of inspections and maintenance.

3. Measurable Goals

The Permittee shall develop measurable goals to gauge permit compliance and program effectiveness for each minimum control measure identified above. The Permittee shall select measurable goals using an integrated approach that fully addresses the requirements and intent of the minimum control measure.

4. Modifications

a. Significant Modifications

- i. Modifications to the SWMP that would result in a major reduction in the overall scope and/or level of effort of the SWMP must be made for cause and in compliance with 40 CFR Section 122.62 and 40 CFR Part 124.
- ii. The Permittee shall report in writing any proposed modification described in Part C.4.a.i above to the Director for approval at least 30 days prior to the initiation date of the modification.

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b. Other Modifications

The Permittee shall report and justify all other modifications made to the SWMP in the annual report, as required by Part D.2 of this permit, for the year in which the modification was made.

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D. REPORTING REQUIREMENTS

1. General Requirements

- a. The Permittee shall include the NPDES permit number (**HI S000090**) and the following certification statement on all correspondence and submittals required by this permit:

“I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment for knowing violations.”

- b. The Permittee shall submit all reports required by this permit to the Regional Administrator and the Director at the following addresses:

- i. Regional Administrator
U.S. Environmental Protection Agency, Region 9
Attention: WTR-7, NPDES/DMR
75 Hawthorne Street
San Francisco, CA 94105-3901
- ii. Director of Health
Clean Water Branch
Environmental Management Division
Department of Health
P.O. Box 3378
Honolulu, HI 96801-3378

2. Annual Report

- a. The Permittee shall submit an annual report covering each calendar year during the term of this permit to the Director by February 28th of the following year. The annual report shall include the following:

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- i. Status of compliance with conditions of this permit.
- ii. Assessment of the SWMP, including progress towards implementing each minimum control measure and outcomes of each measurable goal.
- iii. Modifications made to the SWMP and implementation schedule during that calendar year, including justifications.
- iv. Storm water monitoring results on a Discharge Monitoring Report Form in a format that allows direct comparison with the discharge limitations and requirements of Part B of this permit.
- v. Summary of the storm water activities planned to be undertaken during the next calendar year.
- vi. Major modifications made to the Permittee's small MS4, including, but not limited to, addition/removal of outfalls, drainage lines, and treatment facilities.

3. Noncompliance

a. Oral Reports

The Permittee shall orally notify the Clean Water Branch during regular business hours at 586-4309, and the Hawaii State Hospital Operator at 247-2191 and the Clean Water Branch via facsimile at 586-4352 during nonbusiness hours, within 24 hours of becoming aware of the following occurrences:

- i. Exceedance of a numerical or narrative pollutant limitation as specified in Part B of this permit.
- ii. Occurrence which may endanger human health or the environment.
- iii. Discharge not authorized by this permit.

b. Written Reports

The Permittee shall submit a written noncompliance report within five (5) days from the time the Permittee becomes aware of the noncompliance to the Director at the address listed in Part D.1.b.i of this permit.

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- i. The report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the amount of time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.
- ii. The Director may waive the written report or the five (5) day deadline on a case-by-case basis if the oral report had been received within 24 hours of the noncompliance.

4. Maintenance

The Permittee shall submit a schedule for approval by the Director at least 14 days prior to any maintenance of facilities which might result in exceedance of effluent limitations. The schedule shall contain a description of the maintenance and its purpose, the period of maintenance, including exact dates and times, and steps taken or planned to reduce, eliminate, and prevent occurrence of noncompliance.

5. Total Maximum Daily Load Waste Load Allocation

The Permittee shall develop and submit an implementation and monitoring plan within one (1) year of the date that DOH adopts the Total Maximum Daily Load Waste Load Allocation that identifies the Permittee as a source.

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E. LOCATION MAPS

See Attachments (1-6)

S000090.FNL

Final Permit
February 7, 2007

Monday, November 29, 2010

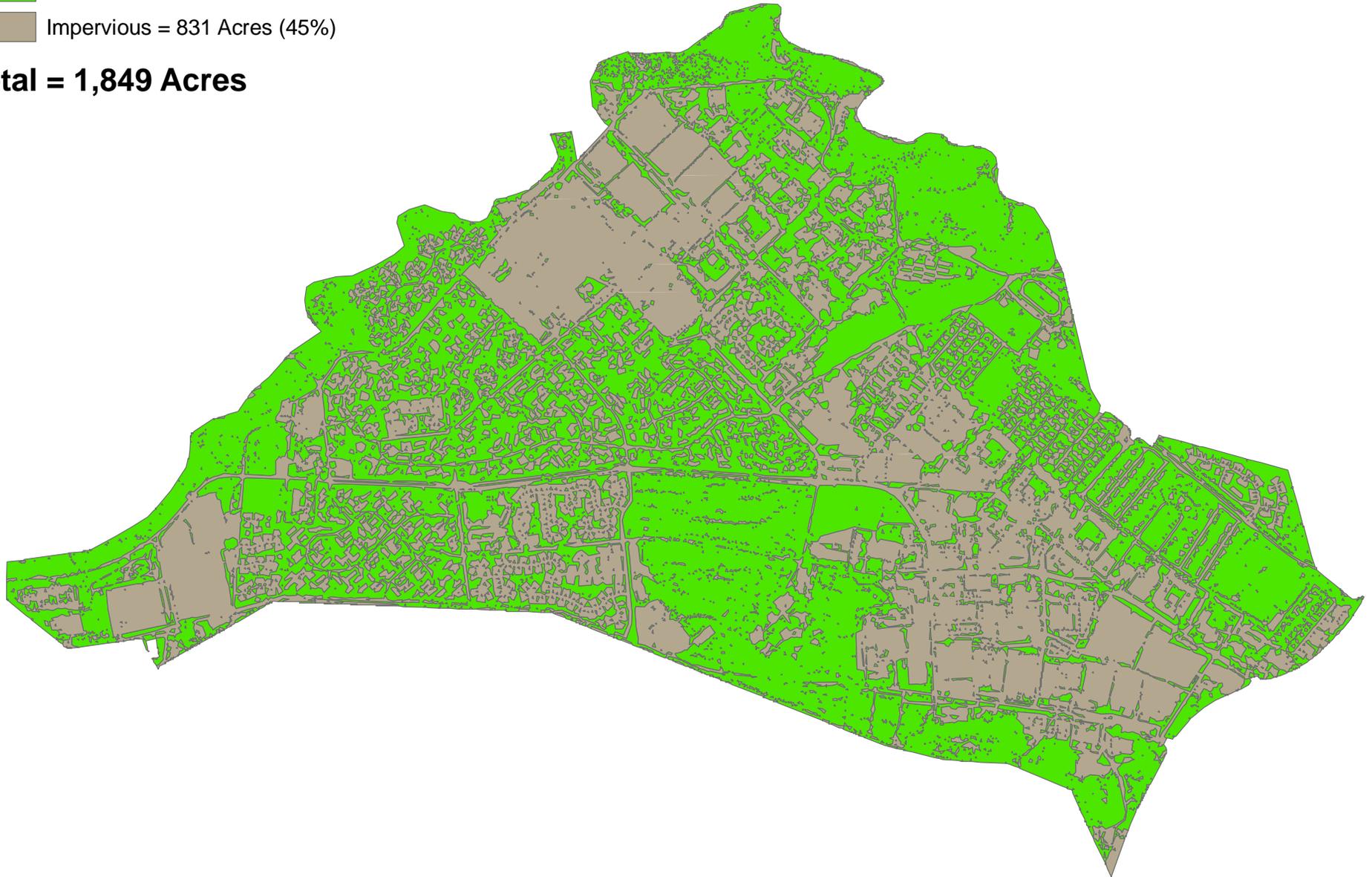
Schofield Barracks

Land Classification

 Pervious = 1,018 Acres (55%)

 Impervious = 831 Acres (45%)

Total = 1,849 Acres



0 50 100 200 300 400 500
Meters



Wheeler Army Airfield

Land Classification

 Pervious = 1,206 Acres (76%)

 Impervious = 382 Acres (24%)

Total: 1,588 Acres



Helemano Military Reservation

Land Classification

-  Pervious = 195 Acres (69%)
-  Impervious = 85 Acres (31%)

Total: 282 Acres



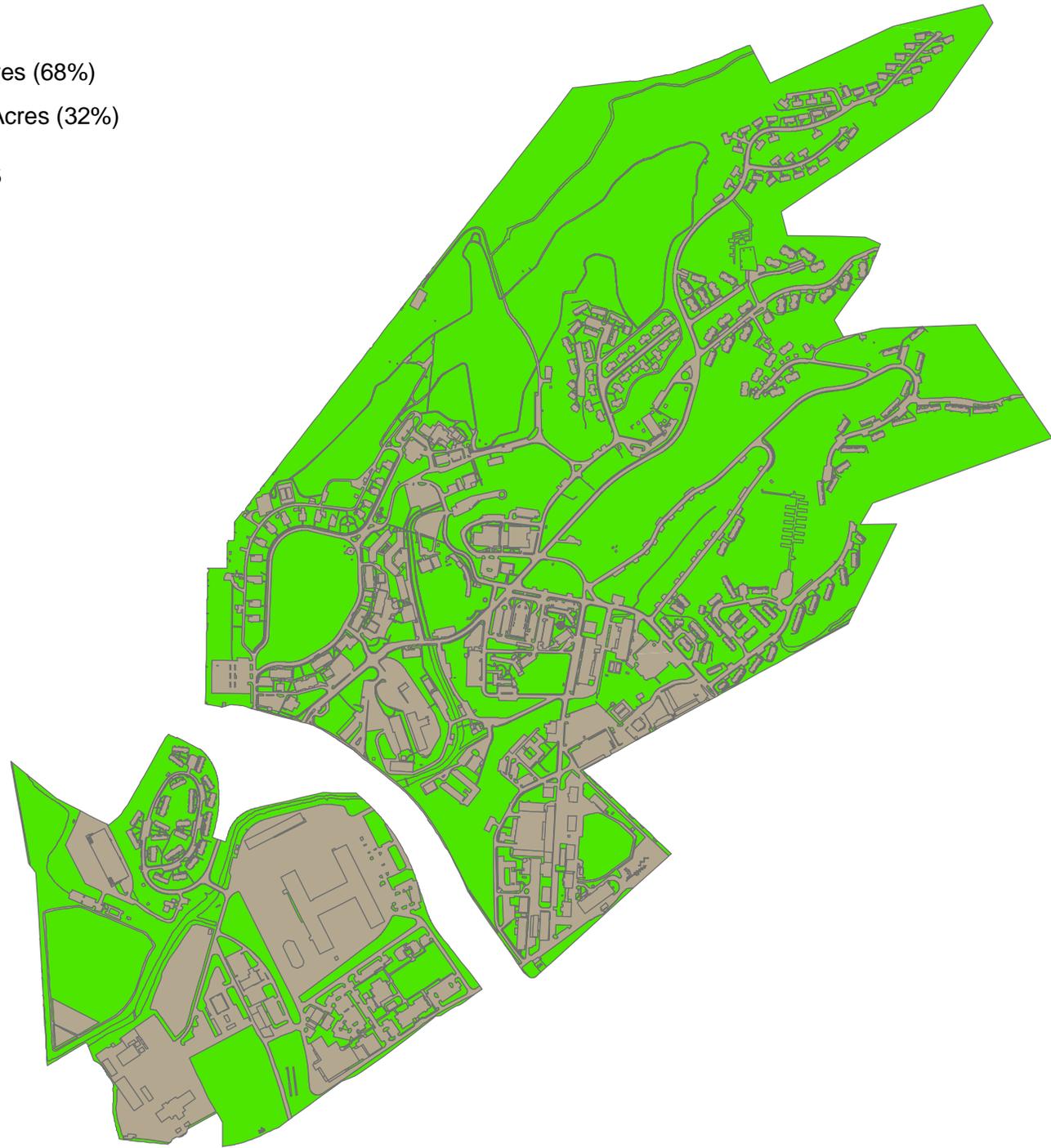
Fort Shafter Military Reservation

Land Classification

 Pervious = 390 Acres (68%)

 Impervious = 187 Acres (32%)

Total: 577 Acres



Aliamanu Military Reservation

Land Classification

-  Pervious = 393 Acres (76%)
-  Impervious = 127 Acres (24%)

Total: 520 Acres



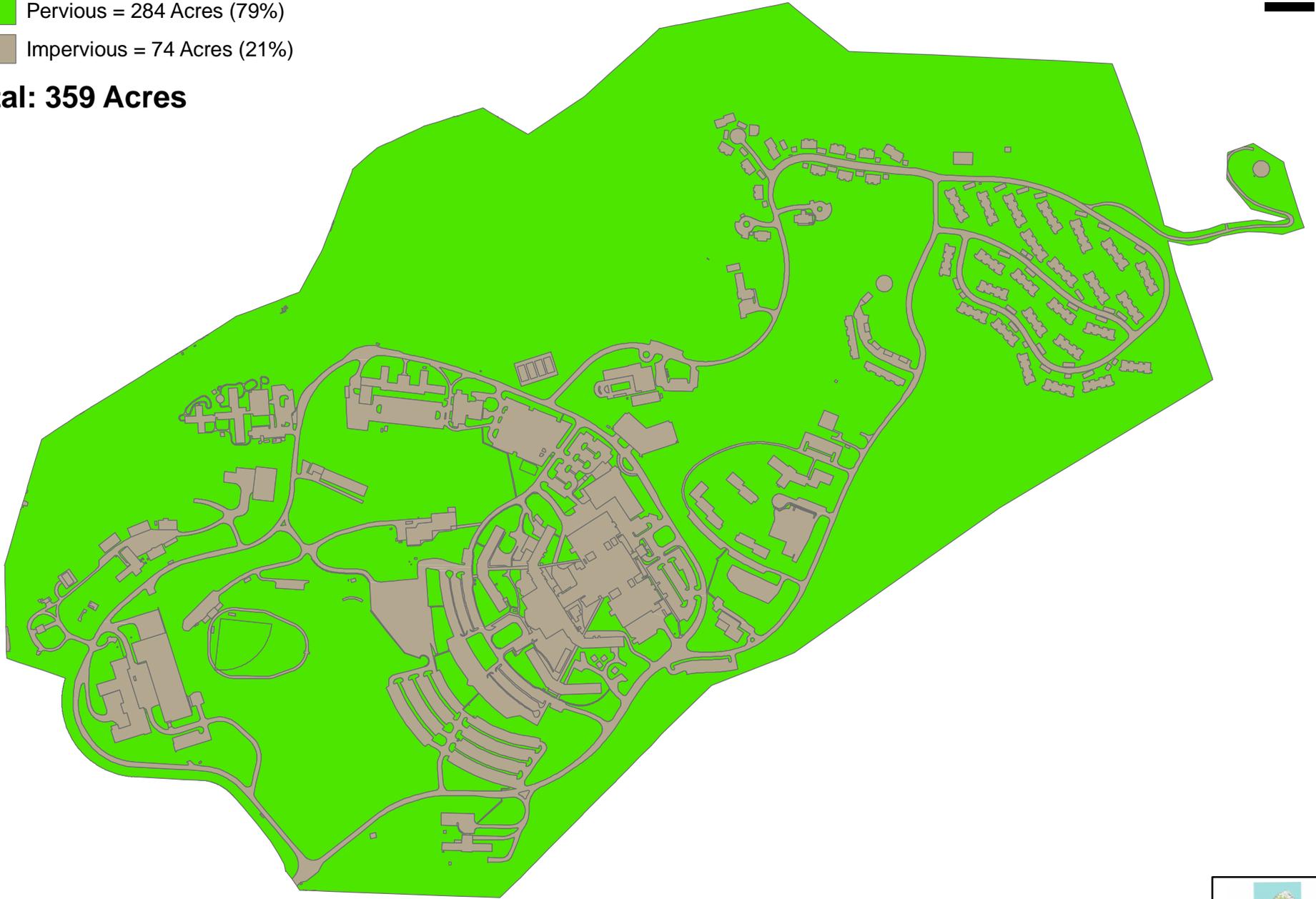
Tripler Army Medical Center

Land Classification

 Pervious = 284 Acres (79%)

 Impervious = 74 Acres (21%)

Total: 359 Acres



**DEPARTMENT OF HEALTH
STANDARD NPDES PERMIT CONDITIONS
UPDATED AS OF DECEMBER 30, 2005**

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Note:

All references to Title 40 of the Code of Federal Regulations (40 CFR) are to regulations that are in effect on July 1, 2004, unless otherwise specified. The Clean Water Act (Act) is also known as the Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, and appears in 33 U.S.C. §§1251 to 1387.

“This permit” means the applicable individual NPDES permit to which these standard conditions apply.

1. Basic water quality criteria (comply with Hawaii Administrative Rules, Chapter 11-54, Section 11-54-04)**a. The Permittee shall not cause or contribute to a violation of the narrative basic water quality criteria specified in Section 11-54-04(a) which states:**

- “(a) All waters shall be free of substances attributable to domestic, industrial, or other controllable sources of pollutants, including:
- (1) Materials that will settle to form objectionable sludge or bottom deposits;
 - (2) Floating debris, oil, grease, scum, or other floating materials;
 - (3) Substances in amounts sufficient to produce taste in the water or detectable off-flavor in the flesh of fish, or in amounts sufficient to produce objectionable color, turbidity, or other conditions in the receiving waters;
 - (4) High or low temperatures; biocides; pathogenic organisms; toxic, radioactive, corrosive, or other deleterious substances at levels or in combinations sufficient to be toxic or harmful to human, animal, plant, or aquatic life, or in amounts sufficient to interfere with any beneficial use of the water;
 - (5) Substances or conditions or combinations thereof in concentrations which produce undesirable aquatic life;
 - (6) Soil particles resulting from erosion on land involved in earthwork, such as the construction of public works; highways; subdivisions; recreational, commercial, or industrial developments; or the cultivation and management of agricultural lands.”

b. The Permittee shall not cause or contribute to a violation of the basic numeric water quality requirements of Hawaii Administrative Rules, Chapter 11-54, Section 11-54-04(b).

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2. Onshore or offshore construction

This permit does not authorize or approve the construction of any onshore or offshore physical structures or facilities or the undertaking of any work in any State waters.

3. Sampling requirements and definitions

a. Sampling Points

All samples shall be taken at the monitoring points specified in this permit and, unless otherwise specified, before the effluent joins or is diluted by any other waste stream, body of water, or substance. Monitoring points shall not be changed without notification to and the approval of the Regional Administrator and the Director of Health. No discharge is authorized which does not totally pass through the final monitoring point.

b. Flow Measurements

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of discharges. The devices shall be installed, calibrated, and maintained to ensure that the accuracy of the measurements are consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than plus or minus ten (10) per cent from the true discharge rates throughout the range of expected discharge volumes. Once-through condenser cooling water flow which is monitored by pump logs or pump hour meters as specified in this permit based on the manufacturer's pump curves shall not be subject to this requirement. Guidance in selection, installation, calibration, and operation of acceptable flow measurement devices can be obtained from the following references:

- (1) "A Guide of Methods and Standards for the Measurement of Water Flow," U.S. Department of Commerce, National Bureau of Standards, NBS Special Publication 421, May 1975, 97 pp. (Available from the U.S. Government Printing Office, Washington, D.C. 20402. Order by SD catalog No. C13.10:421.)
- (2) "Water Measurement Manual," U.S. Department of Interior, Bureau of Reclamation, Second Edition, Revised Reprint, 1974, 327 pp. (Available from the U.S. Government Printing Office, Washington, D.C. 20402. Order by catalog No. 127.19/2:W29/2, Stock No. S/N 24003-0027.)

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- (3) "Flow Measurement in Open Channels and Closed Conduits," U.S. Department of Commerce, National Bureau of Standards, NBS Special Publication 484, October 1977, 982 pp. (Available in paper copy or microfiche from National Technical Information Service (NTIS), Springfield, VA 22151. Order by NTIS No. PB-273 535/5ST.)
- (4) "NPDES Compliance Flow Measurement Manual," U.S. Environmental Protection Agency, Office of Water Enforcement, Publication MCD-77, September 1981, 135 pp. (Available from the General Services Administration (8BRC), Centralized Mailing Lists Services, Building 41, Denver Federal Center, Denver, CO 80225.)

c. Calibration

The Permittee shall periodically calibrate and perform maintenance on all monitoring and analytical equipment used to monitor the pollutants discharged under this permit, at intervals which will insure the accuracy of measurements, but no less than the manufacturer's recommended intervals or six (6) month intervals (whichever comes first). Records of calibration shall be kept under section 14.

d. pH Effluent Limitations Under Continuous Monitoring

If the Permittee continuously measures the pH of the discharge under a requirement or option in this permit, excursions from the range provided in this permit are permitted, provided:

- (1) The pH limitation in this permit is based upon a requirement imposed under 40 CFR Subchapter N, Effluent Guidelines and Standards;
- (2) The total time during which the pH values are outside the required range of pH values shall not exceed 446 minutes in any calendar month;
- (3) No individual excursions from the range of pH values shall exceed 60 minutes; and
- (4) For purposes of this section, an "excursion" is an unintentional and temporary incident in which the pH value of a discharge exceeds the range set forth in this permit. The number of individual excursions exceeding 60 minutes and the total accumulated excursion time in minutes occurring in any calendar month shall be reported in accordance with this permit.

STANDARD NPDES PERMIT CONDITIONS**e. Average**

As used in this permit, unless otherwise stated, the term average means the arithmetic mean of values taken at the frequency required for each parameter over the specified period. For fecal coliform, enterococcus, or *clostridium perfringens*, the "average" shall be the geometric mean. For total coliform, the "average" shall be the median.

f. Mass/Day Measurements

- (1) The "daily discharge" is the total mass (weight) of a pollutant discharged during a calendar day. The daily discharge shall be determined by using the following equations:

$$\text{Daily Discharge (lbs/day)} = 8.34 \times Q \times C; \text{ or}$$

$$\text{Daily Discharge (kg/day)} = 3.785 \times Q \times C;$$

where "C" (in mg/l) is the measured daily concentration of the pollutant and "Q" (in million gallons per day) is the measured effluent flow rate for the same calendar day.

If only one (1) sample is taken during any calendar day, the mass (weight) of pollutant discharged that is calculated from it is the "daily discharge."

- (2) The "average monthly discharge" is defined as the total mass of all daily discharges sampled and/or measured during a calendar month on which daily discharges are sampled and measured, divided by the number of daily discharges sampled and/or measured during the month. It is, therefore, an arithmetic mean found by adding the weights of the pollutant found each day of the month and then dividing this sum by the number of days. This limitation is identified as "Monthly Average" in this permit and the average monthly discharge value is reported in the "Average" column under "Quantity" on the Discharge Monitoring Report Form.
- (3) The "average weekly discharge" is defined as the total mass of all daily discharges sampled and/or measured during the calendar week in which daily discharges are sampled and/or measured. It is, therefore, an arithmetic mean found by adding the weights of pollutants found each day of the week and then dividing this sum by the number of days. This limitation is identified as "Weekly Average" in this permit and the average weekly discharge value is reported in the "Maximum" column under "Quantity" on the Discharge Monitoring Report Form.

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- (4) The “maximum daily discharge” is the highest daily discharge value recorded during the reporting period. This limitation is identified as “Daily Maximum” in this permit and the maximum daily discharge value is reported in the “Maximum” column under “Quantity” on the Discharge Monitoring Report Form.
- g. Concentration Measurements
- (1) The “daily concentration” is the concentration of a pollutant discharged during a calendar day. It is equal to the concentration of a composite sample or in the case of grab samples, it is the arithmetic mean (weighted by flow value) of all samples collected during that calendar day. If only one (1) sample is taken during any calendar day, it represents the “daily concentration.”
- (2) The “average monthly concentration,” other than for fecal coliform, enterococcus, *clostridium perfringens*, or total coliform, is the sum of the daily concentrations sampled and/or measured divided by the number of daily discharges sampled and/or measured during the month (arithmetic mean of the daily concentration values). The average monthly count for fecal coliform, enterococcus, and *clostridium perfringens* is the geometric mean of the counts for samples collected during a calendar month. The average monthly count for total coliform is the median of the counts for samples collected (not less than five (5) discrete samples) during a calendar month. This limitation is identified as “Monthly Average” or “Daily Average” or “Other Limits” in this permit and the average monthly concentration value is reported under the “Average” column under “Quality” on the Discharge Monitoring Report Form.
- (3) The “average weekly concentration,” other than for fecal coliform, enterococcus, *clostridium perfringens*, or total coliform, is the sum of the concentrations of all daily discharges sampled and/or measured during a calendar week on which daily discharges are sampled and measured divided by the number of daily discharges sampled and/or measured during the week (arithmetic mean of the daily concentration values). The average weekly count for fecal coliform, enterococcus, or *clostridium perfringens* is the geometric mean of the counts for samples collected during a calendar week. The average weekly count for total coliform is the median of the counts for samples collected during a calendar week. This limitation is identified as “Weekly Average” or “Other Limits” in this permit and the average weekly concentration value is reported under the

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“Maximum” column under “Quality” on the Discharge Monitoring Report Form.

- (4) The “maximum daily concentration” is the highest daily concentration value recorded during the reporting period. This limitation identified as “Daily Maximum” or “Other Limits” in this permit and the maximum daily concentration is reported under the “Maximum” column under “Quality” on the Discharge Monitoring Report Form.
- h. The effluent flow, expressed as cubic meters per day or million gallons per day (MGD), is the 24-hour average flow averaged monthly. It is the arithmetic mean of the total daily flows recorded during the calendar month. Where monitoring requirements for flow are specified in this permit, the flow rate values are reported in the “Average” column under “Quantity” on the Discharge Monitoring Report Form.
- (1) An “instantaneous flow measurement” is a measure of flow taken at the time of sampling, when both the sample and flow will be representative of the total discharge.
- (2) Where monitoring requirements for pH; dissolved oxygen; or fecal coliform, enterococcus, or *clostridium perfringens* are specified in this permit, the values are generally reported in the “Quality or Concentration” column on the Discharge Monitoring Report Form.
- i. The “arithmetic mean” of any set of values is the summation of the individual values divided by the number of individual values.
- j. The “geometric mean” of any set of values is the N^{th} root of the product of the individual values where N is equal to the number of individual values. The geometric mean is equivalent to the antilog of the arithmetic mean of the logarithms of the individual values. For purposes of calculating the geometric mean, values of zero (0) shall be considered to be one (1).
- k. “Weighted by flow value” means the summation of each concentration multiplied by its respective flow divided by the summation of the respective flows.
- l. The “median” of any set of ordered values is the value below and above which there is an equal number of values or which is the arithmetic mean of the two (2) middle values if there is no one (1) middle number.
- m. A calendar day is defined as the period from midnight of one day until midnight of the next day. However, for the purposes of this permit, any consecutive

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24-hour period that reasonably represents the calendar day may be used for sampling.

- n. "Removal efficiency" is the ratio of pollutants removed by the treatment unit to pollutants entering the treatment unit. Removal efficiencies of a treatment plant shall be determined using the average monthly concentrations (C, in mg/l) of influent and effluent samples collected about the same time and the following equation (or its equivalent):

$$\text{Removal Efficiency (per cent)} = 100 \times \left(1 - \frac{C_{\text{effluent}}}{C_{\text{influent}}} \right)$$

4. **Duty to reapply** (comply with 40 CFR §122.41(b) and Hawaii Administrative Rules, Chapter 11-55, Section 11-55-27)

If the Permittee wishes to continue an activity regulated by this permit after the expiration of this permit, the Permittee must apply for and obtain a new permit. The Permittee shall submit a new application 180 days before the existing permit expires and as specified in the Hawaii Administrative Rules, Chapter 11-55, Section 11-55-27.

5. **Applications** (based in part on 40 CFR §122.22)

- a. All permit applications shall be signed as follows:

- (1) For a corporation. By a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:
- (A) A president, secretary, treasurer, or vice-president of the corporation in charge of a principle business function, or any other person who performs similar policy- or decision-making functions for the corporation, or
 - (B) The manager of one (1) or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate

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information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

- (2) For a partnership or sole proprietorship. By a general partner or the proprietor, respectively; or
 - (3) For a municipality, State, Federal, or other public agency. By either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes:
 - (A) The chief executive officer of the agency, or
 - (B) A senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA).
 - (4) For a trust. By a trustee.
 - (5) For a limited liability company (LLC). By the Manager or a Member authorized to make management decisions for the LLC who is in charge of a principal business function, or who performs similar policy or decision-making functions for the LLC.
- b. All other reports or responses to requests for information required by the Director of Health shall be signed by a person described in subsection a., or by a duly authorized representative of that person. A person is a duly authorized representative only if:
- (1) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, superintendent, or position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.);
 - (2) The authorization is made in writing by a person designated under subsection a.; and
 - (3) The written authorization is submitted to the Director of Health.

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- c. **Changes to authorization.** If an authorization under subsection b. is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of subsection b. must be submitted to the Director of Health prior to or together with any reports, information, or applications to be signed by a duly authorized representative.
- d. **Certification.** Any person signing a document under subsection a. or b. shall make the following certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

6. Duty to comply (comply with 40 CFR §122.41(a))

The Permittee shall comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

- a. The Permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Act for toxic pollutants and with standards for sewage sludge use or disposal established under Section 405(d) of the Act within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if this permit has not yet been modified to incorporate the requirement.
- b. The Act provides that any person who violates Section 301, 302, 306, 307, 308, 318, or 405 of the Act, or any permit condition or limitation implementing any of the sections in a permit issued under Section 402 of the Act, or any requirement

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imposed in a pretreatment program approved under Section 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed \$25,000 per day for each violation.

The Act provides that any person who *negligently* violates Section 301, 302, 306, 307, 308, 318, or 405 of the Act, or any permit condition or limitation implementing any of the sections in a permit issued under Section 402 of the Act, or any requirement imposed in a pretreatment program approved under Section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of \$2,500 to \$25,000 per day of violation, or imprisonment of not more than one (1) year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than \$50,000 per day of violation, or imprisonment of not more than two (2) years, or both.

Any person who *knowingly* violates Section 301, 302, 306, 307, 308, 318, or 405 of the Act, or any permit conditions or limitations is subject to criminal penalties of \$5,000 to \$50,000 per day of violation, or imprisonment for not more than three (3) years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than \$100,000 per day of violation, or imprisonment of not more than six (6) years, or both.

Any person who knowingly violates Section 301, 302, 303, 306, 307, 308, 318, or 405 of the Act, or any permit condition or limitation implementing any of the sections in a permit issued under Section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than \$250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than \$500,000 or by imprisonment of not more than 30 years, or both.

An organization, as defined in Section 309(c)(3)(B)(iii) of the Act, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than \$1,000,000 and can be fined up to \$2,000,000 for second or subsequent convictions.

- c. Any person may be assessed an administrative penalty by the Administrator for violating Section 301, 302, 306, 307, 308, 318, or 405 of this Act, or any permit condition or limitation implementing any of the sections in a permit issued under Section 402 of the Act. Administrative penalties for Class I violations are not to exceed \$10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed \$25,000. Penalties for Class II violations are not to exceed

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\$10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed \$125,000.

7. Need to halt or reduce activity not a defense (comply with 40 CFR §122.41(c))

It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

8. Duty to mitigate (based in part on 40 CFR §122.41(d))

The Permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit or applicable law.

9. Proper operation and maintenance (comply with 40 CFR §122.41(e))

The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by the Permittee only when the operation is necessary to achieve compliance with the conditions of this permit.

10. Permit actions (comply with 40 CFR §122.41(f))

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

11. Property rights (comply with 40 CFR §122.41(g))

This permit does not convey any property rights of any sort or any exclusive privilege.

STANDARD NPDES PERMIT CONDITIONS**12. Duty to provide information** (comply with 40 CFR §122.41(h))

The Permittee shall furnish to the Director of Health, within a reasonable time, any information which the Director of Health may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Permittee shall also furnish to the Director of Health upon request, copies of records required to be kept by this permit.

13. Inspection and entry (comply with 40 CFR §122.41(i)(3))

The Permittee shall allow the Director of Health, or a duly authorized agent (including an authorized contractor acting as a duly authorized agent of the Administrator), upon the presentation of credentials and other documents as may be required by law, to:

- a. Enter upon the Permittee's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit;
- b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
- c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
- d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Act, any substances or parameters at any location.

14. Monitoring and records (based in part on 40 CFR §122.41(j))

- a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

As used in this section, a representative sample means that the content of the sample shall:

- (1) Be identical to the content of the substance sampled at the time of the sampling;

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- (2) Accurately represent the monitored item (for example, sampling to monitor final effluent quality shall accurately represent that quality, even though the sampling is done upstream of the discharge point); and
- (3) Accurately represent the monitored item for the monitored time period (for example, sampling to represent monthly average effluent flows shall be taken at times and on days that cover significant flow variations). Representative sampling may mean including weekends and storm events and may mean taking more samples than the minimum number specified in this permit.

The burden of proving that sampling or monitoring is representative shall be on the Permittee.

- b. The permittee shall retain all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit and records of all data used to complete the application for this permit for a minimum of five (5) years from the date of the sample, measurement, report or application. This period of retention shall be extended during the course of any unresolved litigation or administrative enforcement action regarding the discharge of pollutants by the permittee or when requested by the Director of Health or Regional Administrator.
- c. Any records of monitoring activities and results shall include for all samples:
 - (1) The date, exact place, and time of sampling or measurements;
 - (2) The individual(s) who performed the sampling or measurements;
 - (3) The date(s) analyses were performed;
 - (4) The individual(s) who performed the analyses;
 - (5) The analytical techniques or methods used; and
 - (6) The results of the analyses.
- d. Monitoring must be conducted according to test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, unless other test procedures have been specified in this permit.

STANDARD NPDES PERMIT CONDITIONS

- e. The Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained in this permit shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than two (2) years per violation, or by both for a first conviction. For a second and subsequent conviction, the person is subject to a fine of not more than \$20,000 per day of violation, or imprisonment for not more than four (4) years, or both. (Updated under the Water Quality Act of 1987)
- 15. Signatory requirement** (comply with 40 CFR §§122.22 and 122.41(k))
- a. All applications, reports, or information submitted to the Director of Health shall be signed and certified. (See section 5 or 40 CFR §122.22.)
- b. The Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than six (6) months per violation, or by both.
- 16. Reporting requirements** (based in part on 40 CFR §122.41(l))
- a. **Planned changes.** The Permittee shall give notice to the Director of Health as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:
- (1) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR §122.29(b); or
 - (2) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR §122.42(a)(1) or section 19.
 - (3) The alteration or addition results in a significant change in the Permittee's sludge use or disposal practices, and the alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or

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disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

- b. Anticipated noncompliance. The Permittee shall give advance notice to the Director of Health of any planned changes in the permitted facility or activity which may result in noncompliance with this permit's requirements.
- c. Transfers. This permit is not transferable to any person except after notice to the Director of Health. The Director of Health may require modification or revocation and reissuance of the permit to change the name of the Permittee and incorporate other requirements as may be necessary under the Act or Chapter 342D, HRS. (See 40 CFR §122.61; in some cases, modification or revocation and reissuance is mandatory.)

Monitoring reports. Monitoring results shall be reported at the intervals specified elsewhere in this permit.

- (1) Monitoring results must be reported on a Discharge Monitoring Report Form.
- (2) If the Permittee monitors any pollutant more frequently than required by the permit, using test procedures approved under 40 CFR Part 136 or as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the Discharge Monitoring Report Form.
- (3) Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Director of Health in this permit.

Compliance schedules. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

Other noncompliance. The Permittee shall report all instances of noncompliance not reported under subsections d. and e., at the time monitoring reports are submitted. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

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- g. Other information. Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Director of Health, the Permittee shall promptly submit the facts or information.
17. **Bypass** (based in part on 40 CFR §122.41(m))
- a. Definitions.
- (1) "Bypass" means the intentional diversion of any waste stream from any portion of a treatment facility.
- (2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.
- b. Prohibition of bypass. Every bypass is prohibited and the Director of Health may take enforcement action against a Permittee for bypass, except as provided in subsection c.
- c. Exceptions to bypass prohibition.
- (1) Bypass not exceeding limitations. A bypass is allowable under this paragraph only if it does not cause any effluent limitation to be exceeded, and only if the bypass is necessary for essential maintenance to assure efficient operation.
- (2) Bypass unavoidable to prevent specified harm. A bypass is allowable under this paragraph if:
- (A) The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
- (B) There was no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering

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judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance; and

- (C) The Permittee submitted notices as required under subsection d.
- (3) Approved anticipated bypass. An anticipated bypass is allowable if the Director of Health approves it. The Director of Health shall approve the anticipated bypass only if the Director of Health receives information sufficient to show compliance with paragraph 2., including information on the potential adverse effects with and without the bypass, and information on the search for and the availability of alternatives, whether the Permittee ultimately considers the alternatives feasible or not.
- d. Notice.
- (1) Anticipated bypass. If the Permittee knows in advance of the need for a bypass, the Permittee shall submit prior notice, if possible at least ten (10) days before the date of the bypass.
- (2) Unanticipated bypass. The Permittee shall submit reports of unanticipated bypasses.
- (A) Reports required by the Reporting Requirements of this permit shall be made in accordance with that section. If the Permittee questions whether the Reporting Requirements apply, the Permittee shall follow the Reporting Requirements of this permit;
- (B) For all other bypasses, reports shall be made orally within 24 hours from the time the Permittee becomes aware of the bypass. Written reports may be required on a case-by-case basis.
- e. Burden of proof. In any enforcement proceeding, the party seeking to establish that any exception to the bypass prohibition applies has the burden of proof. Proof that effluent limitations were met requires effluent monitoring during the bypass.
18. Upset (based in part on 40 CFR §122.41(n))
- a. Definition. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly

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designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

- b. **Effect of an upset.** An upset constitutes an affirmative defense to an action brought for noncompliance with the technology based permit effluent limitations if the requirements of subsection c. are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.
 - c. **Conditions necessary for a demonstration of upset.** A Permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
 - (1) An upset occurred and that the Permittee can identify the cause(s) of the upset;
 - (2) The permitted facility was at the time being properly operated;
 - (3) The Permittee submitted notice within 24 hours of any upset which exceeded any effluent limitation in this permit; and
 - (4) The Permittee complied with any remedial measures required under 40 CFR §122.41(d).
 - d. **Burden of proof.** In any enforcement proceeding the Permittee seeking to establish the occurrence of an upset has the burden of proof.
- 19. Existing manufacturing, commercial, mining, and silvicultural dischargers** (comply with 40 CFR §122.42(a))

In addition to the reporting requirements under 40 CFR §122.41(l), all existing manufacturing, commercial, mining, and silvicultural dischargers must notify the Director of Health as soon as they know or have reason to believe:

- a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in this permit, if that discharge will exceed the highest of the following “notification levels”:
 - (1) One hundred micrograms per liter (100 µg/l);

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- (2) Two hundred micrograms per liter (200 µg/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 µg/l) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/l) for antimony;
 - (3) Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR §122.21(g)(7); or
 - (4) The level established by the Director of Health in accordance with 40 CFR §122.44(f).
- b. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in this permit, if that discharge will exceed the highest of the following “notification levels”:
- (1) Five hundred micrograms per liter (500 µg/l);
 - (2) One milligram per liter (1 mg/l) for antimony;
 - (3) Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR §122.21(g)(7); or
 - (4) The level established by the Director of Health in accordance with 40 CFR §122.44(f).
- 20. Publicly owned treatment works (comply with 40 CFR §122.42(b))**

This section applies only to publicly owned treatment works as defined in 40 CFR §122.2.

- a. All publicly owned treatment works must provide adequate notice to the Director of Health of the following:
 - (1) Any new introduction of pollutants into the publicly owned treatment works from an indirect discharger which would be subject to Section 301 or 306 of the Act if it were directly discharging those pollutants; and
 - (2) Any substantial change in the volume or character of pollutants being introduced into that publicly owned treatment works by a source

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introducing pollutants into the publicly owned treatment works at the time of issuance of the permit; and

- (3) For purposes of this paragraph, adequate notice shall include information on paragraph (1), the quality and quantity of effluent introduced into the publicly owned treatment works, and paragraph (2), any anticipated impact of the change on the quantity or quality of effluent to be discharged from the publicly owned treatment works.
- b. (The following condition has been established by EPA Region 9 to enforce applicable requirements of the Resource Conservation and Recovery Act.) Publicly owned treatment works may not receive hazardous waste by truck, rail, or dedicated pipe except as provided under 40 CFR Part 270. Hazardous wastes are defined in 40 CFR Part 261 and include any mixture containing any waste listed under 40 CFR §§261.31-261.33. The Domestic Sewage Exclusion (40 CFR §261.4) applies only to wastes mixed with domestic sewage in a sewer leading to a publicly owned treatment works and not to mixtures of hazardous wastes and sewage or septage delivered to the treatment plant by truck.

21. Reopener clause (comply with 40 CFR §122.44(c), 40 CFR §122.46(d), and 40 CFR §125.123(d)(4))

- a. For any discharger within a primary industry category (see 40 CFR Part 122, Appendix A), requirements under Section 307(a)(2) of the Act as follows:
 - (1) On or before June 30, 1981:
 - (A) If applicable standards or limitations have not yet been promulgated, this permit shall include a condition stating that, if an applicable standard or limitation is promulgated under Sections 301(b)(2)(C) and (D), 304(b)(2), and 307(a)(2) of the Act and that effluent standard or limitation is more stringent than any effluent limitation in this permit or controls a pollutant not limited in this permit, this permit shall be promptly modified or revoked and reissued to conform to that effluent standard or limitation.
 - (B) If applicable standards or limitations have been promulgated or approved, this permit shall include those standards or limitations. (If EPA approves existing effluent limitations or decides not to develop new effluent limitations, it will publish a notice in the Federal Register that the limitations are “approved” or the purpose of this regulation.)

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- (2) On or after the statutory deadline set forth in Sections 301(b)(2)(A), (C), and (E) of the Act, any permit issued shall include effluent limitations to meet the requirements of Sections 301(b)(2)(A), (C), (D), (E), and (F) of the Act, whether or not applicable effluent limitations guidelines have been promulgated or approved. These permits need not incorporate the clause required by this section.
 - (3) The Director of Health shall promptly modify or revoke and reissue any permit containing the clause required under this section to incorporate an applicable effluent standard or limitation under Sections 301(b)(2)(C) and (D), 304(b)(2), and 307(a)(2) of the Act which is promulgated or approved after this permit is issued if that effluent standard or limitation is more stringent than any effluent limitation in this permit, or controls a pollutant not limited in this permit.
 - (4) For any permit issued to a treatment works treating domestic sewage, including "sludge-only facilities," the Director of Health shall include a reopener clause to incorporate any applicable standard for sewage sludge use or disposal promulgated under Section 405(d) of the Act. The Director of Health may promptly modify or revoke and reissue any permit containing the reopener clause required by this paragraph if the standard for sewage sludge use or disposal is more stringent than any requirements for sludge use or disposal in this permit, or controls a pollutant or practice not limited in this permit.
- b. All permits which authorize the discharge of pollutants pursuant to 40 CFR §125.123(c) shall contain the following clause: In addition to any other grounds specified herein, this permit shall be modified or revoked at any time if, on the basis of any new data, the Director of Health determines that continued discharge may cause unreasonable degradation of the marine environment.
- 22. Privately owned treatment works** (The following conditions were established by EPA Region 9 to enforce applicable requirements of the Resource Conservation and Recovery Act and 40 CFR §122.44(m).)
- This section applies only to privately owned treatment works as defined in 40 CFR §122.2.
- a. Materials authorized to be disposed of into the privately owned treatment works and collection system are typical domestic sewage. Unauthorized materials are hazardous waste (as defined 40 CFR Part 261), motor oil, gasoline, paints,

STANDARD NPDES PERMIT CONDITIONS

varnishes, solvents, pesticides, fertilizers, industrial wastes, or other materials not generally associated with toilet flushing or personal hygiene, laundry, or food preparation, unless specifically listed under "Authorized Non-domestic Sewer Dischargers" elsewhere in this permit.

- b. It is the Permittee's responsibility to inform users of the privately owned treatment works and collection system of the prohibition against unauthorized materials and to insure compliance with the prohibition. The Permittee must have the authority and capability to sample all discharges to the collection system, including any from septic haulers or other unsewered dischargers, and shall take and analyze the samples for conventional, toxic, or hazardous pollutants when instructed by the permitting authority or by an EPA or State inspector. The Permittee must provide adequate security to prevent unauthorized discharges to the collection system.
- c. Should a user of the privately owned treatment works desire authorization to discharge non-domestic wastes, the Permittee shall submit a request for permit modification and an application, under 40 CFR §122.44(m), describing the proposed discharge. The application shall, to the extent possible, be submitted using EPA Forms 1 and 2C, unless another format is requested by the permitting authority. If the privately owned treatment works or collection system user is different from the Permittee, and the Permittee agrees to allow the non-domestic discharge, the user shall submit the application and the Permittee shall submit the permit modification request. The application and request for modification shall be submitted at least six (6) months before authorization to discharge non-domestic wastes to the privately owned treatment works or collection system is desired.

23. Transfers by modification (comply with 40 CFR §122.61(a) and Hawaii Administrative Rules, Chapter 11-55, Section 11-55-16)

Except as provided in section 24, a permit may be transferred by the Permittee to a new owner or operator only if the permit has been modified or revoked and reissued (under 40 CFR §122.62(b)(2)), or a minor modification made (under 40 CFR §122.63(d)), to identify the new Permittee and incorporate other requirements as may be necessary under the Act.

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24. Automatic transfers (comply with 40 CFR §122.61(b) and Hawaii Administrative Rules, Chapter 11-55, Section 11-55-04(d))

As an alternative to transfers under section 23, any NPDES permit may be automatically transferred to a new Permittee if:

- a. The current Permittee notifies the Director of Health at least 30 days in advance of the proposed transfer date in subsection b;
- b. The notice includes a written agreement between the existing and new Permittees containing a specific date for transfer of permit responsibility, coverage, and liability between them; and
- c. The Director of Health does not notify the existing Permittee and the proposed new Permittee of his or her intent to modify or revoke and reissue the permit. A modification under this paragraph may also be a minor modification under 40 CFR §122.63. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in subsection b.

25. Minor modification of permits (comply with 40 CFR §122.63)

Upon the consent of the Permittee, the Director of Health may modify a permit to make the corrections or allowances for changes in the permitted activity listed in this section, without following the procedures of 40 CFR Part 124. Any permit modification not processed as a minor modification under this section must be made for cause and with 40 CFR Part 124 draft permit and public notice as required in 40 CFR §122.62. Minor modifications may only:

- a. Correct typographical errors;
- b. Require more frequent monitoring or reporting by the Permittee;
- c. Change an interim compliance date in a schedule of compliance, provided the new date is not more than 120 days after the date specified in the existing permit and does not interfere with attainment of the final compliance date requirement;
- d. Allow for a change in ownership or operational control of a facility where the Director of Health determines that no other change in the permit is necessary, provided that a written agreement containing a specific date for transfer of permit responsibility, coverage, and liability between the current and new Permittees has been submitted to the Director of Health:

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- e. (1) Change the construction schedule for a discharger which is a new source. No change shall affect a discharger's obligation prior to discharge under 40 CFR §122.29.
 - (2) Delete a point source outfall when the discharge from that outfall is terminated and does not result in discharge of pollutants from other outfalls except in accordance with the permit limits.
 - f. (Reserved.)
 - g. Incorporate conditions of a publicly owned treatment works pretreatment program that has been approved in accordance with the procedures in 40 CFR §403.11 (or a modification thereto that has been approved in accordance with the procedures in 40 CFR §403.18) as enforceable conditions of the publicly owned treatment works' permit.
- 26. Termination of permits** (comply with 40 CFR §122.64, 40 CFR §124.5(d), and Hawaii Administrative Rules, Chapter 11-55, Section 11-55-18)
- a. The following are causes for terminating a permit during its term, or for denying a permit renewal application:
 - (1) Noncompliance by the Permittee with any condition of the permit;
 - (2) The Permittee's failure in the application or during the permit issuance process to disclose fully all relevant facts or the Permittee's misrepresentation of any relevant facts at any time;
 - (3) A determination that the permitted activity endangers human health or the environment and can only be regulated to acceptable levels by permit modification or termination; or
 - (4) A change in any condition that requires either a temporary or a permanent reduction or elimination of any discharge or sludge use or disposal practice controlled by the permit (for example, plant closure or termination of discharge by connection to a publicly owned treatment works).
 - b. An NPDES Permittee shall report within 30 days after the permanent discontinuance or dismantlement of that treatment works or waste outlet for which the NPDES permit had been issued. The NPDES permit shall then be surrendered to the Director of Health within 30 days from the date of the report.

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- c. The Director of Health shall follow the applicable State procedures equivalent to 40 CFR Part 124 in terminating any NPDES permit under this section, except that if the entire discharge is permanently terminated by elimination of the flow or by connection to a publicly owned treatment works (but not by land application or disposal into a well), the Director of Health may terminate the permit by notice to the Permittee. Termination by notice shall be effective 30 days after notice is sent, unless the Permittee objects within that time. If the Permittee objects during that period, the Director of Health shall follow 40 CFR Part 124 of this chapter or applicable State procedures for termination. Expedited permit termination procedures are not available to Permittees that are subject to pending State or Federal of both enforcement actions including citizen suits brought under State or Federal law. If requesting expedited permit termination procedures, a Permittee must certify that it is not subject to any pending State or Federal enforcement actions including citizen suits brought under State or Federal law. State-authorized NPDES programs are not required to use 40 CFR Part 22 procedures for NPDES permit terminations.
- d. If the Director of Health tentatively decides to terminate a permit under 40 CFR §122.64 where the Permittee objects, the Director of Health shall issue a notice of intent to terminate. A notice of intent to terminate is a type of draft permit which follows the same procedures as any draft permit prepared under 40 CFR §124.6.
- 27. Removed substances** (under Section 405 of the Act and 40 CFR §125.3(g))
- Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner which would prevent any pollutant from the materials from entering navigable waters.
- 28. Availability of reports** (under Section 308 of the Act)
- Except for data determined to be confidential under 40 CFR Part 2, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Director of Health. As required by the Act, permit applications, permits, and effluent data shall not be considered confidential.

STANDARD NPDES PERMIT CONDITIONS**29. Civil and criminal liability** (under Section 309 of the Act)

Except as provided in permit conditions on "Bypass" (section 17) and "Upset" (section 18), nothing in this permit shall be construed to relieve the Permittee from civil or criminal penalties for noncompliance.

30. Oil and hazardous substance liability (under Section 311 of the Act)

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the Permittee from any responsibilities, liabilities, or penalties to which the Permittee is or may be subject under Section 311 of the Act.

31. Federal facility construction (under Section 313(b) of the Act)

Construction shall not be initiated for facilities for treatment of wastewater at any Federal property or facility if alternative methods for wastewater treatment at the property utilizing innovative treatment processes and techniques, including, but not limited to, methods utilizing recycle and reuse techniques and land treatment are not utilized, unless the life cycle cost of the alternative treatment works exceed the life cycle cost of the most effective alternative treatment by more than 15 per cent.

32. State law (under Section 510 of the Act)

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the Permittee from any responsibilities, liabilities, or penalties established under any applicable State law or regulation.

33. Severability (under Section 512 of the Act)

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, if held invalid, the application of the provision to other circumstances, and remainder of this permit, shall not be affected thereby.

APPENDIX EE

Aqua Engineers Sewer Requirements

Aqua Engineers Collection System Design and Construction Protocol (POH modified) (July 2009)

SECTION 1 AS-BUILT DRAWINGS

SECTION 2 MANHOLE INSERTS

SECTION 3 BIOBARRIER REQUIREMENTS

SECTION 4 WASTEWATER SYSTEM ABANDONMENT

SECTION 5 AQUA ENGINEERS PERMIT APPLICATION

SECTION 6 SEWER LINE CLEANING

6.1 Description / Requirements

SECTION 7 INFILTRATION-EXFILTRATION TESTS

7.1 Description

7.2 Low Pressure Air Testing Requirements

7.3 Water Exfiltration Test Requirements

SECTION 8 CCTV INSPECTION

8.1 Description / Requirements

SECTION 9 MANDREL TESTS FOR PVC PIPE

9.1 Description / Requirements

SECTION 10 TESTING OF MANHOLES

10.1 Description

10.2 Vacuum Testing

10.3 Hydrostatic Testing

APPENDICES

Appendix A

Pump Station Design Standards—NOT APPLICABLE

Appendix B

Pump Station SCADA Specifications—NOT APPLICABLE

Appendix C

AQUA ENGINEERS Schofield Bks PRETREATMENT CODE
—NOT APPLICABLE

Appendix D

Schofield Barracks New Connection Application Form
Aqua Engineers Abandonment Application Form

Aqua Engineers Collection System Design and Construction Protocol

1. AS-BUILT DRAWINGS: Submit as-built drawings identifying all sewer lines abandoned-in-place in this project as indicated in section 4 below.

2 MANHOLE INSERTS:

2.1 Manhole Inserts: Manholes in paved areas (and unpaved areas subject to ponding) shall have a manhole insert fully seated around the manhole frame rim to prevent water from infiltrating between the cover and the manhole frame rim. (Manhole frame shall be cleaned of all dirt and debris prior to placing the manhole insert on the rim.)

2.2 Manhole Inserts (similar to “No Flow Inflow Dish” or approved equal) shall be made of high density polyethylene copolymer material that meets ASTM specification designation D1248, Class A, Category 5, Type 111 (the insert shall have a minimum impact brittleness temperature of -180 deg F). The thickness shall be uniform 3mm or greater. The insert shall be manufactured to the dimensions as shown on the contract drawings to allow easy installation within the manhole frame. A lift strap shall be attached to the rising edge of the bowl of the insert. The lift strap shall be made of 1” width woven polypropylene web and shall be seared on all cut ends to prevent unraveling. The lift strap shall be attached to the insert by means of a stainless steel rivet. Location of the lift strap shall be such as to provide easy visual location. Ventilation of the Insert shall be via a vent hole located on the side wall of the dish 19mm below the lip. The hole thus placed allows a maximum release of 38 liters per 24 hours and is not affected by debris that might collect at the bottom of the dish.

3 BIOBARRIER REQUIREMENTS: Joint installation shall comply with the manufacturer’s instructions. “Biobarrier” (herbicide impregnated geotextile fabric) or approved equal root barrier shall be wrapped around all joints of new sewer pipes and appurtenances within the spread (branches and leaves) of existing trees and 6m (20 ft) from center of newly planted trees. The root deterrent material shall extend a minimum of 230mm (9”) on either side of the joint. Overlap of material shall be 100mm (4”) minimum. Method of fastening material to the pipe shall be with plastic ties or as recommended by the manufacturer and subject to the approval of the Contracting Officer.

4 WASTEWATER SYSTEM ABANDONMENT:

4.1 Sewer manholes (SMH) and sewer lines located under proposed buildings shall be completely removed.

4.2 Sewer manholes (SMH) and sewer lines not required to be demolished and removed to facilitate construction of new work (i.e. not located under any walls, bldgs or other structures, etc.), may be abandoned-in-place, provided the abandonment procedures below are followed.

4.2.1 Schofield Barracks Wastewater System--In-place Abandonment Procedures

- All projects that involve abandonment of the existing collection system shall require submittal of the associated permit. The Contractor shall submit the permit to Aqua Engineers prior to construction.
- Abandonment may not begin until the Contractor has received written approval of the submitted permit application. Aqua Engineers shall review and provide the Contractor a written response to the permit application within fourteen (14) calendar days after receipt of the application.
- Prior to abandonment, sewer lines and manholes shall be cleaned of all waste debris to prevent hazardous gas buildup. Sewer cleaning procedures will be performed per Section 6.1.
- Abandoned sewer lines shall be plugged with concrete into each end for a length of 1.5 times the diameter of the pipe into the abandoned line with concrete bulkhead protruding a minimum of 12" from the end of the pipe. The bulkhead will be sized to provide a minimum of 6" extension beyond the diameter of the pipe. (See attached sketch). Soil encasing of the bulkhead shall be compacted to 90% of laboratory maximum density.
- Sewer lines greater than 18" in diameter shall be filled entirely with concrete.
- Abandoned PVC pipe shall be capped with a glued in place PVC end cap.
- Laterals should also be abandoned using the PVC pipe abandonment procedures above.
- Frame and covers of manholes shall be removed and returned to Aqua Engineers, Inc. (Phone Number: 621-3098). Cone section of manholes (or top 1 m of cast-in-place manholes and other structures) shall be completely removed. Break bottom of manholes to permit subsurface drainage through the bottom. Remaining portion of manhole interior shall be backfilled with compacted granular material, such as base course or S4C. Compaction shall be to 95% of max density.
- As-built drawings of the demolition plan shall identify all abandoned in place sewer lines, manholes and other structures. Topo survey shall reflect these abandoned lines by changing the level to the abandoned utility line level per AECC CADD Standards.

SECTION 5: AQUA ENGINEERS PERMIT APPLICATION

5.1 DESCRIPTION / REQUIREMENTS

All projects that involve a new connection to the existing collection system, or construction of grease traps, or oil/water separators shall require submittal of the associated permit. Discharge from oil/water separators shall be in accordance with applicable portions of Appendix C: Aqua Engineers Schofield Barracks Wastewater Treatment Plant Pretreatment Code. The Contractor shall submit the permit to Aqua Engineers prior to construction. Construction may not begin until the Contractor has received written approval of the submitted permit application. Aqua Engineers shall review and provide the Contractor a written response to the permit application within fourteen (14) calendar days after receipt of the application.

The following permit applications are included in this section:

- Schofield Barracks/Oahu Wastewater System - New Connection Application Form
- Aqua Engineers Grease Trap Permit Application—Not Applicable
- Aqua Engineers Oil/Water Separator Permit Application—Not Applicable
- Aqua Engineers Abandonment Application--(Required only if Contractor proposes to abandon existing sewer lines)

Each permit submittal shall consist of a minimum of 2 hard copies. Permit submittals for Schofield Barracks, East Range and Wheeler Army Airfield shall be sent to:

Schofield Barracks, East Range and Wheeler Army Airfield.
Aqua Engineers, Inc.
Schofield Office
P.O. Box 861561
Wahiawa, HI 96786

Or hand deliver to:

Wheeler Army Airfield
Building 345
Airdrome Road
Wahiawa, HI 96786

SECTION 6

SEWER LINE CLEANING

6.1 DESCRIPTION / REQUIREMENTS

Prior to acceptance by Aqua Engineers, Inc. of any sanitary sewer line, the Contractor shall clean all pipe by flushing each line with clean water. Debris traps shall be placed in the downstream manholes of all sections of line being cleaned. Any stoppages, dirt, or foreign matter shall be removed from the lines and /or manholes. Any dirt, debris or foreign material shall be flushed out of the lines and removed. All cleaning and/or testing of any sewer line, sanitary or storm, shall take place after the completion of all the work (backfilling, compacting, etc.) and after subgrade is made but prior to final paving and concrete work.

The attached Line Cleaning Record Form shall be completed and submitted to the Collection System Superintendent as a requirement of acceptance.

| Structure Identifier | | Type of Equipment/Operation | | Operation Time | | Debris | | | Condition & Severity | | Reason for Maint. | Special Conditions | Line Length | Pipe Size | Hot Spot | Flow |
|----------------------|-----|-----------------------------|---|----------------|------|--------|---|------------------|----------------------|-----|-------------------|--------------------|-------------|-----------|----------|------|
| | | | | H:MM | H:MM | Type | | Overall Severity | Pounds | C/S | | | | | | |
| U/S | D/S | 1 | 2 | 1 | 2 | 1 | 2 | | | | | | | | | |

Initials of Crew: _____

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U/S Identifier D/S Identifier Special Conditions

| | | |
|--|--|--|
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| | | |
| | | |

Type of Equipment/Operation

- 0=None or N/A
- 1=Power Rodder
- 2=Chain Flail/Root Saw
- 3=TV
- 4=Flush
- 5=Visual
- 6=Root Control
- 7=Other
- A=HVC
- B=Hand Rodder

Debris Type

- 0 = Clear or N/A
- 1 = Egg Shells or Grounds
- 2 = Grease or Soap
- 3 = Paper or Rags
- 4 = Grit (Sand, Gravel, Etc.)
- 5 = Foreign Object
- 6 = Roots
- 7 = Mud
- 8 = Solids
- 9 = Other

Debris Severity

- 0 = Clear
- 1 = Mild
- 2 = Medium
- 3 = Severe
- 4 = Stoppage

Sewer Condition

- 0 = No Problem or N/A
- 1 = Broken Pipe
- 2 = Offset Joints
- 3 = Infiltration
- 4 = Roots
- 5 = Sagging Pipe
- 6 = Other

Sewer Severity

- 0 = N/A
- 1 = Minor
- 2 = Moderate
- 3 = Severe

Reason for Maintenance

- 0 = Routine/Scheduled
- 1 = Outside Service Request
- 2 = In-House Service Request
- 3 = Outside Service Request – Agency
- 4 = Outside Service Request – Owners
- 5 = Vandalism
- 6 = Marked for USA

Special Conditions

- 0 = None
- 1 = Write Below

SECTION 7

INFILTRATION-EXFILTRATION TESTS

7.1 DESCRIPTION

Prior to the acceptance of any sanitary sewer line, the said line shall be tested for leakage by either infiltration or exfiltration (air testing) depending upon the groundwater table level. The Contractor shall be required to supply all equipment or materials and manpower required to perform any and all acceptance tests required by Aqua Engineers, Inc.

The Contractor may test using either the Water Exfiltration Test or the Air Test as described below. Due to safety concerns when air testing large-diameter sewers, it is recommended (not required) that sewer mains larger than 15 inches in diameter be tested using the Water Exfiltration Test.

WHEN TESTED:

1. In areas to be left unpaved, the pressure test shall be made after the backfill is satisfactorily compacted.
2. In areas to be paved, the pressure test shall be made after the "base" material has been satisfactorily compacted.

The test, as noted in item 1 or 2, above, is considered the "official test." However, preliminary testing is strongly recommended and may be conducted by the Contractor at any time prior to the "official test."

7.2 LOW PRESSURE AIR TESTING REQUIREMENTS

The Contractor shall furnish at his own expense all materials, equipment and manpower required to perform the test. The sewer laterals shall be tested by inserting air plugs in the lateral and isolating the portion of the sewer lateral that has been replaced or rehabilitated. The lateral, including the cleanout wyes, shall be air tested. If the tested line does not meet the requirements of the test, the Contractor, at his own expense, shall determine, locate, and remedy the cause.

Aqua Engineers, Inc. will allow air testing to be completed provided that the Contractor meets the following requirements:

1. The Contractor shall be fully responsible and take all precautions necessary to ensure the safety of their workers.
2. All plugs shall be adequately braced to support the full load developed.
3. No workers shall be allowed in the excavation or manhole while the

line is under pressure. The Contractor shall make provisions for reading the pressure at the ground surface and for safely releasing the air pressure without entering the manhole or excavation.

4. Air shall be slowly fed into the plugged pipe until the internal air pressure reaches 4.0 pounds per square inch greater than the average back pressure of any groundwater that may submerge the pipe. At least 2 minutes shall be allowed for temperature stabilization before proceeding further.
5. The rate of air loss shall then be determined by measuring the time interval required for the internal pressure to decrease from 3.5 to 2.5 pounds per square inch greater than the average back pressure of any groundwater that may submerge the pipe.

The minimum test time considered acceptable shall be calculated using Ramseur's equation as follows:

$$T = 0.085 \frac{DK}{Q}$$

where

T = shortest time, in seconds, allowed for the air pressure to drop 1.0 psig

K = 0.000419 DL, but not less than 1.0

Q = 0.0015 cubic feet/minute/square feet of internal

surface

D = nominal pipe diameter in inches

L = length of pipe being tested in feet.

Each section of sewer main and service lateral shall be tested between successive manholes by plugging and bracing all openings in the sewer lines. If any leaks are found, the air pressure shall be released, the leaks eliminated, and the test procedure started over again.

The final leakage test of the sewer main line and branching service laterals shall be conducted in the presence of the Collection System Superintendent.

The time and procedure for air testing the pipe shall be calculated in accordance with ASTM C 828.

7.3 WATER EXFILTRATION TEST REQUIREMENTS:

After pipe installation and cleaning, the section of pipeline to be tested shall be prepared for testing by plugging the upper side of the downstream manhole and all openings in the upstream manhole except the downstream opening. Where manholes are widely spaced, sections may be tested by blocking upstream end of pipe. Where grades are slight, two or more sections between manholes may be tested at once. Where grades are steep, and excessive test heads would result by testing from one manhole to another, test tees the full size of the main shall be installed at intermediate points so the maximum head on any section under test will not exceed 15 feet.

A section of pipe prepared as above shall be tested by filling with water to an elevation 5 feet above the top pipe at the upstream end of the test section, or 5 feet above the existing groundwater elevation, whichever is greater. Where required due to high groundwater levels, Contractor shall provide standpipe to allow for the required testing head. The testing head may be above the ground surface in some cases. The water shall be introduced into the test section at least 24 hours in advance of the test period to allow the pipe and joint material to become saturated. The loss in water may be determined by measuring additions of water required to maintain the specified head or by measuring the rate of fall of water level, but the level shall not be allowed to fall more than 1 foot below the initial elevation.

Should the initial test show excess leakage in a section of pipe, it is permissible to draw the water off and test the manholes that contained water. This test shall be made by plugging all the openings in the manholes and filling with water to the same elevation as existed during the test. The leakage from the manhole may be deducted from the total leakage of the test section in calculating the pipe leakage.

The pressure shall be maintained for not less than 2 hours. Leakage shall not exceed 80 gallons per inch of diameter per mile of pipe for 24 hours. All expense of testing shall be borne by the Contractor.

SECTION 8

CCTV INSPECTION

8.1 DESCRIPTION / REQUIREMENTS

All 8-inch and greater main sewers will be subject to initial closed-circuit television inspection performed by a third party hired by the Contractor prior to acceptance. The Contractor shall repair all problems revealed by the television inspection at its own cost. The Contractor shall coordinate with the Collection System Superintendent to arrange for a compatible time to conduct the inspection.

The complete job is ready for television inspection when the following work has been completed:

1. All sewer laterals and mains are installed and backfilled.
2. All structures are in place, complete and pipes are accessible from structures.
3. All other underground facilities, public and private, utility piping and conduits are installed.
4. Pipelines to be inspected have been flushed.
5. Final air or water testing has been completed and passed.

When the above work is complete, the Contractor shall arrange for the CCTV inspection.

The Contractor of the project will notify the Collection System Superintendent as to the scheduled date of the CCTV inspection.

The CCTV inspection shall be recorded in color using the digital CDROM or VHS format. An individual run report shall be prepared (typed) for each lateral inspected. One set of the VHS or CDROM and any paper reports shall be submitted to the Collection System Superintendent for review.

Upon receipt of the inspection tapes and reports, the Collection System Superintendent will notify the Contractor in writing within five (5) working days of any deficiencies revealed by the CCTV inspection that will require repair. If corrective work is indicated and the Contractor wishes to view the videotapes, he shall contact Aqua Engineers, Inc. to set a time for the viewing.

Sewer mains and laterals that have been corrected must be retested and re-televised.

The procedure outlined above will be repeated until all deficiencies observed by CCTV inspection have been corrected to the complete satisfaction of Aqua Engineers, Inc.

The following conditions observed during the CCTV Inspection shall be considered as defects which will require correction prior to acceptance by Aqua Engineers, Inc.

1. Joint separations which are $\frac{3}{4}$ -inches less than full insertion of the joint.
2. Offset or cocked joints.
3. Chips, cracks, indentations and other damage which would impact the structural integrity of the pipe and/or reduce the service life of the pipe.
4. Infiltration.
5. Protrusion of gasket into the piping at joints indicative of an improperly assembled joint.
6. Irregularly shaped pipe.
7. Pipe sags
8. Other obvious defects

The following conditions observed during the CCTV Inspection shall be considered as defects which will require correction prior to acceptance by Aqua Engineers, Inc.

**TABLE 1
SAG TOLERANCES**

| Pipe Slope | Nom. Pipe Size | Complies w/Specifications | Reconstruction Required |
|--------------|----------------|---------------------------|-------------------------|
| <0.4% | 6" | < 1/2" | >1/2" |
| | 8" | < 1/2" | >1/2" |
| | 10" | < 1" | > 1" |
| | 12" | < 1" | > 1" |
| | >12" | < 1" | > 1" |
| 0.4% to 0.7% | 6" | < 1/2" | > 1/2" |
| | 8" | < 1/2" | > 1/2" |
| | 10" | < 1" | > 1" |
| | 12" | < 1" | > 1" |
| | >12" | < 1" | > 1" |
| >0.7% | 6" | < 1" | > 1" |
| | 8" | < 1" | > 1" |
| | 10" | < 1-1/2" | > 1-1/2" |
| | 12" | < 1-1/2" | > 1-1/2" |
| | >12" | < 1-1/2" | > 1-1/2" |

In the event that Aqua Engineers, Inc. determines that numerous defects are observable and is therefore indicative of poor workmanship, Aqua Engineers, Inc. may require that the entire segment be removed from Structure-to-Structure as Defective Work.

In the event of a dispute regarding the depth of a pipe sag, Aqua Engineers, Inc. will measure the depth of the sag with a measuring device. In the event that the depth of the sag is so obvious as to make the measurement unnecessary, should the Contractor request measurement of the depth; the Contractor will be charged for the additional work at Aqua Engineers, Inc.'s current inspection rate.

All Corrective Work shall be performed in accordance with the original Contract Plans and Specifications.

Sewer mains and laterals that have been corrected shall be leakage tested in accordance with the Section 6 and shall be re-inspected using CCTV at the Contractor's expense.

In the event that defects are still observed after a maximum of two (2) repair attempts, the entire segment of piping shall be replaced from Structure-to-Structure.

TELEVISION INSPECTION DATA ENTRY FORM

Main ID U/S WIMS # D/S WIMS #

Work order # Date / / Activity TVI Diameter in Material

Flow Depth (quarters) 0 1 2 3 4 Weather: Clear Cloudy Rain

Job # Reverse Setup

Operator Sketch

Pipe Deterioration L M H Prior History

VTR

Format VHS Super VHS Tape #

Index frames to

CONDITION RATING

Structural Main Lifts

Root I/I

Page of

Reverse Setup

Sketch

Prior History

SUMMARY

RECOMMENDATIONS

| Setup | Folage | VTR (h:m:s) | Clock Position | Grouded | Cracks | | Misaligned Joints | | Broken Joint | | Laterals | | Roots | | Debris | | Infiltration | Alignment | Structural | | Discrepancy | Photograph | |
|-------|--------|-------------|----------------|---------|---------------------|---------------------|-----------------------|-----------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------------|---------------------|---------------------|---------------------|
| | | | | | Radial | Longitudinal | Dropped Joint (Clear) | Stiffed Joint (Clear) | Wide Joint | Protruding | Defective | None | Out and Herb | Light | Heavy | Light | | | Heavy | Deterioration (Corrosion) | | | Ovality |
| U | | | | | <1" >1" >1" >1" | <1" >1" >1" >1" | >75% >75% >75% >75% | >75% >75% >75% >75% | >75% >75% >75% >75% | >75% >75% >75% >75% | >75% >75% >75% >75% | >75% >75% >75% >75% | >75% >75% >75% >75% | >75% >75% >75% >75% | >75% >75% >75% >75% | >75% >75% >75% >75% | >75% >75% >75% >75% | >75% >75% >75% >75% | >75% >75% >75% >75% | >75% >75% >75% >75% | >75% >75% >75% >75% | >75% >75% >75% >75% | >75% >75% >75% >75% |
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Typ - Typical Joint Vis G. - Visible Gasket Dead - Dead/Unused Service Pb - Pumper Service Def. - Defective Service Fcty - Factory Service Dev. Lt. - Line deviates left Dev. Rt. - Deviates right Grd Change - Grade change

TELEVISION INSPECTION DATA ENTRY FORM (Continuation Sheet)

Main ID U/S WIMS # _____ Job # _____ of _____
 Work order # _____ Date / / _____ Activity TVI Operator _____

| Setup | Footage | VTR (hrs) | Clock Position | Cracks | | | | Misaligned Joints | | | Broken Joint | | Laterals | | Roots | | Debris | | Infiltration | | Alignment | | Structural | | Comments | Discrepancy | Photograph | |
|-------|---------|-----------|----------------|---|----------------|-----------------------|-----------------------|-------------------|------------|-------------|--------------|-------|----------|-----------------|-------|-----|--------|-------|--------------|-------|-----------|-----|------------|-------|----------|-------------|------------|-----|
| | | | | Radial | Longitudinal | Dropped Joint (Clear) | Shifted Joint (Clear) | Wide Joint | Protruding | Defective | None | Light | Med | Heavy | Light | Med | Heavy | Light | Med | Heavy | Light | Med | Heavy | Light | | | | Med |
| U | | | | <1" >1" Hair-line <1" >1" Hair-line | >80% >80% >80% | >80% >80% >80% | 2-3" 2-3" 2-3" | Light | <1" Def | None | Light | Light | Sag | <10% | Hole | | | | | | | | | | | | | |
| D | | | | 0-25% 0-25% 0-25% 25-50% 25-50% 25-50% 50-75% 50-75% 50-75% | <80% <80% <80% | <80% <80% <80% | 3-4" 3-4" 3-4" | Med | 2" Dead | 10-75% Herb | Med | Med | Dev Lft | 10-25% Collapse | | | | | | | | | | | | | | |
| U | | | | 0-25% 0-25% 0-25% 25-50% 25-50% 25-50% 50-75% 50-75% 50-75% | >80% >80% >80% | >80% >80% >80% | 2-3" 2-3" 2-3" | Light | <1" Def | None | Light | Light | Sag | <10% | Hole | | | | | | | | | | | | | |
| D | | | | 0-25% 0-25% 0-25% 25-50% 25-50% 25-50% 50-75% 50-75% 50-75% | <80% <80% <80% | <80% <80% <80% | 3-4" 3-4" 3-4" | Med | 2" Dead | 10-75% Herb | Med | Med | Dev Lft | 10-25% Collapse | | | | | | | | | | | | | | |
| U | | | | 0-25% 0-25% 0-25% 25-50% 25-50% 25-50% 50-75% 50-75% 50-75% | >80% >80% >80% | >80% >80% >80% | 2-3" 2-3" 2-3" | Light | <1" Def | None | Light | Light | Sag | <10% | Hole | | | | | | | | | | | | | |
| D | | | | 0-25% 0-25% 0-25% 25-50% 25-50% 25-50% 50-75% 50-75% 50-75% | <80% <80% <80% | <80% <80% <80% | 3-4" 3-4" 3-4" | Med | 2" Dead | 10-75% Herb | Med | Med | Dev Lft | 10-25% Collapse | | | | | | | | | | | | | | |
| U | | | | 0-25% 0-25% 0-25% 25-50% 25-50% 25-50% 50-75% 50-75% 50-75% | >80% >80% >80% | >80% >80% >80% | 2-3" 2-3" 2-3" | Light | <1" Def | None | Light | Light | Sag | <10% | Hole | | | | | | | | | | | | | |
| D | | | | 0-25% 0-25% 0-25% 25-50% 25-50% 25-50% 50-75% 50-75% 50-75% | <80% <80% <80% | <80% <80% <80% | 3-4" 3-4" 3-4" | Med | 2" Dead | 10-75% Herb | Med | Med | Dev Lft | 10-25% Collapse | | | | | | | | | | | | | | |
| U | | | | 0-25% 0-25% 0-25% 25-50% 25-50% 25-50% 50-75% 50-75% 50-75% | >80% >80% >80% | >80% >80% >80% | 2-3" 2-3" 2-3" | Light | <1" Def | None | Light | Light | Sag | <10% | Hole | | | | | | | | | | | | | |
| D | | | | 0-25% 0-25% 0-25% 25-50% 25-50% 25-50% 50-75% 50-75% 50-75% | <80% <80% <80% | <80% <80% <80% | 3-4" 3-4" 3-4" | Med | 2" Dead | 10-75% Herb | Med | Med | Dev Lft | 10-25% Collapse | | | | | | | | | | | | | | |
| U | | | | 0-25% 0-25% 0-25% 25-50% 25-50% 25-50% 50-75% 50-75% 50-75% | >80% >80% >80% | >80% >80% >80% | 2-3" 2-3" 2-3" | Light | <1" Def | None | Light | Light | Sag | <10% | Hole | | | | | | | | | | | | | |
| D | | | | 0-25% 0-25% 0-25% 25-50% 25-50% 25-50% 50-75% 50-75% 50-75% | <80% <80% <80% | <80% <80% <80% | 3-4" 3-4" 3-4" | Med | 2" Dead | 10-75% Herb | Med | Med | Dev Lft | 10-25% Collapse | | | | | | | | | | | | | | |
| U | | | | 0-25% 0-25% 0-25% 25-50% 25-50% 25-50% 50-75% 50-75% 50-75% | >80% >80% >80% | >80% >80% >80% | 2-3" 2-3" 2-3" | Light | <1" Def | None | Light | Light | Sag | <10% | Hole | | | | | | | | | | | | | |
| D | | | | 0-25% 0-25% 0-25% 25-50% 25-50% 25-50% 50-75% 50-75% 50-75% | <80% <80% <80% | <80% <80% <80% | 3-4" 3-4" 3-4" | Med | 2" Dead | 10-75% Herb | Med | Med | Dev Lft | 10-25% Collapse | | | | | | | | | | | | | | |

Typ - Typical Joint Vis G - Visible Gasket Dead - Dead/Unused Service Pb - Plumber Service Def - Defective Service Fcty - Factory Service Dev Lft - Line deviates left Dev Rt - Deviates right Gro Change - Grade change

SECTION 9

MANDREL TESTS FOR PVC PIPE

9.1 DESCRIPTION / REQUIREMENTS

In addition to the previously identified tests, prior to acceptance by the Collection System Superintendent of any composite or PVC sanitary sewer line, the said line shall be tested initially after backfilling and paving, and a minimum of 31 days after backfilling to street subgrade or finish grade in non-street areas as follows (any section failing to pass the test shall be repaired by the Contractor). The line shall again be tested one (1) month prior to the end of the warranty period. Failure during this warranty period test will also require repair of the failed section. Re-rounding will not be allowed. The Contractor shall furnish at his own expense all equipment, material, and manpower necessary to perform the test.

9.2 Only re-excavation and the installation of new pipe will be permitted to replace rejected pipe. Pipe subjected to any correction method or process other than removal shall be replaced with new pipe regardless of whether the method appears "successful" or not. Contractor shall be required to provide replacement pipe.

9.3 Following the placement and densification of backfill and after making subgrade but prior to placing of permanent base pavement or concrete, all main line pipe shall be cleaned and then mandrelled to measure for obstructions (deflections, joint offsets, and lateral pipe intrusions). A rigid mandrel, with a circular cross section having a diameter as indicated below, shall be pulled through the pipe by hand:

Mandrel shall be 95% of I.D of pipe with at least nine (9) fins or any odd number greater than 9.

I.D. = inside diameter as determined to be the maximum average per AWWA specification for the type of pipe.

9.4 The minimum length of the circular portion of the mandrel shall be equal to the nominal diameter of the pipe. The costs for all tests necessary to verify pipe adequacy are the responsibility of the Project Contractor. The Contractor shall provide the mandrel. The mandrel may be reviewed by the inspector after the test at his request. Upon request, the mandrel shall be immediately presented to the inspector who shall examine it and return it within two (2) working days. The request may be made before and/or after the test.

SECTION 10

TESTING OF MANHOLES

10.1 DESCRIPTION

All Project manholes shall be tested using either a vacuum or hydrostatic testing method described below.

10.2 VACUUM TESTING:

Vacuum test procedures and requirements shall be as follows:

1. After completion of the manhole barrels but prior to backfilling and grade ring installation and interior coating, all openings in the manholes are sealed with plugs and a rubber ring "donut" type plug inserted inside the opening of the cone.
2. A small vacuum pump is attached to a hose connected to the plug and 4 psi of vacuum applied.
3. The vacuum is permitted to stabilize at 3.5 psi for 1 minute; then the test is begun.
4. The manhole must maintain vacuum such that no greater than 0.5 psi of vacuum is lost during the specified test period.
5. The specified test period is as follows:

| <u>Manhole depth, ft</u> | <u>Test period, min.</u> |
|--------------------------|--------------------------|
| 0-5 | 4.5 |
| 5-10 | 5.5 |
| 10-15 | 6.0 |
| Greater than 15 | 6.5 |

6. Manholes that fail the test shall be patched as required and retested.
7. A vacuum regulator shall be provided on the vacuum pump such that no greater than 10 psi can be applied to the manhole during the test. All manholes that do not meet the leakage test, or are unsatisfactory from visual inspection, shall be repaired to the satisfaction of the Collection System Superintendent.

10.3 HYDROSTATIC TESTING

Hydrostatic test procedures and requirements shall be as follows:

1. All sewer manholes that shall be hydrostatically tested will be tested for leakage after installation, but prior to being backfilled. Prior to hydrostatic testing, all manholes shall be visually inspected for leaks. All leaks or cracks shall be repaired by the Contractor, with nonshrink grout, prior to hydrostatic testing, to the satisfaction of the Collection System Superintendent. All pipes entering the manhole shall be sealed at a point outside the manhole walls so as to include testing of the pipe/manhole joints.
2. The manhole shall be filled with water to a level 2 inches below the top of the frame. Safety lines shall be secured to all plugs utilized. After a period of at least 1 hour to allow the water level to stabilize, the manhole shall be refilled and the water level shall be checked. The water level shall again be checked after a period of 4 hours. Leakage in each manhole shall not exceed 0.1 gallons per hour per foot of head above the invert, or the Contractor shall be required to make all necessary repairs and retest the manhole.
3. The exterior of the manhole shall be inspected during this period for visible evidence of leakage. Visible moisture, sweating, or beads of water on the exterior of the manhole shall not be considered leakage, but any water running across the surface will be considered leakage and shall be repaired to the satisfaction of the Collection System Superintendent regardless of the volume of water lost.

Appendix D

Schofield Barracks/Oahu Wastewater System - New Connection
Application Form

Aqua Engineers Abandonment Application Form



SEWER CONNECTION APPLICATION FORM

Applicants shall submit a completed form with all required attachments (flow calculations, construction drawings/details, maps, etc).

I. PROJECT INFORMATION

Project Number: _____
Project Name (if any): _____
Location of Property (Installation): Schofield Barracks Wheeler Army Airfield Helemano Military Reservation
Street Address: _____

II. APPLICANT INFORMATION

Company Name: _____
Contact Person: _____ Title: _____
Business Mailing Address: _____
City: _____ State: _____ Zipcode: _____
Phone No.(s): _____ Fax No.: _____

III. ARCHITECT/ENGINEER INFORMATION

Company Name: _____
Contact Person: _____ Title: _____
Business Mailing Address: _____
City: _____ State: _____ Zipcode: _____
Phone No.(s): _____ Fax No.: _____

IV. CONTRACTOR INFORMATION (if known)

Company Name: _____
Contact Person: _____ Title: _____
Business Mailing Address: _____
City: _____ State: _____ Zipcode: _____
Phone No.(s): _____ Fax No.: _____

V. SERVICE CONNECTION INFORMATION

| | | | |
|---------------------------------------|-------|-------------------------------------|-------|
| Total number of service connections | _____ | Service connections Reduced/Removed | _____ |
| Estimated Average Daily Flow (gpd) | _____ | Est Reduction Avg Daily Flow (gpd) | _____ |
| Estimated Maximum Daily Flow (gpd) | _____ | Est Reduction Max Daily Flow (gpd) | _____ |
| Estimated Peak Wet Weather Flow (gpd) | _____ | Est Reduction Peak WW Flow (gpd) | _____ |

**Attach flow calculations in the sample format provided.*

Grease Trap(s) required? Yes No
If yes, please complete Grease Trap Application Form for each proposed new grease trap.

Oil/Water Separator(s) required? Yes No
If yes, please complete Oil/Water Separator Form for each proposed new oil/water separator.

Wastewater Pumping Station(s) required? Yes No

General Description of proposed new facilities:
**Attach construction drawings and construction schedule or summary of anticipated schedule.*

Monday, November 29, 2010

Location of new service connection(s), indicate proposed connection point(s) (attach maps): _____

Required upgrades to existing wastewater system (if known): _____

Please refer to the City and County of Honolulu Design Standards of the Department of Wastewater Management Volumes 1 and 2 for additional submittal requirements.

VI. CONDITIONS OF APPROVAL

- 1 Coordination with Aqua on the time and date when the physical connection will be made. We will require that an Aqua representative be present when the tie in to the manhole is physically being done.
- 2 Upon installation of the connection, the new sewer line must be plugged to prevent an inflow of wastewater into the manhole or WWTP collection system. The plug must be approved by Aqua. Please see the attached specifications of the approved plugs. If a permanent plug is approved, continue to number 5.
- 3 The pneumatic plug(s) shall include a poly-lift line/rope with inflation hoses for inflation/deflation of pipe plug(s). The poly-lift line and pressure gauge shall be attached to an eye bolt near the top of the manhole, allowing quick and easy visual inspection of the pressure gauge.
- 4 The Contractor shall check the pneumatic plug inflation pressure, at minimum, twice a week. The plug shall be maintained at the manufacturer's required inflation pressure.
- 5 No wastewater may be discharged into the manhole or WWTP collection system unless and until Aqua's written approval has been received.
- 6 The Contractor shall be responsible to bear the cost of making the connection to the wastewater collection system as approved by Aqua, any applicable tests, installing the plug or plugs, and making any repairs necessary for damages occurring due to construction of the connection.
- 7 The Contractor shall coordinate with Aqua on the test protocol, date and time of the test and any other test requirements (Infiltration-Exfiltration Test, Mandrel Tests for PVC Pipe, Hydrostatic Testing of Manholes, CCTV Inspection - 8" line or greater)
- 8 All work done related to the physical connection shall comply with Aqua Engineers Collection System Design and Construction Protocol, City and County of Honolulu Wastewater Design Standards and all applicable engineering/building/plumbing code standards. You will be responsible for restoring the area near the connection location to the same condition that existed immediately prior to the commencement of such work.
- 9 The Contractor shall notify Aqua, at a minimum, 72 hours in advance of all inspections, tests, and tie-in or any other work that will require modifications to the existing sewer system.
- 10 By signing below, you agree to the conditions and that except as described herein, Aqua has not made any representations or warranties of any kind regarding the existing WWTP collection system, including the physical condition, and you agree that you are accepting it on an "as is" basis.

Signature

Date

Print Name

Title

FOR AQUA ENGINEERS USE ONLY

New Connection Application Approved? YES NO

Comments: _____

Signature

Date

Print Name

Title

Monday, November 29, 2010



**SCHOFIELD BARRACKS WASTEWATER SYSTEM
 ABANDONMENT APPLICATION FORM**

I. APPLICANT INFORMATION

Company Name: _____
 Contact Person: _____ Title: _____
 Business Mailing Address: _____
 City: _____ State: _____ Zipcode: _____
 Phone No.: _____ Fax No.: _____
 Cell No.: _____ Email: _____

II. SERVICE ABANDONMENT INFORMATION

Project number PN _____
 Project Title _____
 Location of Work _____
 Permit Requirements- As part of the submittal process for receiving approval of this permit, the Applicant shall attach the following:
 1) Demolition plans - Show location of structure and location of wastewater lines.
 2) Termination details - provide detailed drawings indicating how and where the wastewater services will be terminated.
 Grease Trap(s) to be abandoned _____
 Oil/Water Separator(s) to be abandoned _____

Please refer to the Aqua Engineers Collection System Design and Construction Protocol for all abandonment requirements.

FOR AQUA ENGINEERS USE ONLY

| | | | | |
|-----------------------------------|-------|--------------------------|-------|--------------------------|
| Abandonment Application Approved? | YES | <input type="checkbox"/> | NO | <input type="checkbox"/> |
| Comments: | _____ | | | |
| Signature | _____ | | Date | _____ |
| Print Name | _____ | | Title | _____ |

APPENDIX FF

Section 01 57 23 Storm Water Pollution Prevention Measures

Guide specifications to be completed by the Contractor

DEPARTMENT OF THE ARMY POH-01 57 23 (April 2007)
U.S. ARMY CORPS OF ENGINEERS -----
Superseding
POH-01356 (November 2006)
POH-01356A (October 2005)

GUIDE SPECIFICATION FOR MILITARY CONSTRUCTION

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11/06

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DEPARTMENT OF THE ARMY POH-01 57 23 (April 2007)
U.S. ARMY CORPS OF ENGINEERS -----
Superseding
POH-01356 (November 2006)
POH-01356A (October 2005)

GUIDE SPECIFICATION FOR MILITARY CONSTRUCTION

SECTION 01 57 23

STORM WATER POLLUTION PREVENTION MEASURES
11/06

NOTE: This guide specification covers the requirements for environmental protection. This guide specification is to be used in the preparation of project specifications in accordance with ER 1110-345-720.

PART 1 GENERAL

1.1 REFERENCES

NOTE: Issue (date) of references included in project specifications need not be more current than provided by the latest guide specification. Use of SpecsIntact automated reference checking is recommended for projects based on older guide specifications.

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 (1999; R 2004e1) Water Permeability of Geotextiles by Permittivity
- ASTM D 4533 (2004) Trapezoid Tearing Strength of Geotextiles
- ASTM D 4632 (1991; R 2003) Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
- ASTM D 4751 (2004) Determining Apparent Opening Size of a Geotextile
- ASTM D 4873 (2002) Identification, Storage, and

Handling of Geosynthetic Rolls and Samples

1.2 GENERAL

The Contractor shall finalize this specification and specify and implement the storm water pollution prevention measures in a manner which will meet the requirements of Section 01 57 20 ENVIRONMENTAL PROTECTION, and the requirements of the National Pollution Discharge Elimination System (NPDES) permit attached to that Section.

1.3 SUBMITTALS

NOTE: Submittals must be limited to those necessary for adequate quality control. The importance of an item in the project should be one of the primary factors in determining if a submittal for the item should be required.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy projects.

Submittal items not designated with a "G" are considered as being for information only for Army projects and for Contractor Quality Control approval for Navy projects.

The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-07 Certificates

Mill Certificate or Affidavit

Certificate attesting that the Contractor has met all specified requirements.

1.4 EROSION AND SEDIMENT CONTROLS

Contractor shall finalize this specification to describe the intended controls and measures to be used in this project.

1.4.1 Stabilization Practices

NOTE: Describe interim stabilization practices, including site-specific scheduling of the implementation of the practices. Plans should ensure that existing vegetation is preserved where attainable and disturbed areas are stabilized. Show locations for stabilization practices on the drawings.

The stabilization practices to be implemented shall include temporary seeding, mulching, geotextiles, sod stabilization, vegetative buffer strips, erosion control matts, protection of trees, preservation of mature vegetation, etc. On his daily CQC Report, the Contractor shall 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 14 DAYS, stabilization practices shall be initiated as soon as practicable, but no more than 14 calendar days, in any portion of the site where construction activities have temporarily or permanently ceased.

1.4.1.1 Unsuitable Conditions

Where the initiation of stabilization measures by the fourteenth day after construction activity temporarily or permanently ceases is precluded by unsuitable conditions caused by the weather, stabilization practices shall be initiated as soon as practicable after conditions become suitable.

1.4.1.2 No Activity for Less Than 14 Days

Where construction activity will resume on a portion of the site within 14 days from when activities ceased (e.g., the total time period that construction activity is temporarily ceased is less than 14 days), then stabilization practices do not have to be initiated on that portion of the site by the fourteenth day after construction activity temporarily ceased.

1.4.2 Structural Practices

NOTES: Describe structural practices to divert flows from exposed soils, store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site to the degree attainable. A permit under Section 404 of the Clean Water Act may be required for certain structural practices. Check with Permits Branch.

For common drainage locations that serve a disturbed area of 4 or more hectares (10 or more acres) at one time, a temporary or permanent detention basin

providing 252 cubic meters of storage per hectare (3,600 cubic feet of storage per acre) drained, or equivalent control measures, shall be provided where attainable until stabilization of the site. The 252 cubic meters of storage per hectare (3,600 cubic feet of storage per acre) drained does not apply to flows from offsite areas and flows from onsite areas that are either undisturbed or have undergone final stabilization where such flows are diverted around the sediment basin. For drainage locations which serve a disturbed area of 4 or more hectares (10 or more acres) at one time and where a temporary sediment basin providing 252 cubic meters of storage per hectare (3,600 cubic feet of storage per acre) drained, or equivalent sediment controls, is not attainable, sediment controls are required for all sideslope and downslope boundaries of the construction area.

For drainage locations serving less than 4 hectares (10 acres), sediment traps, silt fences, or equivalent sediment controls are required for all sideslope and downslope boundaries of the construction area unless a sediment basin providing storage for 252 cubic meters of storage per hectare (3,600 cubic feet of storage per acre) drained is provided.

Structural practices shall be implemented to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Structural practices shall be implemented in a timely manner during the construction process to minimize erosion and sediment runoff. Structural practices shall include the following devices.

NOTE: Listed are examples of typical structural devices. Requirements for Silt Fences, Straw Bales, and Diversion Dikes are contained within this Guide Specification. Specifications for other structural practices used in the project must be added to this section.

- a. Silt fences.
- b. Straw bales.
- c. Diversion dikes.
- d. Drainage swales.
- e. Check dams.
- f. Subsurface drains.
- g. Pipe Slope drains.
- h. Level spreaders.
- i. Storm drain inlet protection.
- j. Rock outlet protection.
- k. Sediment traps.
- l. Reinforced soil retaining systems.
- m. Gabions.
- n. Sediment basins.
- o. .

The permanent stabilization practices which are to be installed under the contract should be specified in other section of the specifications. These are measures that will be installed during the construction process to control pollutants in storm water discharges that will occur after construction operations have been completed. Structural measures should be placed on upland soils to the degree attainable. The installation of these devices may be subject to Section 404 of the Clean Water Act.

A goal of 80 percent removal of total suspended solids from these flows which exceed predevelopment levels should be used in designing and installing storm water management controls (where practicable). Where this goal is not met, the permittee shall provide justification for rejecting each practice listed above based on site conditions.

Velocity dissipation devices shall be placed at discharge locations and along the length of any outfall channel as necessary to provide a non-erosive velocity flow from the structure to a water course so that the natural physical and biological characteristics and functions are maintained and protected.

1.4.2.1 Silt Fences

The Contractor shall provide silt fences as a temporary structural practice to minimize erosion and sediment runoff. Silt fences shall be properly installed 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). Silt fences shall be installed in the locations indicated on the drawings. Final removal of silt fence barriers shall be upon approval by the Contracting Officer.

1.4.2.2 Straw Bales

The Contractor shall provide bales of straw as a temporary structural practice to minimize erosion and sediment runoff. Bales shall be properly placed to 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, bales shall be placed as work progresses, bales shall be removed/replaced/relocated as needed for work to progress in the drainage area). Areas where straw bales are to be used are shown on the drawings. Final removal of straw bale barriers shall be upon approval by the Contracting Officer. Rows of bales of straw shall be provided 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.

Storm Water Pollution Prevention Measures

DB015723

- c. Along the toe of all cut slopes and fill slopes of the construction areas.

NOTE: Space rows a maximum of 60 meters (200 feet) apart in drains with slopes equal to or less than 5 percent and 30 meters (100 feet) apart in drains with slopes steeper than 5 percent. If drainage ditches have slopes above and below the 5 percent limit the spacing should be shown on the drawings.

- 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. Rows shall be spaced a maximum of 200 feet apart in drains with slopes equal to or less than 5 percent and 100 feet apart in drains with slopes steeper than 5 percent unless otherwise shown on the drawings.
- e. Perpendicular to the flow in the bottom of new drainage ditches, channels, and swales. Rows shall be spaced a maximum of 200 feet apart in drains with slopes equal to or less than 5 percent and 100 feet apart in drains with slopes steeper than 5 percent unless otherwise shown on the drawings.
- f. At the entrance to culverts that receive runoff from disturbed areas.

1.4.2.3 Diversion Dikes

Diversion dikes shall have a maximum channel slope of 2 percent and shall be adequately compacted to prevent failure. Unless otherwise shown on the drawings, the minimum height measured from the top of the dike to the bottom of the channel shall be 18 inches. The minimum base width shall be 6 feet and the minimum top width shall be 2 feet. The Contractor shall ensure that the diversion dikes are not damaged by construction operations or traffic.

1.4.2.4 Fiber Rolls

The Contractor shall provide fiber rolls as a temporary structural practice to reduce water velocity, minimize erosion, and reduce sediment runoff. Rolls shall be properly placed to 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 an area between a ridge and drain, rolls shall be placed as work progresses, rolls shall be removed/replaced/relocated as needed for work to progress in the drainage area). Final removal of fiber rolls barriers shall be upon approval by the Contracting Officer. Rows of fiber rolls shall be provided 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.

NOTE: Space rows a maximum of 60 meters (200 feet) apart in drains with slopes equal to or less than 5 percent and 30 meters (100 feet) apart in drains with slopes steeper than 5 percent. If drainage ditches have slopes above and below the 5 percent limit the spacing should be shown on the drawings.

- 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. Rows shall be spaced at distances not to exceed 35 feet.
- e. Perpendicular to the flow in the bottom of new drainage ditches, channels, and swales. Rows shall be spaced at distances not to exceed 35 feet.
- f. At the entrance to culverts that receive runoff from disturbed areas.
- g. On steep slopes fiber rolls shall be trenched in slightly and spaced at distances not to exceed 35 feet. Rolls shall be placed at the same elevation contour by survey methods. Placement by survey methods will reduce the possibility of a rill developing along a sloping roll. On steep slopes fiber rolls shall be used with erosion control blankets.

The Contractor may 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 inches by 2 inches and shall 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 weight of 1.33 pounds per linear foot and a minimum length of 5 feet.

1.4.3 Minimum BMP Checklist

Development of contract-specific Best Management Practices shall implement the recommendations\requirements based on the category applicable to this project. Categories are identified on pages 12-13 in "Rules Relating to Soil Erosion Standards & Guidelines, Department of Planning & Permitting, City and County of Honolulu".

PART 2 PRODUCTS

2.1 COMPONENTS FOR SILT FENCES

2.1.1 Filter Fabric

The geotextile shall comply with the requirements of ASTM D 4439, and shall consist 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 shall contain stabilizers and/or inhibitors added to the base plastic to make the filaments resistance to deterioration due to ultraviolet and heat exposure. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0 to 120 degrees F. The

Storm Water Pollution Prevention Measures

DB015723

filter fabric shall meet the following requirements:

FILTER FABRIC FOR SILT SCREEN FENCE

| PHYSICAL PROPERTY | TEST PROCEDURE | STRENGTH REQUIREMENT |
|--------------------------------|----------------|----------------------------|
| Grab Tensile Elongation (%) | ASTM D 4632 | 100 lbs. min. 30 % 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

The Contractor may 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 inches by 2 inches when oak is used and 4 inches by 4 inches when pine is used, and shall 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 per linear foot and a minimum length of 5 feet.

2.1.3 Mill Certificate or Affidavit

A mill certificate or affidavit shall be provided attesting that the fabric and factory seams meet chemical, physical, and manufacturing requirements specified above. The mill certificate or affidavit shall specify the actual Minimum Average Roll Values and shall identify the fabric supplied by roll identification numbers. The Contractor shall submit a mill certificate or affidavit signed by a legally authorized official from the company manufacturing the filter fabric.

2.1.4 Identification Storage and Handling

Filter fabric shall be identified, stored and handled in accordance with ASTM D 4873.

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. The bales shall have a standard cross section of 14 inches by 18 inches. All bales shall be either wire-bound or string-tied. The Contractor may use either wooden stakes or steel posts to secure the straw bales to the ground. Wooden stakes utilized for this purpose, shall have a minimum dimensions of 2 inches x 2 inches in cross section and shall 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 per linear foot and a minimum length of 3 feet.

2.3 COMPONENTS FOR FIBER ROLLS

A fiber roll consists of straw, flax, or other similar materials that are rolled and bound into a tight tubular roll and placed on the face of slopes at regular intervals to intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide some removal of sediment from the

Storm Water Pollution Prevention Measures

DB015723

runoff.

PART 3 EXECUTION

3.1 CONTRACTOR RESPONSIBILITY

The Contractor is responsible for complying with all terms of Appendix DD US Army Garrison, Hawaii's NPDES permit and shall employ any or all of the devices described in this specification, the ECP and the BMP, necessary to ensure compliance with applicable regulations concerning water pollution and water quality standards.

Any fines or citations issued by the DOH against the Government resulting directly or indirectly from the Contractor's failure to adequately comply with the State of Hawaii Department of Health water pollution and/or water quality standards during execution of the contract shall be the full and complete responsibility of the Contractor.

3.2 BMP IMPLEMENTATION

Temporary sedimentation basins and gravel entrances and exits are required for construction sites greater than 1 acre in size. The Contractor shall phase his site construction as much as possible to reduce the total amount of exposed areas subject to erosion. A vegetative buffer downstream of graded areas shall be used as much as possible.

3.3 INSTALLATION OF SILT FENCES

Silt fences shall extend a minimum of 16 inches above the ground surface and shall not exceed 34 inches above the ground surface. Filter fabric shall be from a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are unavoidable, filter fabric shall be spliced together at a support post, with a minimum 6 inch overlap, and securely sealed. A trench shall be excavated approximately 4 inches wide and 4 inches deep on the upslope side of the location of the silt fence. The 4-inch by 4-inch trench shall be backfilled and the soil compacted over the filter fabric. Silt fences shall be removed upon approval by the Contracting Officer.

3.4 INSTALLATION OF STRAW BALES

Straw bales shall be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another. Straw bales shall be installed 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. The barrier shall be entrenched and backfilled. A trench shall be excavated 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), the excavated soil shall be backfilled against the barrier. Backfill soil shall conform to the ground level on the downhill side and shall be built up to 4 inches against the uphill side of the barrier. Loose straw shall be scattered over the area immediately uphill from a straw bale barrier to increase barrier efficiency. Each bale shall be securely anchored by at least two stakes driven through the bale. The first stake or steel post in each bale shall be driven toward the previously laid bale to force the bales together. Stakes or steel pickets shall be driven a minimum 18 inches deep into the ground to securely anchor the bales.

3.5 INSTALLATION OF FIBER ROLLS

Locate fiber rolls on level contours spaced 2.4 to 6.0 m (8 to 20 ft) along the face of slope, or as required by Contracting Officer. Stake fiber rolls into a 2 to 4 inch trench. Drive stakes at the end of each fiber roll. Space stakes 1.2m (4 ft) maximum on center. Use wood stakes (minimum length 24 inch), with a nominal classification of 3/4 by 3/4-inch. If more than one fiber roll is placed in a row, the rolls shall be butted, not overlapped. See Caltrans Storm Water quality Handbook for typical Fiber Roll Installation Detail, SC-5.

Fiber rolls are typically left in place, however if they are removed, collect and dispose of sediment accumulation and fill and compact holes, trenches, depressions or any other ground disturbance to blend with adjacent ground.

3.6 MAINTENANCE

NOTE: Describe the procedures to be follow during construction to maintain the vegetation, erosion and sediment control measures, and other protective measures in good and effective operating condition.

The Contractor shall 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. The following procedures shall be followed to maintain the protective measures.

3.6.1 Silt Fence Maintenance

Silt fences shall be inspected in accordance with paragraph INSPECTIONS. Any required repairs shall be made promptly. Close attention shall be paid 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, the fabric shall be replaced promptly. Sediment deposits shall be removed when deposits reach one-third of the height of the barrier. When a silt fence is no longer required, it shall be removed. 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 as specified in the contract.

3.6.2 Straw Bale Maintenance

Straw bale barriers shall be inspected in accordance with paragraph INSPECTIONS. Close attention shall be paid to the repair of damaged bales, end runs and undercutting beneath bales. Necessary repairs to barriers or replacement of bales shall be accomplished promptly. Sediment deposits shall be removed when deposits reach one-half of the height of the barrier. Bale rows used to retain sediment shall be turned uphill at each end of each row. When a straw bale barrier is no longer required, it shall be removed. The immediate area occupied by the bales and any sediment deposits shall be shaped to an acceptable grade. The areas disturbed by this shaping shall be seeded as specified in the contract.

3.6.3 Fiber Roll Maintenance

Repair or replace split, torn, unraveling, or slumping fiber rolls. Inspect fiber rolls when rain is forecast. Perform maintenance as needed or as required by the Contracting Officer. Inspect fiber rolls following rainfall events and at least daily during prolonged rainfall. Perform maintenance as needed or as required by the Contracting Officer.

3.6.4 Diversion Dike Maintenance

Diversion dikes shall be inspected in accordance with paragraph INSPECTIONS. Close attention shall be paid to the repair of damaged diversion dikes and necessary repairs shall be accomplished promptly. When diversion dikes are no longer required, they shall be shaped to an acceptable grade. The areas disturbed by this shaping shall be seeded as specified in the contract.

3.7 INSPECTIONS

3.7.1 General

The Contractor shall inspect disturbed areas of the construction site, areas used for storage of materials that are exposed to precipitation that have not been finally stabilized, stabilization practices, structural practices, other controls, and area where vehicles exit the site at least once every seven (7) calendar days and within 24 hours of the end of any storm that produces 0.5 inch or more rainfall at the site. Where sites have been finally stabilized, such inspection shall be conducted at least once every month.

3.7.2 Inspections Details

Disturbed areas and areas used for material storage that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Erosion and sediment control measures identified in the Erosion and Sediment Control Plan shall be observed to ensure that they are operating correctly. Discharge locations or points shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

Locations where vehicles exit the site shall be inspected for evidence of offsite sediment tracking.

3.7.3 Inspection Reports

The Contractor shall develop an Inspection Checklist based on its site specific BMPs. The checklist shall include a list of the structural practices employed, maintenance performed, and action taken. For each inspection conducted, the Contractor shall 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 Erosion and Sediment Control Plan, and the inspection checklist. The report shall be furnished to the Contracting Officer within 24 hours of the inspection as a part of the Contractor's daily CQC REPORT. A copy of the inspection report shall be maintained on the job site.

-- End of Section --

APPENDIX GG

DPW Water Line Requirements

DPW WATER LINE REQUIREMENTS

General:

1. Unless otherwise specified here-in, water line and appurtenances shall be constructed in accordance with City and County of Honolulu, Board of Water Supply (BWS), Water System Standards.
2. Cathodic protection is not required for underground metallic systems and metallic fittings/portions of non-metallic, underground systems.
3. Do not locate mains and services lines under buildings and under future facilities to the maximum extent feasible. Coordinate with DPW Water System Manager to verify acceptability of water line locations.
4. Blue raised pavement reflector markers shall be provided at all fire hydrant locations adjacent to roadways.
5. Fire hydrant (FHY) body & pipe bollards protecting the FHY & PIV shall be painted OSHA yellow (Finish: Mobil 91 Series water epoxy enamel 2 mil DFT) in accordance with the requirements in the City and County of Honolulu, Board of Water Supply (BWS), Water System Standards and the National Fire Code 291 Chapter 5. FHY tops and nozzle caps shall be painted the color based on the Contractor's individual flow test results in accordance with the National Fire Code 291 Chapter 5.
6. Post indicator valves (PIV), check valves (DCV), reduced pressure (RPP) backflow preventers (if associated with the fire sprinkler system), and fire sprinkler risers shall be painted red.
7. Reduced pressure (RPP) and other backflow preventers (not associated with the fire sprinkler system), vacuum breakers, hose bibs, and all other exposed utilities shall be painted brown.

Water Distribution Mains:

1. Wet-tapping (or live-tapping) a water main will only be allowed when the DPW Water System Manager determines that it is impractical to shut off a "live" main for connection. Practicality will be determined by the DPW Water System Manager.
2. All branches or intersections of mains, lines in each direction shall be valved, unless otherwise approved by the DPW Water System Manager.
3. All water mains 6-inches in diameter and larger shall be Ductile Iron pipe, class 52 or stronger. This does not apply to building supply lines and fire service laterals. Ductile Iron water mains placed underground shall be encased in two-layers of 8-mil polyethylene loose wrap in accordance with AWWA C105.
4. Where a new main is connected to an existing main, valves on both the new and the existing main shall be installed as required above. Where the DPW Water System Manager determines that it is impractical to shut off the "live" main for connection, a tapping sleeve with tapping valve [wet-tapping] shall be installed.
5. Metallic warning tape and continuous copper tracer (toning) wire shall be provided for all mains (regardless of pipe material), unless otherwise approved. "Continuous" means that

copper tracer wire joints must be electrically conductive and waterproof. Use of electronic markers (in lieu of copper tracer wire) requires approval by the POH and DPW.

6. Water Outages
 - a. Water outages shall be limited to 4 hours, unless otherwise approved by the DPW Water System Manager.
 - b. Contractor shall provide a water truck for any water outage lasting longer than 4 hours, unless otherwise approved by the DPW Water System Manager.
7. New water mains exposed alongside or under bridges shall have an epoxy-polyamide coating system conforming to MIL-P-24441. In addition, the word "water" shall be stenciled onto the pipe.

Water Service Laterals:

1. Wet-tapping (or live tapping) of ductile iron and plastic pipe shall be in accordance with BWS Water System Standards.
2. Provide advanced water meter(s) (AWM) on building water service line (except fire service line), that comply with the Energy Policy Act of 2005 (EPACT 2005) and as augmented by the following requirements: AWMs shall have a pulse output to a data gathering device (advance electric meter (AEM)). Both AWM and AEM shall be compatible with the future Directorate of Public Works (DPW) Utility Advanced Metering Data Management System (MDMS). Provide power and telecommunication connectivity as required to support the AWM operational requirements. See RFP paragraph 6 for site electrical and telecommunication metering support requirements.
3. Water lines smaller than 6-inches in diameter shall be Ductile Iron Pipe, class 52 or stronger or PVC Class 200 (AWWA C900) pipe, except that all pipes of a particular diameter shall be of the same material type for the entire contract, unless otherwise approved.
4. The fire sprinkler service line shall be a dedicated line from the distribution main. Fire sprinkler service and domestic service lines shall not be combined, unless otherwise approved.

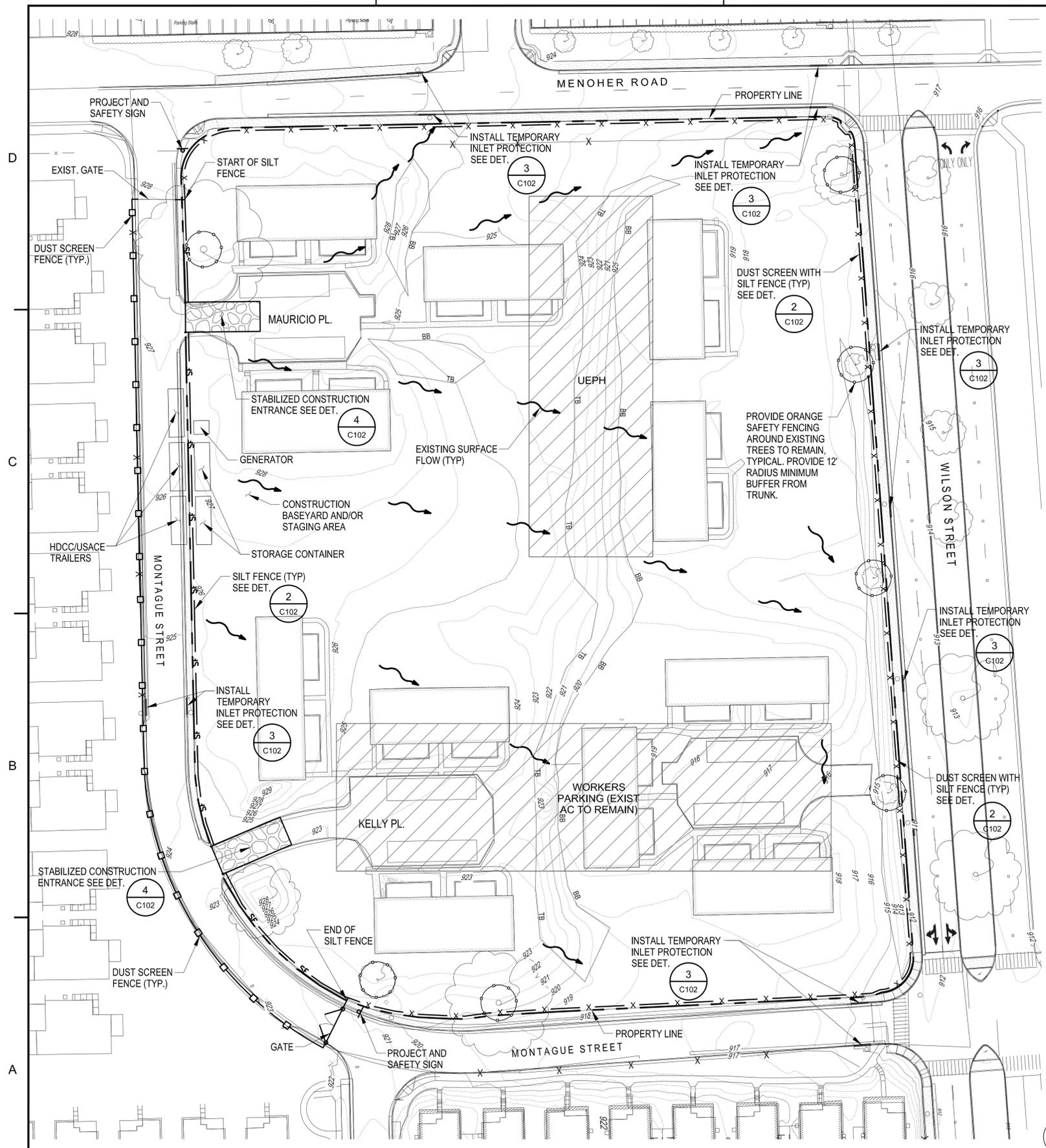
APPENDIX HH

**FY09 PN 68823 Unaccompanied Enlisted Personnel
Housing, Schofield Barracks, Oahu, Hi**

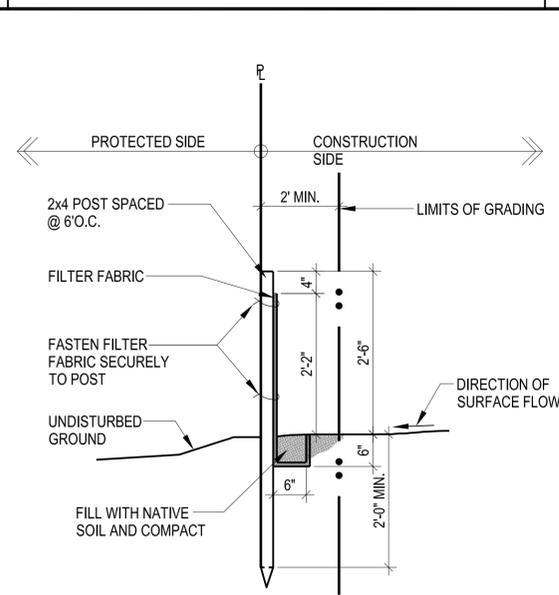
90% Site & Foundation Design Submittal

By Hawaiian Dredging Construction Company

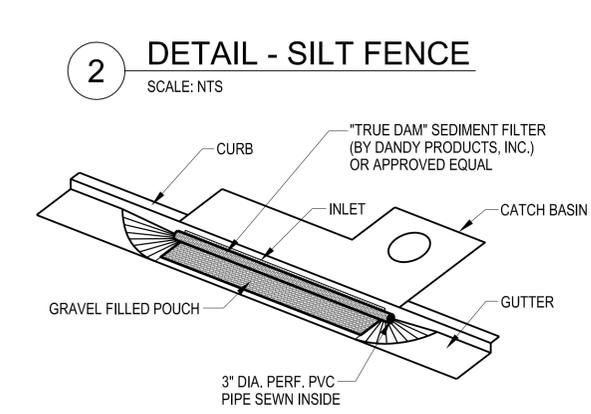
Dated 30 Apr 2010



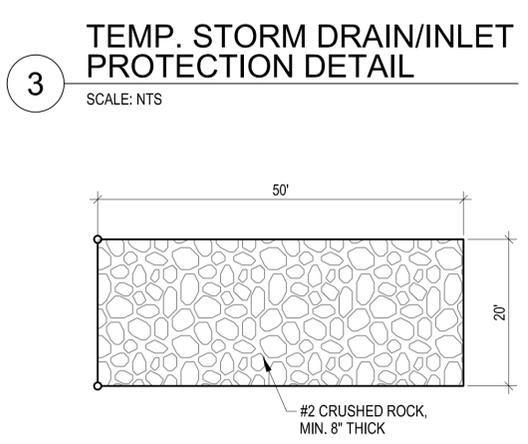
1 EROSION CONTROL PLAN
SCALE: 1"=40'



2 DETAIL - SILT FENCE
SCALE: NTS



3 TEMP. STORM DRAIN/INLET PROTECTION DETAIL
SCALE: NTS



4 STABILIZED CONST. ENTRANCE DET.
SCALE: NTS

EROSION & TEMPORARY DUST CONTROL:

1. DURING CONSTRUCTION, PREVENTATIVE MEASURES SHALL BE USED TO CONTROL FORESEEABLE DUST, EROSION OR SEDIMENTATION PROBLEMS WHICH MAY ARISE AS THE JOB PROGRESSES.
2. FUGITIVE DUST AND SOLID WASTE DISPOSAL DURING GRUBBING AND GRADING ACTIVITIES SHALL MEET REQUIREMENTS OF ADMINISTRATIVE RULES, TITLE II, CHAPTER 60, AIR POLLUTION CONTROL AND CHAPTER 58, SOLID WASTE MANAGEMENT CONTROL.
3. THE CONTRACTOR, AT HIS OWN EXPENSE, SHALL KEEP THE PROJECT AREA AND SURROUNDING AREA FREE FROM DUST NUISANCE. THE WORK SHALL BE IN CONFORMANCE WITH THE AIR POLLUTION CONTROL STANDARDS AND REGULATIONS OF THE STATE DEPARTMENT OF HEALTH.
4. ALL EXPOSED AREAS TO BE LEFT EXPOSED FOR LONGER THAN SIX WEEKS SHALL BE HYDROMULCH SEEDING WITH RYE GRASS.
5. ALL SLOPES AND EXPOSED AREAS SHALL BE SODDED OR PLANTED AS SOON AS FINAL GRADES HAVE BEEN ESTABLISHED. PLANTING SHALL NOT BE DELAYED UNTIL ALL GRADING WORK HAS BEEN COMPLETED. GRADING TO FINAL GRADE SHALL BE CONTINUOUS, AND ANY AREA WITHIN WHICH WORK HAS BEEN INTERRUPTED OR DELAYED SHALL BE PLANTED.

BEST MANAGEMENT PRACTICES NOTES:

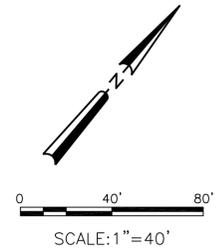
1. MEASURES TO CONTROL EROSION AND OTHER POLLUTANTS SHALL BE IN PLACE BEFORE ANY WORK IS INITIATED. THESE MEASURES SHALL BE PROPERLY CONSTRUCTED AND MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD.
2. ALL TEMPORARY EROSION CONTROL MEASURES SHALL BE CHECKED AND REPAIRED AS NECESSARY.
3. GRASSING OR MULCHING OF EXPOSED AREAS TO BE DONE AS FINISH GRADES ARE ESTABLISHED.
4. DIVERSION OF STORM RUNOFF AWAY FROM FILL SLOPES UNTIL GRASSING ON FILL SLOPES ARE ESTABLISHED.
5. PROVIDE STABILIZED CONSTRUCTION ENTRANCE.
6. ALL TEMPORARY EROSION CONTROL MEASURES SHALL BE REMOVED BY THE CONTRACTOR AFTER COMPLETION OF THE PROJECT PRIOR TO FINAL ACCEPTANCE OR AS DIRECTED BY THE ENGINEER IN THE FIELD.

NOTES:

1. STABILIZED CONSTRUCTION ENTRANCE SHALL BE MAINTAINED AT THE EGRESS AND INGRESS TO THE SITE. TIRE WASH MAY BE USED IN LIEU OF STABILIZED CONSTRUCTION ENTRANCE. CONTRACTOR IS RESPONSIBLE TO KEEP CITY ROADWAYS CLEAN FROM SOIL AND CONSTRUCTION DEBRIS.
2. DUST CONTROL SHOULD BE APPLIED TO REDUCE DUST EMISSIONS. WASH WATER DURING CONSTRUCTION TO CONTROL DUST.
3. ALL STORM DRAIN INLETS ON SITE AND THOSE OFF SITE WHICH MAY RECEIVE RUN OFF FROM THE SITE SHALL USE AN INLET PROTECTION DEVICE.

LEGEND:

- PL — PROPERTY LINE
- 920 — EXIST. CONTOUR MAJOR
- 921 — EXIST. CONTOUR MINOR
- X — X — DUST SCREEN WITH SILT FENCE
- □ — □ — DUST SCREEN FENCE
- SF — SILT FENCE
- ~ — ~ — EXIST SURFACE FLOW
- 12' — 12' RADIUS MINIMUM BUFFER FOR TREES TO REMAIN



US Army Corps of Engineers
Honolulu District

| Mark | Description | Date | Appr |
|------|-------------|------|------|
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| | | | |
| | | | |

HAWAIIAN DREDGING
CONSTRUCTION COMPANY, INC.
HONOLULU, HAWAII 96813

DONALD H. K. MILLES
LICENSED PROFESSIONAL ENGINEER
No. 13482-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

SIGNATURE
APRIL 30, 2010

EXPIRATION DATE OF LICENSE

Prepared By: LAI
Drawn By: ET/IGN
Submitted By: XXXX
XXXX - HAWAIIAN DREDGING
Date: 01/MARCH/2010

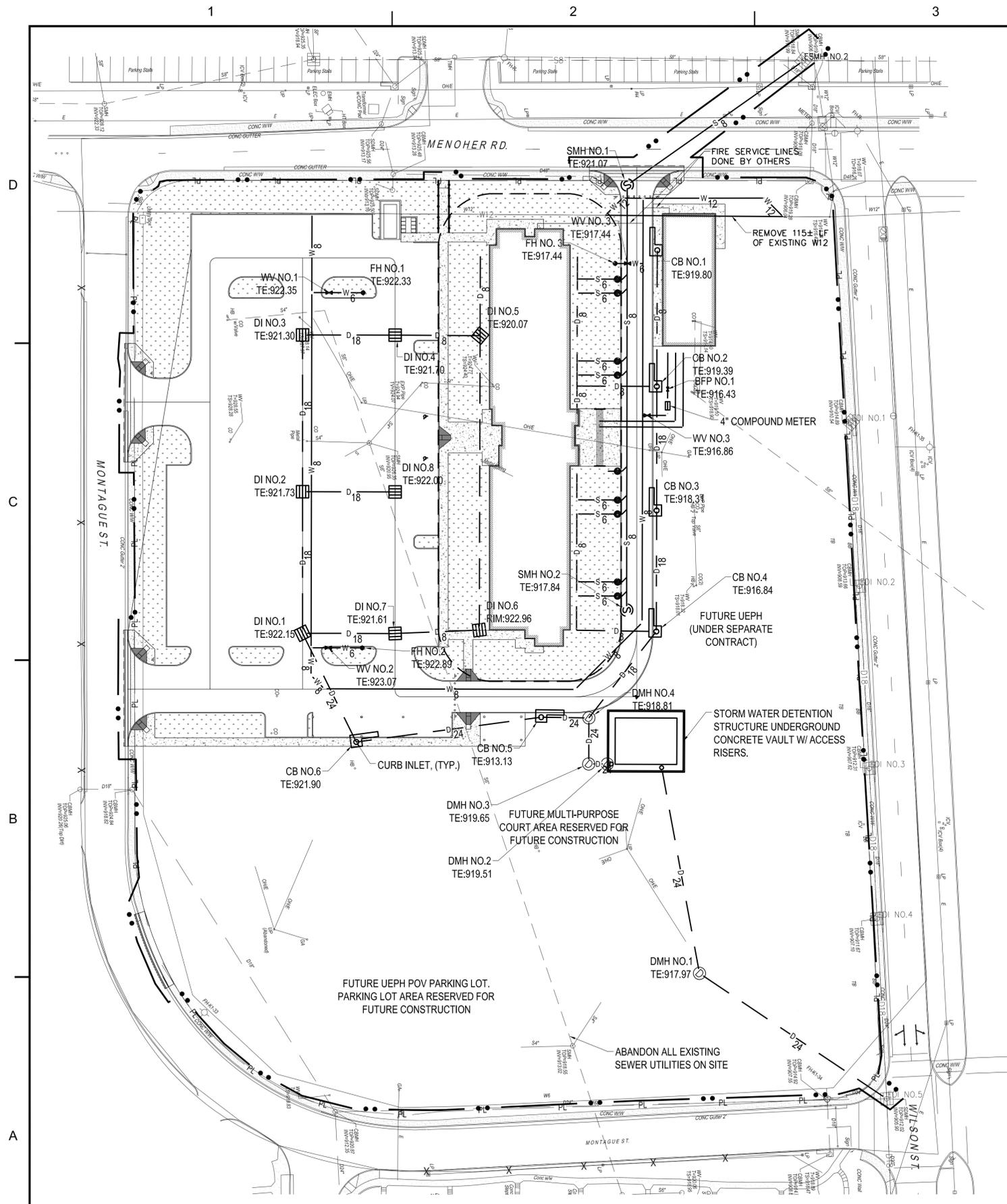
U.S. ARMY CORPS OF ENGINEERS
HONOLULU, HAWAII

DESIGN BRANCH
HONOLULU ENGINEER DISTRICT

EROSION CONTROL PLAN

W9128A-05-C-0012 - Design Build
UEPH PN 68923, FY2009
Schoolfield Barracks, Oahu, Hawaii

Location Code: 9299
Drawing No. 721-11-44
Sheet Number:
C-102
Ring XX of XXX



1 UTILITY PLAN
SCALE: 1"=40'

STRUCTURE TABLE

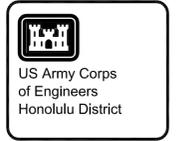
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|-----------------|--|--|
| CB No.1 | | 8" HDPE INV OUT =912.08 |
| CB No.2 | 8" HDPE INV IN =911.20 8" HDPE INV IN =912.61 | 18" HDPE INV OUT =911.20 |
| CB No.3 | 18" HDPE INV IN =910.40 | 18" HDPE INV OUT =910.40 |
| CB No.4 | 18" HDPE INV IN =909.61 8" HDPE INV IN =910.42 | 18" HDPE INV OUT =909.61 |
| CB No.5 | 24" HDPE INV IN =910.58 | 24" HDPE INV OUT =908.90 |
| CB No.6 | 24" HDPE INV IN =911.79 | 24" HDPE INV OUT =911.79 |
| DI No.1 | 18" HDPE INV IN =912.57 18" HDPE INV IN =912.57 | 24" HDPE INV OUT =912.57 |
| DI No.2 | 18" HDPE INV IN =913.49 | 18" HDPE INV OUT =913.49 18" HDPE INV OUT =913.49 |
| DI No.3 | 18" HDPE INV IN =914.50 | 18" HDPE INV OUT =914.50 |
| DI No.4 | 8" HDPE INV IN =915.10 | 18" HDPE INV OUT =914.50 |
| DI No.5 | 8" HDPE INV IN =915.62 | 8" HDPE INV OUT =915.62 8" HDPE INV OUT =915.65 |
| DI No.6 | 8" HDPE INV IN =913.72 | 8" HDPE INV OUT =913.72 |
| DI No.7 | 8" HDPE INV IN =913.17 | 18" HDPE INV OUT =913.17 |
| DI No.8 | 18" HDPE INV IN =914.09 | |
| DMH No.1 | 24" HDPE INV IN =907.16 | 24" HDPE INV OUT =907.16 |
| DMH No.2 | 24" HDPE INV IN =908.48 | |
| DMH No.3 | 24" HDPE INV IN =908.60 | 24" HDPE INV OUT =908.60 |
| DMH No.4 | 24" HDPE INV IN =910.58 | 24" HDPE INV OUT =908.90 |

DRAIN STRUCTURE TABLE

STRUCTURE TABLE

| STRUCTURE NAME: | PIPES IN: | PIPES OUT |
|-----------------|--------------------------|---------------------------|
| RISER 1 | 6" PVC INV IN =918.63 | 6" PVC INV OUT =914.53 |
| RISER 2 | 6" PVC INV IN =918.63 | 6" PVC INV OUT =914.49 |
| RISER 3 | 6" PVC INV IN =918.63 | 6" PVC INV OUT =914.30 |
| RISER 4 | 6" PVC INV IN =918.63 | 6" PVC INV OUT =914.26 |
| RISER 5 | 4" PVC INV IN =919.21 | 4" PVC INV OUT =914.26 |
| RISER 6 | 6" PVC INV IN =918.63 | 6" PVC INV OUT =914.18 |
| RISER 7 | 6" PVC INV IN =918.63 | 6" PVC INV OUT =915.75 |
| RISER 8 | 6" PVC INV IN =918.63 | 6" PVC INV OUT =913.68 |
| RISER 9 | 6" PVC INV IN =918.63 | 6" PVC INV OUT =913.64 |
| SMH No.2 | | 8" PVC INV OUT =914.36 |
| SMH No.1 | 8" PVC INV IN =913.15 | 8" PVC INV OUT =913.15 |

SEWER STRUCTURE TABLE



| Mark | Description | Date | Appr |
|------|-------------|------|------|
| | | | |
| | | | |
| | | | |



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

SIGNATURE
APRIL 30, 2010

EXPIRATION DATE OF LICENSE

Designed By: LAI
Drawn By: ET LCN
Submitted By: XXXX
XXXX - HAWAIIAN DREDGING
Date: 01 MARCH 2010

U.S. ARMY CORPS OF ENGINEERS
HONOLULU, HAWAII
DESIGN BRANCH
HONOLULU ENGINEER DISTRICT

SITE UTILITY PLAN
W9128A-09-C-0012 - Design Build
UEPH PN 68923, FY2009
Schiefel Barracks, Oahu, Hawaii

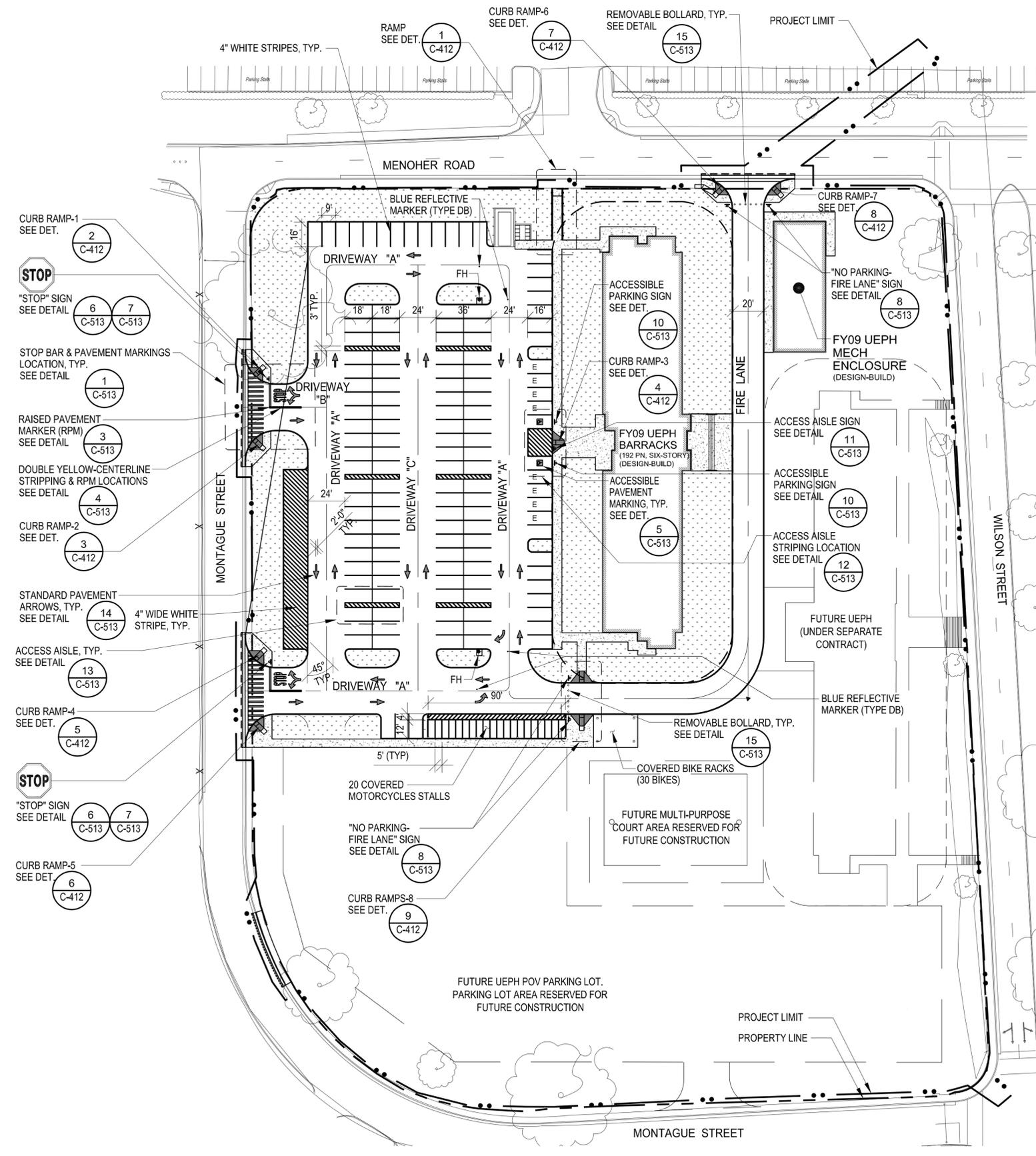
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Drawing No. 721-11-44
Sheet Number:
C-105
Ring XX of XXX



0 40' 80'
SCALE: 1"=40'

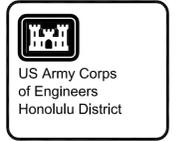
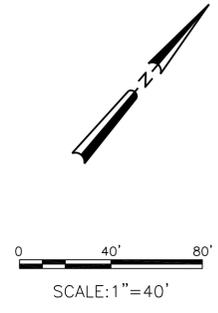
1 2 3 4 5

D
C
B
A



- CURB RAMP-1
SEE DET. (2) C-412
- "STOP" SIGN
SEE DETAIL (6) C-513 (7) C-513
- STOP BAR & PAVEMENT MARKINGS
LOCATION, TYP.
SEE DETAIL (1) C-513
- RAISED PAVEMENT
MARKER (RPM)
SEE DETAIL (3) C-513
- DOUBLE YELLOW-CENTERLINE
STRIPPING & RPM LOCATIONS
SEE DETAIL (4) C-513
- CURB RAMP-2
SEE DET. (3) C-412
- STANDARD PAVEMENT
ARROWS, TYP.
SEE DETAIL (14) C-513
- ACCESS AISLE, TYP.
SEE DETAIL (13) C-513
- CURB RAMP-4
SEE DET. (5) C-412
- "STOP" SIGN
SEE DETAIL (6) C-513 (7) C-513
- CURB RAMP-5
SEE DET. (6) C-412

1 CURB RAMPS LOCATION, PAVEMENT MARKINGS & SIGNAGE PLAN
SCALE: 1"=40'



| Mark | Description | Date | Appr |
|------|-------------|------|------|
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THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

SIGNATURE
APRIL 30, 2010

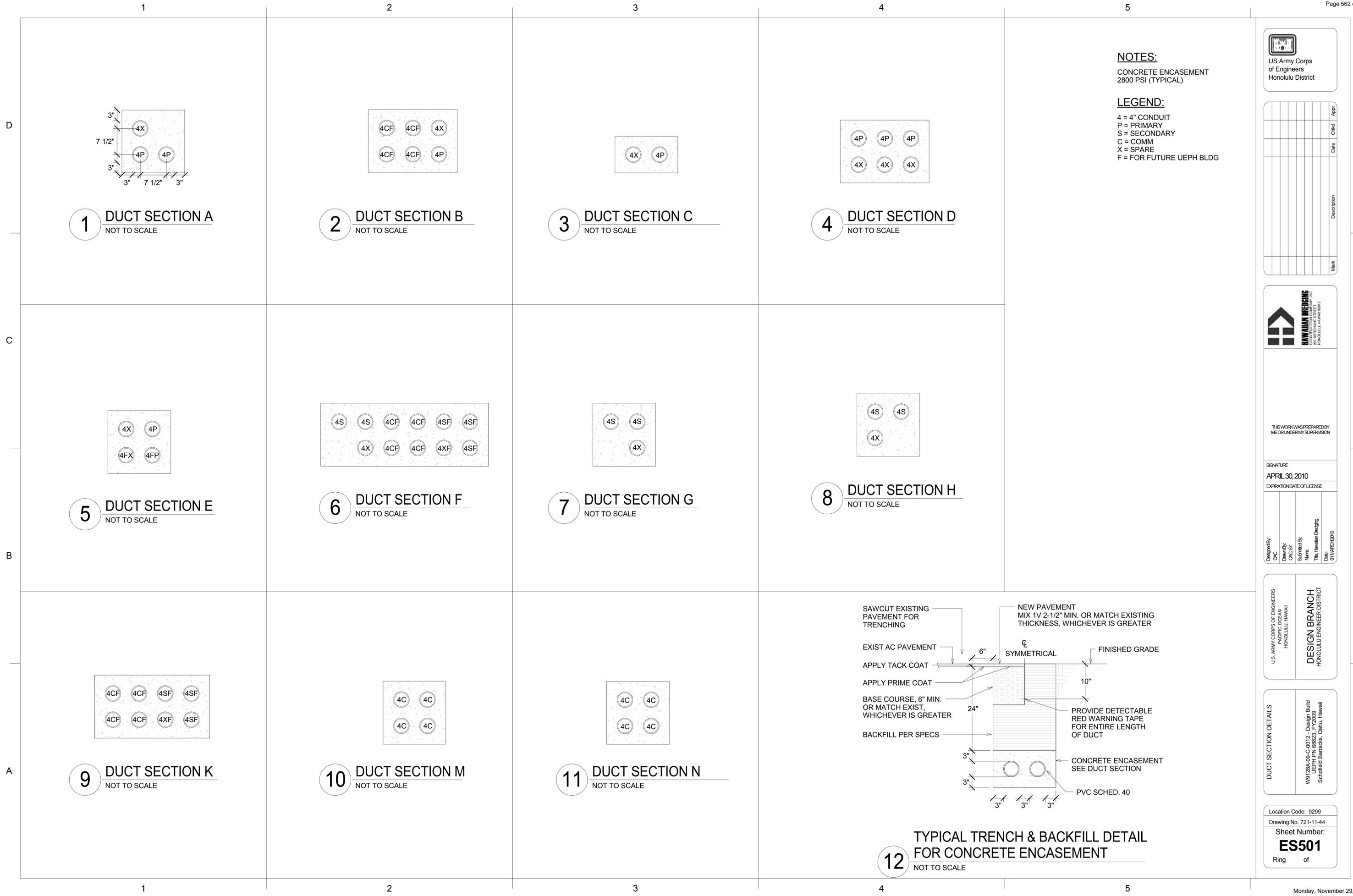
EXPIRATION DATE OF LICENSE

Designed By: LAI
Drawn By: ETT/IGN
Submitted By: XXXX
XXXX - HAWAIIAN DREDGING
Date: 01 MARCH 2010

U.S. ARMY CORPS OF ENGINEERS
HONOLULU, HAWAII
DESIGN BRANCH
HONOLULU ENGINEER DISTRICT

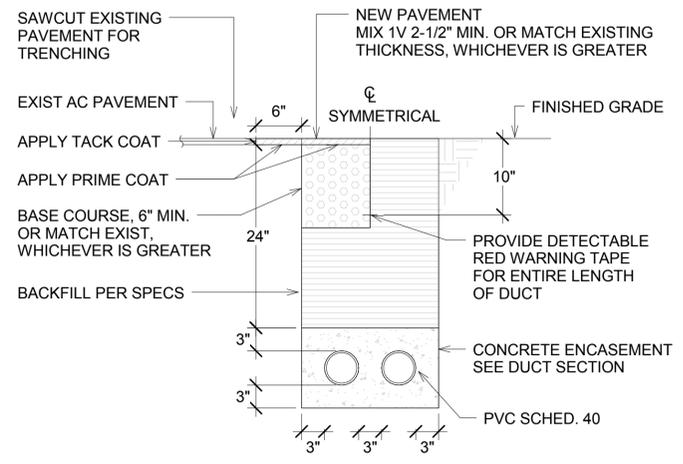
CURB RAMP LOCATION,
PAVEMENT MARKINGS
& SIGNAGE PLAN
W9128A-09-C-0012 - Design Build
UEPH PN 68823, FY2009
Schiefel Barracks, Oahu, Hawaii

Location Code: 9299
Drawing No. 721-11-44
Sheet Number:
C-106
Ring XX of XXX

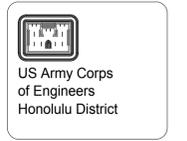


NOTES:
CONCRETE ENCASEMENT
2800 PSI (TYPICAL)

LEGEND:
4 = 4" CONDUIT
P = PRIMARY
S = SECONDARY
C = COMM
X = SPARE
F = FOR FUTURE UEPH BLDG



12 TYPICAL TRENCH & BACKFILL DETAIL FOR CONCRETE ENCASEMENT
NOT TO SCALE



| Mark | Description | Date | Chkd | Appr |
|------|-------------|------|------|------|
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THE WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

SIGNATURE
APRIL 30, 2010
EXPIRATION DATE OF LICENSE

Designed By: DAC
Drawn By: CACSY
Submitted By: Name
Title: Hawaiian Designing
Date: 07/16/2010

U.S. ARMY CORPS OF ENGINEERS
PACIFIC COASTAL DISTRICT
HONOLULU, HAWAII

DESIGN BRANCH
HONOLULU ENGINEER DISTRICT

DUCT SECTION DETAILS

W9128A-09-C-0012 - Design Build
UEPH PN 68823, FY2009
Scholfield Barracks, Oahu, Hawaii

Location Code: 9299
Drawing No. 721-11-44
Sheet Number:
ES501
Ring of

APPENDIX II
EXTERIOR COLOR CHART

Appendix L

Exterior Color Charts



L.1 EXTERIOR COLOR CHARTS FOR INSTALLATION BUILDINGS

Colors schemes and building materials are critical design elements in relating adjacent buildings and creating a compatible visual environment within an installation. This section identifies a standard palette of colors that will unify Schofield Barracks. This palette is divided into Color Selection Areas. See Figure L.1a.

A sufficient color palette range is provided to allow for variety. General direction on the use and application of materials and their colors follows:

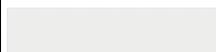
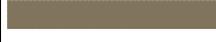
- Avoid cluttered, cosmetic application of a number of different colors on a facade. Simplistically, an exterior color scheme should consist of a wall color, trim color, and an accent color, all of which should work together with the choice of roofing to provide a harmonious appearance compatible with adjacent structures and environs.
- Select colors from the following Exterior Color Chart based upon their appropriateness to the building type, desired appearance, material to be painted and prevailing architectural design and landscape character of the installation. Ease of maintenance, and sustainability should also be considered.
- Avoid garish colors. Strong or vibrant colors should be used with restraint and should be limited to accents or focal points such as entrance doors where appropriate.

L.2 COLOR SELECTIONS

The color designations found in the Exterior Color Charts are names and numbers taken from “Benjamin Moore Paints” standard collection. These selections are based on the successful projects that have been completed at Schofield Barracks. They are provided to establish the desired palette and in no way restrict the use of other manufacturer’s products of similar color.

Exterior colors are one of the unifying elements in establishing the Visual Themes for Schofield Barracks. The colors selected are not those suggested in the IDG Template, but a reflection of colors already in use.

Table L.2b Company Campus Color Selections

| EXTERIOR COLOR CHART COMPANY CAMPUS | | | | |
|--|---|--------------------------------|---|----------------------------|
| Building Design Element | | Required Color Standard | Color Sample | Notes (Hyperlinked) |
| Walls | Base of Wall | Forest Brown 2105-10 |  | See Note 1 |
| | Primary Wall Material | Clay Beige OC-11 |  | See Note 2 |
| Roofs | Sloped Areas | Fairview Taupe HC-85 |  | |
| | Flat Areas | Winter White OC-21 |  | |
| Fenestration | Doors | Fairview Taupe HC-85 |  | |
| | Storm Doors | Fairview Taupe HC-85 |  | |
| | Door and Window Frames | Fairview Taupe HC-85 |  | |
| | Storm Windows or Sashes | Fairview Taupe HC-85 |  | |
| | Windows | Fairview Taupe HC-85 |  | |
| Trim Items | Fascia | Fairview Taupe HC-85 |  | See Note 2 |
| | Soffit | Fairview Taupe HC-85 |  | |
| | Gutters and Downspouts | Fairview Taupe HC-85 |  | |
| | Awnings and Canopies | Fairview Taupe HC-85 |  | See Note 2 |
| | Stair or Balcony Railings, Balusters, and Related Trims | Soft Cranberry 2094-40 |  | |
| | Handrails | Soft Cranberry 2094-40 |  | |

Schofield Barracks

| EXTERIOR COLOR CHART COMPANY CAMPUS | | | |
|--|--|--|--|
| Building Design Element | Required Color Standard | Color Sample | Notes (Hyperlinked) |
| Trim Items | Fire Escapes | Fairview Taupe HC-85 |  |
| | Grilles and Louvers | Match Wall | |
| | Coping | Soft Cranberry 2094-40 |  |
| | Roof Ventilators | Match Roof | |
| Related Site Structures | Courtyard Enclosure Walls, Fences, and Dumpster Enclosures | Stucco: Clay Beige OC-11 Brick: Audubon Russet HC-51 Wood: Natural |   See Note 2 |
| | Retaining Walls | Natural concrete | |
| NOTES: | | | |
| Note 1 | Base of all structures should have a dark band approximately 2 to 3 feet in height to minimize staining of the wall from the red soil prevalent at Schofield Barracks. | | |
| Note 2 | Soft Cranberry 2094-40 is an accent color that can be used in limited amounts to highlight architectural elements. | | |

APPENDIX JJ
EXTERIOR MATERIALS CHART

Table K.2 Company Campus Material Selections

| EXTERIOR MATERIALS CHART COMPANY CAMPUS | | | |
|--|---|---|--------------------------------|
| Building Design Element | | Permitted Material Type | Notes (Hyperlinked) |
| Walls | Base (primary) Material | Concrete, Concrete Masonry Unit | |
| | Secondary Material | Stucco, Exterior Insulation Finish System | |
| Roofs | Sloped Areas | Standing Seam Metal | |
| | “Flat” Areas | EPDM | |
| Fenestration | Doors | Metal | |
| | Storm Doors | Metal | |
| | Door and Window Frames | Metal | |
| | Storm Windows or Sashes | Metal | |
| | Windows | Metal | |
| Trim Items | Fascia | Metal | |
| | Soffit | Metal | |
| | Gutters and D.S. | Metal | |
| | Awnings and Canopies | Metal | |
| | Stairs or Balcony Railings, Balusters, and Related Trim and Accessories | Metal | |
| | Handrails | Metal | |
| Trim Items | Fire Escapes | Metal | |
| | Grilles and Louvers | Metal | |
| | Copings | Metal | |
| | Roof Ventilators | Metal | |
| Related Site Structures | Courtyard Enclosure Walls, Retaining Walls, Fences, Dumpster Enclosures | Concrete or CMU with Stucco, Brick, Wood | |
| | Porch Crawl Space Enclosures | Concrete, Interlocking Block | |
| NOTES | | | |
| Note 1 | . | | |
| Note 2 | . | | |

APPENDIX KK

Electrical Advanced Metering Requirements

**ADVANCED ELECTRICAL METER SPECIFICATIONS,
Including ADVANCED METER DATA MANAGEMENT SYSTEM
Requirements
31 March 2009**

1.0 Electrical meters and instrument transformers shall meet or exceed the following minimum requirements:

1.1 Measure quantities. Electrical meter quantities measured are Power (kilowatt), average demand over 15 minute intervals, Energy (kilowatt-hours), reactive power (kVAR), reactive energy (kVARH), power factor, harmonics, as well as per phase measurements for amps, voltage, and frequency.

1.2 System Accuracy. System accuracy for the meter product devices including instrument transformers shall not exceed 1% as calculated using the Root Sum Square (RSS) method and assuming normal distribution.

1.3 Meter Accuracy:

1.3.1 Meter certification shall be IEEE/ANSI C12.16, Accuracy class 0.5%.

1.4 Communication Protocol. Meters shall communicate via Modbus RTU and ANSI/CEA-709.1b (LonTalk) protocols or as otherwise specified.

1.5 Auxiliary data ports. Unless otherwise specified, electrical meters shall have a minimum of two pulse inputs for incorporation and transmission of other external meter data.

1.6 Surge Protection. IEEE/ANSI C37.90.1, Standard surge withstand capability (SWC) tests for relays and relay systems associated with electric power apparatus.

1.7 Current transformers (CTs) sized properly so that the meter secondary of the transformer shall output current to ensure at least a plus or minus 0.6% accuracy of current when measured between 10% and 90% of full amperage range.

1.7.1 CTs shall not exceed 5 amps on the secondary side.

1.7.2 Burden on CTs shall not exceed rated burden for the accuracy class.

1.7.3 CTs shall be provided in split core configuration.

1.7.4 CTs shall be provided in the appropriate ranges to meet the service entrance amperage requirements.

1.7.5 CTs shall revenue grade and certified per IEEE/ANSI C57.13 or IEC 185.

1.8 Current sensors shall be sized properly for the application and provide a voltage (normally 0-2 volts) to the meter that results in at least a plus or minus 0.6% accuracy of current when measured between 10% and 90% of full amperage range.

1.9 Voltage or Potential Transformers (PTs) sized properly so that the meter secondary of the transformer shall output voltage to ensure at least a plus or minus 0.6% accuracy of voltage when measured from zero to the IEEE/ANSI C57.13 or IEC 185 specified standard burden, at the specified standard burden power factor, and at any value from 90% to 110% of rated voltage.

1.9.1 PTs shall be revenue grade and certified per IEEE/ANSI C57.13 or IEC 185.

1.9.2 Burden on PTs shall not exceed rated burden for accuracy class.

1.10 Data Storage. Unless otherwise specified, the meter must be capable of providing and storing required interval data for a minimum of 30 days.

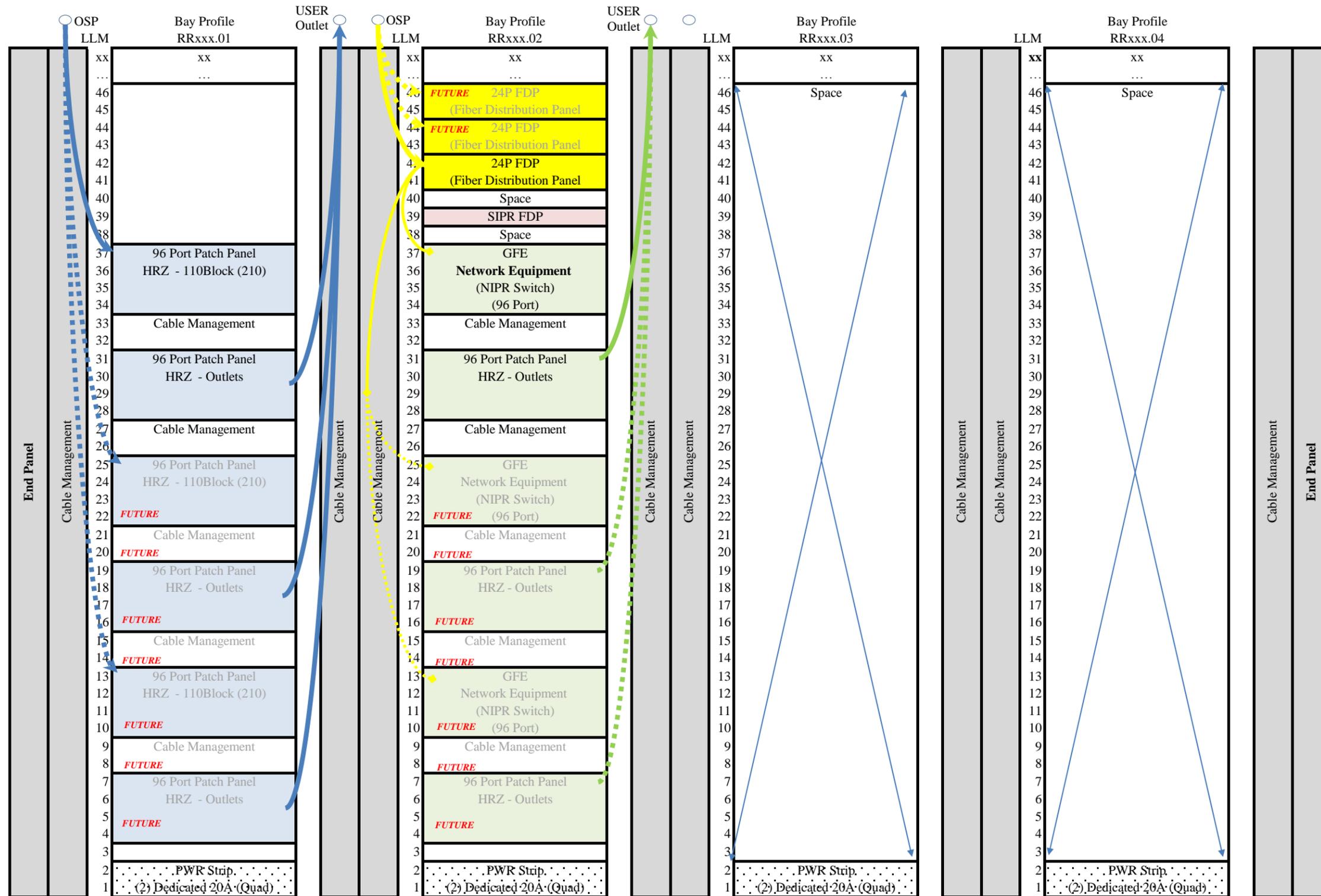
1.11 Environmental Tolerances of Metering Devices.

1.11.1 Meters shall be installed in indoors/interior locations and rated for operation and storage from 0° - 50° C or better and 5 to 90% relative humidity (non-condensing). Interior meters shall be provided with or installed within a NEMA 12 enclosure.

APPENDIX LL

Telecommunication Patch Panel Requirements

30th Signal Battalion
 Network Enterprise Center (NEC) Hawaii
 Infrastructure Management Group (IMG)



NOTES:

- 1) Voice/Data Rack Layouts are typical and shall be validated with A/E or RCDD in accordance to the I3A and UFC
- 2) DATA rack layout is typical but shall require review based on type of switch approved to be deployed - review to be completed by 30th Signal Battalion / Network Enterprise Center
- 3) Patch cords shall be dressed within Cable Management (Front X-Connect) Front Side
- 4) OSP Cabling (CU-CAT 6 / FO) shall be dressed within Cable Management (Rear X-Connect) Back Side (as applicable/possible)

APPENDIX MM

Telecommunications Labeling Requirements

**NETWORK ENTERPRISE CENTER (NEC)
30TH SIGNAL BATTALION**

12 Aug 2010

**STANDARD INFORMATION TECHNOLOGY
AND
TELECOMMUNICATIONS PRACTICES****STANDARDIZED LABELING PROGRAM
BUILDING CABLING SYSTEM LABELING**

- 1. Purpose:** The Standardized Labeling Program is established to ensure all telecommunications equipment rooms or locations are labeled using the same methodology. This action is required and compliant with National, DOD, Army and local standards. This labeling will improve operations and maintenance of Network Enterprise Center (NEC)/30th Signal Battalion managed facilities.
- 2. Applicability:** This standard practice is to be implemented by all personnel/contractors designing, installing and managing telecommunications equipment rooms regardless of size or complexity. Maintenance personnel will verify and systematically update facilities in direct coordination with the NEC's Enterprise Management Center, Infrastructure Management Group.
- 3. General:** This labeling will enable a single method of identifying cabling cross-connect locations, like patch panels and 110 blocks within buildings large and small. The examples at enclosure are the alphanumeric numbering scheme will provide a foundation for improved building-wide and system-wide management.
- 4. References:**
 - a. ANSI/TIA/EIA-568-C.1, Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements, TIA, 2009 w/ current addendums or newest 568 version.
 - b. ANSI/TIA/EIA-606-A, Administration Standard for Commercial Telecommunications Infrastructure, TIA, 2002 w/ current addendums or newest 606 version.
 - b. UFC-3-580-1, Unified Facilities Criteria (UFC), Telecommunications Building Cabling Systems Planning and Design, DOD, 22 June 2007.
 - c. Technical Guide for Information Installation Infrastructure Architecture (I3A), US Army Information Systems Engineering Command, February 2010.
 - d. Telecommunications Distribution Methods Manual, 12th Edition, BISCI, 2009.
- 5. Responsibilities:** Government employees, contracted employees of the US Government and job specific contractors shall design to this labeling scheme, without exception. Exception

requests must be made in writing through the Chief, Operations Division, NEC/30th Signal Battalion and the Chief, Enterprise Management Center.

6. Operations: All facilities housing telecommunications equipment and cabling shall comply with this standard practice.

a. Operations Division shall program building conversions of existing facilities through the appropriate NEC/30th Signal Battalion Management Center's.

b. The Tables address the following subjects:

Table 1. Horizontal Cable/User Outlet/Patch Panel Labeling Matrix

Table 2. 110-Block to 110-Block & Riser Cable Labeling Matrix

Table 3. 110-Block to Patch Panel Cable Labeling Matrix

Table 4. OSP Copper Cable Labeling Matrix

Table 5. Riser Fiber Optic Cable Labeling Matrix

Table 6. OSP Fiber Optic Cable Labeling Matrix

c. Clarification on the attached tables shall be addressed through the Chief, Infrastructure Management Group.

d. This is a living document and should additions or corrections be necessary the NEC/30th Signal Battalion will entertain properly processed requests.

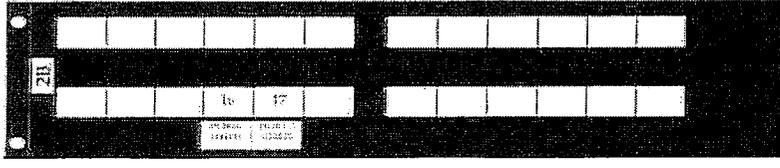
7. Training requirements for Labeling. No formal training required.



DANIEL D. MUNOZ
Chief, Infrastructure Management Group
Network Enterprise Center/30th Signal Battalion

Building Cabling System Labeling Matrix

Labeling requirements set forth in these tables are mandatory for ALL projects containing telecommunications installations, renovations, and upgrades within the US Army - Hawaii and the Joint Trunking System regardless of organization.

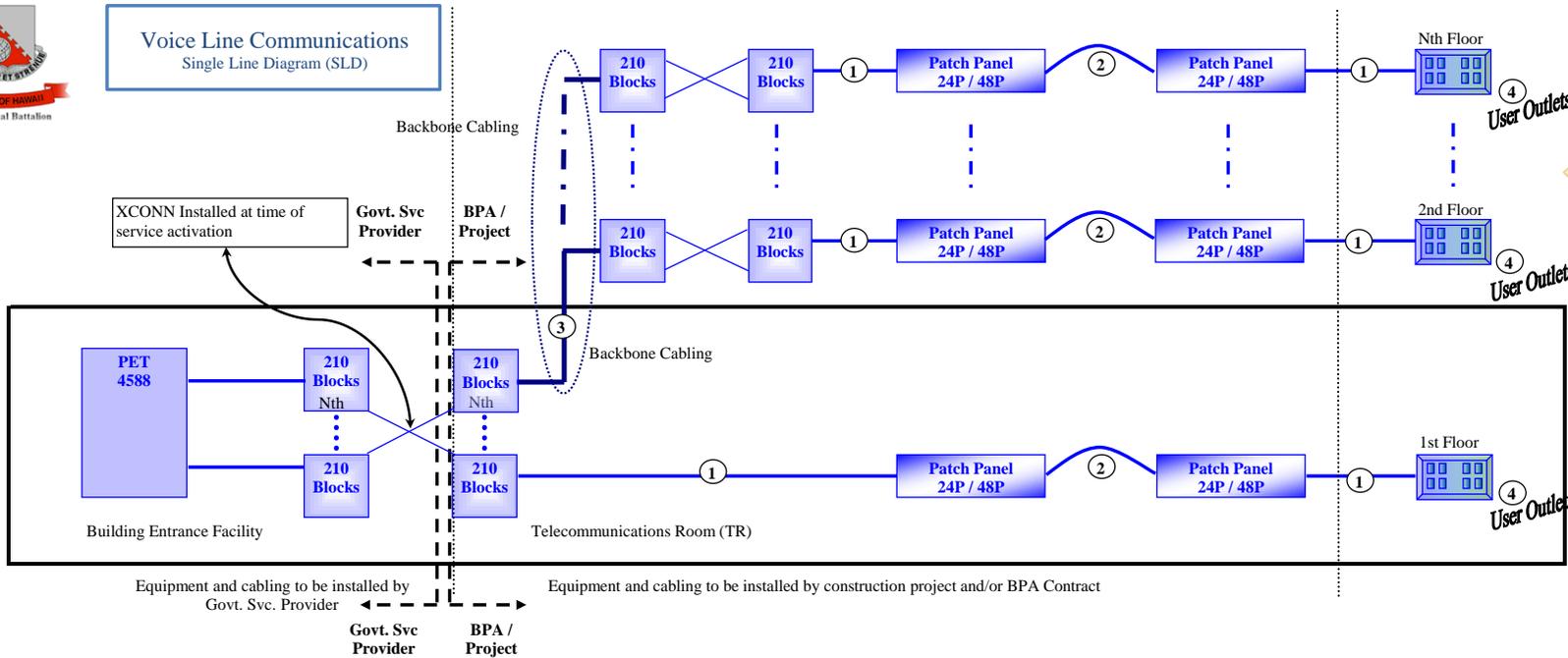
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|---|--|--|---------------------------------|--|-------------|--|-------------|--|---------------|--|------------------|--|--------------------|--|---|--|---------------------|---|---------------------|--|------------|---|--|
| T A B L E 1 | Horizontal Cable/User Outlet/Patch Panel Matrix | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2">TR #, PP #, Port# / User Rm #, User Drop #</td> </tr> <tr> <td colspan="2">105.2B.16/115.10.T1</td> </tr> <tr> <td>TR #</td> <td>Originating Telecommunication Room Number/Designator</td> </tr> <tr> <td>PP #</td> <td>Originating Patch Panel Number/Designator</td> </tr> <tr> <td>Port#</td> <td>Patch Panel Port Number</td> </tr> <tr> <td>User Rm #</td> <td>End User Room Number</td> </tr> <tr> <td>User Drop #</td> <td>End User Drop Number</td> </tr> </table>  | TR #, PP #, Port# / User Rm #, User Drop # | | 105.2B.16/115.10.T1 | | TR # | Originating Telecommunication Room Number/Designator | PP # | Originating Patch Panel Number/Designator | Port# | Patch Panel Port Number | User Rm # | End User Room Number | User Drop # | End User Drop Number | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">105.2B.16/115.10.T1</td> <td style="text-align: center;">105.2B.17/115.10.T2</td> </tr> <tr> <td style="text-align: center;">105.2B.16/115.10.D1</td> <td style="text-align: center;">105.2B.17/115.10.D2</td> </tr> </table> | 105.2B.16/115.10.T1 | 105.2B.17/115.10.T2 | 105.2B.16/115.10.D1 | 105.2B.17/115.10.D2 | | | | |
| TR #, PP #, Port# / User Rm #, User Drop # | | | | | | | | | | | | | | | | | | | | | | | | | |
| 105.2B.16/115.10.T1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| TR # | Originating Telecommunication Room Number/Designator | | | | | | | | | | | | | | | | | | | | | | | | |
| PP # | Originating Patch Panel Number/Designator | | | | | | | | | | | | | | | | | | | | | | | | |
| Port# | Patch Panel Port Number | | | | | | | | | | | | | | | | | | | | | | | | |
| User Rm # | End User Room Number | | | | | | | | | | | | | | | | | | | | | | | | |
| User Drop # | End User Drop Number | | | | | | | | | | | | | | | | | | | | | | | | |
| 105.2B.16/115.10.T1 | 105.2B.17/115.10.T2 | | | | | | | | | | | | | | | | | | | | | | | | |
| 105.2B.16/115.10.D1 | 105.2B.17/115.10.D2 | | | | | | | | | | | | | | | | | | | | | | | | |
| T A B L E 2 | 110-Block to 110-Block & Riser Cable Matrix | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2">TR1# . B1# . (P1#) / TR2# . B2# . (P2#)</td> </tr> <tr> <td colspan="2">105.BF1.(01-08)/203.BF3.(09-16)</td> </tr> <tr> <td>TR1#</td> <td>Originating Telecommunication Room Number/Designator</td> </tr> <tr> <td>B1#</td> <td>110-Block Number/Designator (BF1, BF2, BF3, etc.)</td> </tr> <tr> <td>P1#</td> <td>Originating Punch Down Position [(01-08), (09-16), etc.]</td> </tr> <tr> <td>TR2#</td> <td>Terminating Telecommunication Room Number/Designator</td> </tr> <tr> <td>B2#</td> <td>110-Block Number/Designator (BF1, BF2, BF3, etc.)</td> </tr> <tr> <td>P2#</td> <td>Terminating Punch Down Position [(01-08), (09-16), etc.]</td> </tr> </table> | TR1# . B1# . (P1#) / TR2# . B2# . (P2#) | | 105.BF1.(01-08)/203.BF3.(09-16) | | TR1# | Originating Telecommunication Room Number/Designator | B1# | 110-Block Number/Designator (BF1, BF2, BF3, etc.) | P1# | Originating Punch Down Position [(01-08), (09-16), etc.] | TR2# | Terminating Telecommunication Room Number/Designator | B2# | 110-Block Number/Designator (BF1, BF2, BF3, etc.) | P2# | Terminating Punch Down Position [(01-08), (09-16), etc.] | | | | | | | |
| TR1# . B1# . (P1#) / TR2# . B2# . (P2#) | | | | | | | | | | | | | | | | | | | | | | | | | |
| 105.BF1.(01-08)/203.BF3.(09-16) | | | | | | | | | | | | | | | | | | | | | | | | | |
| TR1# | Originating Telecommunication Room Number/Designator | | | | | | | | | | | | | | | | | | | | | | | | |
| B1# | 110-Block Number/Designator (BF1, BF2, BF3, etc.) | | | | | | | | | | | | | | | | | | | | | | | | |
| P1# | Originating Punch Down Position [(01-08), (09-16), etc.] | | | | | | | | | | | | | | | | | | | | | | | | |
| TR2# | Terminating Telecommunication Room Number/Designator | | | | | | | | | | | | | | | | | | | | | | | | |
| B2# | 110-Block Number/Designator (BF1, BF2, BF3, etc.) | | | | | | | | | | | | | | | | | | | | | | | | |
| P2# | Terminating Punch Down Position [(01-08), (09-16), etc.] | | | | | | | | | | | | | | | | | | | | | | | | |
| T A B L E 3 | 110-Block to Patch Panel Cable Matrix | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2">B# . P# / PP# . PT#</td> </tr> <tr> <td colspan="2">BF1.04/2B.05</td> </tr> <tr> <td>B#</td> <td>110-Block Number/Designator (BF1, BF2, BF3, etc.)</td> </tr> <tr> <td>P#</td> <td>110-Block Punch Down Position [(01-08), (09-16), etc.]</td> </tr> <tr> <td>PP #</td> <td>Patch Panel Number/Designator</td> </tr> <tr> <td>PT#</td> <td>Patch Panel Port Number</td> </tr> </table> | B# . P# / PP# . PT# | | BF1.04/2B.05 | | B# | 110-Block Number/Designator (BF1, BF2, BF3, etc.) | P# | 110-Block Punch Down Position [(01-08), (09-16), etc.] | PP # | Patch Panel Number/Designator | PT# | Patch Panel Port Number | | | | | | | | | | | |
| B# . P# / PP# . PT# | | | | | | | | | | | | | | | | | | | | | | | | | |
| BF1.04/2B.05 | | | | | | | | | | | | | | | | | | | | | | | | | |
| B# | 110-Block Number/Designator (BF1, BF2, BF3, etc.) | | | | | | | | | | | | | | | | | | | | | | | | |
| P# | 110-Block Punch Down Position [(01-08), (09-16), etc.] | | | | | | | | | | | | | | | | | | | | | | | | |
| PP # | Patch Panel Number/Designator | | | | | | | | | | | | | | | | | | | | | | | | |
| PT# | Patch Panel Port Number | | | | | | | | | | | | | | | | | | | | | | | | |
| T A B L E 4 | OSP Copper Cable Matrix | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2">C CA# - Bldg1# / Bldg2# - CS# . (PR#) .AWG#</td> </tr> <tr> <td colspan="2">C 110-1500/532-2400.(1-2400).24</td> </tr> <tr> <td>C</td> <td>Copper Cable Designator</td> </tr> <tr> <td>CA#</td> <td>Cable Number (Assigned by AT&T HITS)</td> </tr> <tr> <td>Bldg1#</td> <td>Originating Building Number/Designator</td> </tr> <tr> <td>Bldg2#</td> <td>Termination Building Number/Designator</td> </tr> <tr> <td>CS#</td> <td>Copper Cable Size (100, 600, 2400, etc.)</td> </tr> <tr> <td>PR#</td> <td>Pair Count [(1-600), (26-50), (101-300), etc.]</td> </tr> <tr> <td>AWG</td> <td>American Wire Gage (AWG) of copper conductors (19) (22) (24) (26)</td> </tr> </table> | C CA# - Bldg1# / Bldg2# - CS# . (PR#) .AWG# | | C 110-1500/532-2400.(1-2400).24 | | C | Copper Cable Designator | CA# | Cable Number (Assigned by AT&T HITS) | Bldg1# | Originating Building Number/Designator | Bldg2# | Termination Building Number/Designator | CS# | Copper Cable Size (100, 600, 2400, etc.) | PR# | Pair Count [(1-600), (26-50), (101-300), etc.] | AWG | American Wire Gage (AWG) of copper conductors (19) (22) (24) (26) | | | | | |
| C CA# - Bldg1# / Bldg2# - CS# . (PR#) .AWG# | | | | | | | | | | | | | | | | | | | | | | | | | |
| C 110-1500/532-2400.(1-2400).24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| C | Copper Cable Designator | | | | | | | | | | | | | | | | | | | | | | | | |
| CA# | Cable Number (Assigned by AT&T HITS) | | | | | | | | | | | | | | | | | | | | | | | | |
| Bldg1# | Originating Building Number/Designator | | | | | | | | | | | | | | | | | | | | | | | | |
| Bldg2# | Termination Building Number/Designator | | | | | | | | | | | | | | | | | | | | | | | | |
| CS# | Copper Cable Size (100, 600, 2400, etc.) | | | | | | | | | | | | | | | | | | | | | | | | |
| PR# | Pair Count [(1-600), (26-50), (101-300), etc.] | | | | | | | | | | | | | | | | | | | | | | | | |
| AWG | American Wire Gage (AWG) of copper conductors (19) (22) (24) (26) | | | | | | | | | | | | | | | | | | | | | | | | |
| T A B L E 5 | Riser Fiber Optic Cable Matrix | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2">TR1# . PP1# . FM1# / TR2# . PP2# . FM2# - M . FS# . (ST#)</td> </tr> <tr> <td colspan="2">105.4G.B/203.3D.A-SM.12.(1-12)</td> </tr> <tr> <td>TR1#</td> <td>Originating Telecommunication Room Number/Designator</td> </tr> <tr> <td>PP1#</td> <td>Patch Panel Number/Designator</td> </tr> <tr> <td>FM1#</td> <td>FO Module Port Number/Designator(s)</td> </tr> <tr> <td>TR2#</td> <td>Terminating Telecommunication Room Number/Designator</td> </tr> <tr> <td>PP2#</td> <td>Patch Panel Number/Designator</td> </tr> <tr> <td>FM2#</td> <td>FO Module Port Number/Designator(s)</td> </tr> <tr> <td>M</td> <td>Fiber Optic Type (SM = Single Mode, MM = Multi Mode)</td> </tr> <tr> <td>FS#</td> <td>Fiber Optic Cable Size (12, 24, 48, 144, etc.)</td> </tr> <tr> <td>ST#</td> <td>Fiber Optic Strand Count [(1-12), (25-36), (1-144), etc.]</td> </tr> </table> | TR1# . PP1# . FM1# / TR2# . PP2# . FM2# - M . FS# . (ST#) | | 105.4G.B/203.3D.A-SM.12.(1-12) | | TR1# | Originating Telecommunication Room Number/Designator | PP1# | Patch Panel Number/Designator | FM1# | FO Module Port Number/Designator(s) | TR2# | Terminating Telecommunication Room Number/Designator | PP2# | Patch Panel Number/Designator | FM2# | FO Module Port Number/Designator(s) | M | Fiber Optic Type (SM = Single Mode, MM = Multi Mode) | FS# | Fiber Optic Cable Size (12, 24, 48, 144, etc.) | ST# | Fiber Optic Strand Count [(1-12), (25-36), (1-144), etc.] | |
| TR1# . PP1# . FM1# / TR2# . PP2# . FM2# - M . FS# . (ST#) | | | | | | | | | | | | | | | | | | | | | | | | | |
| 105.4G.B/203.3D.A-SM.12.(1-12) | | | | | | | | | | | | | | | | | | | | | | | | | |
| TR1# | Originating Telecommunication Room Number/Designator | | | | | | | | | | | | | | | | | | | | | | | | |
| PP1# | Patch Panel Number/Designator | | | | | | | | | | | | | | | | | | | | | | | | |
| FM1# | FO Module Port Number/Designator(s) | | | | | | | | | | | | | | | | | | | | | | | | |
| TR2# | Terminating Telecommunication Room Number/Designator | | | | | | | | | | | | | | | | | | | | | | | | |
| PP2# | Patch Panel Number/Designator | | | | | | | | | | | | | | | | | | | | | | | | |
| FM2# | FO Module Port Number/Designator(s) | | | | | | | | | | | | | | | | | | | | | | | | |
| M | Fiber Optic Type (SM = Single Mode, MM = Multi Mode) | | | | | | | | | | | | | | | | | | | | | | | | |
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| ST# | Fiber Optic Strand Count [(1-12), (25-36), (1-144), etc.] | | | | | | | | | | | | | | | | | | | | | | | | |
| T A B L E 6 | OSP Fiber Optic Cable Matrix | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2">F CA# - Bldg1# / Bldg2# - M . FS# . (ST#)</td> </tr> <tr> <td colspan="2">F 110-1500/532-SM.144</td> </tr> <tr> <td>F</td> <td>Fiber Optic Cable Designator</td> </tr> <tr> <td>CA#</td> <td>Cable Number (Assigned by AT&T HITS)</td> </tr> <tr> <td>Bldg1#</td> <td>Originating Building Number/Designator</td> </tr> <tr> <td>Bldg2#</td> <td>Termination Building Number/Designator</td> </tr> <tr> <td>M</td> <td>Fiber Optic Type (SM = Single Mode, MM = Multi Mode)</td> </tr> <tr> <td>FS#</td> <td>Fiber Optic Cable Size (12, 24, 48, 144, etc.)</td> </tr> <tr> <td>ST#</td> <td>Fiber Optic Strand Count [(1-12), (25-36), (1-144), etc.]</td> </tr> </table> | F CA# - Bldg1# / Bldg2# - M . FS# . (ST#) | | F 110-1500/532-SM.144 | | F | Fiber Optic Cable Designator | CA# | Cable Number (Assigned by AT&T HITS) | Bldg1# | Originating Building Number/Designator | Bldg2# | Termination Building Number/Designator | M | Fiber Optic Type (SM = Single Mode, MM = Multi Mode) | FS# | Fiber Optic Cable Size (12, 24, 48, 144, etc.) | ST# | Fiber Optic Strand Count [(1-12), (25-36), (1-144), etc.] | | | | | |
| F CA# - Bldg1# / Bldg2# - M . FS# . (ST#) | | | | | | | | | | | | | | | | | | | | | | | | | |
| F 110-1500/532-SM.144 | | | | | | | | | | | | | | | | | | | | | | | | | |
| F | Fiber Optic Cable Designator | | | | | | | | | | | | | | | | | | | | | | | | |
| CA# | Cable Number (Assigned by AT&T HITS) | | | | | | | | | | | | | | | | | | | | | | | | |
| Bldg1# | Originating Building Number/Designator | | | | | | | | | | | | | | | | | | | | | | | | |
| Bldg2# | Termination Building Number/Designator | | | | | | | | | | | | | | | | | | | | | | | | |
| M | Fiber Optic Type (SM = Single Mode, MM = Multi Mode) | | | | | | | | | | | | | | | | | | | | | | | | |
| FS# | Fiber Optic Cable Size (12, 24, 48, 144, etc.) | | | | | | | | | | | | | | | | | | | | | | | | |
| ST# | Fiber Optic Strand Count [(1-12), (25-36), (1-144), etc.] | | | | | | | | | | | | | | | | | | | | | | | | |



APPENDIX NN

Telecommunication Cabling Requirements

30th Signal Battalion
Network Enterprise Center (NEC) Hawaii
Infrastructure Management Group (IMG)



- ① Horizontal Cabling - CAT 6 or higher category cabling
- ② Patch Cabling - CAT 6 or higher category cabling to an 8 PIN RJ45 Conn
- ③ Backbone Cabling - CAT 6 or higher category cabling
- ④ User Outlets - Recommended Maximum Deployment based on Facility Usage and Sqft

Configuration is in accordance to:
US Army Regulations
I3A Criteria Dates 2010-02 and UFC 3-580-02

APPENDIX OO

NOT USED



**US Army Corps
of Engineers®**
Engineer Research and
Development Center

Energy and Water Conservation Design Guide (for Sustainment, Restoration and Modernization [SRM] Projects and MILCON Construction)



Prepared for Installation Management Command (IMCOM)
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Prepared by: Engineer Research and Development Center (ERDC)
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Energy and Water Conservation Design Requirements for SRM Projects

Energy and Water Conservation Design Guide (for Sustainment, Restoration and Modernization [SRM] Projects and MILCON Construction)

1 Relevant Policies & Guidance

1.1 All Sustainment, Restoration and Modernization (SRM) funded projects for repair, maintenance, and new work, along with all MILCON construction projects shall comply with and, where applicable, contribute toward the goals specified in the Energy Policy Act of 2005 (EPACT 2005), Energy Independence and Security Act of 2007 (EISA 2007), Executive Order (EO) 13423, Executive Order (EO) 13514, the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings, Leadership in Energy and Environmental Design (LEED) Energy and Atmosphere (EA-1), and other current policies and directives on energy and water conservation listed at Tab 1.

1.2 All SRM projects for major renovations of existing buildings and all new construction projects, regardless of funding source, shall meet the requirement of EPACT 2005 to reduce energy consumption by 30% compared to a facility designed in accordance with ASHRAE 90.1-2004. Building modifications are classified as a major renovation when the cost of the renovation project exceeds 25% of the building's plant replacement value (PRV);

with the project including some or all of the following elements: alteration of overall features of the building's envelope, substantial replacement of the building's lighting, plumbing, electrical, and/or heating, ventilating, and air-conditioning (HVAC) systems in combination with other significant alterations of the building's spaces. Building

Building modifications are classified as a major renovation if the cost of the project exceeds 25% of the building's Plant Replacement Value (PRV)

projects classified as major renovation projects, i.e., exceeding 25% of PRV, will comply with all energy and water conservation requirements, and all methods and standards applicable to new construction, such as to bring the entire building into compliance with current energy and water conservation criteria. All building components and systems being renovated or replaced must comply with their respective energy and water conservation criteria.

1.3 All SRM projects for major renovations of existing buildings and all new construction projects, regardless of funding source, shall install advanced utility meters for measuring electric, natural gas, potable water, steam, hot water and chilled water consumption.

1.4 The target energy consumption of the building (excluding plug and process loads) conforming with the requirements of EPACT 2005 for selected Army facilities and different Department of Energy (DOE) climate zones in kBtu per ft² per year not to be exceeded are listed at Tab 2, Tables 3 -17. The use of the Prescriptive Technology Solution Sets, listed in Tabs 3-10, Tables 1 – 8 in each Tab (numbered respectively by Attachment, e.g., Table 3-1, Table 4-1, etc), and discussed at Tabs 14-16, will result in an annual energy consumption less than or equal to the target energy budget figure, meets life-cycle cost effectiveness requirements, and does not require calculations according to ASHRAE Standard 90.1 Appendix G. When Prescriptive Technology Solution Sets are used, mandatory requirements of ASHRAE Standard 90.1-2007 shall also be met. For the building types addressed at Tab 2, requirements of EPACT 2005 can also be met using designer-developed specific technology sets. In this case, to prove that target energy consumption budgets are met, calculations prescribed in ASHRAE Standard 90.1 Appendix G shall be performed and a life-cycle cost effectiveness analysis shall be provided.

Energy and Water Conservation Design Requirements for SRM Projects

1.5 Our long-term goal is to foster Net Zero/Low Energy Installations. Through a combination of renewable generation, energy efficiency, and energy conservation, we intend to produce as much as or more than what we consume over the course of 1 year. To comply with the requirements of EISA 2007 to eventually eliminate fossil fuel use, new buildings and buildings undergoing major renovations shall be designed so that consumption of energy generated by fossil fuels (including electricity generated by fossil fuels) is reduced, as compared to energy consumption by a similar building in Fiscal Year 2003 (FY03) (as measured by the Commercial Buildings Energy Consumption Survey or Residential Energy Consumption Survey data from the Energy Information Agency), by the percentage listed in Table 1.

Table 1. Percentage reduction in energy generated by fossil fuels by FY.

| FY | Reduction (%) |
|-----------|----------------------|
| 2010 | 55 |
| 2015 | 65 |
| 2020 | 80 |
| 2025 | 90 |
| 2030 | 100 |

1.6 Where conflicts arise between or among the laws, Executive Orders, standards and requirements, the more stringent policy or standard shall take precedence. Where comparisons against “similar buildings” are required, comparators shall be selected from the Commercial Buildings Energy Consumption Survey (CBECS for commercial buildings) or Residential Energy Consumption Survey (RECS for residential buildings).¹

2 Holistic View

2.1 Limiting energy and water conservation efforts to the extent of EPACT 2005 requirements will not allow the Army to meet EISA 2007 goals in the future. To comply with EISA 2007 future requirements, installations shall:

a. Develop holistic energy and water system concepts and apply them installation-wide through Comprehensive Energy and Water Master Plans, setting new more stringent energy and water reduction targets for SRM and new construction projects. Unless it is demonstrated not to be life-cycle cost (LCC) effective (calculated with a building life of 40 years), incorporate energy conservation measures capable of reducing energy consumption by as much as 30-50% in addition to the current Army requirements for 30% energy use reduction listed in UFC-3-400-01, depending on climate, and use renewable energy sources.

b. Execute SRM projects by building clusters with the potential to integrate these clusters into the low energy community/installation. Incorporate advanced technologies in new construction and renovation projects. Use a holistic approach and request commitment from all stakeholders (master planning, resource management, project management, design, construction, O&M, and building users).

2.2 The terms “holistic,” “holistic approach,” and “whole building design approach” specifically refer to an approach that analyzes, assesses, and designs a building site and comprising buildings or facilities as a whole system rather than as a collection of individual buildings, their parts, or subsystems. The holistic approach shall be used to ensure that the following elements are taken into consideration to

¹ www.eia.doe.gov/emeu/cbecs and <http://www.eia.doe.gov/emeu/recs>

Energy and Water Conservation Design Requirements for SRM Projects

produce a superior functional and resource-efficient product:

- a. Building site concepts, designs, systems and subsystems **and**
- b. Building function, occupant needs and appliance selections **and**
- c. Interior and exterior environmental factors **and**
- d. Installation-wide energy, water, resource, and environmental plans **and**
- e. Commitment from stakeholders including master planning, resource management, project management, design, construction, O&M, and building users **and**
- f. Intelligent resolution of the interactions, synergies and conflicts among these elements.

2.3 A whole building design approach shall integrate different building elements and systems to optimize the overall project sustainability, and water and energy efficiency. Integration of the mechanical systems design must be coordinated with the designs of other involved building systems and features, including the building envelope, lighting system, and occupant activities. The appropriate HVAC design solution shall be determined only after the requirements and contributing thermal loads of these interrelated systems have been thoroughly reviewed and all possible efficiency gains through sustainable design strategies have been carefully considered.

3 Building Sustainability, Occupant Well-being and Productivity

3.1 Buildings shall be designed and maintained to meet thermal requirements, which include criteria for thermal comfort and health, process needs, and criteria preventing mold, mildew and other damage to the building materials or furnishings listed at Tab 17.

3.2 New construction and major renovation design shall integrate building systems that meet hygro-thermal requirements to prevent mold and mildew contamination, and that include criteria for building envelopes, HVAC systems, and interior finishes such as paint, wall coverings, etc., as listed at Tab 11. Interior spaces of existing buildings to be renovated shall be visually inspected for mold and mildew growth. Visually suspect mold or mildew shall be tested by one of the methodologies listed at Tab 11 (Section 11.5, "Hygro-Thermal Requirements for Building Envelopes" (p 11-28). If mold or mildew contamination is detected, the cause of the problem shall be determined and the mold or mildew contamination remediated as appropriate.

3.3 Use of vinyl wall covering in locations with predominant air conditioning loads rather than heating loads is prohibited. Vinyl wall covering is a vapor barrier that, in buildings with poor vapor barriers, e.g., most barracks and unit operations buildings, trap moisture in walls causing rapid destruction of the wall systems and hidden mold growth. Replace vinyl wall coverings with latex painted surfaces that will permit transmission of moisture into conditioned space where it can dry, rather than trapping it in the walls.

4 Subsystem Design - Additional Guidance

4.1 **ENERGY STAR**[®]: In all new facilities and

Mold & Mildew

Mold and mildew contamination originates from a water problem.

Possible causes of the problem include:

1. **Improperly designed and /or constructed exterior walls & roofs.**
2. **Improperly designed, constructed, operated or maintained HVAC systems.**
3. **Water leaks or condensation from piping or plumbing systems.**

Energy and Water Conservation Design Requirements for SRM Projects

major renovations, only ENERGY STAR® or FEMP designated products shall be purchased and installed, when such products are commercially available.

4.2 **Commercial kitchen appliances** shall be either ENERGY STAR®, FEMP designated or qualified for California Utilities Rebate Program <http://www.fishnick.com/saveenergy/rebates/>.

4.3 All energy consuming products shall also be designated as using “low standby power” as required by EO 13221. Instructions on how to determine what qualifies as “low standby power” by product type can be found at: http://www.eere.energy.gov/femp/procurement/eep_standby_power.html

4.4 **Motors:** NEMA Premium grade motors that conform to NEMA MG1, and wherever possible, shall at a minimum use Class F insulation. Motors with efficiencies lower than NEMA Premium standard grade may only be used in unique applications that require a high constant torque speed ratio (e.g., inverter duty or vector duty that conform to NEMA MG1, part 30 or part 31).

4.5 **Building Envelope Insulation:** Insulation levels must meet or exceed requirements listed at Tab 11, Tables 11-1 – 11-7.

4.6 **Windows:** Must meet or exceed requirements listed at Tab 11, Tables 11-1 – 11-7.

4.7 Building Air Tightness and Air Barrier Continuity:

4.7.1. New administrative-type buildings, office portions of mixed office and open space (e.g., company operations facilities, dining, barracks and instructional/training facilities) and all buildings undergoing major renovations shall be designed and constructed with a continuous air barrier to control air leakage into, or out of, the conditioned space. Mandatory requirements for the continuous air barrier design and construction and guidelines on sealing air leakage pathways in buildings undergoing renovation are provided at Tab 12.

4.7.2. Barrier conformance shall be demonstrated using test procedures outlined at Tab 13, and complemented using Infra-Red (IR) Thermograph tests. Remediation guidance is listed at Tab 14.

4.7.3. Garrisons will ensure contract specifications address proper envelope sealing and that Construction Quality Assurance plans/practices give this a priority.

4.8 Roofs

4.8.1. In climate zones 1 to 5, reflective “cool” roofs shall be installed on all new construction or planned re-roofing projects over air conditioned spaces in buildings (see Tab 11, Section 11-4 [p 11-22]) .

4.8.2. All climate zones: reflective “cool” roofs shall be installed on industrial, ventilated, and heat only buildings (not air-conditioned buildings).

4.9 Lighting

4.9.1. All areas shall be designed to provide the correct lighting level for the tasks expected to be performed (see Tab 19).

4.9.2. Use only ENERGY STAR® or FEMP designated lighting technologies (see Tab 19). T-8 lamps with instant start electronic ballasts shall be the standard.

4.9.3. Maximize use of lighting controls, e.g., occupancy sensors where appropriate.

Energy and Water Conservation Design Requirements for SRM Projects

4.9.4. Light Emitting Diodes (LEDs) should be considered for all exterior parking/street lights and exit lighting. Parking/street lights should be controlled with photocells. Consider solar-powered lighting for exterior applications.

4.9.5. Eliminate the use of incandescent light bulbs to the maximum extent possible. Replacing incandescent bulbs with compact fluorescent lamps (CFLs) can reduce consumption by 60-70% per lamp.

4.10 Plumbing/Water Conservation. All SRM and new construction projects shall apply the DOE Federal Energy Management Program Best Management Practices for Water Conservation http://www1.eere.energy.gov/femp/water/water_bmp.html and **include the following water conservation measures:**

- g. Eliminate leaks in dripping faucets, pipes, toilets, urinals, steam lines and traps
- h. Install or convert to ultra-low flow fixtures (e.g., toilets, showerheads and kitchen pre-rinse spray valves (PRSV) with low flow nozzles)
- i. Install or convert to only ENERGY STAR® Commercial Dishwashers
- j. Install or convert to only High-efficiency clothes washers (HEW)
- k. Install or convert to water-conserving cooling towers designed with delimiters to reduce drift and evaporation
- l. Recover non-sewage waste water for on-site use (e.g., toilet flushing, landscape irrigation, vehicle washing, ornamental fountains and ponds)
- m. Install waterless urinals.

4.11 HVAC Systems:

4.11.1. Designs for new Army facilities and major retrofits of existing facilities shall utilize dedicated outdoor air systems (DOAS) to maintain acceptable indoor air quality, to discourage the formation and growth of mold and mildew, and to optimize overall energy efficiency of the HVAC system. DOAS decouples the building's latent and sensible cooling loads. DOAS systems shall be sized to deliver sufficient volumes of conditioned outdoor air to satisfy the building's ventilation, makeup and pressurization requirements and shall have sufficient dehumidification capacity to handle the entire latent cooling load under all occupancy and exterior climate conditions and shall be sized based on the 1% Humidity Ratio (HR) occurrence as listed in UFC 3-400-02 Design: Engineering Weather Data. Reheat energy, if required, shall be provided by recovered heat. Primary energy shall not be used for reheat. Heat recovery from the building's exhaust air stream shall be required.

4.11.2. Ducts and pipes conveying heated or cooled fluids shall be insulated and sealed according to ASHRAE Standard 90.1-2007 and according to the recommendations of ASHRAE Advanced Energy Design Guides.²

4.11.3. Special attention shall be applied in climate zones 1a, 2a and 3a to ensure that insulated pipe surface temperatures are never allowed to drop below dew point. The pipe insulation system shall be vapor tight.

² www.ashrae.org/publications/page/1604

Energy and Water Conservation Design Requirements for SRM Projects

4.12 Central Systems:

4.12.1. Shall be used for installation-wide or for building clusters if:

- Density is higher than 40,000 (Kbtu/hr)/(sq. mile) AND
- Cooling density is higher than 68,700 (Kbtu/hr)/(sq. mile) [= 5,725 tons/(sq. mile)].

4.12.2. Shall be designed for combined heat and power (CHP) or tri-generation (heating, cooling and power generation).

4.12.3. Shall be designed with multiple cooling units where practical to enhance reliability (should permit loss of largest unit while maintaining minimum 65% design capacity).

4.12.4. Shall be designed with master plan review to provide for future expansion of central plant.

4.12.5. Should be designed with water cooled compressors rather than air cooled compressors and include other optimization strategies (see Tab 20).

4.13 Steam Systems:

4.13.1. Steam systems shall be converted to variable temperature variable flow medium (<270°F) or low temperature (<190°F) hot water as systems are recapitalized.

4.13.2. Steam systems with condensing boilers shall be designed with lower operating return hot water temperatures (<130°F) and use hot water reset.

4.13.3. Steam needs shall be evaluated and, only when absolutely necessary, be provided by local steam boilers.

4.13.4. Boilers shall be selected with thermal efficiency $\geq 90\%$.

4.13.5. Solar-augmented or solar standalone systems shall be employed where practical and economical to provide steam and high temperature water.

4.14 Hot Water Systems:

4.14.1. EISA 2007 requires that at least 30% of the hot water demand shall be met through the installation and use of solar hot water heaters unless it can be demonstrated that they are not cost effective.

4.14.2. If any level of solar hot water installation and use is found to be cost effective, it shall be installed up to that level.

4.14.3. Solar hot water shall be considered for Domestic Hot Water, space heating and re-heat, absorption chillers, and other systems.

4.15 Building Automation:

4.15.1. Requirements and guideline details are at Tab 21.

4.15.2. Should be applied to HVAC, lighting and other systems where practical using approved Army standards including:

- LonWorks® technology

Energy and Water Conservation Design Requirements for SRM Projects

- LonWorks® network services
- ANSI/CEA 709.1 communications protocol
- ANSI/ASHRAE/IESNA Standard 90.1-2004
- BACnet® is an alternative that may be used where implementation planning has been completed and the strategy documented. There is no Army-approved UFGS for BACnet® so design of BACnet® systems should use the requirements found in the MILCON Transformation Model RFP and ERDC/CER TR-08-12 as described in ECB 2007-8.

BUILDING TURN-OVER

| FEWR or PN NUMBER: | | /BLDG. NUMBER: | | POST or SITE: | | | DATE FAC. ACCEPTED: | | |
|--|----------------------------|----------------|------------------|----------------|---------------|-----|---------------------|---|--|
| METHOD OF EXECUTION: <input type="checkbox"/> In-House <input type="checkbox"/> Corps of Engr <input type="checkbox"/> Other | | | | | | | Project Manager: | | |
| DESCRIPTION: | Mark X for Responsibility: | | | | | Qty | Units | Comments Size, Mfr, Make & Model #, Serial # | |
| Service Required for Real Property items (E=Equipment) | N/A | DPW (SO/PM) | Service Contract | User/ Occupant | Warranty Ends | | | | |
| PROJECT MANAGEMENT | | | | | | | | | |
| Building: | | | | | | | | | |
| Elevators | | | | | | | EA / CAP / FLR | | |
| Gutters / Downspouts | | | | | | | Yes / No | | |
| Rollup Doors/Automatic Doors | | | | | | | EA | | |
| Chemical Wash (Range and Hoods) | | | | | | | # of Systems | | |
| Dryer Vents Inside Walls | | | | | | | EA | | |
| Grease Trap | | | | | | | EA | | |
| Hazardous Waste (TAP) | | | | | | | Yes / No | | |
| Hood/Duct Cleaning | | | | | | | EA | | |
| Janitorial - General Cleaning | | | | | | | SF | | |
| Janitorial - Rest Room | | | | | | | SF | | |
| Sprung - Chemical Latrines | | | | | | | EA | | |
| Moveable Walls | | | | | | | EA | | |
| Oil Water Separators, Parts Washers, Sedimentation Basins, POL Pick-Up (RMSSP Facility) | | | | | | | EA | | |
| Pulpers | | | | | | | EA | | |
| Refuse | | | | | | | # of Cont / CY | | |
| Trash Compactors | | | | | | | EA | | |
| PA System/Duress Alarm | | | | | | | EA | | |
| Gates: | | | | | | | | | |
| Access Control (drop arm, power operated, etc.) | | | | | | | EA | | |
| Key/Entry Control Systems and Devices: | | | | | | | | | |
| Card Key | | | | | | | EA | | |
| Cipher Locks | | | | | | | EA | | |
| Walk-In Vaults | | | | | | | EA | | |
| Fire Suppression: | | | | | | | | | |
| Booster/Fire Pump Stations (individual bldgs) | | | | | | | EA | | |

BUILDING TURN-OVER

| | | | | | | | | | |
|--|----------------------------|----------------|------------------|----------------|---------------|-----|---------------------|---|--|
| FEWR or PN NUMBER: | | /BLDG. NUMBER: | | POST or SITE: | | | DATE FAC. ACCEPTED: | | |
| METHOD OF EXECUTION: <input type="checkbox"/> In-House <input type="checkbox"/> Corps of Engr <input type="checkbox"/> Other | | | | | | | Project Manager: | | |
| DESCRIPTION: | Mark X for Responsibility: | | | | | | | Comments Size, Mfr, Make & Model #, Serial # | |
| Service Required for Real Property items (E=Equipment) | N/A | DPW (SO/PM) | Service Contract | User/ Occupant | Warranty Ends | Qty | Units | | |
| Chemical Fire Suppression System | | | | | | | EA | | |
| Fire Sprinkler Control System | | | | | | | EA | | |
| FM200 | | | | | | | EA | | |
| | | | | | | | | | |
| Fire Detection: | | | | | | | | | |
| Fire Alarm Systems | | | | | | | EA | | |
| | | | | | | | | | |
| Security Systems: | | | | | | | | | |
| Civil Defense Sirens | | | | | | | EA | | |
| Intrusion Alarm (JSIIDS) | | | | | | | EA | | |
| | | | | | | | | | |
| Mass Notification System: | | | | | | | EA | | |
| | | | | | | | | | |
| Telecommunications: | | | | | | | | | |
| Comm Room | | | | | | | EA | | |
| | | | | | | | | | |