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1.0 PROJECT OBJECTIVES

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

Comparison of Military Facilities to Civilian Facilities

Military Facility	Civilian Facility
Trainee Barracks	Mixed Use - Dormatory / Offices / Classrooms

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

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

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

1.1. SECTION ORGANIZATION

This Section is organized under 6 major “paragraphs”.

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

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

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

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

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

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

2.0 SCOPE

2.1. INITIAL ENTRY TRAINING FACILITIES RENOVATION

Provide design and construction services to renovate and expand the existing BNHQ Administration area, renovation of Organizational Classrooms and convert the existing Dining Facilities to Training Classrooms in the first floor spaces of buildings 3405 and 3425 as described in this statement of work.

Option Items for Starship renovation work are comprised of: Company Operations Facilities (COF), Covered Training Areas, Laundry rooms, Sleeping Bays, Cadre Support Spaces and other miscellaneous spaces within the facility.

Exterior Option Items are the addition of standing seam metal roofs over the Sleeping Bays and Cadre Support Spaces, and replacing of existing exterior walls with new Exterior Insulation Finish System wall system in lieu of upgrading of existing exterior walls with an interior insulation wall system.

Site survey and site layout drawings, As-Constructed drawings, and the Adapt-Build Model designs for buildings 3405 and 3425 are provided as For Information Only (FIO) to the Contractors for the development of their Proposals.

2.2. SITE:

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

Approximate area available 10.00 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: Refer to the Adapt-Build Model drawings and CID provided on dvd.

2.4. FURNITURE REQUIREMENTS

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

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

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

2.5. NOT USED

3.0. STARSHIP RENOVATION

3.1. GENERAL

IET Barracks, “Starships”, are required by the Army to encompass living, training, and administrative/command operations. The Starship renovations shall be comprised of: Dining Facility (DFAC) to Classroom conversion, BNHQ Classroom renovation and BNHQ Administration area RENOVATION AND EXPANSION. The facility renovation shall also include upgrading building systems such as mechanical, electrical, and structural as required to meet current codes and regulations as defined in Section 3.4.

3.1.1. Adapt-Build Model Standard Drawings, As-Builts, As-Constructed Drawings, and “For Information Only” (FIO) Design Documents

An Adapt-Build Model design package containing the Standard Design is to be developed into a complete design solution suitable for the conversion/renovation project. See user defined Appendixes.

As-Builts (originals scanned) for building 3405 and building 3425 are provided to aid the Contractor in the conversion/renovation design. All information provided must be verified by the contractor. See user defined Appendixes.

As-Constructed plans for building 3405 and building 3425 are provided to aid the Contractor in the conversion/renovation design. All information provided must be field verified by the contractor. CAD files are included in the user defined Appendixes.

3.1.2. Accessibility

Battalion Headquarters 3.2.4 shall comply with the Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities as currently amended. In all other portions of the facility are for able-bodied soldiers who occupy and manage the Starship facility. The Architectural Barriers Act (ABA) requirements do not apply to the entire Starship facility.

3.1.3. Definitions

Normal population for each classroom is 60 Trainees; “Surge” population for each classroom is 72 Trainees for calculation purposes.

AT/FP Standards to follow from UFC 4-010-01 (8 Oct 2003, including change 1, 22 Jan 2007):

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Standard 1.  Standoff Distances
Standard 2.  Unobstructed Space
Standard 3.  Drive-Up/Drop-Off Areas
Standard 4.  Access Roads
Standard 9.  Exterior Masonry Walls – Apply to all new exterior
masonry
Standard 10. Windows and Skylights
Standard 11. Building Entrance Layout
Standard 12. Exterior Doors
Standard 14. Roof Access
Standard 15. Overhead Mounted Architectural Features
Standard 16. Air Intakes - New Buildings
Standard 18. Emergency Air Distribution Shutoff
Standard 20. Equipment Bracing
Standard 21. Under Building Access
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Standard 22. Mass Notification

3.1.4. Facility Specific Approved Deviations

The following are approved deviations from the requirements stated in Paragraph 5 and 6 that only apply to this project.

(a) LEED SILVER Reference 01 10 00, Paragraph 5.11

(b) Thermal Performance reference 01 10 00, Paragraph 5.5.2

(c) In any case of conflicts between Paragraph 3 and the Adapt-Build Model Design with requirements of Paragraph 6, Paragraph 3 and the Adapt-Build Model Design will apply to this project.

Note: If Option Items are not awarded, the following specific requirements do not apply to the renovation described in 3.2.2, 3.2.3, 3.2.4.

3.1.5. Continued Occupancy

In the event that Option items are not awarded, Starship building 3405 and 3425 will continue to be occupied and be in operation with the exception of the spaces under renovation; therefore all building systems, utilities, and access to the building must be maintained as part of this renovation work. See Floor Plan Appendix J.

Work is required to be performed within the existing building. The Contractor will have access to areas in which this work occurs. The user will occupy the existing building during the life of this Task Order.

Schedule all work at such time and in such a manner to minimize interference and inconvenience to public, staff and Training Operations.

The Contractor must obtain authorization of the COR as approved by the user before starting any work within any existing area of building. The area immediately surrounding all areas of Work shall be protected from danger of materials being dropped or dislodged.

Work shall be carried out in a manner that will not impose avoidable hardship, danger, or inconvenience to public or staff. Prior to commencement of work, Contractor and COR shall jointly survey construction site and surrounding areas, making permanent record of such existing damage as cracks, malfunctioning utility equipment and fixtures, or other similar damage. This record shall serve as a basis for determination of subsequent damage to these structures and adjacent areas due to Contractor's operations. Any damage of any nature to these structures and adjacent areas not noted in original survey but subsequently noted shall be reported immediately to the COR.

The Work area shall be isolated from the occupied spaces. Dustproof enclosures, air quality monitoring and other systems should be provided to prevent cross contamination between occupied and unoccupied spaces be specified. Occupant safety and comfort should be stressed as important requirements in the RFP.

(a) Disruption of Existing Services. The following conditions apply:

- Disruption of utility service is not permitted outside of the construction work area without prior approval of the Facility Manager.
- Work shall be planned so as to minimize shutdown time of any service or operations ----- Request approval of a utility or equipment shutdown in writing to the COR not less than **(14)**

calendar days before time shutdown is desired. Provide the COR with an estimate of the duration of shutdown and how the facility is going to be affected.
- Coordinate and submit request for disruption of existing services with COR.
- Coordinate with COR, DPW& Training Battalion staff in advance of any shut down.
- Begin work only after COR, DPW& Training Battalion staff is fully informed and has agreed to the schedule of shut offs.
- Do not cut into existing services without first verifying with the COR that service has been correctly identified and shut off.
- Operation of existing valves, switches, etc., to affect service shutdown will be completed by Government, unless arranged otherwise.
- Limit duration of each such disruption of service to maximum of 4 hours or as approved by the COR.
- Fabricate and install interconnecting portions of these systems prior to shut down for final connections.
- Maintain utilities or other service, indicated to be abandoned, in service or provide alternate means of service until new facilities are provided, tested, and put in operation.
- Maintain fire protection and fire alarm systems at all times within existing facilities.
- Review all existing conditions, drawings and other documents for proper coordination between new and existing construction.
- Active utilities whose locations are unknown to the Government are suspected to exist. Contractor shall be cautious of their existence. If they are encountered, immediately report to the COR for direction.
- Damages to existing structures, utilities and other items which are caused by Contractor's operations shall be repaired or replaced to their original conditions.

(b) Use of site: The following conditions apply:

- Limit use and operation at site to "Limits of Construction", indicated and required to perform Work. Portions of site beyond area of required Work shall not be disturbed without written approval of the COR.
- Obtain written approval from the COR at least **(14) calendar days** in advance when scheduling Work outside limits of construction. Provide the COR an estimate of time needed to perform Work outside the limits of construction.
- Cutting, capping, and reconnecting utility systems outside the limits of construction shall be performed by Contractor, unless otherwise noted.
- Conform to all laws, ordinances, permits and regulations affecting Work on site.
- Existing roads, streets, drives, parking lots, entrances and required fire exit ways shall be kept clear and available at all times for their intended use. Do not use these areas for parking, staging or storage without COR's written approval. Coordinate with COR, and provide alternate routes for public and COR access if normal routes are affected.
- Do not unreasonably encumber site with equipment, materials or vehicles.
- Return all conditions on or about site and adjacent property which are not shown to be altered, removed or otherwise changed; to conditions which existed previous to starting performance under Task Order.
- Construction personnel will not at anytime park in any officially marked parking lot; on Government's property without Government's consent, and will not park on adjacent residential streets.

(c) Use of facilities: The following conditions apply:

- Limit use and operation within existing facilities to areas indicated for construction Work and as required to perform Work. Other areas within facility shall not be disturbed or disrupted.
- Perform Work so as not to interfere or inconvenience public, staff and training operations.
- Maintain and keep clear all required fire exit ways throughout facility within and in vicinity of construction areas. Coordinate alternate temporary egress routes with COR and local fire authority.

- Do not load structure with weights that will endanger structure.
- Smoking is prohibited within government facilities and on site.
- Audio devices and radios are prohibited. Two-way radios needed for Contractor's operations shall be approved by the Facility manager prior to use. Use of two-way radios within occupied facilities shall be limited, so not to disrupt occupants.
- Use of toilet facilities, washrooms, and telephones within existing facility or occupied areas is not allowed without the COR's consent.
- Cafeteria and dining areas may not be used by construction personnel without the COR's consent.
- Coordinate construction operations to assure that operations are carried out with consideration given to conservation of energy, water, and materials.
- Maintain existing building in a weather-tight condition throughout the construction period. Repair damage and leaks caused by construction operations. Take all precautions necessary to protect building and its occupants during construction period.
- Make every effort to keep noise to a minimum in construction operation. Use of jack hammers will not be permitted to use within the existing building without the COR's consent.

3.2. FUNCTIONAL AND AREA REQUIREMENTS

3.2.1 Areas to be Renovated (Area calculations are approximate)

BUILDING 3405 - Base Contract

3.2.2 DFAC AREA CONVERSION TO CLASSROOMS	24,000 SF	NEW WORK
3.2.3 BNHQ CLASSROOMS RENOVATION	9,730 SF	REPAIR WORK
3.2.4 BNHQ RENOVATION AND EXPANSION	9,060 SF	REPAIR WORK
	42,790 SF	

BUILDING 3405 – Option Item 1,7

3.2.7 COMPANY OPS AND COVERED TRAINING AREA	21,100 SF	REPAIR WORK
3.2.8 LAUNDRY ROOM RENOVATION	10,550 SF	REPAIR WORK
3.2.9 SLEEPING BAY AREA RENOVATION	168,960 SF	REPAIR WORK
3.2.10 CADRE SUPPORT SPACES RENOVATION	11,300 SF	REPAIR WORK
	211,910 SF	

BUILDING 3425 - Base Contract

3.2.2 DFAC AREA CONVERSION TO CLASSROOMS	24,000 SF	NEW WORK
3.2.3 BNHQ CLASSROOMS RENOVATION	9,730 SF	REPAIR WORK
3.2.4 BNHQ RENOVATION AND EXPANSION	9,060 SF	REPAIR WORK
	42,790 SF	

BUILDING 3425 – Option Item 2, 8

3.2.7 COMPANY OPS AND COVERED TRAINING AREA	21,100 SF	REPAIR WORK
3.2.8 LAUNDRY ROOM RENOVATION	10,550 SF	REPAIR WORK
3.2.9 SLEEPING BAY AREA RENOVATION	168,960 SF	REPAIR WORK
3.2.10 CADRE SUPPORT SPACES RENOVATION	11,300 SF	REPAIR WORK
	211,910 SF	

3.2.2. DFAC Area Conversion to Classrooms

3.2.2.1. Functional Space Requirements

(a) Demolish and remove all kitchen equipment. Renovate the entire kitchen area to be converted into classroom space for training. All equipment, in the area of work for this project that is in place at the time of contract award becomes property of the contractor

(b) In structural prototypes that do not use load-bearing walls: Demolish all non-load bearing partitions within the limits of construction indicated.

In structural prototypes that use load-bearing walls: Shore or demolish the existing roof structure within the limits of construction indicated, demolish load-bearing and non-load-bearing walls, and construct a new roof, or construct a new structural system to support the existing roof, that accommodate the new floor plan requirements.

(c) Classrooms – Starship operational mission at **Ft Benning** requires classrooms and physical training space for 1,200 trainees. Four classrooms in minimum 60-student classroom configuration, two large classroom/physical training spaces and a Sick Call room shall be provided. Given that these buildings are existing, and structural framing cannot be changed without major disruption, some classrooms may be larger; however, the minimum 60-student classroom configuration shall be maintained where feasible. Provide class rooms with movable motorized partitions as shown in Standard design. The dividers shall be structure hung. Partitions shall have a minimum STC rating of 45 and include all structural requirements. Each subdivided classroom must have exits in compliance with applicable codes. Each subdivided classroom space shall have 48 inches high dry-eraser marker boards along entire length of all new permanent walls. Each classroom shall have a minimum 40 square feet of lockable storage area. See Standard design for added information.

(d) Classroom Toilets - Provide an adequate amount of toilet fixtures to accommodate the functional occupancy. See Standard design for additional design information.

3.2.3. BNHQ CLASSROOMS RENOVATION

3.2.3.1. Functional Space Requirements

(a) Classrooms: Provide two (2) centralized classrooms as shown in Standard Design. Each classroom space shall have 48 inches high dry-eraser marker boards along entire length of front and side walls.

Provide two power operated 10’-0” x 8’-0” ceiling flush structure mounted projection screens at the front of the classroom. Projection screens shall be flame retardant, mildew resistant, and white matte with black masking borders. Furnish and install a low profile ceiling mounted projector mount system with each projection screen. Ceiling mount shall consist of a steel ball joint and universal projector bracket. Mount shall project a maximum 6 inches below finished ceiling height, and shall securely attach to ceiling and structure above with steel mounting plate. Steel ball joint attaches to the universal projector bracket with twist-lock engagement. Mount shall provide up to 30° roll or pitch adjustment and 360° yaw adjustment at ball joint. Two setscrews lock ball joint in position. Projector mount shall be capable of supporting a 26 pound projector load. Furnish and install concealed electrical wiring, connections and accessories necessary for projector operation.

(b) Classroom Storage: Each classroom shall have a lockable storage room as shown in the Standard Design.

3.2.4. BNHQ Renovation and Expansion

Provide BNHQ Administration area. This space is to house administrative and command operations comprised with command operations, special functions, and storage. The floor plans are provided in the Standard Design.

3.2.4.1. Functional Space Requirements

The following spaces are required to be designed within the BNHQ Area as part of the BNHQ RENOVATION AND EXPANSION:

(a) Vestibules: Provide an enclosed transition space between the exterior and interior of the building, at the primary and secondary entry points.

(b) Lobby: Provide a reception area adjacent to the primary entry vestibule, to receive the general public and serve the battalion business functions.

(c) CQ /Reception Desk: Provide a reception desk area. The area and built-in desk shall be high quality design and construction, reflective of the professionalism in training preformed in this facility. Particular attention to materials, texture and lighting design should be considered.

(d) SIPRNET: Provide secure communication room with design and construction in accordance with AR 380-5, Chapter 7, Section III, Department of the Army Information Security Program.

(e) Copy Center: Provide an enclosed office space for media reproduction.

(f) Command Suite: Provide a command suite with private offices for the Battalion Commander (BN CO), Executive Officer (XO), Command Sergeant Major (CSM), and a reception/waiting area. The Battalion Commander's office shall have a built-in closet with clothes shelf and rod. Provide one Command Suite bathroom with shower stall, sink and toilet.

(g) Command Conference Room: Provide conference room with a seating capacity for approximately 30 persons (Conference table sized and arranged to seat 20) with kitchenette complete with cabinetry with sink with space for microwave, coffee makers, and small size under counter refrigerator.

Furnish and install a low profile ceiling mounted projector mount system with each projection screen. Ceiling mount shall consist of a steel ball joint and universal projector bracket. Mount shall project a maximum 6 inches below finished ceiling height, and shall securely attach to ceiling and structure above with steel mounting plate. Steel ball joint attaches to the universal projector bracket with twist-lock engagement. Mount shall provide up to 30° roll or pitch adjustment and 360° yaw adjustment at ball joint. Two setscrews lock ball joint in position. Projector mount shall be capable of supporting a 26 pound load. Furnish and install concealed electrical wiring, connections and accessories necessary for projector operation.

(h) Operations Center (S2/S3): Provide an open operations administration area to accommodate four work stations, one office and storage room.

(i) Administration (S1): Provide a private S1 office. Provide an open S1 – PAC office to accommodate eight work stations. Provide a message center (Mail Room at Ft Benning) for distributing mail and directives. A built-in lockable counter with laminated sliding glass

window shall be integrated with a rolling shutter door between the message center and the corridor. Counter opening shall be 36 inches wide by 42 inches high minimum.

(j) Supply and Logistics (S4): Provide a Supply and Logistics open administration office to accommodate eight work stations and Storage room.

(k) Unit Ministry Team (UMT): Locate UMT to minimize interruption and immediate contact with the command function. Provide a private Chaplain's office. Provide space for an Assistant Chaplain with a contiguous waiting area.

(l) Corridors: As shown.

(m) Men's Toilet/Shower: Provide one shower stall and toilet facilities to serve the administrative personnel assigned to battalion. Provide a dressing area with a built-in wooden bench adjacent to the shower area as shown in the plans.

(n) Women's Toilet/Shower: Provide one shower stall and toilet facilities to serve the administrative personnel assigned to battalion. Provide a dressing area with a built-in wooden bench adjacent to the shower area.

(o) Janitor: Provide one janitor closet. Janitor's closet shall have a 10 inch deep floor mounted stainless steel mop sink, with hot and cold service faucet, a four holder mop rack and 18 inch deep heavy duty stainless steel shelves for storage of cleaning supplies. Janitor's closet shall have space for storage of buckets and vacuum.

(p) Vending: Vending area shall be sized to accommodate three full-size GFGI vending machines kitchenette complete with cabinetry with sink with space for microwave, coffee maker, and under counter refrigerator.

(q) 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. First floor exterior access is required for centralized mechanical. All telecommunications rooms shall be conditioned space. Refer to Mechanical, Electrical and Telecommunications Sections for additional information.

(r) Table and Chair Storage: Provide a general area to store tables and chairs accessible from interior corridor area.

3.2.5. Not Used.

3.2.6. Not Used.

3.2.7. Company Operations and Covered Training Area Renovation (Options 1, 2, 7, 8)

3.2.7.1. Functional Space Requirements

(a) Entry Vestibule: Entry vestibule for the sleeping bays above shall be at the primary stairwell on each sleeping bay floor and is located within each Company Operations area.

(b) Covered Training Area: Covered training areas are located under the sleeping bays. Renovate existing outdoor training areas as required to facilitate the total renovation requirements. Note that the entire existing soffit area must be replaced since insulation will

be required below Sleeping Bay. Covered Training Area floors shall be cleaned and repaired.

(c) Stair: Existing Stair shall be renovated to comply with code requirements for existing buildings.

(d) Corridors: as designed

(e) Luggage Storage: as designed

(f) Company Administration: Provide a pair of main entrance storefront entry doors into the Company Administration reception and CQ desk. The Company Administration area consists of the following required spaces:

Company Administration Reception
CQ Desk
Men's Bathroom
Women's Bathroom

Battery Commander's Office
1st Sgt Office
Operations Sgt. Office
Conference / Training room

(g) Company Supply Area: Provide storage space for company supplies and equipment, weapons, and consumable supplies. Shipping and receiving functions are performed from company supply area. Infrastructure for the Intrusion Detection System (IDS) such as JSIDS shall be installed as part of this project as required.

The Company Supply Area shall be designed as Secure Storage (Level II): Secure storage structures standards shall comply with AR 190-51 Security of Unclassified Army Property (Sensitive and Non-sensitive) Appendix B, Storage Structure Security, Risk level I. The entry/Issue door shall incorporate a steel dutch-door type day-gate with a steel issue shelf built into the lower leaf of the day-gate.

Issue Room: Provide an Issue Room with built-in issue counter with a laminated sliding glass window shall be integrated with a lockable rolling shutter door between this room and the queuing corridor. Issue counter opening shall be 36 inches wide and 42 inches high minimum.

Supply Room: Provide space for one workstation in the Supply Room area for a Supply NCO.

Arms Room: Arms storage for storage of arms, ammunition, and explosives shall comply with AR 190-11, Physical Security of Arms, Ammunition, and Explosives for Category II, and AR 190-51 Security of Unclassified Army Property (Sensitive and Non-sensitive) 3-6. Communications and electronics equipment and night vision devices, Risk level I. Provide a new Arms vault door which shall incorporate a steel dutch-door type day-gate with a steel issue shelf built into the lower leaf of the day-gate.

(h) Janitor: Provide janitor's closets in the central core area to be shared by the five Company Operations and classroom areas. Janitor's closet shall have a 10 inch deep floor mounted stainless steel mop sink, with hot and cold service faucet, a four holder mop rack and two 18 inch deep heavy duty stainless steel shelves for storage of cleaning supplies. Janitor's closet shall have space for storage of buckets and vacuum. *Note: if space is deemed*

available, the contractor will be required to provide and additional janitor sink and mop racks in a partitioned area in each of the Company Operations Restrooms.

(i) 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. First floor exterior access is required for centralized mechanical. All telecommunications rooms shall be conditioned space. Refer to Mechanical, Electrical Telecommunications Sections for additional information.

3.2.8. Laundry Room Renovation (Options 1, 2, 7, 8)

3.2.8.1. Functional Space Requirements

(a) Laundry: Laundry rooms are located on the first floor below the toilet/shower/dressing area of each of the second floor sleeping bays. Each laundry room shall accommodate a total of eighteen (18) heavy-duty, extra capacity, commercial washers and twenty-four (24) heavy-duty, extra capacity, stacked commercial dryers. Contractor furnished and installed fixed heavy gauge stainless steel clothes folding/hanging tables measuring 2 feet deep by 5 feet wide, and one stainless steel laundry tray and sink are required features of each laundry room. Provide power receptacles, natural gas connection (where gas is available to site) and vent connections for all dryers. Dryers shall be exhausted to the exterior. Do not manifold dryer exhaust vents. All washers and dryers (GFGI) shall be placed on a new 4" high concrete equipment pad (CFCI). The existing TA-50 cleaning table shall be removed.

(b) Boot Wash: Outdoor area for soldiers to rinse mud from field gear, boots and clothing. Boot Wash station shall be provided at five (5) locations at each of the Company building wings. Each boot wash station shall consist of fifteen (15) freeze-proof hydrants with spray nozzle on a 60 inch long flexible hose located adjacent to a grated drain assembly complete with sand interceptor constructed on a new concrete sidewalk sloped to drain. Provide a heavy duty hook at each hydrant for hanging TA-50 gear while cleaning adjacent to each boot wash-station .

(c) Stair Vestibule: Stair vestibule shall be the secondary entry into each sleeping bay above and is located at the fire exit stairwell located adjacent to each laundry at the rear of each training area.

(d) Luggage Storage Room: Construct per Standard Design.

3.2.9. Sleeping Bay Area Renovation (Options 1, 2, 7, 8)

3.2.9.1. Functional Space Requirements

(a) Stair Vestibule: Stair vestibule shall be the secondary entry into each sleeping bay and shall be located at the fire exit stairwell located with the bathroom and laundry at the rear of each sleeping bay.

(b) Sleeping Bay: Each sleeping bay shall be designed to accommodate sixty (60) trainees in an open bay dormitory layout (72 Surge). Sleeping bays must be of equal size and able to accommodate one bunk 84 inches long by 42 inches wide and one wardrobe 42 inches wide x 24 inches deep for each trainee, with adequate circulation. The mandated layout is for all single level of beds due to mechanical duct requirements for return air; see Mechanical requirements. Surge capacity requirements for seventy-two (72) trainees will be met by

using double bunks at some locations. A minimum ceiling height of 7'-11" feet is required. Ceilings shall be designed for durability and against tampering. A "hard" ceiling assembly consisting of 5/8-inch high impact gypsum ceiling board on metal furring or acceptable alternate design as offered. No lay-in acoustical ceiling shall be allowed in sleeping areas. Lighting shall be recessed if hard ceiling is used. All furniture listed is GFGI. All Exit doors from Sleeping bay shall be panic hardware.

(c) Toilet/Shower/Dressing: Trainees shall use shower/toilet/dressing rooms in not more than 4 shifts, so that 60 persons on each bay will need an optimal number of fixtures as follows: 15 showers, 15 toilets and 15 lavatories. Contractor shall provide this number of fixtures to the extent possible given that the minimum number of beds shall be maintained in the sleeping bays. Each toilet/shower/dressing room shall have a dressing area. Urinals shall not be substituted for water closets. Dressing area shall be furnished with continuous hardwood benches and mirrors. Benches shall be mounted on powder-coated steel pedestals permanently anchored to the floor. Benches shall run the entire length of the two longest walls of the dressing area. Furnish and install four full length wall mirrors each 16 to 24 inches by 72 inches, spaced evenly on one short wall of each dressing area. Furnish and install thirty wall mounted clothes hooks spaced evenly along the walls of each dressing area above the wood benches. Lavatories shall be provided in a continuous solid surface material vanity top. Each lavatory shall be furnished with a combination stainless steel framed mirror and stainless steel shelf. Mirror shall be minimum 18 inches wide by 24 inches high. Stainless steel shelf length shall be full width of mirror and minimum 5 inches deep. Extend ceramic tile shower surround to ceiling. Provide tamper resistant showerheads.

(d) Stair: Existing Stair to be renovated to comply with code requirements.

(e) Not Used.

(f) Drill Sergeant (DI) Office: Provide an administrative office adjacent to each sleeping bay on each floor. Each DI Office shall be designed to accommodate three work stations or as shown in floor plan.

(g) DI Toilet/Shower: Provide a toilet and shower adjacent to the DI Office and accessible from the DI Office only. Furnish and install two single tier solid surface lockers in each DI toilet/shower. Each locker shall be 18 inches wide by 18 inches deep by 78 inches high, and shall be lockable.

3.2.10. Cadre Support Spaces Renovation (Options 1, 2, 7, 8)

Provide renovation of the twenty (20) individual apartment style rooms as CADRE SUPPORT SPACES as shown in the Standard Design.

3.2.10.1. Functional Space Requirements

On the second and third floors above the BNHQ Area the Cadre Support Spaces shall be renovated to the following spaces:

(a) Exterior corridor: Repair floor and drains as required making them functional and aesthetically acceptable with no cracked or spalled concrete visible. Provide barrier between exterior corridor and roof above first floor.

(b) Cadre Rooms: On each floor provide four (4) Cadre Support rooms with a floor live load capacity of min 50 PSF (plus 15 PSF partition load) and designed in accordance with the Standard Design provided in Appendix J. Each room shall have built in upper and lower

cabinets with single stainless steel bowl sink, space for microwave (NIC), coffee maker (NIC) and an under counter refrigerator (NIC). Each room will be wired for CATV, LAN drops, along with typical administrative electrical and mechanical loads sized for eight (8) personnel. Life safety and fire code requirement should designate the rooms as living/sleeping, since they may be used for that purpose. Cadre Room corridors to the stair towers shall have a live load capacity of 80 PSF.

(c) Cadre Toilet / Shower / Locker rooms: Provide two (2) Toilet/Shower Locker rooms per floor as shown in Standard Design, with a floor live load capacity of min 75 PSF.

(d) Mechanical / Electrical / Miscellaneous Spaces: Contractor must provide design and construction of required spaces for Cadre floors. The Standard Design shall be developed into a full design including miscellaneous spaces that may be required by the project.

3.3. ARCHITECTURAL REQUIREMENTS

3.3.1. Hardware

3.3.1.1. Non-Destructive Emergency Access System (NDEAS) "Key Lock-Box": Provide recessed mounted, high security, non-destructive emergency access key box suitable for moist conditions. The housing have a minimum ¼" fully welded steel housing. The lock must be UL Listed with double-action rotating tumblers and hardened steel pins accessed by a biased cut key. Key Lock-Boxes must include a tamper switch that will be monitored by the facility fire alarm control panel.

A total of six (6) Key Lock-Boxes are required; one at the entrance to BNHQ area and one at each Company Administration Area (if Options are awarded).

3.3.1.2. 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. Hardware finish shall conform to ANSI/BHMA A156 18. Extension of the existing installation keying system shall be provided. Installation keying system is Best Locks Locksets shall have interchangeable cores. Cores shall have no fewer than seven pins. Cores for locksets other than those for mechanical, electrical, and telecommunications rooms shall be manufactured by Best Lock Corporation. Locksets for mechanical, electrical and telecommunications rooms only shall be keyed to the existing Installation utilities master keying system. Deadbolt locks shall be installed on mechanical, electrical and telecommunications rooms keyed to the Installation keying system. Disassembly of knob or lockset shall not be required to remove core from lockset. 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/alarm system requirements of this document. Provide all hardware necessary to meet the requirements of applicable codes for fire doors and exit doors. Provide closers for all doors opening to corridors and as required by codes. Provide CDX-09 hardware for all SIPRNET room doors.

3.3.2. Special Acoustical Requirements

3.3.2.1. 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. Provide sound insulation to meet a minimum rating of STC 49 at walls and floor/ceiling assemblies. At interior doors provide solid core wood doors in metal frame with sound insulation to meet a minimum rating of STC 25.

3.3.2.2. 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 sleeping spaces.

3.3.3. 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.

3.3.3.1. Exterior Walls: Provide durable materials. Existing exterior walls shall be maintained as much as possible; walls shall be restored, cleaned or repaired as needed. New exterior walls shall blend well with existing walls.

Option 5, 6, 11, 12 Contractor shall design and construct new exterior walls as Standard design option indicates. The new wall system will completely replace all existing exterior walls above the first floor areas with an Exterior Insulation and Finish System as indicated on Standard Design Option Drawings A-331.

3.3.3.2. Roof:

(a) Roof shall be modified to support renovation. Roof framing reinforcing or the removal of existing roofing may be required to accommodate roof over-build framing. The removal and replacement of roof framing may be required in the DFAC-to-Classroom conversion.

(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.

(b) Roof access from building exterior is prohibited.

(c) Provide new roofing at BNHQ expansion as shown in the Standard Design .

(d) Provide new Standing Seam Metal Roof over sleeping bay wings and Cadre Support Spaces as shown in Standard Design (Option Items 3, 4, 9, 10). Gutter and downspout system shall be required for roofs that will discharge to any exterior ground. Refer to Paragraph 6 for roof storm water discharge management.

3.3.3.3. Trim and Flashing (if required by design): Gutters, downspouts, and fascias shall be factory pre-finished metal and shall comply with SMACNA Architectural Sheet Metal Manual.

3.3.3.4. Bird Habitat Mitigation: Not Applicable

3.3.3.5. Exterior Doors and Frames:

All doors in within the limits of construction shall be new.

(a) Main Entrance Doors: Aluminum storefront doors and frames with Architectural Class 1 anodized finish, fully glazed, with medium or wide stile for entry into lobbies or corridors. Provide doors complete with frames, framing members, sub-frames, transoms, sidelights, trim, applied muntins, and accessories. Framing systems shall have thermal-break design. Storefront systems shall comply with wind-load requirements of applicable codes and

criteria including UFC 4-010-01. Refer to Adapt-Build model files for specification and or door schedule.

(b) Exterior Non-entrance Doors: Exterior doors and frames opening to spaces other than corridors or lobbies shall be galvanized insulated hollow metal and comply with ANSI/SDI A250.8. Door and frame installation shall comply with all applicable codes and criteria including UFC 4-010-01. Refer to Adapt-Build model files for specification (08 11 13) and door schedule.

3.3.3.6. Exterior Windows: All existing windows shall be replaced unless otherwise stated elsewhere in this RFP. Provide insulated, high efficiency window systems, non-operable, with thermally broken frames complying with applicable codes and criteria including UFC 4-010-01. 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 including UFC 4-010-01. Window sills shall be designed to discourage bird nesting.

3.3.3.7. Exterior Louvers (if required by design): 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. All existing exterior lovers shall be replaced unless otherwise stated elsewhere in this RFP.

3.3.4. INTERIOR DESIGN OBJECTIVES

Provide durable materials and furnishings that are easily maintained and replaced. Provide interior surfaces that are easy to clean and light in color.

3.3.4.1. Signage: Provide room number sign with changeable two-line message strip signage. 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.

3.3.4.2. Bulletin Boards: provide a total of eighteen (18) bulletin boards in the classroom area and two in each sleeping bay and four in the BNHQ area. Bulletin boards shall be 4 feet high and 6 feet wide. Bulletin boards shall have a header panel and shall have lockable, glazed doors.

3.3.4.3. 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.

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

3.3.4.5. Casework: Provide cabinets complying with AWI Quality Standards (Custom Grade). Countertops shall have waterfall front edge and integral coved backsplash.

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

3.3.4.7. Interior Doors and Frames:

(a) Provide hollow metal doors, or flush solid core wood doors as required. All door frames shall be hollow metal.

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

(c) Insulated Hollow Metal Doors: Comply with ANSI/SDI A250.8. Doors shall be minimum Level 2, physical performance Level B, Model 2; factory primed. Refer to Adapt-Build model files for specification (08 11 13) and or door schedule.

(d) Hollow Metal Frames: Comply with ANSI/SDI A250.8. Frames shall be minimum Level 2, 16 gauge, with continuously welded mitered corners and seamless face joints; factory primed. Refer to Adapt-Build model files for specification (08 11 13) and or door schedule.

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

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

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

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

(1) Glass Mirror/Shelf – 18 inch by 24 inch glass mirror on stainless steel frame with shelf at each lavatory

(2) Hands free liquid soap dispenser – at each lavatory

(3) Hands free paper-towel dispenser

(4) Waste receptacle – recessed mounted at each lavatory/toilet area

(5) Sanitary napkin disposal at each female toilet

(6) Toilet paper dispenser – lockable multiple roll at each toilet

(7) Sanitary toilet seat cover dispenser – at each toilet stall

(8) Shower curtain rod, extra heavy duty – at each shower stall

(9) Shower curtain, white anti-bacterial nylon/vinyl fabric shower curtain – at each shower stall

(10) Soap dish – in shower

(11) Double robe hook – adjacent to shower enclosure entry

(12) Grab bars – as required by ADA

3.3.5. Finishes

3.3.5.1. Paint

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

(b) Exterior surfaces, except factory pre-finished material or exterior surfaces receiving other finishes shall be painted a minimum of one prime coat and two finish coats. Paints having a lead content over 0.06 percent by weight of nonvolatile content are unacceptable. Paints containing zinc-chromate, strontium-chromate, mercury or mercury compounds, confirmed or suspected human carcinogens shall not be used on this project. Exterior paints and coating products shall be classified as containing low volatile organic compounds (VOCs) in accordance with MPI criteria. Application criteria shall be as recommended by MPI guide specifications. Provide an MPI Gloss Level 5 Finish (semi-gloss), unless otherwise specified.

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

3.3.5.2. Minimum Interior Finishes-General

(a) Designers are not limited to finishes listed in the following INTERIOR FINISHES table(s) and are encouraged to offer higher quality finishes.

(b) Wall, ceiling and floor finishes and movable partitions shall conform to the requirements of the IBC, NFPA and UFC 3600-01 Fire Protection Engineering for Facilities. Where code requirements conflict, the most stringent code requirement shall apply.

(c) Carpet shall be minimum of 2 yarn ply, modular tile conforming to ISO 2551, ASTM D 418, ASTM D 5793, ASTM D 5848, solution dyed, tufted, cut and loop pile, commercial 100% branded (federally registered trademark) nylon continuous filament. Vinyl composition tile (VCT) shall be minimum 1/8 inch thick, conforming to ASTM F 1066, Class 2, through pattern tile, Composition 1, asbestos free, with color and pattern uniformly distributed throughout the thickness of the tile.

(d) All walls shall be minimum 5/8”painted gypsum board, except where stated otherwise. Gypsum board shall be mold inhibiting gypsum board. Use high impact resistant gypsum board in vestibules, corridors, vending areas, sleeping bays and storage areas.

(e) All ceiling finishes shall be minimum 5/8” painted gypsum board, except where stated otherwise. Gypsum board shall be mold inhibiting gypsum board.

3.4. STRUCTURAL REQUIREMENTS

3.4.1. General

Provide new fireproofing for structural steel framing members as required per code.

Structural modifications may be required to accommodate reconfiguration of mechanical and electrical equipment; ensure all modifications meet code requirements.

In addition to gravity, seismic, and lateral loads, design ancillary building items, e.g. doors, window jambs and connections, overhead architectural features, equipment bracing, for the requirements of UFC 4-010-01, DOD Minimum Antiterrorism Standards for Buildings. Ensure and document that the design of glazed items includes, but is not limited to, the following items under the design loads prescribed in UFC 4-010-01:

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

(b) Connections of glazed element to supporting members, e.g. window to header.

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

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

All pieces of floor mounted mechanical/electrical equipment shall be installed on a 6-inch thick concrete equipment pad. Provide pad 6 inches larger than equipment footprint on all sides. Install dowel pins into floor slab prior to pouring equipment pad. For areas without a slab, all pieces of floor mounted mechanical equipment shall be installed on a 4-inch thick housekeeping pad. Provide pad 6 inches larger than equipment footprint on all sides. Anchor the pad to the floor.

3.4.2. Applicable Standards, Codes and Criteria

The structural design shall fully comply with the following listed criteria in addition to the provisions provided in paragraph 4 Section 01 10 00 References. Use the latest edition of the International Building Code (IBC) for design guidance, and coordinate design with UFC 4-010-01, UFC 3-310-01, Structural Load Data,

3.4.3. Project Specific Design Loads

(All other loads shall be per the stricter of IBC and UFC 3-310-01 Structural Load Data.):

3.4.3.1. Live Loads:

(a) Elevated slabs – Cadre Area for Partitions — 50 pounds per square foot (psf) minimum and 15 psf

(b) Elevated slabs - Cadre Area Corridors — 80 psf

(c) Elevated slabs - Cadre Toilet/Shower/Locker — 75 psf

(d) Slab on grade — 150 psf minimum

3.4.3.2 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 at the software tab of the PDC website, https://pdc.usace.army.mil/.

3.4.3.3 Occupancy Categories:

a)	Classroom Areas	III
b)	All other Areas	II

3.4.4. Foundation

The foundation is site specific and must be designed upon known geotechnical considerations by an engineer knowledgeable of the local conditions, e.g. highly expansive soils, groundwater levels. The foundations shall be designed as recommended by the geotechnical investigation. Coordinate the need for a vapor barrier with the architectural floor finishes and requirements of the geotechnical report.

3.4.4.1. Slabs-on-grade

Slabs-on-grade shall be reinforced and have a minimum thickness of 5 inches. Floor slab thickness and reinforcing shall be designed for the loads associated with the function of the specific area considered, but not less than 5 inches. Provide vapor barrier under all interior floor slabs. The minimum thickness for vapor barriers shall be 10 mil. Provide capillary water barrier under the vapor barrier when directed by the geotechnical report.

3.4.5. Construction Materials

All design, manufacture, fabrication, and assembly of construction materials to be used in structural systems shall conform to the applicable design standards and meet specific industry standards as required for each subject material or as noted herein.

3.4.5.1. Concrete

All concrete shall be a minimum of 3,000 psi and shall be reinforced.

3.4.5.2. Concrete Materials

(a) Cement: ASTM C 150, Type I-II Portland cement

(b) Fly Ash: ASTM C 618, Class “F”

(c) Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 120

(d) Fine Aggregate: ASTM C 33

(e) Coarse Aggregate: ASTM C 33

(f) Air-Entraining Admixture: ASTM C 260

(g) Accelerating, retarding and water-reducing admixtures: ASTM C 494

(h) Flowing Concrete Admixture: ASTM C 1017, Type 1 or 2

(i) Calcium Chloride shall not be permitted

3.4.6. Design Analysis

Computer generated calculations must identify the program name, source, and version. Provide input data, including loads, loading diagrams, node diagrams, and adequate documentation to

illustrate the design. The schematic models used for input must show, as a minimum, nodes/joints, element/members, materials/properties, and all loadings, induced settlements/deflections, etc., and a list of load combinations. Results must include an output listing for maximum/minimum stresses/forces and deflections for each element and the reactions for each loading case and combination. Provide trace model for loading and energy calculations. Also provide an Envelope Compliance Certificate. All calculations shall be performed by a registered engineer and checked by an engineer other than the design engineer.

3.4.7 **Structural Components of Renovation**

3.4.7.1 DFAC Area Conversion to Classrooms
Some existing DFAC structural prototypes rely on interior load bearing walls in combination with a space frame system of beams and columns, while other prototypes rely entirely on a space frame system, without load-bearing walls, for the support of gravity loads. Additionally, some structural prototypes use the load-bearing and non-load-bearing masonry walls as shear walls for the resistance of lateral loads, while other prototypes rely on the moment-resisting capacity of monolithically cast concrete moment frames for lateral force resistance. In most cases, the arrangement of load-bearing and non-load-bearing walls and the columns of the space frame system are not compatible with the proposed new open classroom area. The successful proposer shall revise the existing structural system in this area to accommodate the proposed column-free classroom spaces. This accommodation may or may not include the complete removal of the existing roof framing, supporting structures, and slab-on-grade, followed by the construction of a new roof framing system with supports located to accommodate the revised architecture. Other accommodations may be considered that involve retaining the existing roof framing but revising the support structure. The new or revised structural system shall replace the lateral force resisting capacity of any lateral-force-resisting elements that are removed in the remodel and that provide lateral force resistance to existing portions of the building that will remain. A lateral force-resisting system shall be provided for new framing systems.

In-fill the existing courtyards to the rear of the existing kitchen area (between the existing DFAC and the Company module to the rear of the facility) with concrete slabs-on-grade and infill roof framing over the existing courtyard roof openings.

3.4.7.2 BNHQ Classrooms Renovation
Provide infill slabs-on-grade and infill roof framing at courtyard roof opening on each side of the existing Classrooms.

3.4.7.3 BNHQ Renovation and Expansion
Provide a single-story steel-frame system with moment resisting frames or braced frames, supported by an appropriate shallow or deep foundation system, for the BNHQ expansion.

3.4.7.4 Cadre Support Spaces Renovation (Option 1)
Reinforce the existing floor framing if (or as) required to meet the change-of-use floor loading requirements.

3.5. MECHANICAL REQUIREMENTS

3.5.1. Plumbing

Lavatory faucets shall be water conserving type with a maximum flow rate not to exceed 2.0 gpm, except where the maximum flow to achieve the minimum LEED Silver baseline requires a lower maximum flow.

The domestic hot water system shall generate and store the domestic hot water at 140° F. A tempering valve shall be provided downstream of the storage tank for the delivery of 110°F

(adjustable) domestic hot water to points of use. Piping shall be copper type L above ground. Below ground piping shall be ductile iron or copper, type K. Pipes shall be sized such that required minimum pressures at the fixtures are maintained.

Sizing of domestic hot water boilers shall be based on a peak morning water use rate of 20 gallons of 110F hot water per soldier (at surge) over a 30 minute period. The system shall be designed for all trainee soldiers in the facility to shower during this period as well as a diversified percentage of non-trainee soldiers. During this peak period, there are no other simultaneous non-latrine based hot water uses (such as laundry rooms)

The Domestic Water Heating Boilers shall be gas fired high efficiency condensing type. The Domestic Hot Water Storage Tank(s) shall be sized to handle normal daily needs, other than heavy shower use. The tank(s) shall be sized such that it(they) can be brought into the building during re-construction with no building demolition required.

A Solar study for this building in on file with the COS shows Solar Hot Water heating is not feasible; therefore no Solar Study is required for this project.

3.5.2. Heating, Ventilating and Air-Conditioning (HVAC)

3.5.2.1. Outside Air Systems:

3.5.2.1.1. The HVAC systems shall be designed to provide outside air quantities conforming to Ventilation Rate Procedure of ASHRAE 62.1-2004. Dedicated Outside Air Units (DOAU's) shall be used to provide dehumidified and reheated air to the building for all the outside air requirements. All ventilation air shall be dehumidified to a dew point of 48F. The DOAU's shall have DX cooling and gas heating. Dehumidification shall be through enthalpy and desiccant wheels. Heating and reheat may be natural gas or condenser hot gas.

3.5.2.1.2. DOAU's serving the sleeping bays and associated company headquarters shall be split systems with the air handling unit located on the roof and the condensing unit mounted on a structural frame on the roof of the classroom/DFAC area. These DOAU's shall supply cold air to one side of a double duct VAV box to share part of the baseline cooling load. The dual duct VAV box shall have a heating coil downstream. The limited floor space does not allow for 2 completely separate duct systems to be routed in the limited ceiling space. The ceiling space also does not allow full size trunk ducts to cross. Therefore, this shared load concept was created. To help address the humidity loads that originate in the toilet area, a single duct VAV box shall supply a portion of the dehumidified air directly to the toilets. The toilet exhaust quantity shall remain constant throughout the day. Although the occupancy of the sleeping bay is variable throughout the day, the DOAU's shall be constant volume in order to make up the toilet exhaust and provide building pressurization. The VAV boxes shall not vary the amount of outside air. They shall serve as the interface between the DOAU air and the AHU air. Also, the quantity of outside air can be determined through the HVAC control system. The DOAU units serving the sleeping bay wings shall have supply air temperature reset, controlled by the various zone demands, to help to keep from overcooling the spaces in the mid seasons.

3.5.2.1.3. The DOAU's serving the classroom areas shall be rooftop air handling units with remote condensing units. Both shall be located on the classroom/ DFAC roof on a structural frame, as the existing roof is not capable of directly supporting these. Due to the highly variable occupancy of the classroom areas, the DOAU's for those spaces shall be capable of demand control ventilation by using VAV terminals with CO2 demand control to deliver the appropriate quantity of outdoor air to the classrooms and to allow the outdoor air to be significantly reduced during periods where any individual classroom is un-occupied. These DOAU's shall recover energy from the toilet exhaust as well as the over-pressurization as a result of the quantity of outside air required for the occupant load. In the classrooms, the VAV terminals shall be double duct VAV with a heating coil downstream. Each of the VAV air valves shall operate

completely independently. One of the air valves shall carry only the air from the DOAU. This valve shall have a minimum position of outside air to serve the greater of the ASHRAE 62 area ventilation or the air required for building pressurization. The valve shall then modulate up to the full ASHRAE 62 ventilation air flow based on CO2 demand. The other air valve shall provide cooling air from the main air handling unit serving that area. For cooling, that air valve shall modulate from full flow down to zero. For heating that same air valve shall modulate in sequence with the heating coil modulating from zero up to the maximum design heating air flow.

3.5.2.1.4. The DOAU serving the BNHQ shall be a split system with the air handling unit located in the first floor mechanical room to the left of the BNHQ area and the condensing unit mounted on a structural frame on the roof of the classroom/DFAC area. This DOAU shall supply neutral air directly to each space. The DOAU shall be constant volume in order to make up the toilet exhaust and to maintain building pressurization. This DOAU shall include heat recovery for the exhaust air from the toilets.

3.5.2.2. HVAC Air Systems:

3.5.2.2.1. In general, all normally occupied areas of the building will be served by Chilled Water Variable Air Volume Air Handling Units. Air handling units will have double wall insulated casing, chilled water coils, filter sections with MERV 8 filters, and fan sections. The AHU's will not require heating coils, as all ventilation air is supplied by DOAU's and space heating will be accomplished at the VAV box.

3.5.2.2.2. For the sleeping bay wings, the AHU's will be located mechanical room(s) located near the sleeping bay wings and ducted to serve the sleeping bays. The Company offices on the first floor will be served by its own air handling unit. Minimum outside air will be from a DOAU. Due to spatial limitations, the DOAU will also supply cold air to carry a portion of the baseline cooling load. While the DOAU air flow will be constant volume, the air from the AHU will be variable down to zero air flow. The air handling units will not have economizer as the economizer would not be able to be activated until the dew point of the outside air was below 48F. An analysis indicated that there were virtually no hours during the year that there was a cooling load in excess of the capability of the DOAU when the outside air dew point was below 48. The VAV boxes will be dual duct. Although the AHU air valve will modulate to zero air flow, the air valve will modulate to a heating air flow when additional heating capacity is required. Some of the spaces in the Company offices also require supplemental baseboard heat. The baseboard heat will be controlled in conjunction with the VAV heating coil and air flow.

3.5.2.2.3. For the classrooms, the AHU's will be located in the mechanical rooms between the sleeping bay wings. In order to maximize the available area inside the sleeping bay, the ductwork is exterior on the backside of the sleeping bay tower and through the classroom roof. Ventilation air is provided directly to the spaces. Since all of the classroom spaces have only a roof load, they will require cooling under most outside conditions. Therefore the AHU will have economizer capability. The economizer will not be engaged until the outside air temperature is below 48 degrees dew point. Economizer relieve will be through roof hoods with motorized and barometric dampers on the roof of the classroom area. The VAV boxes will all be dual duct with downstream heating coils. The outside air valve will modulate based on demand controlled ventilation, with the minimum being set by ASHRAE 62 minimums and building pressurization. The AHU air valve will modulate to fully closed. The AHU air valve will modulate to a heating air flow to satisfy heating loads.

3.5.2.2.4. For the BNHQ area, the AHU will be located in the existing mechanical room to the left of the BNHQ. This air system will use single duct VAV boxes. In areas that have high heating loads, series fan powered boxes will be used to provide additional air flow for additional heating capacity. An economizer is not used for this air system.

3.5.2.3. Other HVAC Air Systems:

3.5.2.3.1. The laundry rooms will have a dedicated outdoor air unit for ventilation to provide ventilation and space pressurization. The rooms will also have heating and cooling fan coil units. The laundry rooms are unused during most of the day. The DOAU will provide space pressurization and ventilation during that time and the fan coils will provide supplemental heating and cooling. When many of the dryers are being used, the space will become negative and additional outside air will be drawn in. Once the dryers usage drops, the space will again become positive and the dry air from the DOAU will purge the moisture from the space.

Decoupling of Exhaust and Supply Ventilation 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 from the rest of the building exhaust and supply systems. Laundry exhaust system and corresponding clothes dryer make-up systems operate at full capacity when dryers are operating and in a reduced capacity/flow mode at other times to provide and maintain a mold free and dry laundry space. Laundry makeup air shall be tempered (heated) to provide adequate min. space temperatures. Laundry room must be supplied by the DOAU, see Mechanical requirements.

3.5.2.3.2. The Communication rooms requiring cooling will be served by dedicated DX ductless mini split air conditioning units. Units will utilize R410A refrigerant to reduce ozone depletion.

3.5.2.3.3. Electrical and mechanical rooms will be ventilated. Rooms that have sufficient outside will, will use wall mounted propeller exhaust fans mounted behind discharge louvers and intake louvers. All the louvers will have motorized dampers. Rooms that have either insufficient outside wall, or no outside wall will use roof mounted intakes and exhaust fans.

3.5.2.3.4. Mechanical rooms on the first floor will be heated with hydronic unit heaters.

3.5.2.3.5. The central stair towers between the sleeping bays will become fully enclosed. These stair towers will be a primary circulation path and will conditioned with heating cooling fan coil units.

3.5.2.3.6. The fire stairs at the ends of the sleeping bays are a secondary circulation path. These will be heated only using hydronic cabinet heaters located on the first and third floors.

3.5.2.3.7. The existing crawl space will be ventilated using a roof mounted intake and a roof mounted exhaust fan. Control of the exhaust fan will be by comparing the dewpoint of the crawl space air and the outside air. The exhaust fan will only operate when the dewpoint of the outside air is lower than the dewpoint of the crawl space air.

3.5.2.4. Hydronic Systems.

3.5.2.4.1. Chilled Water Systems: All HVAC systems must be converted to 4 pipes to allow the capabilities to provide cooling year round. IF Chilled water is provided from a CEP, the systems shall be designed for the plant chilled water system. If chilled water is to be obtained from the central plant new tertiary chilled water pumps will be installed for this building in the mechanical room.

3.5.2.4.2. Heating Water Systems: The heating water system will consist of high efficiency condensing type, gas fired boilers located the existing mechanical room to the right of the BNHQ. Flues will be routed up the backside of the sleeping bay tower. Heating water will be used for building heat through VAV boxes. The heating water pumping system will utilize primary-secondary pumping with variable speed secondary. The heating secondary heating water pumps will be two 50-50 parallel operation pumps. The heating water system will be designed to

provide 140 to 150 degree supply water temperatures and maximum temperature differentials to achieve higher energy efficiencies from the boiler and lower pumping costs.

3.5.2.5. COMPLIANCE WITH THE ENERGY POLICY ACT OF 2005 (EPACT 2005)

3.5.2.5.1. EPACT 2005 REQUIREMENT

Although EPACT 2005 only applies to new facilities, this facility shall be designed as if EPACT 2005 fully applied to it. The building, including the building envelope, HVAC systems, service water heating, power, and lighting systems shall be designed to achieve an energy consumption that is at least 30% below the consumption of a baseline building meeting the minimum requirements of ANSI/ASHRAE/IESNA Standard 90.1-2004 (see paragraph 5.9 Energy Conservation)

3.5.2.5.2. TARGET ENERGY CONSUMPTION BUDGET

The target energy consumption budget (excluding plug loads) for this facility located in Climate 3A is 50 kBTU per ft2 per year or less. The use of the Prescriptive Technology Solution Set, shown below, shall result in an annual energy consumption less than or equal to the target energy budget figure.

3.5.2.5.3. PRESCRIPTIVE PATH (USE OF TECHNOLOGY SOLUTION SET)

The technology solution set shown in the table below achieves the above energy performance and life cycle cost effectiveness requirements for an IET Barracks facility in the indicated DOE climatic zone. This table is required only if the prescriptive path is taken. IF prescriptive path is not followed, then it is required by UFC-3-400-01 section 2-4.1 that a Energy Compliance Analysis (ECA) must be completed to verify that the 30% reduction in energy consumption from 90.1 values has been met. This analysis can be performed using a Trace model or equivalent. The analysis must set up a baseline values from ASHRAE 90.1 and then compared to the new 30% energy reduction design.

Climate Zone 3A, Prescriptive Technology Solution Table

Item	Component	Baseline (1)	30% Solution
Roof	roof deck	R-30	R-40
	Surface reflectance	0.08	0.27
Walls	Light Weight Construction	R-13	R-20
Exposed Floors	Mass	R-4.2 c.i.	R-10 c.i.
Slabs	Unheated	NR (2)	NR (2)
Doors	Swinging	U-0.70	U-0.70
	Non-Swinging	U-1.45	U-1.45
Infiltration		0.4 cfm/ft^2 @ 75 Pa	0.3 cfm/ft^2 @ 75 Pa (3)
Vertical Glazing	Window to Wall Ratio (WWR)	10% - 20%	10% - 20%
	Thermal transmittance	U-0.57	U-0.45
	Solar heat gain coefficient (SHGC)	0.37	0.31
Interior Lighting	Lighting Power Density (LPD)	1.1 W/ft^2	0.9 W/ft^2
	Ballast		Electronic ballast
HVAC	Air Conditioner	PSZ-AC 12.0 SEER (3.05 COP)	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 55ºF – 62ºF with OAT 75º – 54ºF
	Gas Furnace	80% E_t	none
	ERV	yes	70 to 75 % sensible effectiveness
Economizer		no	no
Ventilation	Outdoor Air Damper	Motorized control	Motorized control
	Demand Control	NR	NR
			(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	80% E_t	90% E_t
	Drain Water Heat Recovery	None	none)

1. Baseline requirements are from ANSI/ASHRAE/IESNA Standard 90.1-2004.

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/ft^2) 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.

   c. Building pressurization to prevent infiltration which allows for reduction of heating/cooling and moisture loads on the system.

   d. Must have exhaust heat recovery from the bathroom.

   NOTE: The Central DOAS does not provide sensible heating or cooling. Sensible loads are provided by a complementing heating and cooling system. DOAS units are required for classrooms. Admin areas- Do not require DOAS but must meet the following:
   - DOAS must run 24 hours a day to maintain humidity level.
   - Ventilation air requirements must go through main unit.
   - Damper system required air intake working with main unit.
   - Unit must have exhaust heat recovery, condenser reheat.
   - Units must be designed with more coils (increase surface area) to remove more humidity in peak conditions.
   - Reheat required after coils to bring temp to desired conditions.

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

   All design features of this EPACT 2005 compliant IET Barracks not described above shall be in accordance with the minimum requirements of ANSI/ASHRAE/IESNA Standard 90.1-2004,n including conformance with paragraph 5.9.2, which requires purchase of Energy Star and FEMP designated products

3.5.2.6. Provide air barrier system to allow attainment of building air leakage rate of no more than 0.30 cfm/sf @ 75 Pa when tested in accordance with ASTM E-2178. At the completion of construction, the building or portion thereof shall be tested to show compliance. Insure the piping/plumbing chase from the building crawl space in the Mechanical room and dining areas and at each floor level and at the attic/roof level is properly sealed against air leakage, heat loss and vapor transmission.

3.5.2.7. All major mechanical equipment such as Air Handling Units, pumps, water heaters, heat exchangers, shall be located in mechanical equipment rooms Major mechanical equipment access shall be via a door with minimum dimensions of 72” wide x 80” tall or deep. Mechanical rooms shall be sized for ease of service and maintenance of equipment. Air filters shall be located in duct or unit mounted filter boxes within the mechanical room. DOAS and other mechanical equipment can be located on the roof above the classrooms.

3.5.2.8. Use 1.5” closed cell flexible elastomeric insulation for all cold piping (any piping that shall be at 60º F or less in any operating mode) to prevent the formation of condensation and mold/mildew on the exterior.

3.5.2.9. Design the thermal envelope for the wall to meet the project requirements of Table A. Condensation and moisture analysis shall be performed to show that primary water vapor barrier is exterior to the insulation layer. Insulation in the prescriptive tables is required for the roof deck and walls. Spray foam can be used to meet this requirement. Use winter/summer and inside design conditions as indicated in paragraph 3.5.5.

3.5.2.10. HVAC design loads must include plug loads of 3 watts/sf in classrooms. HVAC design loads must also account for surge population in classrooms.

3.5.2.11. Heating, mechanical ventilation and air-conditioning shall be in accordance with Department of the Army criteria noted above and ASHRAE Standard 62. Continuous ventilation air (24/7 for all areas) must be provided throughout each building for indoor air quality, building pressurization, and makeup of exhausted air. Exhaust airflows and people ventilation shall be provided as required by ASHRAE Standard 62.The overall building shall be positively pressurized by approximately 10 Pa to exclude unplanned infiltration. All ventilation air shall be provided using one or more dedicated outdoor air units.

Recirculation and filtering of air from the Toilet/Shower/Dressing areas at the Sleeping Bays is prohibited.

3.5.2.12. Comply with following if Option 1 is awarded. Special requirements for trainee sleeping bays are: Supply air shall be designed to ensure even distribution or air over the entire sleeping bay with no velocities in the occupied zone (up to 6 feet or higher above finished floor) exceeding 40 feet per minute. Additionally for the each company “platoon” living/sleeping barracks area, air distribution design shall prevent short-circuiting of supply air; also, return or exhaust air shall be located to preclude sweeping of room air over multiple (more than one) rows of bunks. Elimination of pulling return or exhaust air across multiple healthy soldiers is mandatory to decrease the likelihood of infection and has been mandate by the US Army Medical Command for trainee barracks. A final consideration is that the army shall at time stack or double bunk trainees during surge population periods, so air distribution has to take that fact into account also.

3.5.2.13. Meet LEED Silver requirements if Options are awarded.

3.5.3. HVAC Automation and Controls

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 LonWorks® technology using ANSI/CEA 709.1B as the communications protocol and use only LonMark Standard Network Variable Types, as defined in the LonMark® Resource Files, for communication between DDC Hardware devices to allow multi-vendor interoperability. The building BAS shall be capable of integration to a future base wide supervisory monitoring and control (M&C) system (often referred to as a Utility Monitoring and Control System – UMCS). 3 Monitoring and Control hardware and software requirements are listed below. Each list is provisional and shall depend on selected HVAC systems for actual points being monitored and controlled and applicable software:

(a) Standard Input/Output (I/O) points, to be connected and integrated for monitoring and control shall need alarm limits, etc. as appropriate for all I/O:

Outside Temperature (F)
Outside Humidity (%)
Boiler Safeties (All)
Chiller Safeties (All)
Air Handler Safeties (Freezestats, Firestats, etc.)
Air Flow Monitor (normal/low)
Start/Stop Monitor (normal/low)
Air Handler Hot Deck (F) .
Air Handler Cold Deck (F)
Return Air Temperature (F)
Mixed Air Temperature (F)
Supply Temperature for each Zone or Main Supply Temp(F),etc.
Room Air Temperature for each Zone (F)
Humidity for each Zone (%)

Chilled Water Supply (F)
Chilled Water Return (F)
Chilled Water Flow (GPM)
Chiller Start/Stop Control and Load Limiting Input/
Tower Fan Status (on/off)
Condenser Water Supply & Return Temps (F)
Chilled Water Pump Status (on/off)
Economizer Control
Hot Water Pump Status (on/off)
Hot Water Supply & Return Temperatures (F)
Hot Water Flow (GPM)
Filter Media Differential Pressure Alarms
Motor Run Time (elapsed)
Moisture Alarms in Raised Floor Areas
Enable/Disable
Start/Stop
Run-longer user interface (usually 2 hours) to delay unoccupied modes

(b) Standard Monitoring and Control Software that shall be provided, both at the building or be integrated into or used at the existing UMCS are:

High and low temperature limit alarming
High and low humidity limit alarming
Equipment runtime and status (on/off, enabled, etc.)
Scheduled and optimum start/stop
Duty cycling
Demand limiting (motor start/stop restrictions, motor size, etc.)
Occupied/Unoccupied
Time Scheduling
Day/Night Setback
Economizer
Ventilation and Recirculation, Vent Delay, etc.
Hot and Cold deck reset
Reheat coil reset
Boiler plant – boiler optimization
Chiller plant - chiller optimization
Heating water supply temperature reset
Chilled water supply temperature reset
Condenser water reset
Post-wide demand limiting

3.6. ELECTRICAL AND TELECOMMUNICATIONS REQUIREMENTS

3.6.1. Power

3.6.1.1. General

All electrical conduits and outlet boxes located in normally occupied spaces shall be recessed into walls. Power shall be provided for all installed equipment requiring power including all Government Furnished Contractor Installed equipment and all GFGI equipment. Power shall be connected to the existing building electrical system. The existing electrical system shall be modified to accommodate all new construction including the relocation, if necessary, of the service transformer to comply with AT/FP requirements. Provide a power distribution system that is safe, efficient, economical and 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 the service equipment and in all panels serving computer and other electronic equipment. Power poles are not allowed. All circuits routed through areas not being renovated must be clearly labeled, with permanent type letter/color identification signage along the entire length of the new installation. The identification signage must clearly identify the type of service and that the associated item was part of a recent renovation.

3.6.1.1.1. Provide 125-volt duplex receptacles per NFPA 70 and in conjunction with the proposed equipment and furniture layouts.

3.6.1.1.2. In addition to receptacles required elsewhere in the scope of work provide one duplex receptacle per wall in all normally occupied spaces unless otherwise noted.

3.6.1.1.3. For housekeeping purposes provide a minimum of one 125-volt duplex receptacle per corridor. No point along corridor wall at 18 inches above finished floor (AFF) shall be more than 25 feet from a receptacle. Provide 125-volt duplex receptacles within lobbies and reception areas such that no point within the lobby or reception floor shall be more than 25 feet from a receptacle.

3.6.1.1.4. Provide 125-volt GFI duplex receptacles mounted adjacent to lavatories. A minimum of one for every two adjacent lavatories shall be provided. Where toilet has only one lavatory, provide a receptacle.

3.6.1.1.5. Reconnect existing power connections to all equipment, receptacles and devices that are impacted by construction. All existing equipment, receptacle and devices impacted by construction shall be functional upon completion of construction.

3.6.1.1.6. A minimum of two 125-volt duplex receptacles shall be provided in each mechanical room in addition to NFPA 70 requirements and one in each electrical room.

3.6.1.2. DFAC Area Conversion to Classrooms

3.6.1.2.1. Provide 125-volt duplex receptacles along walls such that no point 18 inches AFF is more than 12 feet from a receptacle. The additional requirement in paragraph 3.6.1.1.2 does not apply to these rooms.

3.6.1.2.2. Provide ten (10) evenly spaced 125-volt duplex receptacles on the back wall of one classroom for personal computers. Receptacles shall be located adjacent to the data outlets specified in paragraph 3.6.3.2.3.

3.6.1.3. BNHQ Classrooms Renovation

3.6.1.3.1. Provide 125-volt duplex receptacles along walls such that no point 18 inches AFF is more than 12 feet from a receptacle. The additional requirement in paragraph 3.6.1.1.2 does not apply to these rooms.

3. 6.1.3.2. Provide a 125-volt duplex receptacle next to each VTC connectivity outlet. These receptacles are in addition to those required in paragraph 3.6.1.3.1.

3.6.1.4. BNHQ Renovation and Expansion

3.6.1.4.1. Provide a minimum of one 125-volt GFI duplex receptacle above counter tops containing sinks (excluding those in toilets). No point along back of counter top shall be more than 4 feet from a receptacle.

3. 6.1.4.2. Provide six (6) recessed floor mounted 125-volt duplex receptacles centered underneath conference table.

3. 6.1.4.3. Provide a minimum of seven (7) 125-volt duplex receptacles spaced evenly along conference room perimeter walls.

3. 6.1.4.4. Provide a 125-volt duplex receptacle next to each VTC connectivity outlet. These receptacles are in addition to those required in paragraph 3.6.1.4.3.

3.6.1.5. Company Operations and Covered Training Area Renovation

3.6.1.5.1. For housekeeping purposes provide 125-volt duplex receptacles in the covered training area such that no point along wall at 18 inches above finished grade shall be more than 25 feet from a receptacle.

3.6.1.5.2. Provide a minimum of one 125-volt GFI duplex receptacle above counter tops containing sinks (excluding those in toilets). No point along back of counter top shall be more than 4 feet from a receptacle.

3.6.1.6. Laundry Room Renovation

In addition to outlets required for washers and dryers provide 125-volt duplex convenience receptacles spaced a maximum of 12 feet apart around perimeter of room mounted at 48” AFF.

3.6.1.7. Sleeping Bay Area Renovation

3.6.1.7.1. Provide six (6) 125-volt duplex receptacles spaced evenly along exterior walls in each sleeping bay and two evenly spaced along each end wall. The additional requirement in paragraph 3.6.1.1.2 does not apply to these rooms.

3.6.1.7.2. Provide 125-volt duplex receptacles in the Drill Sergeant office such that no point along wall at 18 inches AFF is more than 6 feet from a receptacle. The additional requirement in paragraph 3.6.1.1.2 does not apply to these rooms.

3.6.1.7.3. Provide a 125-volt duplex receptacle adjacent to data outlet. This receptacle is in addition to the two required along end walls per paragraph 3.6.1.7.1.

3.6.1.8. Cadre Support Spaces Renovation

3.6.1.8.1. Provide 125-volt duplex receptacles such that no point along wall at 18 inches AFF is more than 6 feet from a receptacle. The additional requirement in paragraph 3.6.1.1.2 does not apply to these rooms.

3.6.1.8.2. Provide a minimum of one 125-volt duplex receptacle above counter tops containing sinks (excluding those in toilets). No point along counter shall be more than 4 feet from a receptacle.

3.6.2. Lighting

3.6.2.1. General

All lighting circuits to include conduits and outlet boxes located in normally occupied spaces shall be recessed into walls. Lighting shall comply with the recommendations of the Illumination Engineering Society of North America (IESNA) unless otherwise specified. Lighting controls shall be provided in accordance with ASHRAE 90.1. Provide lighting as specified below in addition to the requirements of Paragraph 5.0 GENERAL TECHNICAL REQUIREMENTS. Lighting illumination level (FC) design shall be based upon the functional purpose of the space. Compact fluorescent lamps of 12 watts or less shall not be used. Lighting levels provided shall be within +/- 10% of required levels. Reconnect existing lighting circuits to all fixtures that are impacted by construction. Existing lighting impacted by construction shall be functional upon completion of construction.

3.6.2.2. DFAC Area Conversion to Classrooms

Storage rooms shall be illuminated to a level of 10 foot-candles.

3.6.2.3. BNHQ Classrooms Renovation

Storage rooms shall be illuminated to a level of 10-foot-candles.

3.6.2.4. BNHQ Renovation and Expansion

3.6.2.4.1. Local manual controls shall supplement automatic controls in offices, conference rooms, and large open work spaces.

3.6.2.4.2. CQ area, mechanical rooms, electrical rooms and storage rooms shall be illuminated to a level of 30 foot-candles.

3.6.2.4.3. Lobby shall be illuminated to a level of 20 foot-candles.

3.6.2.4.4. Provide exterior lighting at main entrance. Lighting shall be controlled by a photocell or time clock.

3.6.2.5. Company Operations and Covered Training Area Renovation

3.6.2.5.1. Local manual controls shall supplement automatic controls in offices, conference rooms, and large open work spaces.

3.6.2.5.2. CQ area, supply room with desk, electrical room, mechanical room and arms vault shall be illuminated to a level of 30 foot-candles.

3.6.2.5.3. Covered training areas, supply room without desk and issue room shall be illuminated to a level of 15 FC’s.

3.6.2.5.4. An un-switched vandal-resistant fixture with emergency ballast shall be provided at the entrance to each arms vault.

3.6.2.5.5. Lighting fixtures in covered training areas shall be recessed mounted.

3.6.2.5.6. Reception area shall be illuminated to a level of 20 foot-candles.

3.6.2.6. Laundry Room Renovation

Illuminate to a level of 30 foot-candles. Lighting shall have automatic motion detection switching.

3.6.2.7. Sleeping Bay Area Renovation

3.6.2.7.1. Local manual controls shall supplement automatic controls in sleeping bays.

3.6.2.7.2. Illuminate sleeping-bays to a level of 15 foot-candles.

3.6.2.7.3. Illuminate Drill Sergeant office to a level of 30 foot-candles.

3.6.2.8. Cadre Support Spaces Renovation

Illuminate to a level of 30 foot-candles.

3.6.3. Telecommunications

3.6.3.1. General

All telecommunications conduits and outlet boxes located in normally occupied spaces shall be recessed into walls. Provide telecommunications outlets per the Technical Criteria for the I3A based on functional purpose of the space and in accordance with the proposed equipment and furniture layouts and other provisions of this RFP.

3.6.3.2. DFAC Area Conversion to Classrooms

3.6.3.2.1. Provide a dual (voice and data) 8-pin modular jack outlet at the front of each partitioned area in each classroom. Telecommunications system shall connect to existing telecommunication systems within the building.

3.6.3.2.2. Provide an outlet that has both a fiber optic jack and an 8-pin modular jack to provide video teleconferencing connectivity in each partitioned area in each classroom.

3.6.3.2.3. Provide ten (10) evenly spaced dual (both for data) 8-pin modular jack outlets on the back wall of one classroom for personal computers.

3.6.3.2. BNHQ Classrooms Renovation

3.6.3.3.1. Provide a dual (voice and data) 8-pin modular jack outlet at the front of each partitioned area in each classroom and on the sides at the midpoint of the classroom. Telecommunications system shall connect to existing telecommunication systems within the buildings.

3.6.3.3.2. Provide an outlet that has both a fiber optic jack and an 8-pin modular jack to provide video teleconferencing connectivity near each screen in each classroom.

3.6.3.4. BNHQ Renovation and Expansion

3.6.3.4.1. In offices provide number of outlets required per the Technical Criteria for the I3A or one outlet per number of desks/workstations whichever is greater.

3.6.3.4.2. All horizontal cabling shall be terminated within the telecommunications room within the BNHQ area.

3.6.3.4.3. Space shall be provided in the form of a six foot by six foot room for future Secret Internet Protocol Router Network (SIPRNET) connectivity to include secure video teleconferencing. The SIPRNET room shall be designed and constructed in accordance with AR 380-5, Department of the Army Information Security Program. Provide the same power, lighting, and telecommunications design features within the SIPRNET room as required for telecommunications rooms per the Technical Criteria for the I3A with the exception of the cable tray. In addition, provide a 2 inch conduit between SIPRNET room and main telecommunications room.

3.6.3.4.4. Provide an outlet that has both a fiber optic jack and an 8-pin modular jack to provide video teleconferencing connectivity in the conference room.

3.6.3.4.5. Provide two wall mounted dual 8-pin modular jack outlets and one floor mounted recessed box with six (6) dual 8-pin modular jack outlets centered underneath conference table.

3.6.3.5. Company Operations and Covered Training Area Renovation

3.6.3.5.1. In offices provide number of outlets required per the Technical Criteria for the I3A or one outlet per number of desks/workstations whichever is greater.

3.6.3.5.2. All horizontal cabling shall be terminated within the telecommunications room within the BNHQ area.

3.6.3.5.3. Connectivity shall be reestablished for pay phones within the covered training areas per local telephone company requirements.

3.6.3.5.4. Provide an outlet that has both a fiber optic jack and an 8-pin modular jack to provide video teleconferencing connectivity in the conference room.

3.6.3.6. Laundry Room Renovation

None required.

3.6.3.7. Sleeping Bay Area Renovation

3.6.3.7.1. Provide a single (data) 8-pin modular jack outlet in each sleeping bay centered on wall outside Drill Sergeant Office.

3.6.3.7.2. Provide three (3) dual 8-pin modular jack outlets in Drill Sergeant office.

3.6.3.8. Cadre Support Spaces Renovation

Provide six (6) dual 8-pin modular jack outlets per room.

3.6.4. CATV

3.6.4.1. General

All CATV conduits and outlet boxes located in normally occupied spaces shall be recessed into walls. All CATV outlet boxes, connectors, cabling, and cabinets shall conform to the Technical Criteria for the I3A unless noted otherwise. All horizontal cabling shall be homerun from the CATV outlet to the nearest telecommunications room unless noted otherwise. The contractor

shall coordinate all CATV work with CATV privatized utility. If demarcation point is relocated as a result of renovation all affected service within the entire building shall be reestablished.

3.6.4.2. DFAC Area Conversion to Classrooms

Provide connectivity at the front of each area classroom or partitioned area.

3.6.4.3. BNHQ Classrooms Renovation

Provide connectivity at the front of each classroom and at the midpoint on the sides of the classroom.

3.6.4.4. BNHQ Renovation and Expansion

Provide connectivity in the conference room and private offices.

3.6.4.5. Company Operations and Covered Training Area Renovation

Provide connectivity in the conference room and private offices.

3.6.4.6. Laundry Room Renovation

None required.

3.6.4.7. Sleeping Bay Area Renovation

Provide connectivity in the Drill Sergeant office.

3.6.5. Paging System

A zoned paging system shall be provided throughout the renovated area and integrated with the telephone system. System may utilize mass notification amplifiers and speakers, but shall be overridden by the mass notification system if mass notification system is activated while the paging system is being utilized. System shall have six (6) zones to include each company operations area, the BNHQ area, and an all call.

3.6.6. Door Status/Alarm Monitoring Systems

Door monitoring systems (one per company) consisting of a door status/alarm panel and door balanced magnetic switches shall be provided. Each monitoring system shall provide door status/alarms on all doors leading into and within the sleeping bay in order to accommodate gender segregation. System shall allow each door alarm to be individually activated or deactivated. Door status/alarm panels shall be located in the Drill Sergeant office. Panels shall provide both an audio and visual signal when alarm is activated. See Paragraph 6.0 for additional requirements.

3.6.7. Intrusion Detection System (IDS)

Infrastructure for IDS shall be provided for each arms vault. Infrastructure shall consist of conduit, pull wire and outlet boxes. Outlet boxes are required for a control panel, balanced magnetic switch, motion sensor and duress switch unless specified otherwise in Paragraph 6.10.

3.6.8. CCTV System

3.6.8.1. A conduit system shall be provided and installed to support CCTV at all doors leading into the BNHQ area. The conduit system shall include, but not be limited to, conduits, pull boxes and

pull wires. All conduits for CCTV signals shall be routed back to the telecommunications room or designated monitoring room.

3.6.8.2. A conduit system shall be provided and installed to support CCTV to monitor the arms vault doors on the outside of the vault. The conduit system shall include, but not be limited to, conduits, pull boxes and pull wires. All conduits for CCTV signals shall be routed back to the telecommunications room or designated monitoring room.

3.6.9. Grounding

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

3.7 Not Used

3.8 FIRE PROTECTION

3.8.1. General Requirements

3.8.1.1. The applicable design standards shall include the following:
- Unified Facilities Criteria (UFC) 1-200-01
- Unified Facilities Criteria (UFC) 3-600-01
- Unified Facilities Criteria (UFC) 4-010-01
- Unified Facilities Criteria (UFC) 4-021-01 04,
- International Building Code,
- NFPA 10: *Standard for Portable Fire Extinguishers*
- NFPA 13: *Standard for the Installation of Sprinkler Systems*
- NFPA 14: *Standard for the Installation of Standpipes and Hose Systems*
- NFPA 20: *Standard for the Installation of Stationary Pumps for Fire Protection*
- NFPA 24: *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*
- NFPA 70: *National Electrical Code*
- NFPA 72: *National Fire Alarm Code*
- NFPA 90A: *Standard for Installation of Air Conditioning and Ventilating Systems*
- NFPA 101: *Life Safety Code*

3.8.1.2. A Qualified Fire Protection Engineer (P.E.) as defined by UFC 3-600-01, Section 1-5 shall be involved in every aspect of the project as it relates to fire protection. This includes, but is not limited to, building code analysis, life safety code analysis, design and acceptance testing of automatic detection and suppression systems, water supply analysis, and a multi-discipline review of the entire project.

3.8.2. Fire Sprinkler

3.8.2.1. Provide a dedicated fire service lead-in to the Starship Facility from the existing public water distribution system. The underground water distribution system and the lead-in shall be designed and installed in accordance with NFPA 24.

3.8.2.1. Provide a wet-pipe sprinkler system throughout the Starship Facility. The design, installation and testing of the sprinkler system shall be performed in accordance with NFPA 13.

3.8.2.2. Provide a dry-pipe or antifreeze sprinkler system as required in areas subject to freezing. The design, installation and testing of the sprinkler system shall be performed in accordance with NFPA 13.

3.8.2.3. Provide standpipes and fire department connections (FDC) as required by the AHJ and the responding fire department. The standpipe system shall be designed, installed and tested in accordance with NFPA 14.

3.8.2.4 If required based on the results of fire hydrant flow tests, provide a fire pump in accordance with NFPA 20. If a fire pump is required the fire pump shall be designed, installed and tested in accordance with NFPA 20.

3.8.2.5 The Qualified Fire Protection Engineer shall perform or witness the fire hydrant flow testing. A water quality analysis shall be performed in accordance with UFC 3-600-01, Section 4-2.3.2 to determine if schedule 10 pipe is permitted to be used.

3.8.3. Fire Alarm / Mass Notification

3.8.3.1. Provide a combination addressable fire alarm/mass notification system consisting of an integrated fire alarm and mass notification control panel, communication equipment connecting the system to a central monitoring station, initiating devices and notification appliances. Separate fire alarm and mass notification systems will not be accepted. The combination fire alarm/mass notification system shall be designed, installed and tested in accordance with NFPA 72, UFC 3-600-01, and UFC 4-021-01.

3.8.3.2. Provide smoke detection in all sleeping areas. All smoke detection shall be monitored by the fire alarm/mass notification system. Smoke detection shall be designed, installed and tested in accordance with NFPA 72.

3.8.3.3. Provide manual pull stations at all required exits in accordance with NFPA 72. Provide additional manual pull stations as required by the AHJ.

3.8.3.4. Provide visual fire alarm notification throughout common areas of the Starship Facility in accordance with the Uniform Federal Accessibility Standard (UFAS) and Americans with Disabilities Act Accessibility Guidelines (ADAAG). Provide visual mass notification appliances at locations required to have visual fire alarm notification.

3.8.3.5. 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.

(End of Section)

4.0 APPLICABLE CRITERIA

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

4.1. INDUSTRY CRITERIA

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

Table 1: Industry Criteria

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

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

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

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

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

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

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

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

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

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

4.2. MILITARY CRITERIA

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

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

4.2.2. Executive Order 12770: Metric Usage In Federal Government

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

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

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

4.2.5. Deleted.

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

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

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

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

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

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

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

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

5.0 GENERAL TECHNICAL REQUIREMENTS

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

5.1. SITE PLANNING AND DESIGN

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

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

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

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

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

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

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

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

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

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

5.2. SITE ENGINEERING

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

5.2.2. SOILS:

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

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

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

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

5.2.3.2. Parking Requirements.

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

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

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

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

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

any 15 minute period. Configure all meters to transmit at least daily even if no receiver for the data is currently available at the time of project acceptance. For privatized utilities, coordinate with the privatization utility(ies) for the proper meter base and meter installation.

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

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

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

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

5.3. ARCHITECTURE AND INTERIOR DESIGN:

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

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

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

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

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

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

5.3.5. BUILDING INTERIOR

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

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

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

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

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

5.3.5.6. Window Treatment: Interior window treatments with adjustable control shall be provided in all exterior window locations for control of day light coming in windows or privacy at night. Uniformity of treatment color and material shall be maintained to the maximum extent possible within a building.

5.3.6. COMPREHENSIVE INTERIOR DESIGN

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

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

5.4. STRUCTURAL DESIGN

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

5.4.2. GENERAL: The structural system needs to be compatible with the intended functions and components that allows for future flexibility and reconfigurations of the interior space. Select an economical structural system based upon facility size, projected load requirements and local availability of materials and labor. Base the structural design on accurate, site specific geotechnical information and anticipated loads for the building types and geographical location. Consider climate conditions, high humidity, industrial atmosphere, saltwater exposure, or other adverse conditions when selecting the type of cement and admixtures used in concrete, the concrete cover on reinforcing steel, the coatings on structural members, expansion joints, the level of corrosion protection, and the structural systems. Analyze, design and detail each building as a complete structural system. Design structural elements to preclude damage to finishes, partitions and other frangible, non-structural elements to prevent impaired operability of moveable components; and to prevent cladding leakage and roof ponding. Limit deflections of structural members to the allowable of the applicable material standard, e.g., ACI, AISC, Brick Industry Association, etc. When modular units or other pre-fabricated construction is used or combined with stick-built construction, fully coordinate and integrate the overall structural design between the two different or interfacing construction types. If the state that the project is located in requires separate, specific licensing for structural engineers (for instance, such as in Florida, California and others), then the structural engineer designer of record must be registered in that state.

5.4.3. LOADS: See paragraph 3 for facility specific (if applicable) and paragraph 6 for site and project specific structural loading criteria. Unless otherwise specified in paragraph 6, use Exposure Category C for wind. If not specified, use Category C unless the Designer of Record can satisfactorily justify another Exposure Category in its

design analysis based on the facility Master Plan. Submit such exceptions for approval as early as possible and prior to the Interim Design Submittal in Section “Design After Award”. In addition to gravity, seismic and lateral loads, design the ancillary building items, e.g. doors, window jambs and connections, overhead architectural features, equipment bracing, for the requirements of UFC 4-010-01, DOD Minimum Antiterrorism Standards for Buildings. Ensure and document that the design of glazed items includes, but is not limited to, the following items under the design loads prescribed in UFC 4-010-01:

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

(b) Connections of glazed element to supporting members, e.g. window to header

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

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

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

5.5. THERMAL PERFORMANCE

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

5.5.2. BUILDING ENVELOPE SEALING PERFORMANCE REQUIREMENT. Design and construct the building envelope for office buildings, office portions of mixed office and open space (e.g., company operations facilities), dining, barracks and instructional/training facilities with a continuous air barrier to control air leakage into, or out of, the conditioned space. Clearly identify all air barrier components of each envelope assembly on construction documents and detail the joints, interconnections and penetrations of the air barrier components. Clearly identify the boundary limits of the building air barriers, and of the zone or zones to be tested for building air tightness on the drawings.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

5.6. PLUMBING

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

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

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

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

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

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

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

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

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

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

5.7. ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

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

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

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

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

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

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

5.7.5.1. Interior Lighting:

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

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

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

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

(e) Lighting Controls: ANSI/ASHRAE/IESNA 90.1 has specific lighting controls requirements. Provide a high level of lighting system control by individual occupants or by specific groups in multi-occupant spaces (classrooms, conference rooms) to promote the productivity, comfort and well being of the building occupants. In office spaces, the preferred lighting should be a 30 FC ambient lighting level with occupancy sensor controlled task lighting in the work spaces to provide a composite lighting level of 50 FC on the working surfaces. Consider incorporating daylighting techniques for the benefit of reducing lighting energy requirements while improving the quality of the indoor spaces. If daylight strategies are used, additional coordination is required with the architect and mechanical engineer. Additionally, incorporate electric lighting controls to take advantage of the potential energy savings.

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

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

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

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

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

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

5.8. HEATING, VENTILATING, AND AIR CONDITIONING

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

5.8.2. DESIGN CONDITIONS.

5.8.2.1. Outdoor and indoor design conditions shall be in accordance with UFC 3-410-01FA. Outdoor air and exhaust ventilation requirements for indoor air quality shall be in accordance with ASHRAE 62.1. All Buildings with minimum LEED Silver requirement (or better) will earn LEED Credit EQ 7.1, Thermal Comfort-Design.

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

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

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

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

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

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

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

The UMCS shall use the IP network to perform supervisory control and monitoring of a ANSI/CEA-709.1B (LonWorks) network using LonWorks Network Services (LNS). The UMCS shall communicate with building control systems using ANSI/CEA-852 only.

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

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

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

5.8.3.2. All DDC Hardware shall:

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

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

(c) Communicate with other DDC hardware using only SNVTs

(d) Conform to the LonMark® Interoperability Guidelines.

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

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

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

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

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

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

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

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

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

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

5.8.3.8. Provide a supervisory “Utility Monitoring and Control System” (UMCS) which meets the following requirements:

(a) The UMCS shall perform supervisory control and monitoring of a base-wide ANSI/CEA-709.1B (LonWorks) network using LonWorks Network Services (LNS).

(b) The UMCS shall be DIACAP certified have a Certificate of Networthiness and shall use the installation’s basewide IP network to provide connectivity between building control systems. DIACAP, Networthiness and access to the IP network shall be coordinated with the installation’s IT organization (NEC) and the DPW.

(c) The UMCS monitoring and control (M&C) software shall be a LonWorks Network Services (LNS)-compatible client-server software package that performs supervisory monitoring and control functions including but not limited to Scheduling, Alarm Handling, Alarm Generation, Trending, Report Generation and Electrical Peak Demand Limiting. The software shall be expandable in both number of points and number of clients supported in order to support system expansion. The M&C Software may include drivers to other (non-ANSI/CEA-709.1B) protocols.

(d) The software shall be capable of scheduling SNVTs such that it can change the value of a SNVT according to an internal schedule.

(e) The software shall be capable of handling alarms by providing an alarm notification via a pop-up to a user display, printing to a printer, sending an email and sending a numeric page.

(f) The system shall include a web based Graphical User Interface which allows for hierarchical graphical navigation between systems, graphical representations of systems, access to real-time data for systems, ability to override points in a system, and access to all supervisory monitoring and control functions. Each system display shall clearly distinguish between the following point data types and information: Real-time data, User-entered data, Overridden or operator-disabled points, Devices in alarm (unacknowledged), and Out-of-range, bad, or missing data. The software shall allow the user to create, modify, and delete displays and graphic symbols. Data on graphics pages shall be no more than 10 seconds behind real time.

(g) Provide a network configuration tool. This software shall use LonWorks Network Services (LNS) for all network configuration and management of ANSI/CEA-709.1B devices, be capable of executing LNS plug-ins, and be capable of performing network database reconstruction of an ANSI/CEA-709.1B control network.

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

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

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

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

Table 5-1: QC Checklist

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

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

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

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

5.8.3.13. Provide training at the project site on the installed building system and UMCS 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. Operation of the UMCS includes but is not limited to

- Configuring and managing alarms

- Configuring schedules
- Creation and modification of trends
- Creation of reports
- Performing operator overrides.

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

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

5.9. ENERGY CONSERVATION

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

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

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

5.9.4. Solar Hot Water Heating. Provide at least 30% of the domestic hot water requirements through solar heating methodologies, unless the results of a Life Cycle Cost Analysis (LCCA) developed utilizing the Building Life Cycle Cost Program (BLCC) which demonstrates that the solar hot water system is not life cycle cost effective in comparison with other hot water heating systems. The type of system will be established during the contract or

task order competition and award phase, including submission of an LCCA for government evaluation to justify non-selection of solar hot water heating. The LCCA uses a study period of 25 years and the Appendix K utility cost information. The LCCA shall include life cycle cost comparisons to a baseline system to provide domestic hot water without solar components, analyzing at least three different methodologies for providing solar hot water to compare against the baseline system.

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

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

5.10. FIRE PROTECTION

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

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

5.10.3. Fire Extinguisher Cabinets: Provide fire extinguisher cabinets and locations for hanging portable fire extinguishers in accordance with NFPA 10 Standard for Portable Fire Extinguishers.

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

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

5.11. SUSTAINABLE DESIGN

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

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

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

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

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

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

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

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

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

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

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

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

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

building. See Project Specific Requirements for project specific siting constraints. The following list highlights the major points but the detailed requirements as presented in Appendix B of UFC 4-010-01 must be followed.

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

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

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

(d) Mass notification system (shall also conform to UFC 4-021-01, Mass Notification Systems)

(e) For facilities with mailrooms (see paragraph 3 for applicability) – mailrooms have separate HVAC systems and are sealed from rest of building

6.0 PROJECT SPECIFIC REQUIREMENTS

6.1. GENERAL

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

6.2. APPROVED DEVIATIONS

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

In case of any conflicts between Paragraph 5 and Paragraph 3, Paragraph 3 requirements will apply in this project.

6.3. SITE PLANNING AND DESIGN

6.3.1. General:

This project is located in the Sand Hill area of Fort Benning. The project is phased to coincide with the completion of a new DFAC on a site between the two projects, Buildings 3405 and 3425. Appendix J contains the schematic site drawings for the project. The D/B Contractor is responsible for all site work requirements in the RFP. The Contractor shall be responsible for the site planning, design, and construction of all functional and technical requirements listed in the RFP including erosion control measures, mechanical equipment, electrical equipment, equipment pads, underground conduit, piping, utility service lines and connections (electrical, communications, CATV, water, sanitary sewer, storm drainage, gas, mechanical), sidewalks, dumpster pads and screening, etc. to the LIMITS OF CONSTRUCTION.

6.3.2. Site Structures and Amenities

Site PT equipment that requires removal to accommodate new construction must be replaced with equivalent equipment to be approved by the Government. Portable buildings on the site that require relocation to accommodate new construction shall be relocated by the Government prior to start of construction.

6.3.3. Site Functional Requirements:

6.3.3.1. Stormwater Management (SWM) Systems.

Permanent stormwater management on the site will consist of proper vegetation of disturbed areas. No detention or stormwater treatment will be required for this project.

The Site and Civil drawings in Appendix J provide schematic grading for the building addition for Buildings 3405 and 3425. Modify existing storm drainage in the area of the additions as required to ensure proper drainage of the site and protection of the addition, existing structure, and pavement from storm water and ponding.

6.3.3.2. Erosion and Sediment Control

The D/B Contractor shall provide the project specific Erosion Control Package approved by the Georgia Soil and Water Conservation Commission (GSWCC) prior to construction. The Erosion Control Package shall use the Fort Benning standard format. The preparer of the Erosion Control Package must be a licensed Professional Engineer in the State of Georgia and must be a Level II Certified Design Professional by GSWCC. Any violation to such permits will result in the immediate shutdown of work until corrective measures have been taken at the Contractor's expense. The Contractor shall implement any additional erosion and sediment control measures necessary to retain sediment within the boundaries of the project site during all phases of construction. The Contractor shall ensure that at least one GSWCC certified individual is available on-site during land disturbing activities (LDA). In the event that the GSWCC certified individual leaves the site and is the only individual on-site that is certified, all LDA should stop until the certified individual returns.

The Contractor shall prepare, sign, and submit the Notice of Intent (NOI). The Contractor shall pay all land disturbance fees associated with the project at no additional expense to the Government.

The Contractor shall prepare, sign, and submit the Notice of Termination (NOT).

The Manual for Erosion and Sediment Control, forms, fees, and other information may be obtained in most current form from HYPERLINK "http://gaswcc.georgia.gov"http://gaswcc.georgia.gov <>. Appendix MM contains the the Erosion, Sedimentation, and Pollution Control Plan Checklist for reference.

6.3.3.3. Vehicular Circulation.

No additional parking is included in this project. Replacement parking is part of the scope of work for Building 3425. Refer to the drawings in Appendix J for modifications to the existing paving and parking. Fire lanes for the existing buildings must be added to meet code requirements. Ensure pavement sections and turning radii are appropriate for fire truck access. Where existing pavement is removed as part of the scope of work, repair and infill pavement shall match the design requirements of the existing pavement.

6.4. SITE ENGINEERING

6.4.1. Existing Topographical Conditions

A three dimensional survey has been provided as part of this contract and is located in Appendix J. The D/B Contractor shall verify the existing conditions at the time of Award and bring any discrepancies to the attention of the Government immediately.

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

See Appendix A for preliminary geotechnical reports. A separate report has been prepared for each building.

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.

The D/B Contractor shall be responsible for conducting fire flow tests that are to be used in the design and construction of the facility. Recent fire flow test data of adjacent buildings are included in Appendix D for preliminary design.

6.4.4. Pavement Engineering and Traffic Estimates:

The new fire lanes must be designed to accommodate emergency vehicle traffic. Replacement parking for Building 3425 shall be designed to match existing traffic conditions. No additional parking places shall be provided.

6.4.5. Traffic Signage and Pavement Markings

Install traffic signage as indicated on the provided civil drawings or as required to comply with Force Protection and limiting access to drives and parking, or as required to earn LEED credit.

6.4.6. Base Utility Information

A site drawing has been provided to show points of connection to site communications and locations of existing site utilities. All utility connections and construction shall be per the privitized utility standards, details, and procedures. All utility connections fees shall be paid by the Contractor at no additional expense to the Government. Refer to Appendices C, EE, and FF for additional requirements.

Site Base Electrical Utility is owned by Flint Electric. The point of contact is Walker Fricks at 478-988-3510.

Site Base Water Utility is owned by Columbus Water Works. The point of contact is Mark Graham at 706-587-0409.

Site Base Sewer Utility is owned by Columbus Water Works. The point of contact is Mark Graham at 706-587-0409.

Site Base Gas Utility is owned by ATMOS Energy. Point of contact is Omer McCants at 706-576-2993.

Site Base Cable TV Utility is owned by Windjammer. Point of contact is James Kerr at 256-297-0835.

6.4.7. Cut and Fill

A preliminary site plan is provided for the additions to building 3405 and 3425 in Appendix J. The Contractor is responsible for determining final grading. The Contractor shall provide suitable fill for the addition foundations and shall compact and test the building pads prior to constructing the foundation.

6.4.8. Borrow Material

Borrow material is available at Fort Benning. Borrow sites may be more than 15 miles from the project site.

6.4.9. Haul Routes and Staging Areas

Haul routes to the site are shown on site drawings. Haul routes to borrow areas are not shown.

6.4.10. Clearing and Grubbing:

Clearing and grubbing within the limits of construction to accommodate new construction must be approved by contracting officer representative. Protect all existing trees not noted on RFP plans for removal, unless additional tree removal is approved by contracting officer representative. Fort Benning tree removal procedures must be followed on this project. Refer to paragraph 6.15 and Appendix E for information on procedures.

6.4.11. Landscaping:

See Appendix I for the Fort Benning approved plant list.

6.4.12. Turf:

All disturbed areas on the project site shall have a minimum of 4" of topsoil, fertilizer, and sod. See the site specifications in Appendix GG for the requirements for seeding and sodding.

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 Fort Benning'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 Fort Benning**'s** Installation Architectural Theme from existing and proposed adjacent building forms; i.e. building exterior skin, roof lines, delineation of entrances, proportions of fenestration in relation to elevations, shade and shadow effects, materials, textures, exterior color schemes, and organizational layout.

6.5.2.2. The design should address Fort Benning'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 building addition is a small part of the overall building but will be significant as it is the main entrance. Existing building materials and details do not need to be identically matched, but all exterior finishes need to be consistent with the existing materials in both color palette and style. Where brick replacement is included in the project, the goal is to create a unified appearance without duplicating the existing design. Refer to the Adapt-Build Model for the addition elevations required by the base bid and for EIFS elevations for the brick replacement as required by Options 5 and 6. Refer to Appendix F for photographs of the existing buildings and some representative photographs of the brick conditions.

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

6.5.2.5. See Appendix F for exterior colors that apply to Architectural character at Fort Benning. 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

Refer to Paragraph 3 and the Adapt-Build Model for design requirements.

6.5.3. Programmable Electronic Key Card Access Systems:

Programmable key cards are not required for this facility.

6.5.4. INTERIOR DESIGN

6.5.4.1 Space:
The building program includes a variety of spaces from private offices to a multipurpose rooms and classrooms. The interior design should reflect the diversity of spaces with lighting, color, and materials selected to enhance the function of the space as well as clearly identify the different areas.

6.5.4.2 Acoustics:
Acoustic control is important in the large spaces for coherent transmission of speech. Acoustic isolation is critical in the classrooms to prevent disruption of work. Refer to the room by room descriptions for individual room requirements. Where acoustical performance is required by the program, provide floor to structure separation. Coordinate ductwork runs to minimize penetration of acoustically rated walls. Provide acoustic panels and sound absorptive surfaces as needed to create acoustically functional space.

6.5.4.3 Finishes:
Finishes in all the high traffic areas need to be carefully considered for durability, hygiene, and maintenance. See Paragraph 3 for specific finish requirements.

Interior building signage requirements:

Refer to Paragraph 3 for interior building signage requirements.

6.6. STRUCTURAL DESIGN

6.6.1 BUILDING OCCUPANCY CATEGORY
The Building Occupancy Category of the Training Battalion Bldg 3405 is Category II per UFC 3-301-01 Table 2-2. The new addition shall be structurally independent from the existing building. The structural design shall conform to the applicable criteria stated in the RFP including but not limited to the following:

UFC 1-200-01 Design: General Building Requirements

UFC 3-301-01 Design: Structural Engineering

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

International Building Code (IBC), except as modified in UFC 1-200-01 and UFC 3-301-01

6.6.2 STRUCTURAL LOADING
Structural Loading shall be per UFC 3-301-01 for minimum floor live loads, ground snow loads, wind speed, and seismic data. Those loads shall govern except where heavier floor or roof live loads are required for equipment or use of the floors or roof.

6.6.3. FLOOR LIVE LOADING
The minimum floor loads shall be as indicated below:
Typical slab on grade: 150 psf

Heavy storage rooms 250 psf.

The loads above shall be minimum live loads which should be increased as required for equipment and loading conditions.

6.6.4 ROOF LIVE LOAD
Minimum roof live load shall be 20 psf (unreducible)
Ground snow load: 5 psf
Snow load importance factor:
Is = 1.0 (Occupancy Category II)

6.6.5 WIND LOADS
Basic wind speed (3-second gust) 95 mph
Exposure C
Wind Importance factor:
Iw = 1.0 (Occupancy Category II)

6.6.6 SEISMIC LOADS
Seismic Use Group & Importance Factor:

Occupancy Category II; IE = 1.0
Site Spectral Response for short period: Ss = 0.15
Site Spectral Response for 1-second period: S1 = 0.07
Seismic Site Class - to be determined by geotechnical investigation
Seismic Design Category (based on site class D) B

6.6.7 STRUCTURAL SYSTEM AND LATERAL LOAD RESISTING SYSTEM: The structural system for the building shall be as determined by the contractor’s structural engineer and be structurally independent from the existing building. Structural elements shall be non-combustible material. Fire-retardant lumber is not allowed for use as a structural element.

The structure shall be designed for the self weight of all building / structure components plus allowance for miscellaneous suspended mechanical and electrical systems. The structures will also be designed for the following minimum live loads (other applicable deal and live loads listed below per the above mentioned codes shall also be accounted for). All load bearing masonry walls and marsonry partitions must be reinforced with minimum 1/2 inch diameter vertical and horizontal reinforcing at a maximum spacing of 48 inches on center. The Contractor may use horizontal joint reinforcing in concrete masonry walls in lieu of horisontally reinforcing in bond beams.

Upgrade of the existing building to meet current seismic design criteria is not a requirement of this project.

6.6.8 FOUNDATION: The Contractor's Structural Engineer shall select/design foundations per the Final Geotechnical Report. The allowable bearing pressure and soil site class (per IBC Table 1615.1.1) shall be indicated in the Final Geotechnical Report. The Contractor's Geotechnical Engineer shall prepare the Final Geotechnical Report. Structural foundation elements shall have a minimum concrete compressive strength of 3000 psi at 28-days. Actual compressive strength shall be based on the design requirements but shall not be less than 3000 psi. Frost penetration at Ft. Benning is 0 inches.

6.6.9 SLABS ON GRADE:

6.6.9.1 Slabs on grade, if allowed by the final geotechnical report, and their base support shall be in accordance with the Final Geotechnical Report. The design minimum live load for typical slabs on grade shall be 150 psf with a minimum of 250 psf for slabs at heavy storage areas. All slabs on grade shall be placed in a checkerboard or lane fashion. Crack control joints may be construction joints, contraction joints, or expansion / isolation joints with a maximum spacing of 18 feet in each direction. The length of the area between joints shall not exceed 1.3 times the width.

6.6.9.2 Provide a moisture vapor barrier for all interior slabs on grade including the storage and mechanical rooms, garages, and carports. The moisture vapor barrier shall consist of lapped polyethylene sheeting with a minimum thickness of 6 mils and a minimum of 4-inch thick capillary water barrier. Provide a capillary water barrier consisting of clean washed sand, poorly graded rock, crushed gravel, or natural gravel. Conform to ASTM C 33 for fire aggregate grading with a maximum of 3 percent by weight passing ASTM D 1140, No. 200 sieve (wash), or coarse aggregate size Nos. 57, 67, 78, or 89.

6.6.10 SEVICEABILITY CRITERIA
6.6.10.1 Deflections of structural members shall not be greater than allowed by the applicable material standards (ACI, AISC, SJI, etc), nor the limits set below. Deflection limits are needed to restrict damage to ceilings, partitions, and other fragile nonstructural elements.

6.6.10.2 Member deflection due to live load shall not exceed the member length divided by 360. Member deflection due to live and dead load shall not exceed the member length divided by 240.

6.6.10.3 Building drift including deflection of the lateral load resisting system and diaphragm deflection under the 50-year wind shall not exceed .006 x the height of the building where flexible interior and exterior wall elements are used (metal wall panels, gypsum board and steel studs, etc).

6.6.10.4 Building drift including deflection of the lateral load resisting system and diaphragm deflection under the 50-year wind shall not exceed .003 x the height of the building where brittle wall elements are use (brick or block veneer, block walls, etc).

6.6.10.5 Building drift including deflection of the lateral load resisting system and diaphragm deflection under seismic loading shall not exceed the limits in the 2006 IBC.

6.6.11 ANTI-TERRORISM / FORCE PROTECTION: Building 3405 will comply with setback requirements. Bollards, gates, and similar equipment designed to limit vehicular access within the 82 foot set-back are part of this project.

6.6.11.1 The existing building renovation will not required the structural elements to be upgraded for current progressive collapse. All other renovation requirements will need to be met in accordance with UFC 1-200-1, section 2-34 and UFC 4-010-01, section 1-6.2.3.

6.6.12 Special Inspections and Structural Observations: Special inspections and structural observations shall be per Chapter 17 of the IBC. The Contractor shall be responsible for hiring and paying for the special inspectors and tests required by Chapter 17. The structural observations shall be by the engineer of record for the work performed or a qualified engineer or technicial working under the direction of the engineer of record.

6.7. THERMAL PERFORMANCE

Refer to Paragraph 3 and Appendix MM for thermal performance requirements and design claculations for this building. Note that while EPAct 2005 criteria applies to this project, additional LEED points earned through improved building performance may be required to meet the minimum 33 points for the LEED Silver rating. Refer to 10 CFR 433 for the rules regarding EPAct 2005

6.8. PLUMBING

6.8.1. PLUMBING, GENERAL:

All plumbing shall be intrinsically safe from freezing in the project climate. Extension of plumbing vents above the roof shall comply with the applicable plumbing code. Plumbing systems shall comply with IPC and Columbus Water Works specifications.

6.8.2. Potable Water Supply System:

6.8.2.1. Quality: All potable water supplies shall have an established potability monitoring program. D/B Contractor shall perform a water hardness test.

6.8.2.1.1. Water Treatment: A water chemistry analysis reporting, as a minimum, the calcium and magnesium concentrations and the water hardness shall be used as the basis for determining the potable water treatment design scope.

6.8.2.1.2. Scale Control: Water softening will be required when the water supply to the facility has a hardness of 5 gr/gal or more. The softening system should be designed to deliver water with a hardness between 3 gr/gal and 5 gr/gal.

6.8.2.2. Backflow Prevention, General: The flow of non-potable water, or any other non-potable liquids, into the potable water supply shall be prevented. Necessary measures to prevent backflow, cross connection, or back-siphoning shall be included in the design. Cross connection of a municipal and installation-dedicated (well-based, base pumping station, etc.) system shall require approval from the local Authority Having Jurisdiction (AHJ). Generally, backflow isolation will be required on the main supply mains serving the building; The D/B Contractor shall coordinate backflow prevention requirements, including requirements for maintenance accessibility and periodic testing, with Columbus Water Works.

6.8.2.3. Potable Water Use Reduction: D/B Contractor’s Mechanical Engineer’s design shall employ strategies that in aggregate use 20% less water than the water use baseline calculated for the building (not including irrigation) after meeting the Energy Policy Act of 2005 fixture performance requirements. Calculations shall be based on estimated occupant usage and shall include only the following fixtures as applicable to the building; water closets, waterless urinals, lavatory faucets, showers, and kitchen areas. Up to 40% water conservation is expected to be required to meet LEED Silver criteria.

6.8.3. Hot Water System: The system shall be designed and sized in accordance with ASHRAE Applications Handbook.

6.8.3.1. Hot Water Design Temperature: Domestic hot water shall be generated and stored at a minimum temperature of 140 degrees Fahrenheit. It shall be tempered with a thermostatic mixing value to permit distribution at a maximum hot water temperature distribution design set point of 110 degrees Fahrenheit. However, provide the capability to increase system temperature to 126 degrees Fahrenheit to permit the option to increase the temperature if so recommended by the Infection Control Officer.

6.8.3.2. Hot water storage capacity shall be in accordance with ASHRAE per fixture methodology.

6.8.3.3. Hot Water System Temperature Maintenance: Designs for recirculating hot water systems shall include provisions for isolating and balancing the system. The recirculating hot water system shall provide hot water at the faucet within twenty (20) seconds of opening.

6.8.3.4. For a remote, single point hot water faucet, electric stand-alone point of use hot water heaters may be substituted for a recirculation branch.

6.8.4. Underground and Above Ground Piping and Fittings:

Refer to the Adapt-Build Model and Columbus Water Works specifications for requirements .

6.8.5. Plumbing Fixtures and Other Equipment: Plumbing fixtures should conform generally to American Society of Mechanical Engineers International, ASME standards series A112 or International Association of Plumbing and Mechanical Officials, IAMPO standards series Z124. For uniformity, all fixtures shall be identified by the Joint Schedule Number (JSN) provided in MIL-STD-1691. All water closets and urinals shall be wall mounted. Lavatories shall be wall or countertop mounted. Automatic hands-free flush valves and faucets shall be either hard wired or shall use water flow to recharge their own battery.

6.8.5.1. Handicapped Fixtures: Provide handicapped fixtures in accordance with the requirements of the Accessibility Provisions of Section 01 01 00 paragraph 6.1.3, PROJECT REQUIREMENTS.

6.8.5.2. Janitors Closets shall be provided with anti-siphonage floor sinks.

6.8.5.3. Drinking Water Coolers: Locate public drinking water coolers convenient to each public area. The standard rating and performance shall conform to ARI Standard 1010. Refer to Paragraph 3 for additional accessible requirements.

6.8.5.4. Anti-siphonage freeze proof hose bibbs shall be provided in compliance with UFC 4-510-01, Section 8-2.7.3.

6.8.6. Sanitary Drainage System: The sanitary waste system shall be connected to an approved existing sewer system. The requirements of Columbus Water Works shall be followed.

6.8.6.1. General Purpose Floor Drains: General floor drains shall be provided in mechanical equipment and air handler rooms that contain water-using equipment and in restrooms designed for use by more than single occupancy. Provide a hose bib in Air Handler Room(s) to permit cleaning of air handler coils.

6.8.6.2. Sanitary vents shall be piped to the exterior; air admittance vents (Studor Vents) shall not be acceptable.

6.8.7. Storm Water Disposal: Provide drainage and disposal of storm water, direct or from runoff, from roofs and paved areas. All sloped roofs shall have gutters and downspouts piped directly to the storm water system and shall not be allow to run on to another roof to drain.

6.8.7.1. Sizing: Sizing of the storm water drainage system shall be based on the guidance and precipitation rates shown in the IPC.

6.8.7.2. Leakage Testing: Provide leakage testing on all plumbing systems using methods and pressures established for the type and classification of pipe being tested in accordance with industry codes and practices. Testing of all piping shall be conducted prior to joints being concealed.

6.9. SITE ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

6.9.1 Site Electrical:

6.9.1.1 Validate project power and criteria requirements, and the power source capacity available for the project. The Comprehensive Narrative shall include but not be limited to considerations for power reliability, available unobligated capacity, and condition of the electrical distribution to the project, above and /or below grade obstructions, etc. Any necessary upgrading of electrical distribution beyond the project scope shall be identified expeditiously in order to avoid affecting project schedule and/or funds. Substation, distribution lines and equipment shall be able to serve the full design load of the facility plus a minimum 20 percent future load growth.

6.9.1.2 Refer to the Site Drawings in Appendix J for proposed new location for building transformer. Coordinate final location with Flint Electric and ATFP requirements. Refer to Appendix C for additional information regarding coordination with Flint Electric.

6.9.1.3 Emergency Power. The facility does not require a generator. Any areas requiring UPS are identified in Paragraph 3.

6.9.2 Site Telecommunications:

6.9.2.1 New duct bank is indicated on the Site Drawings in Appendix J extending from the existing point of connection to the proposed area for the new communications room. Routing, type and number of duct bank shall conform to Fort Benning NEC requirements. Refer to Appendix FF for Fort Benning NEC Outside Plant Infrastructure requirements and for the 2010 I3A.

6.9.2.2 Design Analysis. The CSE shall ensure that all of the communication systems are described in great detail in the Design Analysis. The Design Analysis shall also serve as a document for the design history of the communications systems. This effort shall begin with the first design submittal and the systems descriptions shall continue to be elaborated/expanded through all subsequent design submittals. After coordinating all requirements with the base, the Design Analysis shall document all design directives given to the CSE, as well as all major decisions by the CSE, regarding the design of the communications systems. Particular attention shall be given to this area to ensure the Design Analysis provides a complete detailed narrative on the scope, equipment, function, operation, and design history of each system. The Design Analysis shall serve as the basic document against which the design shown on the Drawings and in the Specifications is checked. The Communications Systems Engineering consultant or qualified A-E in-house designer shall first ensure the Design Analysis is accurate and then shall coordinate the Drawings and Specifications with this document.

6.9.2.3. Installation-Wide Area Network. Building 3405 is currently served by 400 pair of copper and 16 strands of fiber. Building 3425 is served by 400 pair of copper and 12 strands of fiber. The quantity for both buildings has been determined to be adequate. If design and program requirements change and additional capacity is determined to be needed, a proposed solution shall be discussed in the DA and shall include all cost data for any outside plant work that may be required beyond new duct bank shown on Site Drawings in Appendix J. This shall include the location of the nearest point, to acquire adequate service, and the cable path required for the connection. The required media and any in-place assets that may be used by the project to achieve the connection shall be identified.

6.9.5. Intrusion Detection System (IDS) Coordinate all requirements for the IDS with the Provost Marshals office and provide according to their requirements. Refer to Paragraph 3 and the Adapt-Build Model for existing IDS to be maintained and for new requirements.

6.9.6. Communications Rooms. The existing Communications rooms do not comply with present standards and will need to be relocated and / or upgraded. The rooms will be used to install all of the equipment and wiring terminations for the PDS and the GFGI equipment and racks for the LAN data systems. Centrally locate the closets in the areas that they serve. Refer to the provided Adapt-Build Model for preliminary locations.

6.9.7. Mass Notification System (MNS). The MNS shall be installed in conjunction with the Fire Alarm System and with base requirements.

6.10. FACILITY ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

Refer to Paragraph 3 and the Adapt-Build Model for facility electrical requirements.

Refer to Paragraph 3 and the Adapt-Build Model for facility telecommunications requirements. Coordinate with User to determine pay phone requirements and locations.

6.11. HEATING, VENTILATING, AND AIR CONDITIONING

Refer to Paragraph 3 and the Adapt-Build Model documents in appendices JJ through MM for specific requirements.

6.11.1. Design Conditions: ASHRAE Handbook of Fundamentals 2009 1% DB Cooling and 99% DB Heating Values. Note that ventilation loads must consider the 1% WB and 1% HR conditions as well.

6.11.1.1. Interior Design Conditions: ASHRAE Standard 55-2004.

6.11.1.2. Mechanical Equipment Rooms: Climatic conditions at the site require that mechanical equipment rooms be air-conditioned and inside the air barrier. This makes sealed combustion mandatory for any combustion equipment in the room.

6.11.1.3. Schedule Adjustment: Provide HVAC systems capable of adjusting operational schedules as needed to accommodate user schedules.

6.11.1.4. Sensitive Areas: Provide separate HVAC zone(s) for sensitive areas requiring conditioned space 24 hours per day, 365 days per year. This includes Comm Closets and electronics rooms.

6.11.2.Refrigerants: Refrigeration equipment shall utilize refrigerant having an Ozone Depletion Potential (ODP) of not greater than 0.05. Refrigeration room design shall include the safety features, such as sensing devices, purge ventilation system, etc., as required for the particular refrigerant in accordance with ASHRAE Standards 15 and 34.

6.11.3.Mechanical Equipment Space: Mechanical equipment rooms containing sensitive electronic equipment shall be provided with temperature and humidity control as required for reliable, dependable operation of the sensitive equipment. Location of air handlers and other equipment shall consider typical and unique climatic and local conditions. Design and installation shall demonstrate that vibration and noise is attenuated. Special attention shall be given to proximity of sound and vibration sensitive areas. Systems shall be located such that equipment and persons maintaining equipment are protected from the elements as far as reasonably possible. Maintenance personnel access to equipment room penthouses, etc, shall be along safe, clearly designated routes without ladders or temporary equipment. Air handling units shall be located in equipment rooms, or within conditioned enclosures providing protection from the weather and safe, efficient access. Roof top mounted equipment, even in a penthouse, is discouraged. Penthouses, if incorporated in design, shall not be visible from the historic district. Any equipment exterior to the building envelope shall be shielded from sight by appropriate enclosures or surrounds and shall be consistent with the exterior architectural design intent.

(a) Coordination with other trades, code requirements and manufacturer’s required clearances around equipment such as electrical panels, pull space, and hoisting.

(b) Space and access is sufficient to promote safe and efficient inspection, operation, maintenance, repair, and replacement of equipment. Optimization of distribution runs.

6.11.4.Heating, Ventilating and Air Conditioning (HVAC): HVAC systems shall be intrinsically safe from freezing in the project climate, for example: exclusion of water coils that may come in contact with unconditioned outside air and water piping in exterior walls and cabinetry, consideration of cold outside air drafts which may occur regardless of the HVAC operation, inclusion of insulated dampers at all exterior openings, screening over exterior openings which minimize the likelihood of closure due to hoar frost, combustion air controls for the boiler room that prevent cold drafts on any component subject to freezing, negative building pressurization for any humidified portion of the building, summer- and winter-positions for air filters in the air handlers, and cold-room alarms in the Building Automation System (BAS) control systems.

6.11.5.1. A Zone is defined as an area with its own thermostatic control. A zone with multiple rooms shall only include rooms that have identical load profiles with a maximum of four rooms per zone. Open VAV zones shall be not larger than 2,000 square feet per terminal. All VAV terminals shall include reheat where a separate controllable heating system, such as perimeter heating, has not been installed.

6.11.5.2. In order to better control VAV terminal noise, terminals shall be selected to handle not more than 80% of the manufacturer listed maximum airflow for the terminal when delivering design airflow to the zone.

6.11.6. General Design Considerations

6.11.6.1. Contaminant Removal: HVAC systems shall be designed to remove or reduce to acceptable levels of volatile chemical and airborne microbiological contaminants within the facility. Systems shall be designed to

remove excessive moisture in facility spaces and to control moisture and dust accumulation in air handling units, distribution elements, and chases, to avoid conditions permitting the growth of pathogenic, allergenic, or otherwise objectionable microorganisms, and to maintain CO2 levels consistent with the recommendations of ASHRAE.

6.11.6.2. Moisture Control: Contractor shall establish and implement a moisture control strategy as part of an Indoor Air Quality Management Plan, including control of moisture flows and condensation to prevent building damage and mold contamination that meets requirements of LEED NC 2.2 Indoor Environmental Quality, Credit 3.1. Ventilation system performance shall insure all ventilation systems maintain design minimum ventilation requirements. All monitoring equipment shall generate an alarm to the BAS when the conditions vary from the design set point by 10% or more.

6.11.6.3. Balancing Ports and Features: Necessary controls, instrumentation, and balancing ports and devices shall be provided to establish and maintain the required space temperature, and air changes rate, and to facilitate balancing procedures for all systems.

6.11.6.4. Mechanical Equipment:

6.11.6.4.1. Contractor shall install permanent monitoring systems that provide feed back.

6.11.6.4.2. Provide thermometers in all outside air, supply air, return air, and mixed air ductwork or fan section and a Dwyer type differential pressure air filter gauge at each filter bank for the air handling unit.

6.11.6.4.3. All electric motors one HP and larger shall be high efficiency type. Variable frequency drives shall be provided with a bypass switch, a manual starter and automatic restart feature. Pumps above 3hp shall be floor mounted.

6.11.6.4.4. Contractor shall purchase Energy Star and FEMP-designated products and equipment and include Energy Star purchasing information in appropriate construction documents.

6.11.6.4.5. Contractor shall use no CFC-based refrigerants in the building HVAC Systems.

6.11.4.6. Heating shall be provided by two primary heat generators, each sized for 65% of the calculated load.

6.11.4.7. If the calculated gross block cooling load, before any credit from heat recovery devices, is 200 Tons or greater, the cooling plant shall consist of a minimum of two chillers each sized for 50% of the calculated load. Scroll compressors are preferred to helical rotary compressors.

6.11.4.8. Pumping shall be provided by two pumps, each sized for 50% of the calculated flow requirement. Variable primary pumping is preferred to primary-secondary systems.

6.11.4.9.Outdoor air shall be measured using airflow measurement stations installed in strict accordance with manufacturer’s instructions.

6.11.4.10. VAV fans shall be equipped with Variable Frequency Drives. Provide one spare drive of each size used on the project. Do not equip drives operating fans with bypasses.

6.11.4.11. Ventilation air requirements do not track supply air requirements. Provide control that maintains required ventilation airflow and building pressure requirements under any operating conditions.

6.11.5. Cooling and Heating Load Calculations:

6.11.5.1. Heating Load Calculation: Calculations used to determine primary and airside (including reheat) heating equipment shall not include credit for lighting, people and equipment internal load sources. These loads are typically not present, or greatly reduced, at night and on weekends. Heat calculations shall take into consideration an additional 15% capacity to accommodate morning warm up loads when night setback temperatures are utilized.

6.11.5.2. Equipment Heat Generation: The primary component of cooling loads in many rooms/spaces within the facility will be equipment heat generation. In order to insure accurate load determination, the Engineer of Record for the HVAC system shall coordinate with the equipment supplier and with the individual Using Agency to identify all individual equipment items and the corresponding load contributions. In performing load calculations, the Contractor's Mechanical Engineer of Record shall consider the as-designed equipment provisions of each unique space.

6.11.5.3. Lighting Loads: Lighting loads present a significant component of facility cooling loads and as such require consideration of the as-designed lighting fixture numbers and characteristics of each space.

6.11.5.4. Envelope Components: Minimum insulation values for building envelope components are listed in ASHRAE Energy Standard 90.1-2004. U-value calculations shall take into consideration the "fin effect" of metallic elements of wall and roof construction, such as the effect of steel studs in walls.

6.11.6. HVAC Piping Systems:

6.11.6.1. Underground piping shall be a pre-engineered, prefabricated metallic pressure pipe within a non-metallic outer pipe casing. Prefabricated pipe and fittings shall be insulated in the factory with foam having a density not less than 2 pcf and thermal conductivity factor not less than 0.15 Btu SF at 75 degrees F.

6.11.6.2. Aboveground Piping: Steel piping shall conform to ASTM A53 Type E or S, Grade B, standard weight. Piping sizes 2" and smaller may be screwed or welded, piping 2-1/2" and larger shall be welded. Threaded fittings shall conform to ASME B16.3. Welded fittings shall conform to ASME B31.9 and shall be identified in accordance with MSS SP-25. Flanges shall conform with ASME B16.5 and ASTM A182/A. Bolts shall conform ASTM A193/A. Quick disconnects at VAV terminals and fan coil units shall be incorporated.

6.11.6.3. Copper tubing shall conform to ASTM B88 type K or L. Solder fittings shall conform to ASME B16.22 or ASME B16.18.

6.11.6.4. Welding: Welders shall be qualified for welding procedures to be used on this project. Welding procedures to be used, procedure qualification reports and welding performance qualification tests dated within the past 2 years for each welder shall be provided prior to commencement of work. All welds shall be visually inspected by the Contractor to detect surfaces discontinuities. The government shall have the right to have up to ten percent of the welds re-evaluated using radiographic testing at no additional charge.

6.11.6.5. Solder: Solder shall conform to ASTM B32, grade Sb5, tin-antimony alloy for service pressures up to 150 psig. Solder flux shall be liquid or paste form, non-corrosive and conform to ASTM B 813.

6.11.6.6. Piping Identification: Pipe identification shall be by color banding and service labels. Lettering size and band width shall be as follows:

Pipe Sizes	Band Width	Lettering Size
1/2" - 1-1/4"	8	1/2"
1-1/2"-2-1/2"	8	3/4"
3 - 6	12	1-1/4"

6.11.6.7. Valve Identification: Valve identification shall be by brass tags, 1-1/2" diameter with depressed lettering 1/2" high.

6.11.6.8. Utility Metering: All utilities on this project shall be provided with a meter and electronic interface units compatible with the Fort automated meter reading system. Meter interface units shall be wired to the Communication Room.

6.11.6.9. Water Treatment: A chemical pot feeder shall be supplied for each closed water distribution system. Chemical treatment shall provide for removal of oil, grease and permit flushing of wall scale, foreign matter and

contaminants from the water system. Final chemical treatment shall provide for scale and corrosion inhibitors and pH control in the range of 8.0 to 10.0 for a period of one year.

6.11.6.10. Leakage Testing: Provide leakage testing on all piping systems using methods and pressure levels established by industry codes and practices. Testing for all piping systems shall be applied before joints are concealed and at a pressure not less than 1.5 times the maximum working pressure.

6.11.6.11. Air Handling and Distribution:

6.11.6.12. Air Handling Unit: Air handling units are to be double wall, internally-insulated, readily maintainable units suitable for utilization in medical facilities. Provide doors for access to all internal components on both sides of cooling and heating coils, etc., that allow the entire interior of the air handling unit to be washed down and cleaned. Blow-through coil configurations are not permitted.

6.11.6.13. System Shutdown Capability: HVAC systems shall be designed to permit shutdown (night setback/setup, outside air shutdown) of individual areas or departments not in operation on a 24-hour basis. Exhaust of toilets, and other normally-exhausted spaces shall be continued without interruption.

6.11.6.14. Outdoor Air Intakes: Outdoor air intakes shall be located as far as practical, but not less than 30 ft, from exhaust outlets of ventilation systems, cooling towers, combustion equipment stacks, laboratory and isolation room exhaust and plumbing vent stacks, or from areas which may collect vehicular exhaust and other noxious fumes. Locate the bottom of air intakes serving central systems as high as practical but not less than 10 ft above ground level, or if installed above the roof, at least 3 ft above roof level. Outdoor air shall not be drawn from equipment rooms.

6.11.6.15. Balancing Provisions: Duct branches serving each individual space shall be provided with a manual balancing damper, accessible above the ceiling, located as remote from the space supply or return fixture as practicable. Any balancing damper provided as part of air diffusers is not to be used for system balancing.

6.11.6.16. SYSTEMS NOISE AND VIBRATION CONTROL, Sound isolation.

6.11.6.16.1. Air Fixtures: Diffusers, grilles, etc. used in distribution supply, return, and exhaust shall be sized to provide air inlet/outlet velocities consistent with room NC level requirements.

6.11.6.16.2. Air Velocity: Contractor shall limit air velocities in ductwork, air transfer grills, or door undercuts to values consistent with ASHRAE recommendations to control noise generation. Contractor shall limit air velocity across the face of the coils to match system design with a value not greater than 450 fpm.

6.11.6.16.3. VAV/CAV Terminal Units: Variable Air Volume Terminal units and constant velocity controllers are a frequent source of noise generation in air distribution systems. Schedule units with minimum inlet sizes for incremental ranges of flow, and indicate maximum sound power output for octave bands 2 thru 7 for each unit, at the maximum inlet static pressure which the unit will be exposed.

6.11.6.16.4. Exterior Noise Sources: The Contractor shall evaluate the sound characteristics of exterior equipment provided as part of the project, such as cooling towers, air cooled refrigeration equipment etc. to ensure that such sources do not result in interior noise levels exceeding the limitation provided in UFC 4-510-01 Appendix A.

6.11.6.17. Air handling unit coil capacities may be sized for the calculated peak load less not more than 50% of the calculated heat recovery available to the unit at the time of peak load.

6.11.6.18. An air handling unit shall serve not more than 30,000 square feet of conditioned area, shall not distribute or return air across any smoke barrier, and shall not serve more than one floor of the building.

6.11.6.19. Spaces that require 24/7 conditioning shall be served by separate units. These systems shall be DX unless a separate process chiller is furnished solely to serve such loads.

6.11.7. Duct Design: Duct systems shall be designed in accordance with applicable criteria. Maximum velocity in ductwork mains shall not exceed 2500 fps, and velocities in branch ducts and takeoffs shall not exceed recommended levels in these standards. Access panels shall be provided as necessary for access to fire dampers,

smoke dampers, and control equipment, and to facilitate periodic cleaning or disinfecting of ductwork. All supply air, with the exception of air transferred between spaces for the purpose of pressurization, shall be provided in sheet metal ductwork. All return air shall be provided in sheet metal ductwork. All duct that requires insulation shall be externally insulated.

6.11.7.1. Duct Materials: All ductwork shall be constructed from materials as follows:

(a) Supply, return and exhaust mains: galvanized sheet ASTM A525 coating G90.

(b) Supply & Return runouts within 5' of grille, register, or diffuser: polymer lined flexible ductwork. Maximum length of flex shall be five feet. Connection using flex shall be as straight as possible.

6.11.7.2. Duct Construction: Ductwork constructed to meet SMACNA Third Edition HVAC Ductwork Construction Standards is the minimum acceptable quality. Where specific requirements for ductwork are stated, these requirements will take precedence over SMACNA Standards.

6.11.7.3. Ductwork Pressure Classifications and Maximum Airflow Velocities: The minimum pressure classifications and maximum airflow velocities for ductwork system shall be as follows:

Supply ducts between fan and VAV terminals	4" wg	2400 fpm
Supply ducts downstream from VAV terminals	2" wg	800 fpm
Return ducts	2" wg	1800 fpm
Exhaust ducts	2" wg	1200 fpm

The Contractor shall determine duct section where a higher pressure classification is required.

6.11.7.4. Leakage Criteria and Test Pressures: Air leakage and pressure testing of ductwork distribution systems shall be performed by an independent Test and Balance Agency. All ductwork distribution systems except low pressure downstream from terminal boxes shall be tested. No additional leakage shall be made to the test allowable leakage factor for access doors, fire or smoke dampers, sound attenuators etc. that are part of the system under test. Leakage test pressure and allowable leakage in cfm/square foot of duct surface area under test shall not exceed the following:

	Test Pressure	Maximum Leakage
Supply ducts	4" wg	0.03 cfm/square foot
Return ducts	2" wg	0.04 cfm/square foot
Exhaust ducts	2" wg	0.04 cfm/square foot

Ductwork under test that exceeds the leakage allowance shall be re-sealed and re-tested.

6.11.7.5. Utilization of above ceiling areas for exhaust is not acceptable; all exhausted air shall be fully ducted from room to exterior. Outside air and return air in mechanical rooms shall be ducted. Use of the room as a plenum is not acceptable.

6.11.7.6. Duct cleanliness: Duct cleanliness shall be not less than Level B Intermediate Level as defined by SMACNA Duct cleanliness for New Construction Guidelines.

6.11.7.7. Duct lining: Duct lining shall not be used. Sound attenuators, packed type, which comply with ASTM C1071 and UL 181, shall be used in lieu of duct lining to attenuate fan noise.

6.11.7.8. Flexible Duct: Flexible duct shall be insulated type with inner and outer covering. Flexible duct to VAV boxes shall not exceed five (5) duct diameters in extended length. Flexible ducts shall not be used to connect between sheet metal ducts.

6.11.7.9. All VAV boxes shall be connected with straight hard duct. The length of the duct shall be a minimum of three duct diameters.

6.11.8. Maintenance Provisions:

6.11.8.1. General Personnel Access: Safe and practical means of personnel access must be provided to, and within, all areas of the facility where equipment is located, to adequately provide for operation, maintenance, and replacement (O&M) of the equipment. Access to equipment rooms from outside the facility shall be provided within equipment rooms, a minimum of thirty inches of clearance is required at all service points to mechanical equipment. The design of O&M personnel access ways should not provide less than 5.5 ft of overhead clearance (except on intermittent basis), or require personnel to climb over equipment or crawl on hands and knees. Locate systems such that equipment and persons maintaining the equipment are protected from the elements as far as reasonably possible. Maintenance personnel access to equipment rooms, penthouses, etc. is to be along safe, clearly designated roofs without ladders or temporary equipment. Locate AHU's in equipment rooms or within conditioned enclosures providing protection from the weather and safe, efficient access. Equipment exterior to building envelope shall be shielded from sight by appropriate enclosures or surrounds, and to be consistent with designer's exterior architectural design intent and any other applicable directive included in the RFP. Mechanical room location and layout shall consider: coordination with other trade/code/manufacturer clearances around and above equipment; sufficiency of space and access to equipment; and optimization of distribution runs. Mechanical equipment will be allowed in mechanical attics provided the equipment can be readily removed and replaced without need of disassembling it, the attic is ventilated by gravity and all other prescriptions in this 6.12.10 heading.

6.11.8.2. Equipment Clearances: Minimum clearances between electrical and mechanical equipment shall be as required by NFPA 70. Assure that practical means are provided for the removal/replacement of the largest and/or heaviest equipment item(s) located in the facility. Provide adequate pull space for all coils, heat exchangers, chillers and filters. Sufficient space shall be provided in above-ceiling areas to facilitate equipment installation and O&M.

6.11.8.3. Suspended/Mounted Mechanical Equipment: Where suspended and mounted equipment is installed, provide a minimum of 66 inches clearance for headroom as required. In refrigeration equipment rooms, provide overhead clearances required by ASHRAE 15. For any workstation or location requiring maintenance access, which is not readily accessible from a 6 ft high portable ladder, provide a fixed ladder and/or catwalk.

6.11.8.4. Air Distribution System Components: Outdoor air intake plenums, air handling unit casings, and distribution ductwork shall be designed to permit access for periodic cleaning.

6.11.8.5. HVAC System Balancing Provisions: Adequate access shall be provided to facilitate operation, adjustment, and testing at all HVAC balancing and measuring points and equipment, including automatic and manual damper operators, air terminal units, Pitot tube ports, valves, and sensing devices. Testing, adjusting and balancing of heating, ventilating and air conditioning equipment shall be included in Total Building Commissioning practices.

6.11.9. Vibration Control: All prime moving equipment shall be isolated to prevent transmission of vibrations to the structure. Additional information and requirements addressing vibration control are contained at 6.13 MECHANICAL AND ELECTRICAL SYSTEMS NOISE AND VIBRATION CONTROL.

6.11.10. Interdisciplinary Coordination:

6.11.10.1.Smoke and Fire Dampers: HVAC service zones shall be designed to coincide with smoke and fire zones whenever practicable. Ductwork penetrations of fire/smoke rated walls should be minimized, to reduce the required number of smoke/fire dampers and complexity of controls. Coordinate with architectural design to assure access for inspection and service of dampers is provided.

6.11.10.2. Ductwork: Air supply, return and exhaust systems shall be of the mechanical ventilation type and shall meet the requirements of NFPA 90A.

6.11.10.3. Smoke Mode Operation: Air handling and distribution systems shall react to the detection of smoke in accordance with NFPA 101 and 90A. Smoke evacuation or venting features shall be provided as required by NFPA 101, NFPA 99, or ANSI A17.1.

6.11.10.4. Seismic Design Requirements: Refer to Section 01 01 00, Paragraph 6.7, STRUCTURAL DESIGN for seismic provisions for the HVAC system equipment and components. Contractor shall be responsible to assure that Seismic bracing of HVAC piping shall be coordinated with thermal expansion compensation features, to allow for the necessary pipe movement with temperature changes.

6.11.11. Ventilation Design:

6.11.11.1. Ventilation Air Changes: Ventilation rates contained in ASHRAE Standard 62.1-2004 shall be applied for spaces or applications The use of a dedicated outside air unit shall be considered.

6.11.11.2. General Exhaust Provisions: Exhaust systems shall be provided for toilets, and janitor's closets. All exhaust discharge outlets shall be located above the building roof line and located to prevent short-circuiting to air intakes or other building openings. Exhaust fans shall be located at the end of the exhaust duct run. Exhaust ducts shall be under negative pressure.

6.11.11.3. Space Pressurization: Design for a space pressurization of 0.04 inches-wg.

6.11.12. HVAC System Controls

6.11.12.1. VAV Air Handling Unit Controls: All VAV systems shall be provided with supply and return fans with economizer operation.

6.11.12.2. Fan Speed Modulation: Fan speeds shall be modulated by means of variable speed motor controllers (typically Insulated Gate Bipolar Transistors (IGBT) variable frequency drive technology). Supply fans shall modulate based upon maintaining a fixed static pressure at a location remotely located in the ductwork sufficient to assure operation of all VAV terminal devices. Supply, return, and outside airflow rates shall be measured by the DDC control system, and the return fan shall modulate to maintain a fixed differential airflow below that of the supply fan. A high supply duct static sensor and low temperature sensor (freeze stat) for shutdown capability shall be provided.

6.11.12.3. Control Precision: Temperature controllers shall maintain space temperature within +/- 2°F.

6.11.12.4. Temperature control shall be provided for distinct individual thermal zones. Each thermal zone shall have a temperature sensor and shall have no more than 4 rooms on the temperature sensor. Temperature sensors shall be adjustable by the occupant and shall indicate space temperature. Temperature sensors shall have adjustment limits set by the DDC system to prevent over cooling or overheating.

6.11.12.5. Humidity Control: Mechanical equipment rooms containing sensitive electronic equipment shall be provided with temperature and humidity control as required for reliable, dependable operation of the sensitive equipment. Refer to UFC 4-510-01 item 7-2.8 Mechanical Equipment Rooms and item 7-2.9 Humid Climate Definition. Humidity control shall be provided as required to comply with the RH Set point requirements in UFC 4-510-01 Appendix A for individual spaces. Duct humidifiers shall be provided with a downstream duct humidity sensor with a high limit of 85% RH.

6.11.13. MECHANICAL AND ELECTRICAL SYSTEMS NOISE AND VIBRATION CONTROL.

6.11.13.1. Mechanical Systems Design: Careful consideration shall be given to the selection, location, and installation of mechanical system components to insure compatibility with the building occupants and functional requirements. The misapplication of mechanical system components and their relationship to adjacent spaces can result in unwanted noise that may impede the facility function. The sections that follow address specific parts of the design approach for mechanical system noise and vibration control. These parts are: duct-borne fan noise; air-generated noise; cross-talk between spaces; noise control within mechanical equipment rooms; vibration isolation; and plumbing noise. These sections present general guidelines, and do not replace detailed engineering analysis.

6.11.14. Duct-Borne Fan Noise:

6.11.14.1. Introduction: All rotating equipment, predominantly fans in air distribution systems, generates noise. The noise is transmitted to occupied spaces through the supply and return air distribution systems. To the maximum extent practicable, equipment shall be specified and selected on the basis of low noise level output. To

the maximum extent D-B Contractor's Mechanical Engineer of Record shall specify/schedule the maximum sound power output, per each octave band, for air handling unit fans.

6.11.14.2. Air-Generated Noise: Movement of air in heating and ventilating systems generates noise caused by turbulent airflow. Low or medium air velocity systems are most appropriate for use in medical facilities because low velocity distribution greatly reduces the generation and regeneration of noise produced by high velocities.

6.11.14.2.1. Air Fixtures: Size air distribution supply, return and exhaust (diffusers, grilles, etc.) to provide inlet/outlet velocities consistent with room NC level requirements indicated in UFC 4-510-01 Appendix A.

6.11.14.2.2.VAV/CAV Terminal Units: Specify/schedule units with minimum inlet sizes for incremental ranges of flow, and indicate maximum sound power output for octave bands 2-7 for each unit at the maximum inlet static pressure to which the unit will be exposed.

6.11.14.3. Airflow velocities: Listed below are approximate ranges of airflow velocities at the face of the terminal devices (diffusers and grilles) and in the last 3 to 6 feet of duct serving a space, required to achieve specific ambient noise levels. These noise levels are represented by NC (Noise Criteria) curves and assume no additional noise contribution due to duct-borne fan noise or air turbulence.

Noise Criterion (NC) Range	Terminal Airflow Velocity (feet per minute)
NC-25 to NC-30	(350 to 425)
NC-30 to NC-35	(425 to 500)
NC-35 to NC-40	(500 to 600)

6.11.14.4. Duct layout: Locate the outlets of connected ducts as far apart as possible. Use diametrically opposing duct elbows to reduce cross-talk. Internal acoustic lining shall be avoided in favor of utilizing the natural attenuating effect of longer separating duct runs, elbows, and other duct fittings. To minimize cross-talk transmission in supply and return ductwork, individual room runouts shall be configured so that outlets are spaced as far apart as possible.

6.11.14.5. Vibration Isolation: Structure-borne sound is produced by a noise source, such as vibrating or rotating machinery, which transmits energy directly into to and through the structure. All vibrating equipment in a medical facility shall be resiliently isolated on vibration isolation systems to reduce the transmission of structure-borne noise, according to manufacturers' recommendations.

6.11.14.6. Flanking transmission: Flanking transmission of vibration energy from mechanical equipment shall be minimized. All connections to vibrating equipment shall be through flexible connectors, conduits, piping, or hose. All piping in mechanical equipment spaces connected to vibrating equipment shall be supported by resilient ceiling hangers or floor-mounted resilient supports. Penetrations through equipment room walls and ceilings shall be oversized, packed with a resilient material such as glass fiber or mineral fiber, caulked airtight, and covered with escutcheon plates where required for fire ratings. Piping should be supported on both sides of the penetrations and shall not rest on the structure.

6.11.15. Plumbing Noise:

6.11.15.1. Piping isolation: At wall and floor penetrations, water piping runs shall be free from the structure and the opening packed with a resilient insulation material and fully caulked. Water supply pipes larger than 2 inches in diameter shall be suspended from the structure on neoprene-in-shear hangers or floor-mounted on resilient

supports. Flexible pipe connectors will be used to connect the supply and drain pipes to vibrating units such as garbage disposals.

6.11.15.2. Water hammer: The use of short, air filled branch pipes or stubs to control water hammer is not effective and shall not be used. Install manufactured shock absorber, which employs a gas-filled stainless steel bellows to absorb the shock.

6.11.16. Electrical Systems:

6.11.16.1. Interior dry distribution transformers and fluorescent lighting fixtures shall be selected to limit intrinsic acoustic "hum" noise to non-noticeable levels in functional areas. All fluorescent fixtures shall be equipped with electronic ballasts.

6.11.16.2. Flanking transmission: Flanking transmission of vibration energy from mechanical equipment shall be minimized. All connections to vibrating equipment shall be through flexible connectors and conduits.

6.11.16.3. Back-to-back outlet boxes shall not be permitted in sensitive areas.

Provide M&C Software with a license for no less than 0 clients

Provide M&C Software with a license for no less than 1260 points.

6.12. ENERGY CONSERVATION

6.12.1. General

Minimum energy requirements for the facility are stated in Paragraph 3. Increase any efficiencies where possible or where need to earn a LEED Silver rating.

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:

Renewable energy features have not been determined to be required or cost effective for this project.

6.13. FIRE PROTECTION

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

Systems covered under this section include Fire Sprinkler System (FSS), Fire Detection and Alarm System (FDAS) and Mass Notification System (MNS). When the phrase “fire protection systems” is used in this section the reference shall be applied to all fire protection systems listed above. The Fort Benning Fire Chief, or his designee, shall be present for final connection of the Fire Alarm System to the Fort Benning Fire Alarm System.

6.13.1. Project Fire Protection Engineer

6.13.1.1. Under the terms of UFC 3-600-01, this is considered a major project and requires the services of a qualified Fire Protection Engineer (FPE) as an integral part of the design team and involved in every aspect of the design as it related to fire protection and life safety. A qualified Fire Protection Engineer is defined as a registered professional engineer who has passed the fire protection engineering written examination administered by the National Council of Examiners for Engineering and Surveys (NCEES). NICET certification is not sufficient to address the FPE requirement.

6.13.1.2. The FPE shall be an independent third party hire by the prime contractor as an integral part of the prime contractor's design team for identifying and coordinating all of the fire protection and life safety requirements for this project. The FPE shall have no business relationships (owner, partner, operating officer, distributor, salesman or technical representative) with any construction subcontractors involved with this project; or with any fire protection equipment device manufacturers, suppliers or installers for any such equipment, provided as part of this project. Provide to the contracting officer for review and approval the name and qualifications, including proof of registration, of the FPE prior to the start of work.

6.13.1.3. The FPE shall be responsible for the design and specification of all fire protection systems, performing a multi-discipline review of the entire project, preparing the Fire Protection Design Analysis, and providing design certification in accordance with UFC 3-600-01. The FPE shall meet with the Fort Benning fire protection authorities to review all fire protection aspects of the project prior to the interim design submittal.

6.13.2. FIRE ALARM SYSTEM: The equipment furnished shall be compatible and be UL listed, FM approved, or approved or listed by a nationally recognized testing laboratory in accordance with the applicable NFPA standards. A new addressable fire alarm system shall be installed and shall be monitored at a site receiving station. The UL listed mass notification system may be installed in conjunction with the fire alarm system. The systems shall be designed by a Fire Protection Engineer and installed by a NICET 3 technician.

6.13.3. The fire alarm system shall be fully addressable up to each individual device at the building fire alarm control panel. Fire station transmission shall receive distinct alarm, trouble, and supervisory signals. Provide all panels, individual addressable devices, hardware, battery back up power and software for a fully functional system. The system shall be software programmable to enable expansion or modification without replacement of hardware or firmware such as adding or deleting devices. The system shall have a minimum of 50% addressable device expansion capability without hardware modifications to the panel.

6.13.3.1. Fire alarm system pull stations shall be non-glass break type and not require the use of a key to reset. Fire alarm pull stations shall be dual action and located by each required exit and within mechanical rooms having exterior doors.
6.13.3.2. The system shall supervise the fire sprinkler system and all other fire protection systems. The fire alarm system shall provide monitoring of the sprinkler system through a 24-volt paddle-type water flow switch. A 24-volt DC bell shall be mounted on the exterior of each building above the FDC.

6.13.3.3. Duct detectors located in concealed locations shall be provided with remote annunciation and test switches. Remote visual and audible devices shall be located adjacent to the duct detector and within 10 feet of the finished floor. Duct detectors shall be photoelectric type and their installation shall comply with NFPA 90A.

6.13.3.4. Fire/smoke doors held open by magnetic devices shall be powered from the fire alarm control panel.

6.13.3.5. Audible/visual notification appliances shall comply with NFPA 72 and ADA Accessibility Guidelines for Building and Facilities. Visual devices shall be synchronized when more than one device is located in a common field of view. Provide audible/visual notification appliances in mechanical rooms and in common use areas such as breakroom, restrooms, corridors and lobbies, etc.

6.13.3.6. Provide a weatherproof strobe listed for -30C (-22 F) alarm visual indicator located on the exterior corner of the building facing the fire access road.

6.13.3.7. Provide a textual fire alarm annunciator at a fire department approved location within the building.

6.13.3.8. Performance of fire alarm circuits shall be as follows: IDC style D, SLC style 6, NAC style Z.

6.13.3.9. All wiring shall be in conduit. Conduit and fittings shall comply with NFPA 70. All conductor connections shall be made under screw terminals. Provide insulated barrier type terminal strips at junction points. Use of wire nuts, crimped connectors, or twisting of conductors is prohibited.

6.13.3.10. Provide addressable control modules capable of operating as a relay for interfacing the control panel with other systems, i.e. HVAC controls, door holders, etc.

6.13.3.11. Activation of any pull station, sprinkler water flow, or smoke detector shall cause all audible/visual devices to operate and an alarm signal sent to the fire station. Activation of a duct smoke detector shall cause the associated AHU to shut down, associated fire/smoke dampers to close, and a supervisory signal sent to the fire station.

6.13.3.12. Provide spare parts for each initiating, monitoring, and notification device used. Provide two percent of the total number used, but not less than two each.

6.13.3.13. The system shall be functionally and operationally tested. Each installed initiating and notification device shall be individually tested, and all wiring tested for stray voltage, ground faults, short-circuit faults, loop resistance, and supervision. Acceptance testing and Record of Completion shall be provided in accordance with NFPA 72.

6.13.3.14.Separate training sessions shall be provided for the operation and maintenance staff. The training for operation staff shall consist of an 8 hour session. The training for system maintenance staff shall consist of two days (16 hours total). Training sessions shall be provided after the system is functionally complete but prior to final acceptance tests. The sessions shall cover items contained in the operating and maintenance instructions. The contractor shall provide all required training material, visual aids, and software/hardware to supply the number of personnel to be trained in each session.

6.13.4. SPRINKLER SYSTEM: The facility shall be protected with automatic sprinkler systems. Wet pipe sprinkler systems shall be provided in areas that are heated and dry pipe sprinkler systems shall be provided in areas subject to freezing. All floors and all areas of the facility shall be protected. The sprinkler system design shall be in accordance with UFC 3-600-01 and NFPA 13. Design densities, design areas and exterior hose streams shall be in accordance with UFC 3-600-01. The sprinkler systems shall be designed and all piping sized with computer generated hydraulic calculations. The exterior hose stream demand shall be included in the hydraulic calculations. A complete sprinkler system design, including sprinklers, branch lines, floor mains and risers, shall be shown on the drawings. The sprinkler system plans shall include node and pipe identification used in the hydraulic calculations. All sprinkler system drains, including main drains, test drains, and auxiliary drains, shall be routed to 2'x2' splash blocks at exterior grade. Sprinkler system design analysis drawings shall be provided in the 60% and 100% design submittals.

6.13.4.1. The contractor shall design a system as required to ensure adequate available water supply. The system is inadequate when the residual pressure is below 20 psi when supplying 100% of the fire flow demand. Refer to Appendix D, Fire Flow Test.

6.13.4.2. The D/B Contractor shall conduct a hydrant flow test in accordance with NFPA 291 prior to the first Design After Award Submittal and include the test, system calculations and design in the Design After Award Submittals. Provide hydrant flow information in accordance with NFPA 291 report format. The flow test shall be conducted by or witnessed by the D/B Contractor’s Fire Protection Engineer of Record.

6.13.4.3. Hydraulic calculations shall include a 10% safety factor on system pressure. Water velocity in the piping system shall not exceed 20 feet/sec. Software that uses k-factors for typical branch lines is not acceptable.

6.13.4.4. Sprinkler Service Main and Riser: The sprinkler service main shall be a dedicated line from the distribution main. Sprinkler service and domestic service shall not be combined. The sprinkler service main shall be provided with an exterior post indicator valve with tamper switch reporting to the fire alarm control panel (FACP). The ground floor entry penetration shall be sleeved per NFPA 13 requirements for seismic protection. The sprinkler entry riser shall include a double check detector backflow preventer, a fire department connection, and a wall hydrant for testing of the backflow preventer. The sprinkler system shall include an indicating control valve, an alarm check valve, a water motor alarm, and a flow switch reporting to the FACP. All control valves shall be OS&Y gate type and shall be provided with tamper switches connected to the FACP. Facilities with multiple floors shall be provided with

floor control valves for each floor. The floor control valve assembly shall be in accordance with UFC 3-600-01, Figure 4-1.

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

6.13.4.6. Seismic Protection: The D/B Contractor shall confirm the seismic requirements for the project based on the requirements of the relevant codes and results of the geotechnical investigation. If required, sprinkler and fire pump piping systems shall be protected against dmamage from earthquakes. Seismic protection shall include flexible and rigid couplings, sway bracing, seismic separation assemblies where piping crosses building seismic separation joints, and other features as required by NFPA 13 for protection of piping against damage from earthquakes.

6.13.4.7. Fire Water Supply: Fire flow test data is provided in Appendix D. The D/B Contractor shall verify the fire flow data by conducting necessary fire flow tests at the project site during the project design and shall base the design of the fire protection systems on the results of this test.

6.13.4.8. Fire Pump: The D/B Contractor shall determine if a fire pump is required based on fire flow test data and fire protection system design requirements. If required, a complete fire pump installation shall be provided. Fire pump installation shall be in accordance with UFC 3-600-01, NFPA 13, NFPA 20, and UFGS 13920. Fire pump system design analysis and drawings shall be provided in the 60% and 100% design submittals.

6.13.4.9. Materials and equipment shall be UL listed in the UL Fire Protection Equipment Diretory, or FM Approved and listed in FM P7825a and FM P7825b.

6.13.4.10. Provide a Knox box for each building. Coordinate the location with the Fort Benning Fire Department.

6.13.4.11. Fittings for non-grooved steel pipe shall be malleable iron conforming to ASME B16.3. Fittings into which sprinklers, drop nipples or riser nipples (sprigs) are screwed shall be threaded type. Plain-end fittings with mechanical couplings, fittings that use steel gripping devices to bite into the pipe and segmented welded fittings shall not be used. Gasket for grooved coupling shall be the flush type that fills the entire cavity between the fitting and the pipe. Reductions in pipe sizes shall be made with one-piece tapered reducing fittings.

6.13.4.12. Water motor alarms shall not be used. All sprinkler system alarms shall be electrically monitored and supervised by the fire alarm system. The water flow switch shall have a 10 second surge delay prior to transmitting an alarm condition.

6.13.4.13. Fire sprinkler piping shall be routed, distributed and concealed above suspended ceilings with recessed chrome plated heads and chrome escutcheons. Sprinklers installed in finished spaces shall be concealed or semi-recessed type. Sprinklers with o-rings shall not be used. Center heads in two directions in ceiling tile and provide piping offsets as required. Sprinkler piping in unfinished areas such as mechanical and electrical rooms shall be exposed with upright sprinklers.

6.13.5. Testing and Training of Fire Sprinkler Systems and Fire Detection and Alarm Systems (FDAS)

6.13.5.1. Testing: The sprinkler system, including underground water mains, shall be fully functionally and operationally tested. Each installed initiating and notification device shall be individually tested, and all wiring tested for stray voltage, ground faults, short circuit faults, loop resistance, and supervision. Acceptance testing and Record of Completion shall be provided in accordance with NFPA 72. Upon completion of specified tests, the contractor shall complete and submit the Contractor’s Material and Test Certificates.

6.13.5.2. Disinfection and Flushing: After all system components are installed and hydrostatic testing is successfully completed, the sprinkler system shall be thoroughly flushed with potable water and disinfected with chlorinating material in accordance with AWWA C651 and AWWA C652.

6.13.5.3. Separate training sessions, each for 2 persons, shall be provided for the operation and maintenance staff. The training for operation staff shall consist of an 8-hour session. The training for system maintenance staff shall consist of two days (16 hours total). Training sessions shall be provided after the system is functionally complete

but prior to final acceptance tests. The sessions shall cover items contained in the operating and maintenance instructions. The contractor shall provide all required training material, visual aids, and software/hardware to supply the number of personnel to be trained in each session.

6.14. SUSTAINABLE DESIGN

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

6.14.2. The minimum requirement for this project is to achieve LEED Silver level. Each non-exempt facility (building plus sitework) must achieve this level. In addition to any facilities indicated as exempt in paragraph 3, the following facilities are exempt from the minimum LEED achievement requirement: Building 3405 and 3425 are not exempt from the LEED Silver rating requirement..

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

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

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

SS Credit 1 Site Selection:

Project site IS NOT considered prime farmland.

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

Project site contains no habitat for threatened or endangered species.

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

Project site WAS NOT previously used as public parkland.

SS Credit 2 Development Density & Community Connectivity.

Project site DOES NOT meets the criteria for this credit.

SS Credit 3 Brownfield Redevelopment.

Project site DOES NOT meets the criteria for this credit.

SS Credit 4.1 Public Transportation Access.

Project site DOES NOT meets the criteria for this credit.

EA Credit 6 Green Power.

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

MR Credit 2 Construction Waste Management.

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

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

6.14.7. Not Used

6.14.8. Additional Information

Refer to Appendix O for a preliminary strategy for achieving LEED Silver based on the Adapt-Build Model. The D-B Contractor should review the list of points as revise as necessary to coincide with the awarded options and design solutions for Buildings 3405 and 3425. Due to the nature of the project, a number of credits are not available and the D/B Contractor will need to ensure that points selected are attainable and are diligently followed through design and construction to maintain that status.

Refer to Appendix P for procedures for accessing the project from the USGBC website. Note that the Government has pre-registered the project in LEED 2.2.

6.15. ENVIRONMENTAL

Refer to Apendix E for the Hazardous Materials report for Building 3405. A similar report is being prepared for Building 3425

6.16. PERMITS

6.16.1 AIR PERMITS: The Contractor shall be responsible for coordinating with Fort Benning's Environmental Management Division (EMD) staff in obtaining all required and applicable permits as part of the design proces and shall secure all permits necessary for construction of this project.

6.16.1.1 Fort Benning operates under a Title V Air Permit for air quality requirements, and the contractor is required to perform a regulatory review of all air sources in the project and submit for approval to the EMD. Each Congressional Appropriation is defined as one project.

6.16.1.2 New sources must be reviewed for NESHAP (National Emissions Standards for Hazardous Air Pollutants) applicability.

6.16.1.3 Contractor is required to develop required air permit application(s) and / or coordinate with EMD on any on-going permit applications. Contractor is responsible for all air permitting fees and all required permits shall be obtained prior to construction of any new sources.

6.16.1.4 Contractor is responsible for complying with all State regulatory requirements for boilers fired by either natural gas or distillate oil, and insuring that the boiler(s) is included in the Installation's Title V Air Permit.

6.16.1.5 New boilers with an input greater than 10 million btu/hr shall meet 40 CFR Part 60, New Source Performance Standards. All new boilers shall include low NOx burners.

6.16.1.6 The Contractor is required to have an air permit for each type of material (i.e. concrete, rock crushing, asphalt batch plants) that will produce dust and other harmful particulates within the boundaries of the installation. The Installation's Title V Air Permit cannon be changed unilaterally by the Contractor, and the Contractor shall coordinate any and all changes / modifications through the designated EMD staff.

6.16.1.7 Air Permint Submittal Requirements (Boilers and Domestic Water Heaters): Pursuant to satisfying requirements under the Clean Air Act, at or before the 60 percent design stage, the A-E shall submit the following to the installation's environmental office:

(1) A listing of boilers and domestic water heaters that will be fired by natural gas, propane, and / or fuel oil.

(2) The fuel or fuels (primary and backup , if applicable that will be utilized for each piece of equipment.

(3) The quantity of each particular size.

(4) The respective input firing rate.

(5) A point of contact and an alternate point of contact should the environmental office require additional information from the designer of record during the permitting process.

6.16.1.8 The Contractor shall submit two copies of the document(s) to the Savannah District: one to the Project Manager for placement in Central files, and one to the Mechanical Section.

6.16.1.8 This document shall not be sent prematurely, since any increase in boiler sizing subsequent to submission of the document(s) will require revision to the permitting process. In any event, if there is a change in equipment sizing during refinement of the design process, an updated copy of the document(s) shall be submitted per the guidance listed in the paragraphs above.

6.16.1.9 The A-E is responsible for incorporating into the design the equipment accessories requiree for compliance with the governing environmental laws. This includes, but is not limited to, determining the need for individual metering and the level of emissions monitoring required. The A-E's concept design narrative shall specifically address those features that will be incorporated into the boiler system design to assure compliance with the applicable environmental laws of the State.

6.16.1.10 Prior to the submission of form DD 1354 Acceptance of Real Property, the Contractor shall submit to EMD copies of all required Federal and / or State certifications associated with emissions units, i.e. visible emissions certifications. The dates that the certifications are submitted to EMD shall be noted in the remarks section of form DD 1354.

6.16.1.11 Proposers shall be aware that the construction permit will not have been obtained prior to award of the design-build contract. No construction associated with the building(s) housing the boiler(s) or other source(s) of contaminant can be done prior to obtaining the required permit. Generally, only the following things can be done prior to possession of the permit: clearing and grading, access roads, driveways, parking lots, underground utilities up to the 5-foot line of the building(s), and ancillary structures (structures not associated with housing the sources of contaminants).

6.16.2 Refer to 6.3.3.2, Appendix GG Site Specifications and Appendix MM for Fort Benning and State of Georgia storm water permitting requirements.

6.17. DEMOLITION

See the drawings in Appendix J and the Adapt-Build Model for the extent of site and building demolition. Building demolition may require abatement. Refer to Appendix E for Hazardous Materials reports for Building 3405.

6.18. ADDITIONAL FACILITIES

Furniture, Fixtures and Equipment required by this project are detailed in the Adapt-Build Model.

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
- Army Corps of Engineers ECB No. 2005-10, (31 August 2005) Scheduling Requirements for Testing of Mechanical Systems in Construction http://www.wbdg.org/ccb/ARMYCOE/COEECB/ecb_2005_10.pdf

1.2. QUALIFICATIONS

The Contractor shall 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

Design and permit activities, including necessary conferences and follow-up actions and design package submission activities shall be included. The Contractor shall 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. The schedule shall include review and correction periods associated with each item.

3.3.2.3. Procurement Activities

The schedule must 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, procure, fabricate, and deliver.

3.3.2.4. Mandatory Tasks

The following tasks must be included and properly scheduled:

3.3.2.4.1. Submission, review and acceptance of design packages

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 Engineering and Construction Bulletin (ECB) No. 2005-10 dated 31 August 2005.

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. 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.

3.3.2.6. 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.

3.3.2.7. 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

3.3.2.8. 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.

3.3.2.9. 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.

3.3.2.10. 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, Construction Submittal, Approval, 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.

3.3.2.11. 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 in the accepted contract proposal, 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

The schedule must 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. The schedule shall 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 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. The network diagram shall 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

Diagrams shall 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 acutal 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. Activity Statusing

Statusing 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 statused 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

The Contractor shall 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 idenify 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 montly 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 zero(0) copy(ies) of the submittal.

1.14. INFORMATION ONLY SUBMITTALS

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

3.1.1. Design Quality Control Plan

3.1.2. Post Award Conference

3.1.3. Partnering & Project Progress Processes

3.1.4. Initial Design Conference

3.1.5. Pre-Construction Conference

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

3.2.1. Site/Utilities

3.2.2. Interim Design Submittals

3.2.3. Over-the-Shoulder Progress Reviews

3.2.4. Final Design Submissions

3.2.5. Design Complete Submittals

3.2.6. Holiday Periods for Government Review or Actions

3.2.7. Late Submittals and Reviews

3.3. DESIGN CONFIGURATION MANAGEMENT

3.3.1. Procedures

3.3.2. Tracking Design Review Comments

3.3.3. Design and Code Checklists

3.4. INTERIM DESIGN REVIEWS AND CONFERENCES

3.4.1. General

3.4.2. Procedures

3.4.3. Conference Documentation

3.5. INTERIM DESIGN REQUIREMENTS

3.5.1. Drawings

3.5.2. Design Analyses

3.5.3. Geotechnical Investigations and Reports

3.5.4. LEED Documentation

3.5.5. Energy Conservation

3.5.6. Specifications

3.5.7. Building Rendering

3.5.8. Interim Building Design Contents

3.6. FINAL DESIGN REVIEWS AND CONFERENCES

3.7. FINAL DESIGN REQUIREMENTS

3.7.1. Drawings

3.7.2. Design Analysis

3.7.3. Specifications

3.7.4. Submittal Register

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

3.7.6. Acceptance and Release for Construction

3.8. DESIGN COMPLETE CONSTRUCTION DOCUMENT REQUIREMENTS

3.9. SUBMITTAL DISTRIBUTION, MEDIA AND QUANTITIES

3.9.1. Submittal Distribution and Quantities

3.9.2. Web based Design Submittals

3.9.3. Mailing of Design Submittals

3.10. AS-BUILT DOCUMENTS

ATTACHMENT A STRUCTURAL INTERIOR DESIGN (SID) REQUIREMENTS

ATTACHMENT B FURNITURE, FIXTURES AND EQUIPMENT REQUIREMENTS

ATTACHMENT C TRACKING COMMENTS IN DRCHECKS

ATTACHMENT D SAMPLE FIRE PROTECTION AND LIFE SAFETY CODE REVIEW

ATTACHMENT E LEED SUBMITTALS

ATTACHMENT F BUILDING INFORMATION MODELING REQUIREMENTS

ATTACHMENT G DESIGN SUBMITTAL DIRECTORY AND SUBDIRECTORY FILE ARRANGEMENT

1.0 GENERAL INFORMATION

1.1. INTRODUCTION

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

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

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

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

1.2. DESIGNER OF RECORD

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

2.0 PRODUCTS (Not Applicable)

3.0 EXECUTION

3.1. PRE-WORK ACTIVITIES & CONFERENCES

3.1.1. Design Quality Control Plan

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

3.1.2. Post Award Conference

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

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

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

3.1.3. Partnering & Project Progress Processes

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

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

3.1.4. Initial Design Conference

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

3.1.5. Pre-Construction Conference

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

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

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

3.2.1. Site/Utilities

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

3.2.2. Interim Design Submittals

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

3.2.3. Over-the-Shoulder Progress Reviews

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

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

3.2.4. Final Design Submissions

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

3.2.5. Design Complete Submittals

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

3.2.6. Holiday Periods for Government Review or Actions

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

3.2.7. Late Submittals and Reviews

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

3.3. DESIGN CONFIGURATION MANAGEMENT

3.3.1. Procedures

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

3.3.2. Tracking Design Review Comments

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

3.3.3. Design and Code Checklists

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

3.4. INTERIM DESIGN REVIEWS AND CONFERENCES

3.4.1. General

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

3.4.2. Procedures

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

3.4.3. Conference Documentation

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

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

3.5. INTERIM DESIGN REQUIREMENTS

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

3.5.1. Drawings

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

3.5.2. Design Analyses

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(b) Provide all references used in the design including Government design documents and industry standards used to generate the fire protection analysis.

(c) Provide classification of each building in accordance with fire zone, building floor areas and height and number of stories.

(d) Provide discussion and description of required fire protection requirements including extinguishing equipment, detection equipment, alarm equipment and water supply. Alarm and detection equipment shall interface to requirements of Electronic Systems.

(e) Provide hydraulic calculations based on water flow test for each sprinkler system to insure that flow and pressure requirements can be met with current water supply. Include copies of Contractor's water flow testing done to certify the available water source.

3.5.2.8. For parts including plumbing systems:

(a) List all references used in the design.

(b) Provide justification and brief description of the types of plumbing fixtures, piping materials and equipment proposed for use.

(c) Detail calculations for systems such as sizing of domestic hot water heater and piping; natural gas piping; LP gas piping and tanks, fuel oil piping and tanks, etc., as applicable.

(d) When the geotechnical report indicates expansive soils are present, indicate in the first piping design submittal how piping systems will be protected against damage or backfall/backflow due to soil heave (from penetration of slab to the 5 foot building line).

3.5.2.9. For elevator systems:

(a) List all criteria codes, documents and design conditions used.

(b) List any required permits and registrations for construction of items of special mechanical systems and equipment.

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

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

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

3.5.3. Geotechnical Investigations and Reports:

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

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

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

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

3.5.4. LEED Documentation:

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

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

3.5.5. Energy Conservation:

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

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

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

3.5.6. Specifications

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

3.5.7. Building Rendering

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

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

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

3.5.8. Interim Building Design Contents

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

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

3.5.8.1. Lawn and Landscaping Irrigation System

3.5.8.2. Landscape, Planting and Turfing

3.5.8.3. Architectural

(a) Design Narrative

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

(c) Finish schedule

(d) All required equipment

(e) Special graphics requirements

(f) Door and Window Schedules

(g) Hardware sets using BHMA designations

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

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

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

3.5.8.4. Structural Systems. Include:

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

(b) Foundation plan showing main foundation elements where applicable

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

3.5.8.5. Plumbing Systems

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

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

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

3.5.8.6. HVAC Systems

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

(1) Room designations.

(2) Mechanical legend and applicable notes.

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

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

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

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

(7) Exhaust fans and specialized exhaust systems.

(8) Thermostat location.

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

(10) Location of all air handling equipment.

(11) Air balancing information.

(12) Flue size and location.

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

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

(1) Capacity

(2) Electrical characteristics

(3) Efficiency (if applicable)

(4) Manufacturer's name

(5) Optional features to be provided

(6) Physical size

(7) Minimum maintenance clearances

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

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

3.5.8.7. Fire Protection and Life Safety.

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

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

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

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

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

(5) Indicate any hazardous areas and their classification

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

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

3.5.8.8. Elevators. Provide:

(a) Description of the proposed control system

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

3.5.8.9. Electrical Systems.

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

(1) Room designations.

(2) Electrical legend and applicable notes.

(3) Lighting fixtures, properly identified.

(4) Switches for control of lighting.

(5) Receptacles.

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

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

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

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

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

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

(2) Branch Circuit Designations.

(3) Load Designations.

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

(5) Branch Circuit Connected Loads (AMPS).

(6) Special Features

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

(1) Fixture Designation.

(2) General Fixture Description.

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

(4) Type of Mounting.

(5) Special Features.

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

3.5.8.10. Electronic Systems including the following responsibilities:

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

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

(c) Public Address System

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

(e) Cathodic Protection.

(f) Intrusion Detection, Card Access System

(g) Central Control and Monitoring System

(h) Mass Notification System

(i) Electrical Power Distribution Systems

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

(a) Telecommunications Cabling

(b) Supporting Infrastructure

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

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

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

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

3.6. FINAL DESIGN REVIEWS AND CONFERENCES

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

3.7. FINAL DESIGN REQUIREMENTS

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

3.7.1. Drawings

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

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

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

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

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

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

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

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

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

(c) Each file (both CAD and PDF) shall represent one complete drawing from the drawing set, including the date, submittal phase, and border. Each drawing file shall be completely independent of any data in any other file, including fonts and shapes not included with the basic CAD software program utilized. Drawing files with external references or special fonts are not acceptable. All displayed graphic elements on all levels of the drawing files shall be part of the project drawing image. The drawing files shall not contain any graphic element that is not part of the drawing image.

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

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

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

3.7.2. Design Analyses

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

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

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

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

3.7.3. Specifications

Specifications shall be 100% complete and in final form.

3.7.4. Submittal Register

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

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

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

3.7.6. Acceptance and Release for Construction

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

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

3.8. DESIGN COMPLETE CONSTRUCTION DOCUMENT REQUIREMENTS

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

3.9. SUBMITTAL DISTRIBUTION, MEDIA AND QUANTITIES

3.9.1. Submittal Distribution and Quantities

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

Activity and Address	Drawing Size (Full Size) **ANSI D** Full Sets/ *Partial Sets	Design Analyses & Specs Full Sets/ *Partial Sets	Drawing Size (Half Size) **11x17** Full Sets/ *Partial Sets	Non-BIM Data CD-ROM or DVD as Necessary (PDF& **.dgn**)	Furniture Submittal (FFE)	Structural Interior Design Submittal	BIM Data DVD (Per Attach F)
Commander, U.S.Army Engineer District **[Not Supplied - DistrictInfoGeneral : CONSTRUCTION_DISTRICT]**	2/0	3/0	3/0	4	0	0	0
Commander, U.S.Army Engineer District, Center of Standardization **Ft Worth District**	2/0	2/0	0/0	0	0	0	0
Installation	2/0	2/0	0/0	0	0	0	0
U.S.Army Corps of Engineers Construction Area Office	2/0	6/0	6/0	6	1	1	0
Information Systems Engineering Command (ISEC)	0/0	0/0	0/0	1	1 (Electronic only)	N/A	1
Other Offices	16/0	2/0	13/0	17	0	0	0

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

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

3.9.2. Web based Design Submittals

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 fourteen (14) different addresses. Assemble drawing sheets, specs, design analyses, etc. into individual sets; do not combine duplicate pages from individual sets so that the government has to assemble a set.

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

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

3.10. AS-BUILT DOCUMENTS

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

ATTACHMENT A
STRUCTURAL INTERIOR DESIGN (SID) REQUIREMENTS

1.0 GENERAL INFORMATION

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

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

2.1. FORMAT AND SCHEDULE

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

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

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

Design submittal requirements include, but are not limited to:

2.1.1. Narrative of the Structural Interior Design Objectives

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

2.1.2. Interior Color Boards

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

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

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

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

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

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

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

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

2.1.3. Exterior Color Boards

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

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

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

2.2. STRUCTURAL INTERIOR DESIGN DOCUMENTS

2.2.1. General

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

2.2.2. Finish Color Schedule

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

2.2.3. Interior Finish Plans

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

2.2.4. Furniture Footprint Plans

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

2.2.5. Interior Signage

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

2.2.6. Interior Elevations, Sections and Details

Indicate material, color and finish placement.

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

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

1.1. FORMAT AND SCHEDULE

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

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

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

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

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

Design submittal requirements include, but are not limited to:

1.1.1. Narrative of Interior Design Objectives

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

1.1.2. Furniture Order Form

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

(a) Furniture item illustration and code

(b) Furniture item name

(c) Job name, location, and date

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

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

(f) Finish name and number (code to finish samples)

(g) Fabric name and number, minimum Wyzenbeek Abrasion Test double rubs (code to fabric samples)

(h) Dimensions

(i) Item location by room number and room name

(j) Quantity per room

(k) Total quantity

(l) Special instructions for procurement ordering and/or installation (if applicable)

(m) Written Product Description: include a non-proprietary paragraph listing the salient features of the item to include but not limited to:

(1) required features and characteristics

(2) ergonomic requirements

(3) functional requirements

(4) testing requirements

(5) furniture style

(6) construction materials

(7) minimum warranty

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

Chair Description:

(1) Mid-Back Ergonomic Task Chair

(2) Pneumatic Gaslift; Five Star Base

(3) Mesh Back; Upholstered Seat

(4) Height and Width Adjustable Task Arms:

a. Arm Height: 6”- 11” (+-1/2”)

b. Arm Width: 2”– 4” adjustment

(5) Height Adjustable Lumbar Support

(6) Adjustable Seat Height 16”-21” (+- 1”)

(7) Sliding Seat Depth Adjustment 15”-18” (+-1”)

(8) Standard Hard Casters (for carpeted areas)

(9) Overall Measurements:

a. Overall width: 25” - 27”

b. Overall depth: 25”– 28”

(10) Must have a minimum of the following adjustments (In addition to the above):

a. 360 Degree Swivel

b. Knee-Tilt with Tilt Tension

c. Back angle

d. Forward Tilt

e. Forward Tilt and Upright Tilt Lock

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

(1) Type furniture systems (panel, stacking panels, spine wall, desk based system, or a combination)

(2) Minimum noise reduction coefficient (NRC)

(3) Minimum sound transfer coefficient (STC)

(4) Minimum flame spread and smoke development

(5) UL testing for task lighting and electrical system

(6) Panel widths and heights and their locations (this may be done on the drawings)Worksurface types and sizes (this may be done on the drawings)

(7) Worksurface edge type

(8) Varying panel/cover finish materials and locations (locations may be shown on the drawings)

(9) Storage requirements

(10) Keyboard requirements

(11) Lock and keying requirements

(12) Accessory components (examples: tack boards, marker boards, paper management)

(13) Electrical and communication raceway requirement; type, capacity and location (base, beltline, below and/or above beltline)

(14) Locations of communication cables (base, beltline, below and/or above beltline, top channel)

(15) Types of electrical outlets

(16) Types of communication jacks; provided and installed by others

(17) Locations of electrical outlets and communication jacks (this may be done on the drawings)

(18) Type of cable (examples: Cat. 5, Cat. 6, fiber optic; UTP or STP, etc.) system needs to support; provided and installed by others

1.1.3. Alternate Manufacturer List

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

1.1.4. FF&E Procurement List

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

1.1.5. Points of Contact (POCs)

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

1.1.6. Color Boards

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

1.1.7. Itemized Furniture Cost Estimate

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

1.2. INTERIOR DESIGN DOCUMENTS

1.2.1. Overall Furniture and Area Plans

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

1.2.2. Workstation Plans

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

1.2.3. Panel Plans

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

1.2.4. Desk Plans

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

1.2.5. Reflected Ceiling Plans

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

1.2.6. Electrical and Telecommunication Plans

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

1.2.7. Artwork Placement Plans

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

1.2.8. Window Drapery Plans

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

1.3. FURNITURE SELECTION

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

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

1.4. CONSTRUCTION

1.4.1. Provide knee space at workstations and tables that is not obstructed by panels/legs that interfere with knee space of seated person and provide desks, storage and tables with leveling devices to compensate for uneven floors.

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

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

1.4.4. Unless otherwise noted, specify lockable desks and workstations and storage of steel construction. Use tempered glass glazing when glazing is required.

1.5. FINISHES AND UPHOLSTERY

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

1.5.2. Use manufacturer's standard fabrics; including textile manufacturers fabrics that have been graded into the furniture manufactures fabric grades and are available through their GSA Schedule. Customers Own Material

(COM) can be used in headquarter buildings in command suites with executive furniture. Coordinate specific locations with Corps of Engineers Interior Designer.

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

1.6. ACCESSORIES

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

1.6.2. Not Used.

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

1.7. MISSION UNIQUE EQUIPMENT

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

1.8. SUSTAINABILITY

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

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

1.9. FURNITURE SYSTEMS

1.9.1. General.

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

1.9.2. Connector Systems.

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

1.9.3. Panels and Spine Walls

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

1.9.4. Electrical And Information/Technology (IT)

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

1.9.5. Pedestals

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

1.10. EXECUTIVE FURNITURE

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

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

1.11. SEATING

1.11.1. General

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

1.11.2. Desk and Guest Seating

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

1.11.3. Conference Room Seating

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

1.11.4. Lounge, Waiting and Reception Area Seating

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

1.11.5. Break Room Seating

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

1.11.6. Lounge, Waiting and Reception Furniture.

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

1.12. FILING AND STORAGE.

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

1.13. TRAINING TABLES.

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

1.14. FURNITURE WARRANTIES.

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

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

ATTACHMENT C
TRACKING COMMENTS IN DRCHECKS

1.0 General

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

2.0 DrChecks Review Comments

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

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

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

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

3.0 DrChecks Initial Account Set-Up

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

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

4.0 DrChecks Reviewer Role

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

4.1. Log into DrChecks.

4.2. Click on the appropriate project.

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

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

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

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

5.0 DrChecks Comment Evaluation

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

5.1. Log into DrChecks.

5.2. Click on the appropriate project.

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

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

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

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

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

6.0 DrChecks Back-check

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

6.1. Log into DrChecks.

6.2. Click on the appropriate project.

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

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

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

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

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

ATTACHMENT D
SAMPLE FIRE PROTECTION AND LIFE SAFETY CODE REVIEW

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

1.0 SAMPLE FIRE PROTECTION AND LIFE SAFETY CODE REVIEW

1.1. Project Name (insert name and location)

1.2. Applicable Codes and Standards

1.2.1. Unified Facilities Criteria (UFC): 3-600-01, Design: Fire Protection Engineering For Facilities

1.2.2. International Building Code (IBC) for fire resistance requirements, allowable floor area, building height limitations and building separation distance requirements, except as modified by UFC 3-600-01.

1.2.3. National Fire Protection Association (NFPA) 101 Life Safety Code (latest edition), for building egress and life safety and applicable criteria in UFC 3-600-01.

1.2.4. ADA and ABA Accessiblity Guidelines. For Buildings and Facilities See Section 01 10 00, Paragraph 3 for facility specific criteria.

1.3. Occupancy Classification
IBC chapters 3 and 4

1.4. Construction Type
IBC chapter 6

1.5. Area Limitations
IBC chapter 5, table 503

1.6. Allowable Floor Areas
IBC section 503, 505

1.7. Allowable area increases
IBC section 506, 507

1.8. Maximum Height of Buildings
IBC section 504

1.9. Fire-resistive substitution

1.10. Occupancy Separations
IBC table 302.3.2

1.11. Fire Resistive Requirements

1.11.1. Exterior Walls - [_____] hour rating, IBC table 601, 602

1.11.2. Interior Bearing walls - [_____] hour rating

1.11.3. Structural frame - [_____] hour rating

1.11.4. Permanent partitions - [_____] hour rating

1.11.5. Shaft enclosures - [_____] hour rating

1.11.6. Floors & Floor-Ceilings - [_____] hour rating

1.11.7. Roofs and Roof Ceilings - [_____] hour rating

1.12. Automatic Sprinklers and others used to determine the need for automatic Extinguishing Equipment, Extinguishing Systems, Foam Systems, Standpipe

1.12.1. UFC 3-600-01, chapters 4 and 6 systems, wet chemical systems, etc. State which systems are required and to what criteria they will be designed.

1.12.2. UFC 3-600-01, Appendix B Occupancy Classification. Note the classification for each room. This may be accomplished by classifying the entire building and noting exceptions for rooms that differ (E.g. The entire building is Light Hazard except boiler room and storage rooms which are [_____], etc.)

1.12.3. UFC 3-600-01, Chapter 3 Sprinkler Design Density, Sprinkler Design Area, Water Demand for Hose Streams (supply pressure and source requirements).

1.12.4. UFC 3-600-01, Chapter 4 Coverage per sprinkler head. Extended coverage sprinkler heads are not permitted.

1.12.5. Available Water Supply. Provide the results of the water flow tests showing the available water supply static pressure and residual pressure at flow. Based on this data and the estimated flow and pressure required for the sprinkler system, determine the need for a fire pump.

1.12.6. NFPA 13, Para. 8.16.4.6.1. Provide backflow preventer valves as required by the local municipality, authority, or water purveyor. Provide a test valve located downstream of the backflow preventer for flow testing the backflow preventer at full system demand flow. Route the discharge to an appropriate location outside the building.

1.13. Kitchen Cooking Exhaust Equipment

Describe when kitchen cooking exhaust equipment is provided for the project. Type of extinguishing systems for the equipment should be provided. per NFPA 96. Show all interlocks with manual release switches, fuel shutoff valves, electrical shunt trips, exhaust fans, and building alarms.

1.14. Portable Fire Extinguishers, fire classification and travel distance. per NFPA 10

1.15. Enclosure Protection and Penetration Requirements. - Opening Protectives and Through Penetrations

1.15.1. IBC Section712, 715 and Table 715.3. Mechanical rooms, exit stairways, storage rooms, janitor [_____] hour rating. IBC Table 302.1.1

1.15.2. Fire Blocks, Draft Stops, Through Penetrations and Opening Protectives

1.16. Fire Dampers. Describe where fire dampers and smoke dampers are to be used (IBC Section 716 and NFPA 90A}. State whether isolation smoke dampers are required at the air handler.

1.17. Detection Alarm and Communication. UFC 3-600-01, (Chapter 5); NFPA 101 para. 3.4 (chapters 12-42); NFPA 72

1.18. Mass Notification. Describe building/facility mass notification system (UFC 4-021-01) type and type of base-wide mass notification/communication system. State whether the visible notification appliances will be combined with the fire alarm system or kept separate. (Note: Navy has taken position to combine visible notification appliances with fire alarm).

1.19. Interior Finishes (classification). NFPA 101.10.2.3 and NFPA 101.7.1.4

1.20. Means of Egress

1.20.1. Separation of Means of Egress, NFPA 101 chapters 7 and 12-42; NFPA101.7.1.3

1.20.2. Occupant Load, NFPA101.7.3.1 and chapters 12-42.

1.20.3. Egress Capacity (stairs, corridors, ramps and doors) NFPA101.7.3.3

1.20.4. Number of Means of Egress, NFPA101.7.4 and chapters 12-42.

1.20.5. Dead end limits and Common Path of Travel, NFPA 101.7.5.1.6 and chapters 12-42.

1.20.6. Accessible Means of Egress (for accessible buildings), NFPA101.7.5.4

1.20.7. Measurement of Travel Distance to Exits, NFPA101.7.6 and chapters 12-42.

1.20.8. Discharge from Exits, NFPA101.7.7.2

1.20.9. Illumination of Means of Egress, NFPA101.7.8

1.20.10. Emergency Lighting, NFPA101.7.9

1.20.11. Marking of Means of Egress, NFPA101.7.10

1.21. Elevators, UFC 3-600-01, Chapter 6; IBC and ASME A17.1 - 2000,(Safety Code for Elevators and Escalators)

1.22. Accessibility Requirements, ADA and ABA Accessibility Guidelines for Buildings and Facilities

1.23. Certification of Fire Protection and Life Safety Code Requirements. (Note: Edit the Fire team membership if necessary). Preparers of this document certify the accuracy and completeness of the Fire Protection and Life Safety features for this project in accordance with the attached completed form(s).

1.24. Designer of Record. Certification of Fire protection and Life Safety Code Requirements. (Note: Edit the Fire team members if necessary). Preparers of this document certify the accuracy and completeness of the Fire Protection and Life Safety features of this project.

Fire Protection Engineer of Record:

_____

Signature and Stamp

Date

OR

Architect of Record:

_____

Signature and Stamp

Date

Mechanical Engineer of Record:

_____

Signature and Stamp

Date

Electrical Engineer of Record:

_____

Signature/Date

ATTACHMENT E
LEED SUBMITTALS

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	**LEED-NC v2.2 Submittals (OCT09REV)**		Provide for Credit Audit Only		Date Submitted (to be filled in by Contractor)	Government Reviewer's Use (OCT09REV)
PAR		**FEATURE**	**DUE AT**		**REQUIRED DOCUMENTATION**	**DATE**	**REV**
GENERAL							
	GENERAL - All calculations shall be in accordance with LEED 2.2 Reference Guide.						
	GENERAL: Obtain excel version of this spreadsheet at http://en.sas.usace.army.mil/enWeb, "Engineering Criteria". OCT09REV						
	GENERAL - For all credits, narrative/comments may be added to describe special circumstances or considerations regarding the project's credit approach.						
	GENERAL - Include all required LEED drawings indicated below in contract drawings with applicable discipline drawings, labeled For Reference Only.						
	NOTE: Each submittal indicated with "**" differs from LEED certified project submittals by either having a different due date or being an added submittal not required by GBCI. OCT09REV						
	OCT09REV GENERAL - Audit documentation may include but is not limited to what is indicated in this table.						
			Closeout		List of all Final Design submittals revised after final design to reflect actual closeout conditions. Revised Final Design submittals. - OR - Statement confirming that no changes have been made since final design that effect final design submittal documents.		Proj Engr (PE)
CATEGORY 1 - SUSTAINABLE SITES							
SSPR1		Construction Activity Pollution Prevention (PREREQUISITE)	**Final Design		List of drawings and specifications that address the erosion control, particulate/dust control and sedimentation control measures to be implemented.		CIV
OCT09REV			**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			**Final Design		Narrative that indicates which compliance path was used (NPDES or Local standards) and describes the measures to be implemented on the project. If a local standard was followed, provide specific information to demonstrate that the local standard is equal to or more stringent than the NPDES program.		CIV
SS1		Site Selection	Final Design		Statement confirming that project does not meet any of the prohibited criteria.		CIV
OCT09REV			**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	X	LEED Site plan drawing that shows all proposed development, line depicting boundary of all bodies of water and/or wetlands within 100 feet of project boundary and a line depicting 5' elevation above 100 year flood line that falls within project boundary. Not required if neither condition applies.		CIV
SS2		Development Density & Community Connectivity	Final Design		Option 1: LEED Site vicinity plan showing project site and surrounding development. Show density boundary or note drawing scale.		CIV
OCT09REV			**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design		Option 1: Table indicating, for project site and all surrounding sites within density radius (keyed to site vicinity plan), site area and building area. Project development density calculation. Density radius calculation. Development density calculation within density radius.		CIV
			Final Design		Option 2: LEED Site vicinity plan showing project site, the 1/2 mile community radius, pedestrian walkways and the locations of the residential development(s) and Basic Services surrounding the project site.		CIV
			Final Design		Option 2: List (including business name and type) of all Basic Services facilities within the 1/2 mile radius, keyed to site vicinity plan.		CIV
SS3		Brownfield Redevelopment	Final Design		Narrative describing contamination and the remediation activities included in project. Include statement indicating how site was determined to be a brownfield.		CIV
OCT09REV			**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
SS4.1		Alternative Transportation: Public Transportation Access	Final Design		Statement indicating which option for compliance applies. State whether public transportation is existing or proposed and, if proposed, cite source of this information.		CIV
OCT09REV			**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design		Option 1: LEED Site vicinity plan showing project site, mass transit stops and pedestrian path to them with path distance noted.		CIV
			Final Design		Option 2: LEED Site vicinity plan showing project site, bus stops and pedestrian path to them with path distance noted.		CIV
SS4.2		Alternative Transportation: Bicycle Storage & Changing Rooms	Final Design		FTE calculation. Bicycle storage spaces calculation. Shower/changing facilities calculation.		CIV
			Final Design		List of drawings that show the location(s) of bicycle storage areas. Statement indicating distance from building entrance.		CIV
			Final Design		List of drawings that show the location(s) of shower/changing facilities and, if located outside the buiding, statement indicating distance from building entrance.		ARC
SS4.3		Alternative Transportation: Low Emitting & Fuel Efficient Vehicles	Final Design		Statement indicating which option for compliance applies. FTE calculation. Statement indicating total parking capacity of site.		CIV
OCT09REV			**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design		Option 1: Low-emission & fuel-efficient vehicle calculation.		CIV

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	**LEED-NC v2.2 Submittals (OCT09REV)**		Provide for Credit Audit Only		Date Submitted (to be filled in by Contractor)	Government Reviewer's Use (OCT09REV)
PAR		**FEATURE**	**DUE AT**		**REQUIRED DOCUMENTATION**	**DATE**	**REV**
			Final Design		Option 1: List of drawings and specification references that show location and number of preferred parking spaces for low-emission & fuel-efficient vehicles and signage.		CIV
			Final Design		Option 1: Statement indicating quantity, make, model and manufacturer of low-emission & fuel-efficient vehicles to be provided. Statement confirming vehicles are zero-emission or indicating ACEEE vehicle scores.		CIV
			Final Design		Option 2: Low-emission & fuel-efficient vehicle parking calculation.		CIV
			Final Design		Option 2: List of drawings and specification references that show location and number of preferred parking spaces and signage.		CIV
			Final Design		Option 3: Low-emission & fuel-efficient vehicle refueling station calculation.		CIV
			Final Design		Option 3: List of drawings and specifications indicating location and number of refueling stations, fuel type and fueling capacity for each station for an 8-hour period.		CIV
			Closeout	X	Option 3: Construction product submittals indicating what was provided and confirming compliance with respect to fuel type and fueling capacity for each station for an 8-hour period.		CIV
SS4.4		Alternative Transportation: Parking Capacity	Final Design		Statement indicating which option for compliance applies.		CIV
OCT09REV			**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design		Option 1: Preferred parking calculation including number of spaces required, total provided, preferred spaces provided and percentage.		CIV
			Final Design		Option 2: FTE calculation. Preferred parking calculation including number of spaces provided, preferred spaces provided and percentage.		CIV
			Final Design		Options 1 and 2: List of drawings and specification references that show location and number of preferred parking spaces and signage.		CIV
			Final Design		Option 3: Narrative indicating number of spaces required and provided and describing infrastructure and support programs with description of project features to support them.		CIV
SS5.1		Site Development: Protect or Restore Habitat	**Final Design		Option 1: List of drawing and specification references that convey site disturbance limits.		CIV
OCT09REV			**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			**Final Design		Option 2: LEED site plan drawing that delineates boundaries of each preserved and restored habitat area with area (sf) noted for each.		CIV
			**Final Design		Option 2: Percentage calculation of restored/preserved habitat to total site area. List of drawings and specification references that convey restoration planting requirements.		CIV
SS5.2		Site Development: Maximize Open Space	Final Design		Option 2: LEED site plan drawing delineating boundary of vegetated open space adjacent to building with areas of building footprint and designated open space noted.		CIV
OCT09REV			**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
SS6.1		Stormwater Design: Quantity Control	Final Design		Statement indicating which option for compliance applies.		CIV
OCT09REV			**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design		Option 1: Indicate pre-development and post-development runoff rate(cfs) and runoff quantity (cf) -OR - Narrative describing site conditions, measures and controls to be implemented to prevent excessive stream velocities and erosion.		CIV
			Final Design		Option 2: Indicate pre-development and post-development runoff rate(cfs) and runoff quantity (cf). Indicate percent reduction in each.		CIV
SS6.2		Stormwater Design: Quality Control	Final Design		For non-structural controls, list all BMPs used and, for each, describe the function of the BMP and indicate the percent annual rainfall treated. List all structural controls and, for each, describe the pollutant removal and indicate the percent annual rainfall treated.		CIV
OCT09REV			**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
SS7.1		Heat Island Effect: Non-Roof	**Final Design		LEED site plan drawing indicating locations and quantities of each paving type, including areas of shaded pavement. Percentage calculation indicating percentage of reflective/shaded/open grid area.		CIV
OCT09REV			**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
SS7.2		Heat Island Effect: Roof	Final Design		Option 1: Percentage calculation indicating percentage of SRI compliant roof area. List of drawings and specification references that convey SRI requirements and roof slopes.		ARC

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PAR		**FEATURE**	**DUE AT**		**REQUIRED DOCUMENTATION**	**DATE**	**REV**
			Final Design OCT09REV		Option 1: List of specified roof materials indicating, for each, product type, manufacturer, product name and identification if known, SRI value and roof slope. OCT09REV		ARC
			**Closeout OCT09REV		Option 1: List of installed roof materials indicating, for each, manufacturer, product name and identification, SRI value and roof slope.		PE
			Closeout	X	Option 1: Manufacturer published product data or certification confirming SRI		PE
			Final Design		Option 2: Percentage calculation indicating percentage of vegetated roof area.		ARC
			Final Design		Option 3: Combined reflective and green roof calculation.		ARC
			Final Design OCT09REV		Option 3: List of specified roof materials indicating, for each, product type, manufacturer, product name and identification if known, SRI value and roof slope. OCT09REV		
			**Closeout OCT09REV		Option 3: List of installed roof materials indicating, for each, manufacturer, product name and identification, SRI value and roof slope.		PE
			Closeout	X	Option 3: Manufacturer published product data or certification confirming SRI		PE
SS8		Light Pollution Reduction	Final Design		Interior Lighting: List of drawings and specification references that convey interior lighting requirements (location and type of all installed interior lighting, location of non-opaque exterior envelope surfaces, allowing confirmation that maximum candela value from interiorfixtures does not intersect non-opaque building envelope surfaces). - OR - List of drawings and specification references that show automatic lighting controls that turn off non-essential lighting during non-business hours.		ELEC
OCT09REV			**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		ELEC
			Final Design		Exterior Lighting: List of drawings and specification references that convey exterior lighting requirements (location and type of all site lighting and building façade/landscape lighting).		ELEC
			Final Design		Exterior Site Lighting Power Density (LPD): Tabulation for exterior site lighting indicating, for each location identification or description, units of measure, area or distance of the location, actual LPD using units consistent with ASHRAE 90.1, and the ASHRAE allowable LPD for that type of location. Percentage calculation of actual versus allowable LPD for all site lighting.		ELEC
			Final Design		Exterior Building Facade/Landscape Lighting Power Density (LPD): Tabulation for exterior building facade/landscape lighting indicating, for each location identification or description, units of measure, area or distance of the location, actual LPD using units consistent with ASHRAE 90.1, and the ASHRAE allowable LPD for that type of location. Percentage calculation of actual versus allowable LPD for all building facade/landscape lighting.		ELEC
			Final Design		Exterior Lighting IESNA Zone: Indicate which IESNA zone is applicable to the project.		ELEC
			Final Design		Exterior Lighting Site Lumen table indicating, for each fixture type, quantity installed, initial lamp lumens per luminaire, initial lamp lumens above 90 degrees from Nadir, total lamp lumens and total lamp lumens above 90 degrees. Percentage of site lamp lumens above 90 degrees from nadir to total lamp lumens.		ELEC
			Final Design		Exterior Lighting Narrative describing analysis used for addressing requirements for light trespass at site boundary and beyond.		ELEC
CATEGORY 2 – WATER EFFICIENCY							
WE1.1		Water Efficient Landscaping: Reduce by 50%	Final Design		Statement indicating which option for compliance applies.		CIV
OCT09REV			**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design		Calculation indicating, for baseline and design case, total water applied, total potable water applied, total non-potable water applied. Design case percent potable water reduction. If nonpotable water is used, indicate source of nonpotable water.		CIV
			Final Design		List of landscape plan drawings.		CIV
			Final Design		Narrative describing landscaping and irrigation design strategies, including water use calculation methodology used to determine savings and, if non-potable water is used, specific information about source and available quantity.		CIV
WE1.2		Water Efficient Landscaping: No Potable Water Use or No Irrigation	Same as WE1.1		Same as WE1.1		CIV
WE2		Innovative Wastewater Technologies	Final Design		Statement confirming which option for compliance applies.		MEC

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			Final Design		Statement confirming which occupancy breakdown applies (default or special). For special occupancy breakdown, indicate source and explanation for ratio.		MEC
			Final Design		Occupancy calculation including male/female numbers for FTEs, visitors, students, customers, residential and other type occupants/users		MEC
			Final Design		Statement indicating percent of male restrooms with urinals. Statement indicating annual days of operation.		MEC
			Final Design		Baseline flush fixture calculation spreadsheet indicating, for each fixture type, gender, flush rate, daily uses per person for each occupant type identified in occupancy calculation and annual baseline flush fixture water usage.		MEC
			Final Design		Design case flush fixture calculation spreadsheet indicating, for each fixture type, gender, fixture manufacturer, fixture model number, flush rate, percent of occupants using this fixture type, daily uses per person for each occupant type identified in occupancy calculation and annual design case flush fixture water usage.		MEC
			Final Design		Option 1: If onsite non-potable water is used, identify source(s), indicate annual quantity from each source and indicate total annual quantity from all onsite non-potable water sources.		MEC
			Final Design		Option 1: Summary calculation indicating baseline annual water consumption, design case annual water consumption, non-potable annual water consumption and total percentage annual water savings.		MEC
			Final Design		Option 2: Statement confirming on-site treatment of all generated wastewater to tertiary standards and all treated wastewater is either infiltrated or used on-site.		MEC
			Final Design		Option 2: List of drawing and specification references that convey design of on-site wastewater treatment features.		CIV
			Final Design		Option 2: On-site water treatment quantity calculation indicating all on-site wastewater source(s), annual quantity treated, annual quantity infiltrated and annual quantity re-used on site from each source and totals for annual quantity treated, annual quantity infiltrated and annual quantity re-used on site from all sources.		CIV
			Final Design		Option 2: Wastewater summary calculation indicating design case annual flush fixture water usage, annual on-site water treatment and percentage sewage convyance reduction.		MEC
			Final Design		Narrative describing project strategy for reduction of potable water use for sewage conveyance, including specific information on reclaimed water usage and treated wastewater usage.		MEC
WE3.1		Water Use Reduction: 20% Reduction	Final Design		Statement confirming which occupancy breakdown applies (default or special). For special occupancy breakdown, indicate source and explanation for ratio.		MEC
			Final Design		Occupancy calculation including male/female numbers for FTEs, visitors, students, customers, residential and other type occupants/users		MEC
			Final Design		Statement indicating percent of male restrooms with urinals. Statement indicating annual days of operation.		MEC
			Final Design		Baseline flush fixture calculation spreadsheet indicating, for each fixture type, gender, flush rate, daily uses per person for each occupant type identified in occupancy calculation and annual baseline flush fixture water usage.		MEC
			Final Design		Design case flush fixture calculation spreadsheet indicating, for each fixture type, gender, fixture manufacturer, fixture model number, flush rate, percent of occupants using this fixture type, daily uses per person for each occupant type identified in occupancy calculation and annual design case flush fixture water usage.		MEC
			Closeout	X	Manufacturer published product data or certification confirming fixture water usage.		PE
WE3.2		Water Use Reduction: 30% Reduction	Same as WE3.1		Same as WE3.1		MEC
CATEGORY 3 – ENERGY AND ATMOSPHERE							
EAPR1		Fundamental Commissioning of the Building Energy Systems (PREREQUISITE)	**Final Design		**Owner's Project Requirements document		ALL
			**Final Design		**Basis of Design document for commissioned systems		MEC, ELEC
			**Final Design		**Commissioning Plan		MEC, ELEC

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			Closeout		Statement confirming all commissioning requirements have been incorporated into construction documents.		PE
			Closeout		Commissioning Report		PE
EAPR2		Minimum Energy Performance (PREREQUISITE)	Final Design		Statement listing the mandatory provisions of ASHRAE 90.1 that project meets relative to compliance with this prerequisite and indicating which compliance path was used.		MEC ELEC ARC
EAPR3		Fundamental Refrigerant Management (PREREQUISITE)	Final Design		Statement indicating which option for compliance applies.		MEC
			Final Design		Option 2: Narrative describing phase out plan, including specific information on phase out dates and refrigerant quantities.		MEC
EA1		Optimize Energy Performance	Final Design		Statement indicating which compliance path option applies.		MEC
			Final Design		Option 1: Statement confirming simulation software capabilities and confirming assumptions and methodology.		MEC
			Final Design		Option 1: General information including simulation program, principal heating source, percent new construction and renovation, weather file, climate zone and Energy Star Target Finder score.		MEC
			Final Design		Option 1: Space summary listing, for each building use, the conditioned area, unconditioned area and total area and include total area for each category		MEC
			Final Design		Option 1: List of all simulation output advisory message data and show difference between baseline and proposed design		MEC
			Final Design		Option 1: Comparison summary for energy model inputs including description of baseline and design case energy model inputs, showing both by element type		MEC
			Final Design		Option 1: Energy type summary lising, for each energy type, utility rate description, units of energy and units of demand		MEC
			Final Design		Option 1: Statement indicating whether project uses on-site renewable energy. If yes, list all sources and indicate, for each source, backup energy type, annual energy generated, rated capacity and renewable energy cost		MEC
			Final Design		Option 1: If analysis includes exceptional calculation methods, statement describing how exceptional calculation measure cost savings is determined		MEC
			Final Design		Option 1: If analysis includes exceptional calculation methods, for each exceptional calculation method indicate energy types and, for each energy type, annual energy savings, annual cost savings, and brief descriptive narrative		MEC
			Final Design		Option 1: Baseline performance rating compliance report table indicating, for each energy end use, whether it is a process load, energy type, annual and peak energy demand for all four orientations. For each orientation indicate total annual energy use for each orientation and total annual process energy use.		MEC
			Final Design		Option 1: Baseline energy cost table indicating, for each energy type, annual cost for all four orientations and building total energy cost.		MEC
			Final Design		Option 1: Proposed Design performance rating compliance report table indicating, for each energy end use, whether it is a process load, energy type, annual and peak energy demand, baseline annual and peak energy demand and percent savings. Indicate total annual energy use and total annual process energy use for both proposed design and baseline and percent savings.		MEC
			Final Design		Option 1: Proposed Design energy cost table indicating, for each energy type, annual cost for all four orientations and building total energy cost.		MEC
			Final Design		Option 1: Energy cost and consumption by energy type report indicating, for each energy type, proposed design and baseline annual use and annual cost, percent savings annual use and annual cost. Indicate for renewable energy annual energy generated and annual cost. Indicate exceptional calculations annual energy savings and annual cost savings. Indicate building total annual energy use, annual energy cost for proposed design and baseline and indicate percent savings annual energy use and annual energy cost.		MEC

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			Final Design		Option 1: Compliance summaries from energy simulation software. If software does not produce compliance summaries provide output summaries and example input summaries for baseline and proposed design supporting data in the tables. Output summaries must include simulated energy consumption by end use and total energy use and cost by energy type. Example input summaries should represent most common systems and must include occupancy, use pattern, assumed envelope component sizes and descriptive features and assumed mechanical equipment types and descriptive features		MEC
			Final Design		Option 1: Energy rate tariff from project energy providers (only if not using LEED Reference Guide default rates)		MEC
EA2.1		On-Site Renewable Energy	Final Design		Statement indicating which compliance path option applies.		ELEC
			Final Design		List all on-site renewable energy sources and indicate, for each source, backup energy type, annual energy generated, rated capacity and renewable energy cost. Indicate total annual energy use (all sources), total annual energy cost (all sources) and percent renewable energy cost.		ELEC MEC
			Final Design		Option 1: Indicate, for renewable energy,proposed design total annual energy generated and annual cost.		ELEC MEC
			Final Design		Option 2: Indicate CBECS building type and building gross area. Provide the following CBECS data: median annual electrical intensity, median annual non-electrical fuel intensity, average electric energy cost, average non-electric fuel cost, annual electric energy use and cost, annual non-electric fuel use and cost.		ELEC MEC
			Final Design		Option 2: Narrative describing renewable systems and explaining calculation method used to estimate annual energy generated, including factors influencing performance.		ELEC MEC
EA2.2		On-Site Renewable Energy	Same as EA2.1		Same as EA2.1		ELEC MEC
EA2.3		On-Site Renewable Energy	Same as EA2.1		Same as EA2.1		ELEC MEC
EA3		Enhanced Commissioning	**Final Design		**Owner's Project Requirements document (OPR)		ALL
			**Final Design		**Basis of Design document for commissioned systems (BOD)		ELEC MEC
			**Final Design		**Commissioning Plan		ELEC MEC
			Closeout		Statement confirming all commissioning requirements have been incorporated into construction documents.		PE
			Closeout		**Commissioning Report		PE
			**Final Design		Statement by CxA confirming Commissioning Design Review		
			Closeout		Statement by CxA confirming review of Contractor submittals for compliance with OPR and BOD		PE
			Closeout		**Systems Manual		PE
			Closeout		Statement by CxA confirming completion of O&M staff and occupant training		PE
			Closeout		**Scope of work for post-occupancy review of building operation, including plan for resolution of outstanding issues		PE
			**Predesign		Statement confirming CxA qualifications and contractual relationships relative to work on this project, demonstrating that CxA is an independent third party.		MEC
EA4		Enhanced Refrigerant Management	Final Design		Refrigerant impact calculation table with all building data and calculation values as shown in LEED 2.2 Reference Guide Example Calculations		MEC
			Final Design		Narrative describing any special circumstances or explanatory remarks OCT09REV		
			Closeout	X	Cut sheets highlighting refrigerant data for all HVAC components.		PE
EA5		Measurement & Verification	Closeout		Statement indicating which compliance path option applies.		PE
			Closeout		Measurement and Verification Plan		PE
			Closeout		**Scope of work for post-occupancy implementation of M&V plan		PE
EA6		Green Power	Closeout		Statement indicating which compliance path option applies.		PE
			Closeout		Option 1: Indicate proposed design total annual electric energy usage		PE
			Closeout		Option 2: Indicate actual total annual electric energy usage		PE
			Closeout		Option 3: Calculation indicating building type, total gross area, median electrical intensity and annual electric energy use		PE

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			Closeout		Green power provider summary table indicating, for each purchase type, provider name, annual quantity green power purchased and contract term. Indicate total annual green power use and indicate percent green power		PE
			Closeout		Narrative describing how Green Power or Green Tags are purchased		PE
CATEGORY 4 – MATERIALS AND RESOURCES							
MRPR1		Storage & Collection of Recyclables (PREREQUISITE)	Final Design		Statement confirming that recycling area will accommodate recycling of plastic, metal, paper, cardboard and glass. Narrative indicating any other materials addressed and coordination with pickup.		ARC
MR1.1		Building Reuse: Maintain 75% of Existing Walls, Floors & Roof	**Final Design		If project includes a building addition, confirm that area of building addition does not exceed 2x the area of the existing building.		ARC
			**Final Design		Spreadsheet listing, for each building structural/envelope element, the existing area and reused area. Total percent reused.		ARC
MR1.2		Building Reuse: Maintain 95% of Existing Walls, Floors & Roof	Same as MR1.1		Same as MR1.1		ARC
MR1.3		Building Reuse: Maintain 50% of Interior Non-Structural Elements	**Final Design		If project includes a building addition, confirm that area of building addition does not exceed 2x the area of the existing building.		ARC
			**Final Design		Spreadsheet listing, for each building interior non-structural element, the existing area and reused area. Total percent reused.		ARC
MR2.1		Construction Waste Management: Divert 50% From Disposal	**Preconstruction		Waste Management Plan		PE
			**Construction Quarterly and Closeout		Spreadsheet calculations indicating material description, disposal/diversion location (or recycling hauler), weight, total waste generated, total waste diverted, diversion percentage		PE
					OCT09REV		
			**Construction Quarterly and Closeout		Receipts/tickets for all items on spreadsheet		PE
MR2.2		Construction Waste Management: Divert 75% From Disposal	Same as MR2.1		Same as MR2.1		PE
MR3.1		Materials Reuse: 5%	Closeout		Statement indicating total materials value and whether default or actual.		PE
			Closeout		Spreadsheet calculations indicating, for each reused/salvaged material, material description, source or vendor, cost. Total reused/salvaged materials percentage.		PE
MR3.2		Materials Reuse: 10%	Same as MR3.1		Same as MR3.1		PE
MR4.1		Recycled Content: 10% (post-consumer + 1/2 pre-consumer)	Closeout		Statement indicating total materials value and whether default or actual.		PE
			Closeout		Spreadsheet calculations indicating, for each recycled content material, material name/description, manufacturer, cost, post-consumer recycled content percent, pre-consumer recycled content percent, source of recycled content data. Total post-consumer content materials cost, total pre-consumer content materials cost, total combined recycled content materials cost, recycled content materials percentage.		PE
			Final Design or NLT Preconstruction		**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal. OCT09REV		PE
			Closeout	X	Manufacturer published product data or certification, confirming recycled content percentages in spreadsheet		PE
MR4.2		Recycled Content: 20% (post-consumer + 1/2 pre-consumer)	Same as MR4.1		Same as MR4.1		PE
MR5.1		Regional Materials:10% Extracted, Processed & Manufactured Regionally	Closeout		Statement indicating total materials value and whether default or actual.		PE
			Closeout		Spreadsheet calculations indicating, for each regional material, material name/description, manufacturer, cost, percent compliant, harvest distance, manufacture distance, source of manufacture and harvest location data. Total regional materials cost, regional materials percentage.		PE
			Preconstruction OCT09REV		**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal. OCT09REV		PE
			Closeout	X	Manufacturer published product data or certification confirming regional material percentages in spreadsheet		PE

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MR5.2		Regional Materials:20% Extracted, Processed & Manufactured Regionally	Same as MR5.1		Same as MR5.1		PE
MR6		Rapidly Renewable Materials	Closeout		Statement indicating total materials value and whether default or actual.		PE
			Closeout		Spreadsheet calculations indicating, for each rapidly renewable material, material name/description, manufacturer, cost, rapidly renewable content percent, rapidly renewable product value. Total rapidly renewable product value, rapidly renewable materials percentage.		PE
			Final Design OCT09REV		**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal. OCT09REV		ARC
			Closeout	X	Manufacturer published product data or certification confirming rapidly renewable material percentages in spreadsheet		PE
MR7		Certified Wood	Closeout		Statement indicating total materials value and whether default or actual.		PE
			Closeout		Spreadsheet calculations indicating, for each certified wood material, material name/description, vendor, cost, wood component percent, certified wood percent of wood component, FSC chain of custody certificate number. Total certified wood product value, certified wood materials percentage.		PE
			Final Design or NLT Preconstruction		**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal. OCT09REV		PE
			Closeout	X	Vendor invoices, FSC chain of custody certificates and anufacturer published product data or certification confirming all certified wood materials percentages in spreadsheet.		PE
CATEGORY 5 – INDOOR ENVIRONMENTAL QUALITY							
EQPR1		Minimum IAQ Performance (PREREQUISITE)	Final Design		Statement indicating which option for compliance applies, stating applicable criteria/requirement, and confirming that project has been designed to meet the applicable requirements.		MEC
			Final Design		Narrative describing the project's ventilation design, including specifics about fresh air intake volumes and special considerations.		MEC
EQPR2		Environmental Tobacco Smoke (ETS) Control (PREREQUISITE)	Final Design		Statement indicating which option for compliance applies, stating applicable criteria/requirement, and confirming that project has been designed to meet the applicable requirements.		ARC
			Final Design		List of drawing and specification references that convey conformance to applicable requirements (signage, exhaust system, room separation details, etc).		ARC
EQ1		Outdoor Air Delivery Monitoring	Final Design		Statement indicating which option for compliance applies and confirming that project has been designed to meet the applicable requirements.		MEC
			Final Design		List of drawing and specification references that convey conformance to applicable requirements.		MEC
			Final Design		Narrative describing the project's ventilation design and CO2 monitoring system, including specifics about monitors, operational parameters and setpoints.		MEC
			Closeout	X	Cut sheets for CO2 monitoring system.		PE
EQ2		Increased Ventilation	Final Design		Statement indicating which option for compliance applies and confirming that project has been designed to meet the applicable requirements.		MEC
			Final Design		Narrative describing the project's ventilation design, including specifics about zone fresh air intake volumes and demonstrating compliance.		MEC
			Final Design		Option 2: Narrative describing design method used for determining natural ventilation design, including calculation methodology/model results and demonstrating compliance.		MEC
			Final Design		List of drawing and specification references that convey conformance to applicable requirements.		MEC
EQ3.1		Construction IAQ Management Plan: During Construction	**Preconstruction		Construction IAQ Management Plan		PE
			Closeout		Statement confirming whether air handling units were operated during construction		PE
			Closeout		Dated jobsite photos showing examples of IAQ management plan practices being implemented. Label photos to indicate which practice they demonstrate. Minimum one photo of each practice at each building.		PE
			Closeout		Spreadsheet indicating, for each filter installed during construction, the manufacturer, model number, MERV rating, location installed, and if it was replaced immediately prior to occupancy.		PE
EQ3.2		Construction IAQ Management Plan: Before Occupancy	**Preconstruction		Construction IAQ Management Plan		PE

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			Closeout		Statement indicating which option for compliance applies and confirming that required activities have occurred that meet the applicable requirements.		PE
			Closeout		Option 1a: Narrative describing the project's flushout process, including specifics about temperature, airflow and duration, special considerations (if any) and demonstrating compliance.		PE
			Closeout		Option 1b: Narrative describing the project's pre-occupancy and post-occupancy flushout processes, including specifics about temperature, airflow and duration, special considerations (if any) and demonstrating compliance.		PE
			Closeout		Option 2: Narrative describing the project's IAQ testing process, including specifics about contaminants tested for, locations, remaining work at time of test, retest parameters and special considerations (if any).		PE
			Closeout		Option 2: IAQ testing report demonstrating compliance.		PE
EQ4.1		Low Emitting Materials: Adhesives & Sealants	Closeout		Spreadsheet indicating, for each applicable indoor adhesive, sealant and sealant primer used, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data.		PE
			Closeout		Spreadsheet indicating, for each applicable indoor aerosol adhesive, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data - OR - Statement confirming no indoor aerosol adhesives were used for the project.		PE
			Closeout	X	Manufacturer published product data or certification confirming material VOCs in spreadsheet		PE
EQ4.2		Low Emitting Materials: Paints & Coatings	Closeout		Spreadsheet indicating, for each applicable indoor paint and coating used, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data.		PE
			Closeout		Spreadsheet indicating, for each applicable indoor anti-corrosive/anti-rust paint and coating used, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data - OR - Statement confirming no indoor anti-corrosive/anti-rust paints were used for the project .		PE
			Closeout	X	Manufacturer published product data or certification confirming material VOCs in spreadsheet		PE
EQ4.3		Low Emitting Materials: Carpet Systems	Closeout		Spreadsheet indicating, for each indoor carpet used, the manufacturer, product name/model number, if it meets LEED requirement (yes/no) and source of LEED compliance data.		PE
			Closeout		Spreadsheet indicating, for each indoor carpet cushion used, the manufacturer, product name/model number, if it meets LEED requirement (yes/no) and source of LEED compliance data - OR - Statement confirming no indoor carpet cushion was used for the project.		PE
			Closeout	X	Manufacturer published product data or certification confirming material CRI label in spreadsheet		PE
EQ4.4		Low Emitting Materials: Composite Wood & Agrifiber Products	Closeout		Spreadsheet indicating, for each indoor composite wood and agrifiber product used, the manufacturer, product name/model number, if it contains added urea formaldehyde (yes/no) and source of LEED compliance data.		PE
			Closeout	X	Manufacturer published product data or certification confirming material urea formaldehyde in spreadsheet		PE
EQ5		Indoor Chemical & Pollutant Source Control	Closeout OCT09REV		Spreadsheet indicating, for each permanent entryway system used, the manufacturer, product name/model number and description of system. Roll-up and carpet systems requiring weekly cleaning to earn this credit are not a permitted option for Army projects.		PE
			Final Design		List of drawing and specification references that convey locations and installation methods for entryway systems.		ARC
			Final Design		Spreadsheet indicating, for each chemical use area, the room number, room name, description of room separation features (walls, floor/ceilings, openings) and pressure differential from surrounding spaces with doors closed - OR - Statement confirming that project includes no chemical use areas and that no hazardous cleaning materials are needed for building maintenance.		ARC MEC
			Final Design		If project includes chemical use areas: List of drawing and specification references that convey locations of chemical use areas, room separation features and exhaust system.		ARC MEC
			Closeout OCT09REV		If project includes chemical use areas: Spreadsheet indicating, for AHUs/mechanical ventilation equipment serving occupied areas, the manufacturer, model number, MERV rating, location installed, and if it was replaced immediately prior to occupancy (yes/no) - OR - Statement confirming that project does not use mechanical equipment for ventilation of occupied areas.		PE

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	**LEED-NC v2.2 Submittals (OCT09REV)**		Provide for Credit Audit Only		Date Submitted (to be filled in by Contractor)	Government Reviewer's Use (OCT09REV)
PAR		**FEATURE**	**DUE AT**		**REQUIRED DOCUMENTATION**	**DATE**	**REV**
EQ6.1		Controllability of Systems: Lighting	Final Design		Calculation indicating total number of individual workstations, number of workstations with individual lighting controls and the percentage of workstations with individual lighting controls.		ELEC
			Final Design		For each shared multi-occupant space, provide a brief description of lighting controls.		ELEC
			Final Design		Narrative describing lighting control strategy, including type and location of individual controls and type and location of controls in shared multi-occupant spaces.		ELEC
EQ6.2		Controllability of Systems: Thermal Comfort	Final Design		Calculation indicating total number of individual workstations, number of workstations with individual thermal comfort controls and the percentage of workstations with individual thermal comfort controls.		MEC
			Final Design		For each shared multi-occupant space, provide a brief description of thermal comfort controls.		MEC
			Final Design		Narrative describing thermal comfort control strategy, including type and location of individual and shared multi-occupant controls.		MEC
EQ7.1		Thermal Comfort: Design	Final Design		Design criteria spreadsheet indicating, for spring, summer, fall and winter, maximum indoor space design temperature, minimum indoor space design temperature and maximum indoor space design humidity.		MEC
			Final Design		Narrative describing method used to establish thermal comfort control conditions and how systems design addresses the design criteria, including compliance with the referenced standard.		MEC
EQ7.2		Thermal Comfort: Verification	Final Design		Narrative describing the scope of work for the thermal comfort survey, including corrective action plan development		MEC
EQ8.1		Daylight & Views: Daylight 75% of Spaces	Final Design		Option 1: Table indicating all regularly occupied spaces with space area and space area with 2% daylighting factor. Sum of regularly occupied areas and regularly occupied areas with 2% daylighting factor. Percentage calculation of areas with 2% daylighting factor to total regularly occupied areas.		ARC
			Final Design		Option 1: Glazing factor calculation table		ARC
			Final Design		Option 2: Simulation model method, software and output data		ARC
			Final Design		Option 2: Table indicating all regularly occupied spaces with space area, space area with minimum 25 footcandles daylighting illumination, and method of providing glare control. Sum of regularly occupied areas and regularly occupied areas with 25 fc daylighting. Percentage calculation of areas with 25 fc daylighting to total regularly occupied areas.		ARC
			Final Design		For all occupied spaces excluded from the calculation, provide narrative indicating reasons for excluding the space.		ARC
			Final Design		List of drawing and specification references that convey exterior glazed opening head and sill heights and glazing performance properties.		ARC
			Closeout	X	Manufacturer published product data or certification confirming glazing Tvis in spreadsheet		PE
EQ8.2		Daylight & Views: Views for 90% of Spaces	Final Design		Table indicating all regularly occupied spaces with space area and space area with access to views. Sum of regularly occupied areas and regularly occupied areas with access to views. Percentage calculation of areas with views to total regularly occupied areas.		ARC
			Final Design		For all occupied spaces excluded from the calculation, provide narrative indicating reasons for excluding the space.		ARC
			Final Design		LEED Floor plan drawings showing line of sight diagramming of views areas in each regularly occupied space. List of drawing/specification references that convey exterior glazed opening head and sill heights.		ARC
CATEGORY 6 – FACILITY DELIVERY PROCESS							
IDc1.1		Innovation in Design	Final Design OCT09REV		Narrative decribing intent, requirement for credit, project approach to the credit. List of drawings and specification references that convey implementation of credit. All other documentation that validates claimed credit.		
IDc1.2		Innovation in Design	Final Design OCT09REV				
IDc1.3		Innovation in Design	Final Design OCT09REV				
IDc1.4		Innovation in Design	Final Design OCT09REV				
IDc2		LEED Accredited Professional	Final Design		Narrative indicating name of LEED AP, company name of LEED AP, description of LEED AP's role and responsiblilities in the project.		ARC

ATTACHMENT F
Version 02-03-2010

BUILDING INFORMATION MODELING REQUIREMENTS

1.0 Section 1 - Submittal Format

1.1. Design Deliverables. Develop all designs using Building Information Modeling (BIM) and Computer Aided Design (CAD) software. Design submittal drawings shall be 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 V8i 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 [Not Supplied - DistrictInfoGeneral : ISSUING_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.

3.2. Initial Design Conference Submittal.

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

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

3.3. Interim Design Submittals.

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

3.4. Final Design Submissions and Design Complete Submittals.

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

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

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

4.0 Section 4 – BIM Model Minimum Requirements and Output

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

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

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

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

4.2.3. Doors, Windows and Louvers. Doors, windows and louvers shall be depicted to represent their actual size, type and location. Doors and windows shall be modeled with the necessary intelligence to produce accurate window and door schedules.

4.2.4. Roof. The Model shall include the roof configuration, drainage system, penetrations, specialties, and the necessary intelligence to produce accurate plans, building sections and generic wall sections where roof design elements are depicted.

4.2.5. Floors. The floor slab shall be developed in the structural Model and then referenced by the architectural Model for each floor of the Project building.

4.2.6. Ceilings. All heights and other dimensions of ceilings, including soffits, ceiling materials, or other special conditions shall be depicted in the Model with the necessary intelligence to produce accurate plans, building sections and generic wall sections where ceiling design elements are depicted.

4.2.7. Vertical Circulation. All continuous vertical components (i.e., non-structural shafts, architectural stairs, handrails and guardrails) shall be accurately depicted and shall include the necessary intelligence to produce accurate plans, elevations and sections in which such design elements are referenced.

4.2.8. Architectural Specialties and Woodwork. All architectural specialties (i.e., toilet room accessories, toilet partitions, grab bars, lockers, and display cases) and woodwork (i.e., cabinetry and counters) shall be accurately depicted with the necessary intelligence to produce accurate plans, elevations and sections in which such design elements are referenced.

4.2.9. Signage. The Model shall include all signage and the necessary intelligence to produce accurate plans and schedules.

4.2.10. Schedules. Provide door, window, hardware sets using BHMA designations, flooring, wall finish, and signage schedules from the Model, indicating the type, materials and finishes used in the design.

4.3. Furniture. The furniture systems Model may vary in level of detail for individual elements within a Model, but at a minimum must include all features that would be included on a quarter inch (1/4”=1’0”) scaled drawing, and have necessary intelligence to produce accurate plans. Representation of furniture elements is to be 2D. Contractor may provide a minimal number of 3D representations as examples. Examples of furniture include, but are not limited to, desks, furniture systems, seating, tables, and office storage.

4.3.1. Furniture Coordination. Furniture that makes use of electrical, data or other features shall include the necessary intelligence to produce coordinated documents and data.

4.4. Equipment. The Model may vary in level of detail for individual elements within a Model. Equipment shall be depicted to meet layout requirements with the necessary intelligence to produce accurate plans and minimum schedules depicting their configuration. Examples of equipment include but are not limited to copiers, printers, refrigerators, ice machines and microwaves.

4.4.1. Schedules. Provide furniture and equipment schedules from the model indicating the materials, finishes, mechanical, and electrical requirements.

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

4.5.1. Foundations. All necessary foundation and/or footing elements, with necessary intelligence to produce accurate plans and elevations

4.5.2. Floor Slabs. Structural floor slabs shall be depicted, including all necessary recesses, curbs, pads, closure pours, and major penetrations accurately depicted.

4.5.3. Structural Steel. All steel columns, primary and secondary framing members, and steel bracing for the roof and floor systems (including decks), including all necessary intelligence to produce accurate structural steel framing plans and related building/wall sections.

4.5.4. Cast-in-Place Concrete. All walls, columns, and beams, including necessary intelligence to produce accurate plans and building/wall sections depicting cast-in-place concrete elements.

4.5.5. Expansion/Contraction Joints. Joints shall be accurately depicted.

4.5.6. Stairs. The structural Model shall include all necessary openings and framing members for stair systems, including necessary intelligence to produce accurate plans and building/wall sections depicting stair design elements.

4.5.7. Shafts and Pits. The structural Model shall include all necessary shafts, pits, and openings, including necessary intelligence to produce accurate plans and building/wall sections depicting these design elements.

4.6. Mechanical. The mechanical systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4”=1’0”) scaled drawing. Small diameter (less than 1-1/2” NPS) field-routed piping is not required in the model. Additional minimum Model requirements include:

4.6.1. HVAC. All necessary heating, ventilating, air-conditioning and specialty equipment, including air distribution ducts for supply, return, and ventilation and exhaust ducts, including control system, registers, diffusers, grills and hydronic baseboards with necessary intelligence to produce accurate plans, elevations, building/wall sections and schedules.

4.6.1.1. Mechanical Piping. All necessary piping and fixture layouts, and related equipment, including necessary intelligence to produce accurate plans, elevations, building/wall sections, and schedules.

4.6.2. Plumbing. All necessary plumbing piping and fixture layouts, floor and area drains, and related equipment, including necessary intelligence to produce accurate plans, elevations, building/wall sections, riser diagrams, and schedules.

4.6.3. Equipment Clearances. All HVAC and Plumbing equipment clearances shall be modeled for use in interference management and maintenance access requirements.

4.6.4. Elevator Equipment. The Model shall include the necessary equipment and control system, including necessary intelligence to produce accurate plans, sections and elevations depicting these design elements.

4.7. Electrical/Telecommunications. The electrical systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4”=1’0”) scaled drawing. Small diameter (less than 1-1/2”Ø) field-routed conduit is not required in the model. Additional minimum Model requirements include:

4.7.1. Interior Electrical Power and Lighting. All necessary interior electrical components (i.e., lighting, receptacles, special and general purpose power receptacles, lighting fixtures, panelboards, cable trays and control systems), including necessary intelligence to produce accurate plans, details and schedules. Lighting and power built into furniture/equipment shall be modeled.

4.7.2. Special Electrical Systems. All necessary special electrical components (i.e., security, Mass Notification, Public Address, nurse call and other special occupancies, and control systems), including necessary intelligence to produce accurate plans, details and schedules.

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

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

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

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

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

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

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

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

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

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

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

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

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

5.0 Section 5 - Ownership and Rights in Data

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

6.0 Section 6 – Contractor Electives

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

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

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

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

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

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

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

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

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

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

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

7.0 Section 7 – BIM Project Execution Plan Template

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

ATTACHMENT G
DESIGN SUBMITTAL DIRECTORY AND SUBDIRECTORY FILE ARRANGEMENT

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

Design Submittal Directory and Subdirectory File Arrangement.

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

SECTION 01 45 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 devise
- 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 [Not Supplied - ConstructionReqQC : COURSE_LOCATION]. 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_ATTN]

  [Not Supplied - ConstructionReqQC : LAB_MAIL]

  [Not Supplied - ConstructionReqQC : LAB_STATE]
- For other deliveries:

  [Not Supplied - ConstructionReqQC : LAB_NAME_OTHER]

[Not Supplied - ConstructionReqQC : LAB_ATTN_OTHER]

[Not Supplied - ConstructionReqQC : LAB_MAIL_OTHER]

[Not Supplied - ConstructionReqQC : LAB_STATE_OTHER]

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

3.8. COMPLETION INSPECTION

3.8.1. Punch-Out Inspection

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

3.8.2. Pre-Final Inspection

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

3.8.3. Final Acceptance Inspection

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

3.9. DOCUMENTATION

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

3.9.1.1. Contractor/subcontractor and their area of responsibility.

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

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

3.9.1.4. Test and/or control activities performed with results and references to specifications/drawings requirements. Identify the applicable control phase (Preparatory, Initial, Follow-up). List deficiencies noted, along with corrective action.

3.9.1.5. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.

3.9.1.6. Submittals and deliverables reviewed, with contract reference, by whom, and action taken.

3.9.1.7. Offsite surveillance activities, including actions taken.

3.9.1.8. Job safety evaluations stating what was checked, results, and instructions or corrective actions.

3.9.1.9. Instructions given/received and conflicts in plans and/or specifications.

3.9.1.10. Provide documentation of design quality control activities. For independent design reviews, provide, as a minimum, identity of the ITR team, the ITR review comments, responses and the record of resolution of the comments.

3.9.2. Contractor's verification statement.

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

3.10. NOTIFICATION OF NONCOMPLIANCE

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

End of Section 01 45 04.00 10

SECTION 01 50 02
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

1.6. GOVERNMENT FIELD OFFICE

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.

1.6. GOVERNMENT FIELD OFFICE

1.6.1. Resident Engineer's Office

Provide the Government Resident Engineer with an office, approximately 1,400 square feet in floor area, co-located on the project site with the Contractor’s office and providing space heat, air conditioning, electric light and power, power and communications outlets and toilet facilities consisting of at least one lavatory and at least one water closet complete with connections to water and sewer mains. Provide a mail slot in the door or a lockable mail box mounted on the surface of the door. Provide outlets for 5 government phones and same number of LAN connections for Government computers. Coordinate with the Resident Engineer for locations. Provide a conference room with space large enough for 12 personnel to hold meetings. Provide a minimum of two outlets per government work station and at least one outlet per 10 feet of wall space for other government equipment. Provide at least twice weekly janitorial service. Remove the office facilities upon completion of the work and restore those areas. Connect and disconnect utilities in accordance with local codes and to the satisfaction of the Contracting Officer.

1.6.2. Trailer-Type Mobile Office

The Contractor may, at its option, furnish and maintain a trailer-type mobile office acceptable to the Contracting Officer and providing as a minimum the facilities specified above Securely anchor the trailer to the ground at all four corners to guard against movement during high winds, per EM 385-1-1.

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 warrantied 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 Contractors 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 Warrantied 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 (MDSD) 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

SUBSURFACE EXPLORATION
AND
GEOTECHNICAL ENGINEERING REPORT
(PRELIMINARY)

Trainee Barracks Upgrade Program (TBUP) Building 3405
LI 69147, FY11
Fort Benning, Georgia

By
Soils Section
Geotechnical & HTRW Branch
U.S. Army Engineer District, Savannah

April 2010

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ATTACHMENT A: Foundation Design Analysis for EM Barracks #3
ATTACHMENT B: Soil Test Boring Location Plan
ATTACHMENT C: Soil Test Boring Logs
ATTACHMENT D: Soil Laboratory Test Data

SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING REPORT (PRELIMINARY)

Trainee Barracks Upgrade Program (TBUP) Building 3405
LI 69147, FY 11
Fort Benning, Georgia

1. PURPOSE. The Government has used previous investigations for the preparation of this report. This subsurface characterization report provides a general overview of the site conditions, including subsurface soil and groundwater conditions, with detailed descriptions provided on the individual archived soil boring logs.

2. QUALIFICATION OF REPORT. There were no investigations completed specifically for the barracks renovations/addition. Existing subsurface data has been collected and used to characterize the subsurface soil and groundwater conditions. No effort was made to define, delineate, or designate any area of environmental concern or of contamination. The contractor's team shall include a licensed geotechnical engineer to interpret the report and develop foundation and earthwork recommendations and design parameters. Additional subsurface investigations and/or laboratory analyses required to determine site soil conditions and develop the final design shall be performed under the direction of a licensed geotechnical engineer and shall be the full responsibility of the contractor. A final geotechnical evaluation report shall be prepared by the licensed geotechnical engineer and submitted along with the first site design submittal.

3. PROJECT DESCRIPTION. The proposed project is the Trainee Barracks Upgrade Program for Building 3405. The project includes the reconfiguration of the existing dining facility into classroom space, the retrofitting of the current classroom and battalion headquarters space, and the expansion of the battalion headquarters by 2,000 square feet. This work will involve the technological upgrade of existing building areas, systems, equipment, fixtures and other components (i.e. architectural/structural, mechanical, plumbing, electrical/lighting, fire, alarm systems, and energy monitoring & control systems).

4. EXPLORATION PROCEDURES.

a. Site Reconnaissance. Prior to the preparation of this report, a geotechnical engineer visually inspected the proposed project site and surrounding areas to observe the existing conditions. The observations were used in preparing this report.

b. Field Exploration.

(1) Subsurface conditions at the project site were explored by soil test borings in 1975 for the design of the existing barracks. A foundation design analysis report was prepared at that time. The 1975 report, Foundation Design Analysis for EM Barracks Complex – Barracks #3, Group Dispensary and Brigade Headquarters is included as Attachment A. The borings were performed at the approximate locations shown on the plan included in Attachment B. The 1975 report and associated boring logs/soil test data are being provided for information only. Any references (enclosure) in the 1975 report are not included. These were mainly edits to outdated specification sections.

(2) Boring locations were established in the field by an engineer by measuring distance along and offsets from 2nd Armored Division Road and Moye Road. The ground surface elevation at each boring location was determined by interpolation from the site topography survey. Since the measurements were not precise, the locations shown on the boring layout plans and the elevations on the drilling logs should be considered approximate.

(3) The soil test borings for the barracks design were drilled by Savannah District using a truck mounted Failing 314 drill rig. Continuous split-barrel sampling with Standard Penetration Testing (SPT) was performed on the borings. All soil sampling and Standard Penetration Testing were in substantial accordance with ASTM D 1586. In the Standard Penetration Test, a soil sample is obtained with a standard 1 $^{3}/_{8}$-inch I.D. by 2-inch O.D. split-barrel sampler. The sampler is first seated 6 inches and then driven an additional 12 inches with blows from a 140 lb. hammer falling a distance of 30 inches. The number of blows required to drive the sampler the final 12 inches is recorded and is termed the "standard penetration resistance," or the "N-value." Penetration resistance, when properly evaluated, is an index of the soil's strength, density, and foundation support capability.

(4) Representative portions of the soil samples obtained from the borings were sealed in airtight containers and transported to the Savannah District office where they were examined by a geotechnical engineer. Classification of the soil samples was performed in general accordance with ASTM D 2488 (Visual-Manual Procedure for Description of Soils). The soil classifications include the use of the Unified Soil Classification System described in ASTM D 2487 (Classification of Soils for Engineering Purposes). Since the soil descriptions and classifications are based on visual examination, they should be considered approximate.

(5) Logs of the soil borings graphically depicting soil descriptions, standard penetration resistances, and groundwater levels are included in Attachment C.

c. Laboratory Soils Testing. Several soil samples obtained during the field investigations were selected for moisture content, grain-size distribution, Atterberg limits, consolidation and shear strength testing. The laboratory testing was performed to confirm the field classifications and to aid in the evaluation of the subsurface soils. The laboratory tests were performed in accordance with applicable ASTM Standards. The results of these tests are included in Attachment D.

5. SITE AND SUBSURFACE CONDITIONS.

a. Site Description. The site proposed for the Trainee Barracks Upgrade Program addition is Building 3405, near the intersection of 2nd Armored Division Road and Moye Road. The existing barracks were constructed in 1978 and are occupied by one battalion, (1,200 trainees) of Initial Entry Training Soldiers. The new construction is planned for the northwest side of Building 3405. It is possible that this portion of the site may contain loose fill material and/or possible building debris from the construction of the existing barracks.

b. Area and Site Geology.

(1) Fort Benning is located in the Coastal Plain physiographic province immediately south of the Fall Line, the demarcation separating the Coastal Plain from the Piedmont province. The Fall Line runs roughly east to west along the northern boundary of the base. The base is located in the Fall Line Zone where Cretaceous age sedimentary formations of the Coastal Plain overlap the deeply weathered metamorphic and igneous rocks of the Piedmont. In the Fort Benning area, the Cretaceous system includes, from oldest to youngest, the Tuscaloosa Formation, Eutaw Formation, Blufftown Formation, Cusseta Sand, and the Ripley Formation. The formations consist of poorly consolidated marine deposits of coarse to fine sands, gravel, micaceous clays, and shales. Soils derived from the Coastal Plain formations occupy about 85 percent of the land surface of Fort Benning.

(2) Younger deposits are also present at Fort Benning. Remnant terrace deposits occupy the tops of several ridges in the west-central portion of the installation; these are Pliocene in age and generally occur as isolated caps. The Kelley Hill section of the Fort Benning Cantonment is located on high alluvial terrace deposits of the Pleistocene Age, while to the west more recent low alluvial terrace deposits occupy both sides of the Chattahoochee River. These materials were deposited during times of high sea levels in the Pleistocene Epoch. The low alluvial terrace deposits are found in the area surrounding Lawson Army Airfield. They consist of sand, gravel, clay, organic material, and silt, and are pale yellow to medium gray in color. Wood pieces and dark gray clay are locally abundant. The deposits range in thickness from 33 to 49 feet.

c. Subsurface Soil Conditions.

(1) Field classifications indicate sandy materials are the predominant soil identified at the barracks site. These consisted mostly of clayey sands (SC), and silty sands (SM). Standard penetration resistances, or N-values, within these soils ranged from 3 to 100. These resistances indicate that the relative density of the sandy soils range from very loose to very dense. Borings CS-34, CS-35, and CS-36 encountered a layer of highly plastic clays (CH) at approximately 9 to 13 feet below ground surface. The thickness of the clay layer varied from 1.5 feet to 9 feet. Standard penetration resistances, within these clays ranged from 13 to 45 indicating consistencies ranging from stiff to hard. Potential design-build contractors should note that there may be loose fill material and/or construction debris buried within the footprint of the new construction.

(2) The above subsurface description is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The boring logs should be reviewed for specific information at individual boring locations. The stratifications shown on the boring logs represent the conditions only at the actual boring locations. Variations may occur and should be expected between boring locations. The stratification lines shown on the boring logs represent approximate boundaries between the subsurface materials; the actual transitions are typically more gradual.

d. Groundwater Conditions.

(1) Based on the borings drilled in 1984, the groundwater was encountered as high as 4.5 feet below the ground surface (approximately at elevation 280).

(2) It should be noted that groundwater conditions, including perched water, vary during periods of prolonged drought and excessive rainfall as well as seasonally. Therefore, fluctuations in the elevation of the groundwater and the occurrence of perched water conditions should be anticipated with changing climatic and rainfall conditions.

(3) Water should not be allowed to collect near the foundation or on floor slab areas of the building either during or after construction. Undercut or excavated areas should be sloped toward one corner to facilitate removal of any collected rainwater, groundwater or surface runoff. Positive site drainage should be provided to reduce infiltration of surface water around the perimeter of the building and beneath floor slabs.

6. DRAWINGS. The drawing showing the soil boring locations completed by the government is included in this RFP. These locations and the locations of any additional investigations (SPT borings, test pits, cone penetrometer tests, laboratory soils test data, etc.) performed by the AE's consulting geotechnical engineer shall be shown on the final design and on the project as-built drawings completed by the design build contractor. In addition, the selected design-build contractor shall show all boring logs, CPT soundings, and soil laboratory test data used for design on the final design drawings and on the as-built drawings.

7. SPECIFICATIONS. It is recommended that the AE use the Savannah District's EARTHWORK specification, 31 00 00, when editing the specifications for this project. The specification (SpecsIntact format) can be found at the following website, http://en.sas.usace.army.mil/enweb/httproot/ae/index.htm, under menu "Guide Specs".

8. FINAL GEOTECHNICAL EVALUATION REPORT. A final geotechnical evaluation report shall be prepared by the contractor's licensed geotechnical engineer and submitted along with the first foundation design submittal. The geotechnical report shall summarize the subsurface conditions and provide recommendations for the design of appropriate foundations, floor slabs, retaining walls, embankments, roadways, and pavements. The report shall recommend the type of foundation system to be used, lateral load resistance capacities for foundation systems, and allowable bearing elevations for footings, grade beams, slabs, etc. An assessment of post-construction settlement potential including total and differential shall be

provided. Recommendations regarding lateral earth pressures (active, at-rest, and passive) to be used in the design of retaining walls shall be provided. The report shall include the recommended spectral accelerations and Site Class for seismic design along with an evaluation of any seismic hazards and recommendations for mitigation, if required. Calculations shall be included to support the recommendations for bearing capacity, settlement, and pavement sections. Supporting documentation shall be included for all recommended design parameters such as Site Class, shear strength, earth pressure coefficients, friction factors, subgrade modulus, California Bearing Ratio (CBR), etc. In addition, the report shall provide earthwork recommendations, expected frost penetration, expected ground-water levels, recommendations for dewatering and ground-water control, and identify the possible presence of any surface or subsurface features that may affect the construction of the project such as sinkholes, boulders, shallow rock, undocumented fill, old structures, soft areas, or unusual soil conditions.

ATTACHMENT A

Foundation Design Analysis for EM Barracks Bldg #3

Ch, Soils
Ch, F&M
F&M File

EM Barracks Complex - Barracks Bldg. #3, Group Dispensary and Brigade Headquarters, Ft. Benning, GA, LI 309, FY 76

SASFS

XX THRU Ch, F&M Branch

Soils Section

3 Nov 75
Mr. Seyden/dwm/311

TO Ch, Mil Coord Section
ATTN: Mr. Sam Ray

1. A foundation design analysis has been completed for the subject facility. Information from this analysis is presented in the following paragraphs for the AE's design use.

2. Bearing Capacity. The following allowable soil bearing values will be used to size the footings.

a. Brigade Headquarters and Group Dispensary Buildings. The allowable soil bearing value is 2,500 psf. This value is based on a minimum depth of 3.0 feet to the footing base, measured from the finish floor, finish grade or crawl space grade, whichever is lower. This value is also based on a minimum footing width of 2.0 feet for continuous wall footings.

b. Barracks Building No. 3. The allowable soil bearing value is 3,000 psf. This value is based on a minimum depth of 3.0 feet to the base of the footings, measured from the finish floor, finish grade or crawl space grade, whichever is lower. This value is also based on a minimum footing width of 2.0 feet for continuous wall footings. Footing depths should not exceed 4.0 feet unless absolutely necessary since excavations for footings in cut sections may get near the ground water table.

3. Ground Water Conditions and Waterproofing Requirements.

a. Brigade Headquarters Building. Based on borings drilled in February 1975, the ground water table was encountered at 29.0 feet below the existing ground elevation or approximate elevation 253 msl. A capillary water barrier is not required; however, a vapor barrier shall be provided for beneath all slab on grade areas.

b. Group Dispensary Building. Based on borings drilled in February 1975, the ground water table was encountered at 19.0 feet below the existing ground elevation or approximate elevation 266 msl. A capillary water barrier is not required; however, a vapor barrier shall be provided for beneath all slab on grade areas.

c. Barracks Building No. 3. Based on borings drilled in January 1975, the ground water table was encountered as high as 4.5 feet below the existing ground elevation or at approximate elevation 280 msl. A capillary water barrier is required as well as a vapor barrier beneath all areas to receive slab on grades.

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Due to the high ground water condition, the following paragraph shall be included as subparagraph 6.2.1 of Section 2E of the specifications.

"6.2.1 Special Treatment for Ground Water Conditions (Barracks Bldg. #3). Borings indicate that the ground water table may be encountered at various locations throughout the site during site grading and footing excavations. The Contractor shall provide temporary ditches, interceptor drains, or other approved methods to control the ground water and facilitate drainage during site work such that all excavation is performed in the dry and all fill is placed on firm dry material. The Contractor shall provide dewatering as required so that all footing excavations are accomplished in the dry and all footing excavations remain dry and firm until footings are placed and backfilled. Discharge from ditches and any required dewatering facilities shall be carried to any convenient approved locations."

It is recommended that the AE study the inclosed boring logs (Incl 1) with respect to possible ground water table problems that may be encountered in the parking areas or roadways in the vicinity of Barracks Building No. 3. Definite plans should be included in Section 2G of the specifications should the AE consider this to be a problem.

4. Material Types. The information in Inclosure 3 will be written into Sections 2E and 2G of the specifications verbatim.

5. Preparation of Ground Surfaces, Compaction and Testing. The following paragraphs shall be included in applicable sections of the specifications verbatim.

a. Section 2E, paragraph 8.2

8.2 Preparation of ground surfaces: Unsatisfactory material in surfaces to receive fill or in excavated areas shall be removed and replaced with satisfactory materials. The surface shall be scarified to a depth of 6 inches before the fill is started. Sloped surfaces steeper than 1 vertical to 4 horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. When subgrades are of less than the specified density, the ground surface shall be broken up to a minimum depth of 6 inches, pulverized, and compacted to the specified density. When the subgrade is part fill and part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 12 inches and compacted as specified for the adjacent fill. Any existing gullies and erosion features shall be graded to such a width that will allow all fill placed in these areas to be compacted with mechanized equipment. The placing of satisfactory materials and compaction shall be as specified in paragraphs Placing and Compaction.

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b. Section 2E, paragraph 8.4.

8.4 Compaction. After placing, compaction shall be accomplished by approved equipment. Compaction of materials classified as SP, SW, GP, GW, and GM shall be by a vibratory roller with a minimum weight of 10 tons and a rate of vibration between 1100 and 1400 cycles per minute. Compaction of other soil shall be by approved equipment suited to the soil compacted. All fill and backfill shall be compacted to a minimum of 90% of the maximum density for cohesive soils and to a minimum of 95% of the maximum dry density for cohesionless soils. Maximum dry density shall be determined by the test procedure for compaction designated as CE-55. All materials shall be placed at a moisture content which will readily facilitate compaction to the specified density. Materials too wet to provide a stable working surface or which result in rutting or pumping of the fill, shall be thoroughly dried by aerating with a disc until the moisture content is such to achieve a stable surface when compacted to the required densities.

c. Section 2E, paragraph 8.5.

8.5 Tests. Testing shall be the responsibility of the Contractor and shall be performed at no additional cost to the Government. Testing shall be performed by an approved commercial testing laboratory previously approved by the Contracting Officer, accomplished in this type work. The Contractor shall obtain samples of satisfactory materials anticipated for use as fill and shall test the materials to establish the range of the maximum dry density and optimum moisture content. A minimum of one (1) compaction test shall be run on each different material intended for use as fill. Testing procedures and the number of tests required during construction, both laboratory moisture-density tests and field density-moisture tests, shall be in accordance with the requirements specified previously and hereinafter.

d. Section 2E, paragraphs 8.5.1, 8.5.2, 8.5.3, 8.5.3.1, 8.5.3.2, 8.5.4.

See Inclosure 4.

e. Section 2G, paragraph 10.

10. Preparation of ground surface for fill. All vegetation, such as roots, brush, heavy sods, heavy growth of grass, and all decayed vegetable matter, rubbish and other unsuitable material within the area upon which fill is to be placed shall be stripped or otherwise removed before the fill is started. In no case will unstable material remain in or under the fill area that will prevent the placement and compaction of subsequent layers to the specified densities. Sloped ground surfaces steeper than one vertical to four horizontal on which fill is to be placed shall be plowed, stepped or benched, or broken up as directed, in such manner that the fill material will bond with the existing surface. Any existing gullies and erosion features shall be graded to such a width that will allow all fill placed in these

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areas to be compacted with mechanized equipment. Prepared surfaces on which compacted fill is to be placed shall be scarified, wetted or dried as may be required to obtain the compaction specified.

f. Section 2U, paragraphs 5.3 and 5.4.

See Inclosure 5.

6. Inclosed are copies of the boring logs (incl 1) and the boring location plan (incl 2) for the subject facility. It will be the responsibility of the AE to show boring locations on an applicable P-plate. Location, identity, and type (auger or CS-continuous splitspoon) of the borings must be indicated. A note, "See Appendix A of the specifications for complete logs of borings", must be indicated on the boring location plan. No logs of the borings will be drafted on the drawings unless specifically directed by this office. Savannah District will include these logs in Appendix A of the specifications.

7. Also inclosed is a copy of the available soils test data (incl 6). Further test data will be furnished as available.

8. It is requested that when information on this project is forwarded to SAD for review, a sentence be added to the letter of transmittal stating specifications Section 2E and 2U contain information in addition to that given in the OCE guide specifications.

9. This analysis is based on data furnished by the AE on SAS FL's 363 dated 3 September 1975 and location of the proposed structures as shown on the following drawings: Bldg. No. 3, file 21-01-28, plate P-3, Dispensary and Brigade Headquarters - plate P-7. Any change in the finish floor elevations or structural loading could possibly effect this analysis and should be brought to the attention of the Foundations and Materials Branch immediately so that a review can be made.

10. Due to the recent shift of Barracks Building No. 5 by the AE, a foundation analysis has not been completed. It is requested that at the earliest possible date, a revised site plan be furnished this section. Also, it is requested that a plan be furnished showing the FY 76 road work.

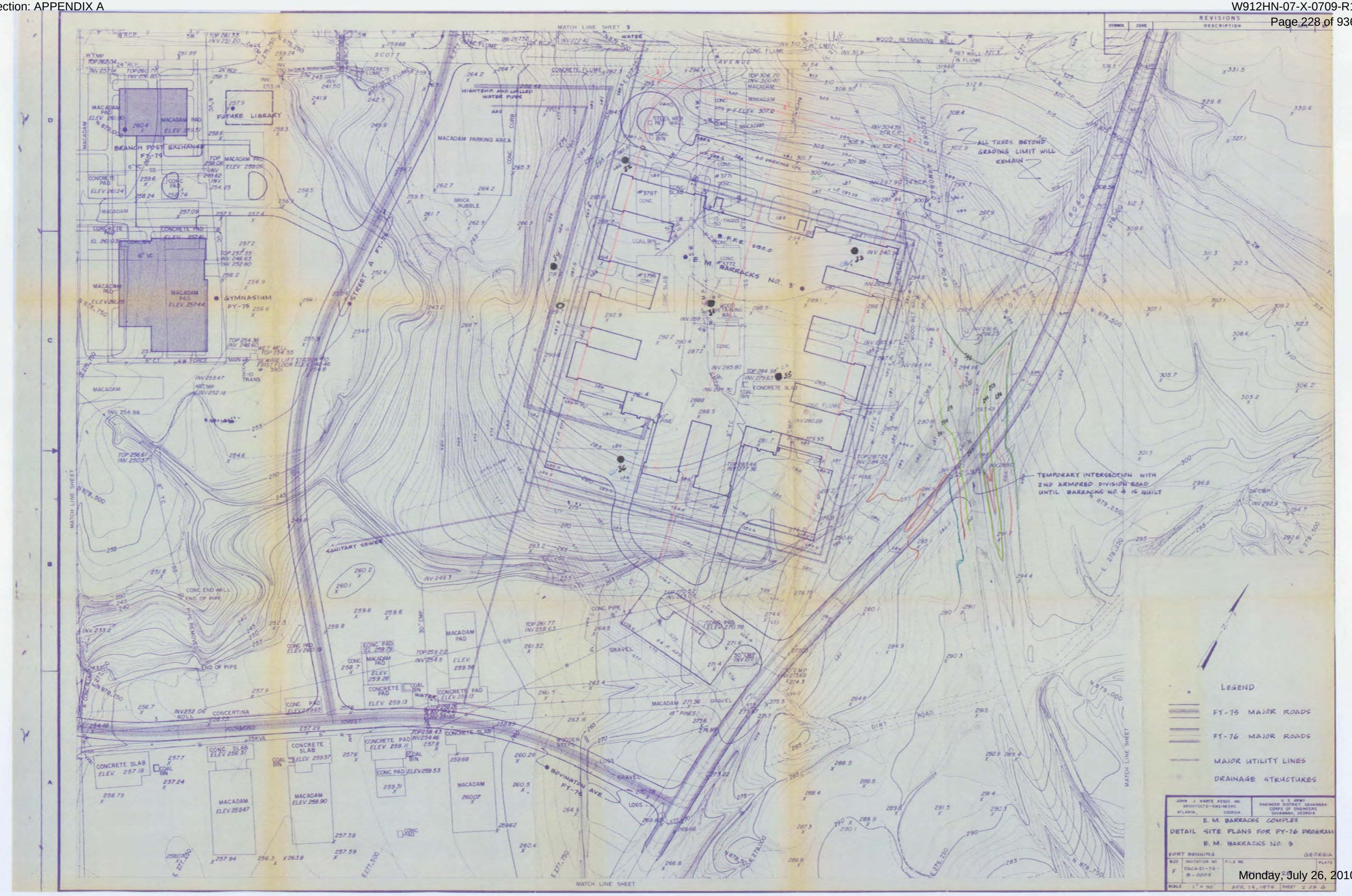
6 Incl
as

WILLIAM K. THOMPSON, JR.
Acting Chief, Soils Section

CF: ERS-4 w/o incl
Ch, Paving & Grading w/incl 3,4,5
Ch, Structural Sec w/incl 3 & 4
Ch, Mech Sec w/incl 5
SADEN-TF, ATTN: Mr. Roger Brown w/incl 1 thru 5 and Foundation Design Analysis

ATTACHMENT B

Soil Test Boring Location Plan


MATCH LINE SHEET 3
SCOTT AVENUE
FUTURE LIBRARY
BRANCH POST EXCHANGE FY-75
GYMNASIUM FY-75
MACADAM PARKING AREA
HIGHTEMP. AND CHILLED WATER PIPES
CONCRETE FLUME
STREET A FY-76
E. M. BARRACKS NO. 3
ALL TREES BEYOND GRADING LIMIT WILL REMAIN
2ND ARMORED DIVISION ROAD
TEMPORARY INTERSECTION WITH 2ND ARMORED DIVISION ROAD UNTIL BARRACKS NO. 4 IS BUILT
SANITARY SEWER
RICHMOND STREET
BOVINGTON AVE. FY-76
MATCH LINE SHEET
LEGEND
FY-75 MAJOR ROADS
FY-76 MAJOR ROADS
MAJOR UTILITY LINES
DRAINAGE STRUCTURES
JOHN J. HARTE ASSOC. INC. ARCHITECTS-ENGINEERS ATLANTA, GEORGIA
U.S. ARMY ENGINEER DISTRICT SAVANNAH CORPS OF ENGINEERS SAVANNAH, GEORGIA
E. M. BARRACKS COMPLEX
DETAIL SITE PLANS FOR FY-76 PROGRAM
E. M. BARRACKS NO. 3
FORT BENNING GEORGIA
DACA21-76-B-0005
APR. 16, 1976
SCALE 1" = 50'

ATTACHMENT C

Soil Test Boring Logs

Hole No. CS-31

DRILLING LOG

DIVISION: SOUTH ATLANTIC
INSTALLATION: FORT BENNING
SHEET 1 OF 2 SHEETS

1. PROJECT: E. M. BARRACKS
2. LOCATION (Coordinates or Station): SEE PLAN
3. DRILLING AGENCY: SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number): CS-31
5. NAME OF DRILLER: STARLING
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE: 70.5'
10. SIZE AND TYPE OF BIT: 1 3/8" I.D. SPLITSPOON
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: FAILING 314
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 5; UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE: STARTED 19 JAN 75; COMPLETED 20 JAN 75
17. ELEVATION TOP OF HOLE: 289.0' Estimated from Topo
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: C. Davis

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0'		SC - RED CLAYEY FINE SAND	MOISTURE CONTENT 9.4	1	Blows 90 100/0.8 100/0.4
	5'		TAN AND GRAY	9.8	2	W.T. 12.5 Date 19 JAN 75 Depth to water during drilling 30 25 70 58
	10'			12.4	3	63 38 38
	15'		SM - GRAY AND ORANGE SILTY FINE SAND W/CLAY LAYERS		4	30 26
	20'				5	W.T. 10.5' Water table reading 24 hrs. after hole completed. 28 19 23 30
	25'					Lab Classification Sample No. 2 SC 5 SM 34 46 57 70
	30'		CONT. ON PAGE 2			

0 5 10 15 20 25 30

DRILLING LOG (Cont Sheet) ELEVATION TOP OF HOLE 303.0' **Hole No.** CS-31

PROJECT: E.M. BARRACKS | INSTALLATION: FORT BENNING | SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH 30' b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g BLOWS
			SM- GRAY AND TAN SILTY FINE SAND			82
						50
						60
	35'					27
						30
						67
	40'					70
						90
						84
	45'					72
						70
			GRAY AND PINK			78
						93
	50'					98
						97
						87
	55'					91
						90
						100/0.C
	60'					100/0.7
						100/0.8
						100/0.5
	65'					100/0.9
						100/0.5
						98
						90
	70'					94

NOTE: Soils field classified in accordance with the Unified Soil Classification System.

100/0.C' = 100 BLOWS AND 0.C' PENETRATION

BLOWS PER FOOT: 2

Number required to drive 1 3/8" ID splitspoon w/140 lb. hammer falling 30".

Hole No. CS-32

DRILLING LOG

DIVISION: SOUTH ATLANTIC
INSTALLATION: FORT BENNING
SHEET 1 OF 3 SHEETS

1. PROJECT: E. M. BARRACKS
2. LOCATION (Coordinates or Station): SEE PLAN
3. DRILLING AGENCY: SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number): CS-32
5. NAME OF DRILLER: STARLING
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE: 75.0'
10. SIZE AND TYPE OF BIT: 1 3/8" E. D. SPLITSPOON
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: FAILING 314
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 6; UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE: STARTED 21 JAN 75; COMPLETED 22 JAN 75
17. ELEVATION TOP OF HOLE: 297.5 Estimated from Topo
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: C. DAVIS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	Blows
	0'		SM- TAN SILTY FINE SAND	Moisture Content	1		26
				7.1			24
							65
	5'		SC- TAN, GRAY AND RED CLAYEY FINE SAND			W.T. 48.0'	89
				12.2	2	Date 21 JAN 75 Depth to water during drilling	68
							80
	10'						33
				13.0	3		36
							70
							100/09
	15'						
				11.8	4	Caved at W.T. 34.0' Water table reading 24 hrs. after hole completed.	75
							40
							96
	20'						
				14.4	5		100/08
						Lab Classification	95
						Sample No. 1 SM	57
	25					2 SC	
						5 SC	50
			W/STRING BINDER				90
							100/06
	30		CONT. ON PAGE 2				100/08

DRILLING LOG (Cont Sheet) VA. TOP OF HOLE 307.3' Hole No. CS-32

PROJECT: E. M. BARRACKS | INSTALLATION: FORT BENNING | SHEET 2 OF 3 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30'		SC- TAN, YELLOW AND PURPLE CLAYEY FINE SAND			BLOWS 30
						100
						100/0.7
						100/0.5
	35'					100/0.9 35
						98
						100/0.7
	40'					100/0.8 40
						100/0.8
						100/0.5
	45'					100/0.7 45
						100/0.9
						100/0.9
						70
	50					50
						65
						90
						100/0.9
	55'		SM- TAN AND GRAY MICACEOUS SILTY FINE SAND		6	100/0.8 55
						95
						100/0.9
	60'					75 60
						79
						70
						80
	65'					65
						72
						70
	70'		CONT. ON PAGE 3			63 70

DRILLING LOG (Cont Sheet) ON TOP OF HOLE 307.3' **Hole No.** CS-32

PROJECT: E. M. BARRACKS | INSTALLATION: FORT BENNING | SHEET 3 OF 3 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	70'		SM- GRAY AND TAN, SILTY FINE AND MEDIUM SAND			BLOWS 70 60 69 72 75
	75'					

NOTE: Soils field classified in accordance with the Unified Soil Classification System.

BLOWS PER FOOT:

Number required to drive 1⅜" ID splitspoon w/140 lb. hammer falling 30".

Hole No. CS-33

DRILLING LOG | DIVISION SOUTH ATLANTIC | INSTALLATION FORT ENNING | SHEET 1 OF 2 SHEETS

1. PROJECT: E. M. BARRACKS
2. LOCATION (Coordinates or Station): SEE PLAN
3. DRILLING AGENCY: SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number): CS-33
5. NAME OF DRILLER: STARLING
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE: 36.0'
10. SIZE AND TYPE OF BIT: 3" I.D. SPLITSPOON
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: FAILING 314
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 5 | UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE: STARTED 18 JAN 75 | COMPLETED 18 JAN 75
17. ELEVATION TOP OF HOLE: 293.5 † Estimated From Topo
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: C. DAVIS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	BLOWS
	0'		SC- TAN, GRAY AND RED CLAYEY FINE SAND	Moisture Content 8.4	1		17
							24
						W.T. 12.0'	35
	5'			11.6	2	Date 18 JAN 75 Depth to water during drilling	20
							40
							70
	10'			19.5	3	Lab Classification Sample No. 1 SM	48
							45
							49
			SM- GRAY SILTY FINE SAND W/ CLAY LAYERS				15
	15'				4		28
						W.T. 12.0'	40
						Water table reading 24 hrs. after hole completed.	22
	20'				5		30
							40
							25
	25'						75
							48
							63
	30'		CONT. ON PAGE 2				50

DRILLING LOG (Cont Sheet) ELEVATION TOP OF HOLE 299.9 Hole No. CS-33

PROJECT E.M. BARRACKS INSTALLATION FORT BENNING SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30'					Blows 30
			SM-YELLOW SILTY FINE AND MEDIUM SAND			61
						68
						50
	35'					48 35

NOTE: Soils field classified in accordance with the Unified Soil Classification System.

BLOWS PER FOOT:

Number required to drive 1⅜" ID splitspoon w/140 lb. hammer falling 30".

Hole No. CS-34

DRILLING LOG

DIVISION: SOUTH ATLANTIC

INSTALLATION: FORT BENNING

SHEET 1 OF 2 SHEETS

1. PROJECT: E.M. BARRACKS
2. LOCATION (Coordinates or Station): SEE PLAN
3. DRILLING AGENCY: SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number): CS-34
5. NAME OF DRILLER: STARLING
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE: 60.0'
10. SIZE AND TYPE OF BIT: 1 3/8" I.D. SPLITSPOON
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: FAILING 314
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 8; UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE: STARTED 23 JAN 75; COMPLETED 23 JAN 75
17. ELEVATION TOP OF HOLE: 291.5 Estimated from Topo
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: C. DAVIS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	BLOWS
	0'		SC - TAN CLAYEY FINE SAND	Moisture Content	1		12
				16.0			12
						W.T. 13.0	
	5'					Date 27 JAN 75	60
				14.3	2	Depth to water during drilling	72
							100/0.8
							40
	10'		CH - GRAY AND RED FAT CLAY	24.3	3		45
			SC - TAN CLAYEY FINE SAND		4		40
							17
	15'					W.T. 10.0'	13
					5	Water table reading 24 hrs. after hole completed.	14
			SM - GRAY AND ORANGE SILTY FINE SAND W/ CLAY LAYERS				15
							11
	20'				6		12
						Lab Classification	21
						Sample No. 1 SC	30
						3 CH	41
	25'					6 SC	
						8 SM	28
							30
			SC - GRAY CLAYEY FINE SAND		7		
	30'		CONT. ON PAGE 2				24

DRILLING LOG (Cont Sheet) ON TOP OF HOLE 303.2 Hole No. QS-34

PROJECT: E. M. BARRACKS | INSTALLATION: FORT BENNING | SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30'					Blows
			SC - GRAY CLAYEY FINE SAND			22
						27
						41
	35'					35
						52
						51
			SM - GRAY AND TAN MICACEOUS SILTY FINE SAND		8	70
	40'					89 40
						98
						83
	45'					89 45
						78
						81
						90
	50'					55
						95
						93
						91
	55'					90 55
						100/0.9
						97
						100/0.8 60
	60'					100/0.8 = 100 BLOWS IN 0.8' PENETRATION

NOTE: Soils field classified in accordance with the Unified Soil Classification System.

BLOWS PER FOOT:

Number required to drive 1 3/8" ID splitspoon w/140 lb. hammer falling 30".

Hole No. CS-35

DRILLING LOG

DIVISION: SOUTH ATLANTIC

INSTALLATION: FORT BENNING

SHEET 1 OF 2 SHEETS

1. PROJECT: E.M. BARRACKS
2. LOCATION (Coordinates or Station): SEE PLAN
3. DRILLING AGENCY: SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number): CS-35
5. NAME OF DRILLER: STARLING
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE: 36.0'
10. SIZE AND TYPE OF BIT: 1 3/8" I.D. SPLITSPOON
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: FAILING 314
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 5; UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE: STARTED 19 JAN 75; COMPLETED 19 JAN 75
17. ELEVATION TOP OF HOLE: 285.0 Estimated from Topo.
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: C. DAVIS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	BLOWS
			SC- RED CLAYEY FINE SAND	% Moisture Content 9.5	1		23
							22
						W.T. 4.5'	10
	5'		SMO- DARK GRAY ORGANIC SILTY FINE SAND		2	Date 19 JAN 75 Depth to water during drilling	8
							5
			SC- GRAY SOFT CLAYEY FINE SAND W/HIGH LIQUID LIMIT				3
						Lab Classification	6
	10'				3	Sample No 1 SM 4 CH	7
							10
			CH- GRAY AND RED FAT CLAY W/THIN SAND LENSES				30
	15'				4		28
			SM- GRAY, TAN AND WHITE SILTY FINE SAND			W.T. 4.5'	20
						Water table reading 24 hrs. after hole completed.	21
	20'				5		29
							33
							41
	25'						48
							45
			W/GRAVEL				27
	30'		CONT. ON PAGE 2				25

DRILLING LOG (Cont Sheet) | ELEVA TOP OF HOLE 290.1 | Hole No. CS-35

PROJECT: E. M. BARRACKS | INSTALLATION: FORT BENNING | SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30'					Blows 30
			SM- TAN AND WHITE SILTY FINE SAND W/ GRAVEL			22
						22
						40
	35'					32 35

NOTE: Soils field classified in accordance with the Unified Soil Classification System.

BLOWS PER FOOT:

Number required to drive 1⅜" ID splitspoon w/140 lb. hammer falling 30".

Hole No. CS-36

DRILLING LOG

DIVISION: SOUTH ATLANTIC

INSTALLATION: FORT BENNING

SHEET 1 OF 2 SHEETS

1. PROJECT: E.M. BARRACKS
2. LOCATION (Coordinates or Station): SEE PLAN
3. DRILLING AGENCY: SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number): CS-36
5. NAME OF DRILLER: STARLING
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE: 36.0'
10. SIZE AND TYPE OF BIT: 1 3/8" I.D. SPLITSPOON
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: FAILING 314
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 5; UNDISTURBED
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE: STARTED 22 JAN 75; COMPLETED 22 JAN 75
17. ELEVATION TOP OF HOLE: 285.0 Estimated from Topo
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: C. DAVIS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	BLOWS
	0'		SC - TAN CLAYEY FINE SAND	Moisture Content 14.4	1		14
							28
						W.T. 9.0'	28
	5'					Date 22 JAN 75	
				11.9	2	Depth to water during drilling	48
							23
							63
	10'		CH - GRAY AND RED FAT CLAY W/ SAND LAYERS	39.5	3		16
							25
						Lab Classification	
						Sample No 2 SC	25
	15'					4 CH	18
					4		13
						W.T. 7.6'	20
						Water table reading	
						24 hrs. after	35
	20'		SM - GRAY AND TAN SILTY FINE SAND W/ CLAY LAYERS		5	hole completed.	39
							50
							47
	25'						53
							61
							58
	30'		CONT. ON PAGE 2				61

DRILLING LOG (Cont Sheet) ION TOP OF HOLE 293.2' Hole No. CS-36

PROJECT: E. M. BARRACKS | INSTALLATION: FORT BENNING | SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	30'		SM- GRAY AND TAN SILTY FINE SAND			Blows 3 68 73 81 85 3
	35'					

NOTE: Soils field classified in accordance with the Unified Soil Classification System.

BLOWS PER FOOT:

Number required to drive 1⅜" ID splitspoon w/140 lb hammer falling 30".

Hole No. A-27

DRILLING LOG

DIVISION: SOUTH ATLANTIC
INSTALLATION: FORT BENNING
SHEET 1 OF 1 SHEETS

1. PROJECT: E.M. BARRACKS COMPLEX
2. LOCATION (Coordinates or Station): SEE PLAN
3. DRILLING AGENCY: SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number): A-27
5. NAME OF DRILLER: B. STARLING
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE: 25.0 FEET
10. SIZE AND TYPE OF BIT: 6 INCH O.D. AUGER
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: 314 FAILING
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 6; UNDISTURBED
14. TOTAL NUMBER CORE BOXES: 0
15. ELEVATION GROUND WATER
16. DATE HOLE: STARTED 19 SEPT. 1975; COMPLETED 19 SEPT. 1975
17. ELEVATION TOP OF HOLE: 270.4 FEET
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: Victor Montagud

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			ML - ORANGE FINE SILT	Moisture Content 3.4	1	
	5		SM - ORANGE SILTY FINE SAND			W.T. 18.2' Date 19 SEPT. 75 Depth to water during drilling
			SP - ORANGE FINE SAND	2.5	2	
			- YELLOW			
	10		- WHITE	0.2	3	W.T. 16.3' Water table reading 24 hrs. after hole completed.
			MH - WHITE FINE SILT			
	15			28.1	4	Lab Classification Sample No. 1 SM 4 CH
			SP - WHITE AND GOLD MEDIUM SAND			
	20				5	
			- TAN AND WHITE			
	25				6	
			BOTTOM OF HOLE 25.0 FEET			

Hole No. A-25

DRILLING LOG

DIVISION: SOUTH ATLANTIC
INSTALLATION: FORT BENNING
SHEET 1 OF 1 SHEETS

1. PROJECT: E.M. BARRACKS COMPLEX
2. LOCATION (Coordinates or Station): SEE PLAN
3. DRILLING AGENCY: SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number): A-25
5. NAME OF DRILLER: B. STARLING
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE: 20.0 FEET
10. SIZE AND TYPE OF BIT: 6 INCH O.D. AUGER
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: 314 FAILING
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 5; UNDISTURBED
14. TOTAL NUMBER CORE BOXES: 0
15. ELEVATION GROUND WATER
16. DATE HOLE: STARTED 22 SEPT. 1975; COMPLETED 22 SEPT. 1975
17. ELEVATION TOP OF HOLE: 286.2 FEET
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: Victor Montuoro

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			SM - ORANGE SILTY MEDIUM SAND	Moisture Content 0.8	1	W.T. DRY Date 22 SEPT. 75 Depth to water during drilling
	5		SC - GRAY AND ORANGE CLAYEY MEDIUM SAND	10.5	2	
			MH - GRAY AND RED FINE SILT	16.7	3	W.T. 19.0' Water table reading 24 hrs. after hole completed.
	10					
	15			14.3	4	Lab Classification Sample No 1 SC 3 CH
			SP - WHITE MEDIUM SAND - GOLD		5	
	20		BOTTOM OF HOLE 20.0 FEET			

Hole No. A-26

DRILLING LOG

DIVISION: South Atlantic
INSTALLATION: Fort Benning
SHEET 1 OF 1 SHEETS

1. PROJECT: E.M. Barracks Complex
2. LOCATION (Coordinates or Station): See Plan
3. DRILLING AGENCY: Savannah District
4. HOLE NO. (As shown on drawing title and file number): A-26
5. NAME OF DRILLER: B. Starling
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE: 25.0 FEET
10. SIZE AND TYPE OF BIT: 6 inch O.D. Auger
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: 314 Failing
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 6; UNDISTURBED
14. TOTAL NUMBER CORE BOXES: 0
15. ELEVATION GROUND WATER
16. DATE HOLE: STARTED 19 Sept. 1975; COMPLETED 19 Sept. 1975
17. ELEVATION TOP OF HOLE: 267.3 FEET
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: Victor Montemayor

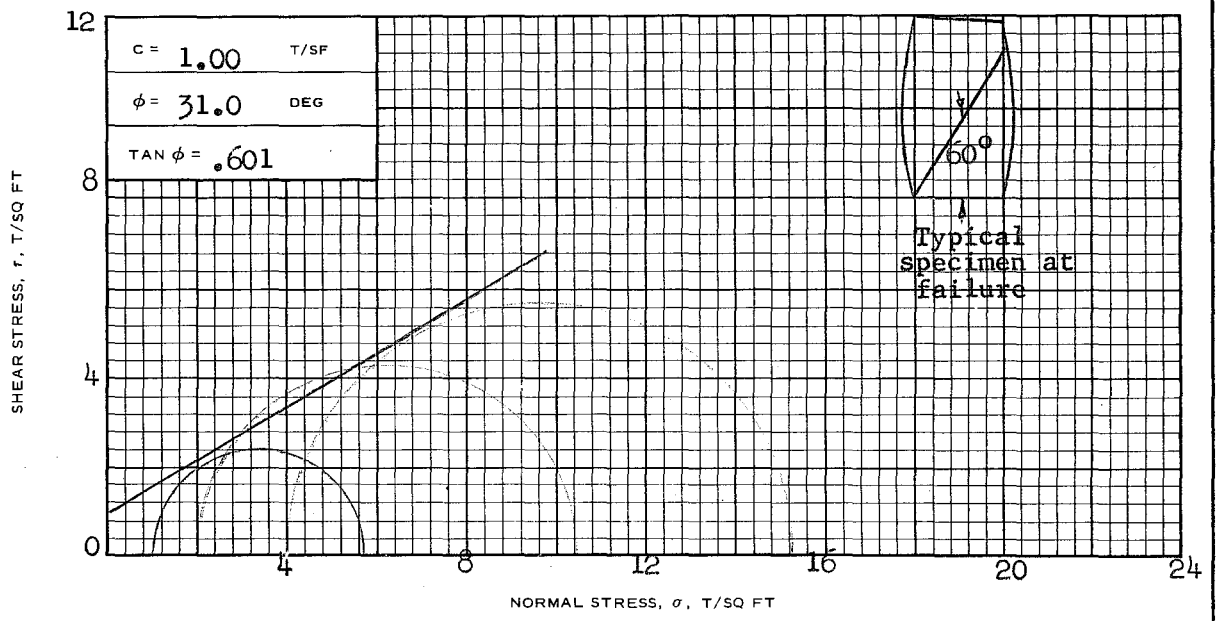
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV ERY e	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			SM - TAN SILTY MEDIUM SAND	Moisture Content 5.5	1	
	5		- GRAY	12.1	2	W.T. 16.2' Date 19 SEPT. 75 Depth to water during drilling
	10		ML - GRAY AND PINK FINE SILT	22.5	3	W.T. 14.8' Water table reading 24 hrs. after hole completed.
	15		SM - GOLD SILTY FINE SAND	17.4	4	Lab classification Sample No 2 SC 4 SM
	20		- PINK: VERY FINE		5	
			- GOLD AND WHITE: COARSE		6	
	25		BOTTOM OF HOLE 25.0 FEET			

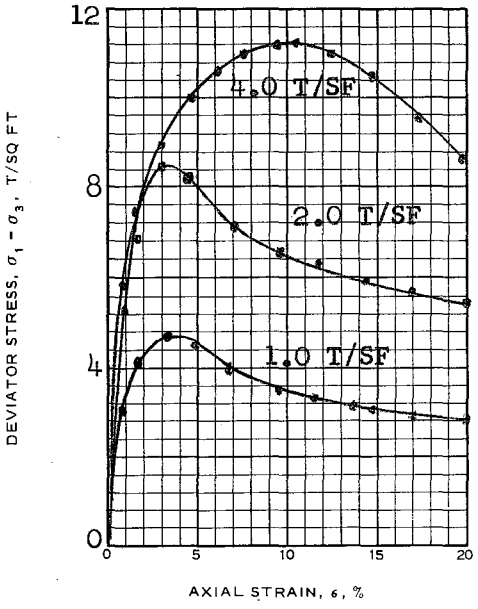
ATTACHMENT D

Soil Laboratory Test Data

WORK ORDER NO. SAS-ENG-BEN-91
REQ. NO. 9063

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY,
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061





SPECIMEN NO.			1	2	3
INITIAL	WATER CONTENT, %	w_o	5.3	5.2	6.0
	DRY DENSITY LB/ CU FT	γ_{d_o}	110.4	109.7	108.7
	SATURATION, %	s_o	27.8	27.0	30.0
	VOID RATIO	e_o	.505	.514	.528
BEFORE SHEAR	WATER CONTENT, %	w_c	4.6	4.6	5.2
	DRY DENSITY LB/CU FT	γ_{d_c}	111.3	111.0	111.1
	SATURATION, %	s_c	24.8	24.7	27.9
	VOID RATIO	e_{c_f}	.492	.496	.495
	FINAL BACK PRESSURE, T/SQ FT	u_o	--	--	--
MINOR PRINCIPAL STRESS, T/SQ FT		σ_3	1.00	2.00	4.00
MAXIMUM DEVIATOR STRESS, T/SQ FT		$(\sigma_1 - \sigma_3)_{MAX}$	4.69	8.43	11.23
TIME TO $(\sigma_1 - \sigma_3)_{MAX}$, MIN		t_f	20	20	70
ULTIMATE DEVIATOR STRESS, T/SQ FT		$(\sigma_1 - \sigma_3)_{ULT}$	3.16	5.87	10.49
INITIAL DIAMETER, IN.		D_o	1.38	1.38	1.38
INITIAL HEIGHT, IN.		H_o	3.08	3.08	3.08

CONTROLLED- Strain (.15%/min.) TEST

DESCRIPTION OF SPECIMENS Tannish gray silty sand (SM)

LL NP	PL NP	PI NP	Gs 2.66	TYPE OF SPECIMEN Undisturbed	TYPE OF TEST Nat R

REMARKS: See Lab Classification data on ENG Form 2087

PROJECT Ft. Benning
Area: EM Barracks Complex
BORING NO. CS-32 SAMPLE NO. 1
DEPTH 1.0'-3.0'
LABORATORY SADEN-L DATE 13 June 1975

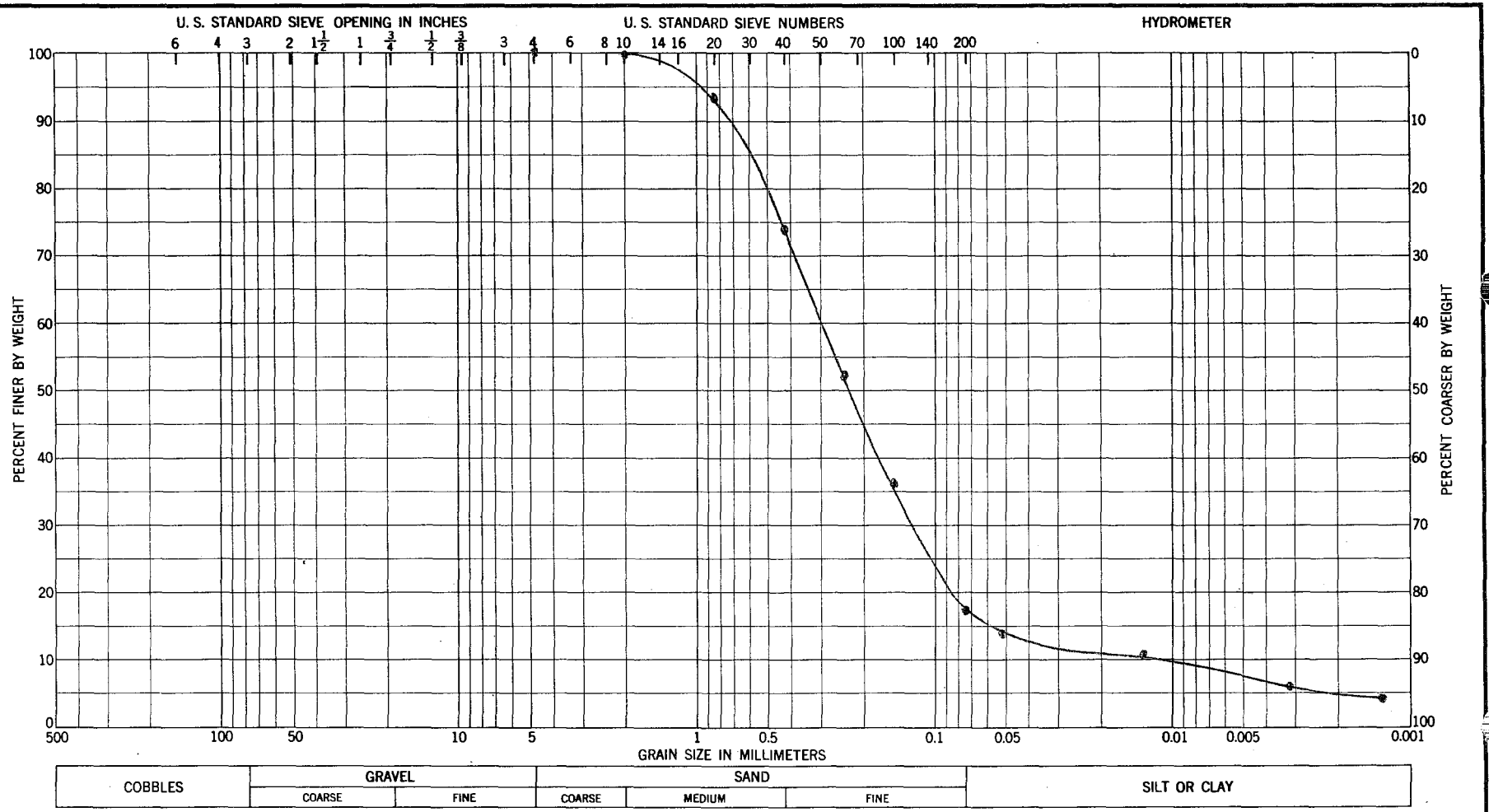
TRIAXIAL COMPRESSION TEST REPORT

ENG FORM NO. 2089 REV JUNE 1970 PREVIOUS EDITION IS OBSOLETE TRANSLUCENT (EM 1110-2-1906)

Lab. No. 114/6204

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 9063
REQ. NO. SAS-ENG-BEN-91



Sample No.	Elev. or Depth	Classification	Nat w %	LL	PL	PI
1	1.0'-3.0'	Tannish gray silty sand (SM)	5.3	NP	NP	NP

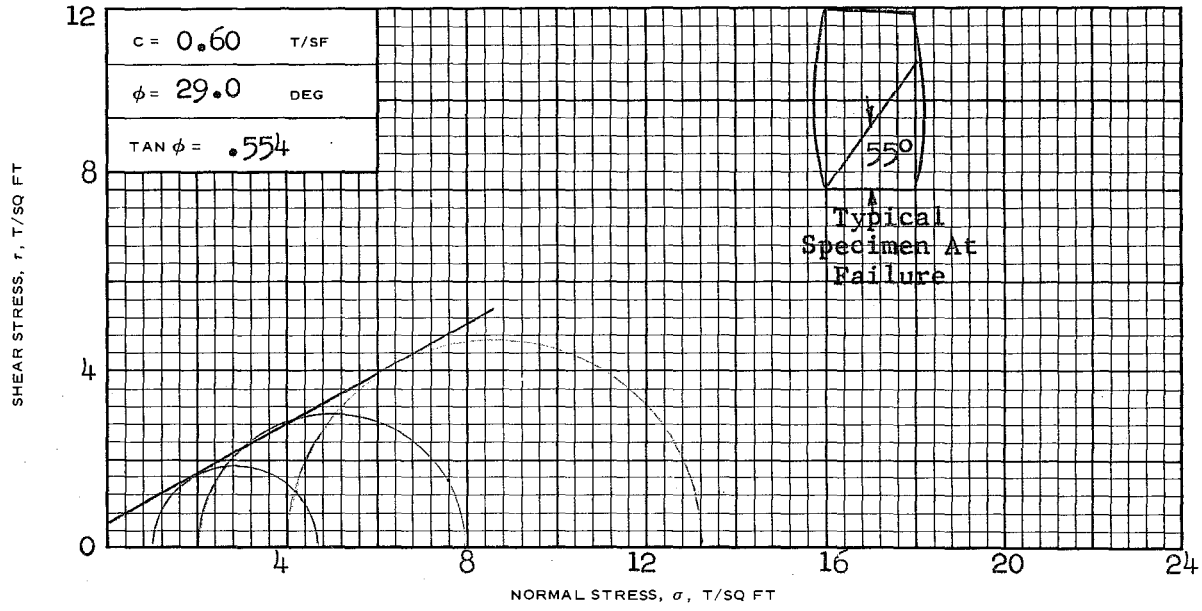
GRADATION CURVES

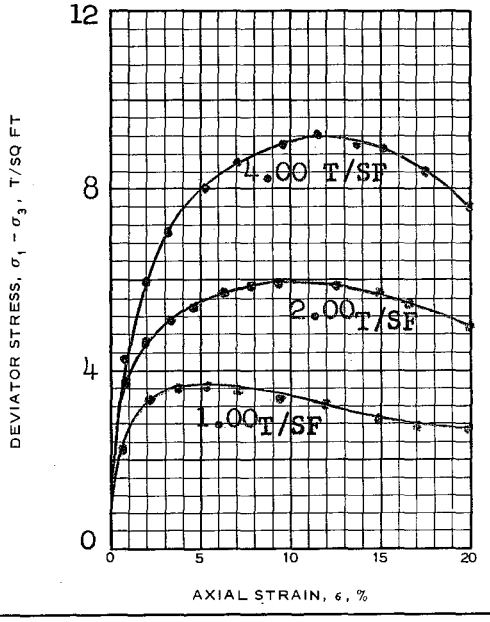
Project Ft. Benning
Lab. No. 114/6204 (Nat R Test)
Area EM Barracks Complex
Boring No. CS-32, Sample 1
Date 13 June 1975

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY,
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 9063
REQ. NO. SAS-ENG-BEN-91





SPECIMEN NO.			1	2	3
INITIAL	WATER CONTENT, %	w_o	13.4	14.2	13.4
	DRY DENSITY LB/ CU FT	γ_{d_o}	113.4	112.5	112.7
	SATURATION, %	S_o	76.2	79.0	74.7
	VOID RATIO	e_o	.469	.481	.479
BEFORE SHEAR	WATER CONTENT, %	w_c	12.4	12.9	12.2
	DRY DENSITY LB/CU FT	γ_{d_c}	114.6	114.4	115.1
	SATURATION, %	S_c	73.0	75.4	72.3
	VOID RATIO	e_c	.455	.457	.449
	FINAL BACK PRESSURE, T/SQ FT	u_o	--	--	--
MINOR PRINCIPAL STRESS, T/SQ FT		σ_3	1.00	2.00	4.00
MAXIMUM DEVIATOR STRESS, T/SQ FT		$(\sigma_1 - \sigma_3)_{MAX}$	3.70	5.95	9.21
TIME TO $(\sigma_1 - \sigma_3)_{MAX}$, MIN		t_f	35	60	75
ULTIMATE DEVIATOR STRESS, T/SQ FT		$(\sigma_1 - \sigma_3)_{ULT}$	2.90	5.70	8.90
INITIAL DIAMETER, IN.		D_o	1.38	1.38	1.38
INITIAL HEIGHT, IN.		H_o	3.08	3.08	3.08

CONTROLLED- Strain (.15%/min.) TEST

DESCRIPTION OF SPECIMENS Gray & Tan clayey sand (SC)

LL 40	PL 19	PI 21	G_s 2.67	TYPE OF SPECIMEN Undisturbed	TYPE OF TEST Nat R

REMARKS: See Lab Classification Data on ENG Form 2087

PROJECT Ft. Benning
Area: EM Barracks Complex
BORING NO CS-34 SAMPLE NO. 1
DEPTH 1.0'-3.0'
LABORATORY SADEN-L DATE 13 June 1975

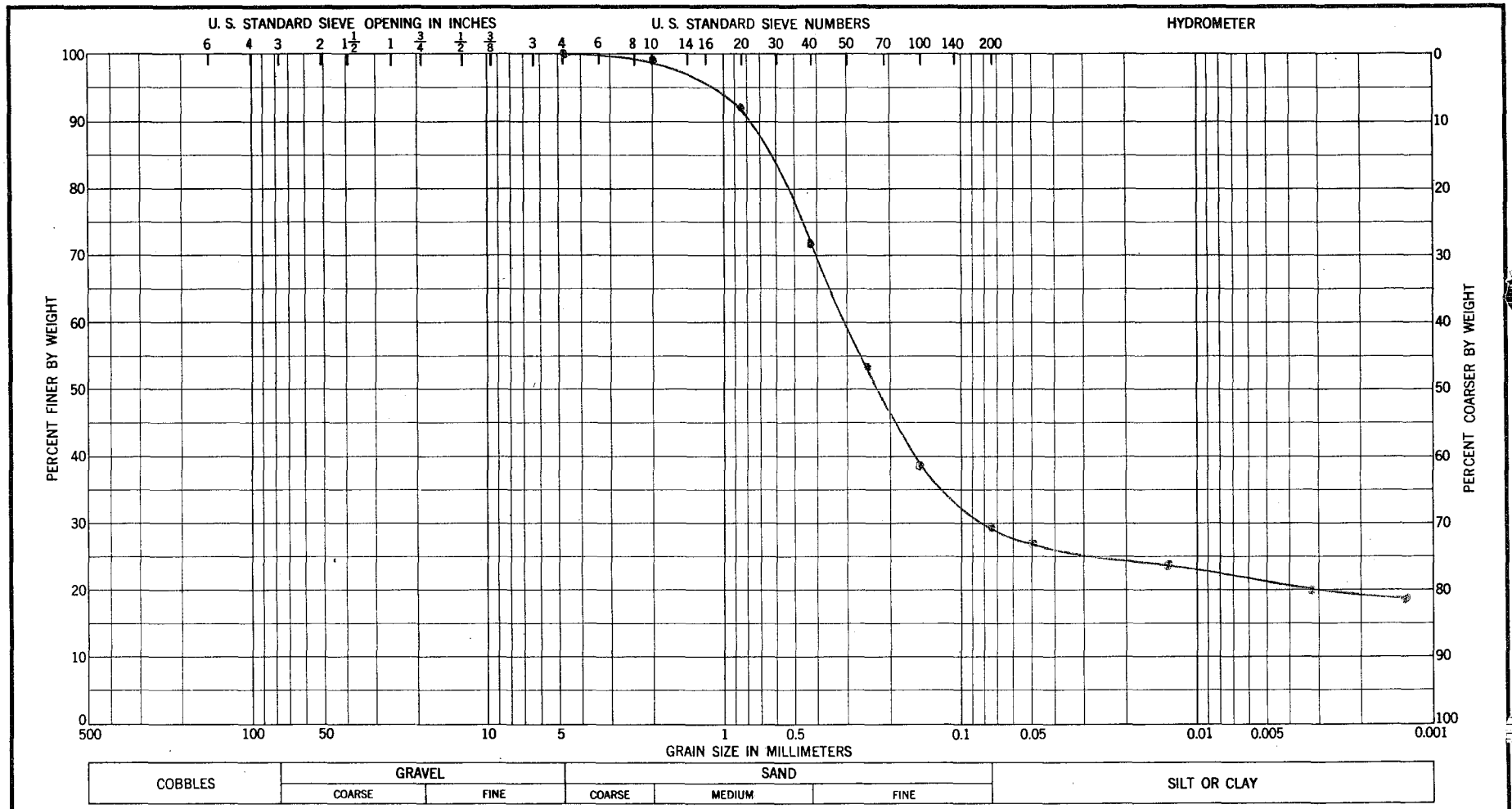
TRIAXIAL COMPRESSION TEST REPORT

ENG FORM NO. 2089 REV JUNE 1970 PREVIOUS EDITION IS OBSOLETE TRANSLUCENT (EM 1110-2-1906)

Lab. No. 114/6205

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 9063
REQ. NO. SAS-ENG-BEN-91



Sample No.	[redacted] Depth	Classification	Nat w %	LL	PL	PI
1	1.0'-3.0'	Gray & Tan clayey sand (SC)	14.5	40	19	21

GRADATION CURVES

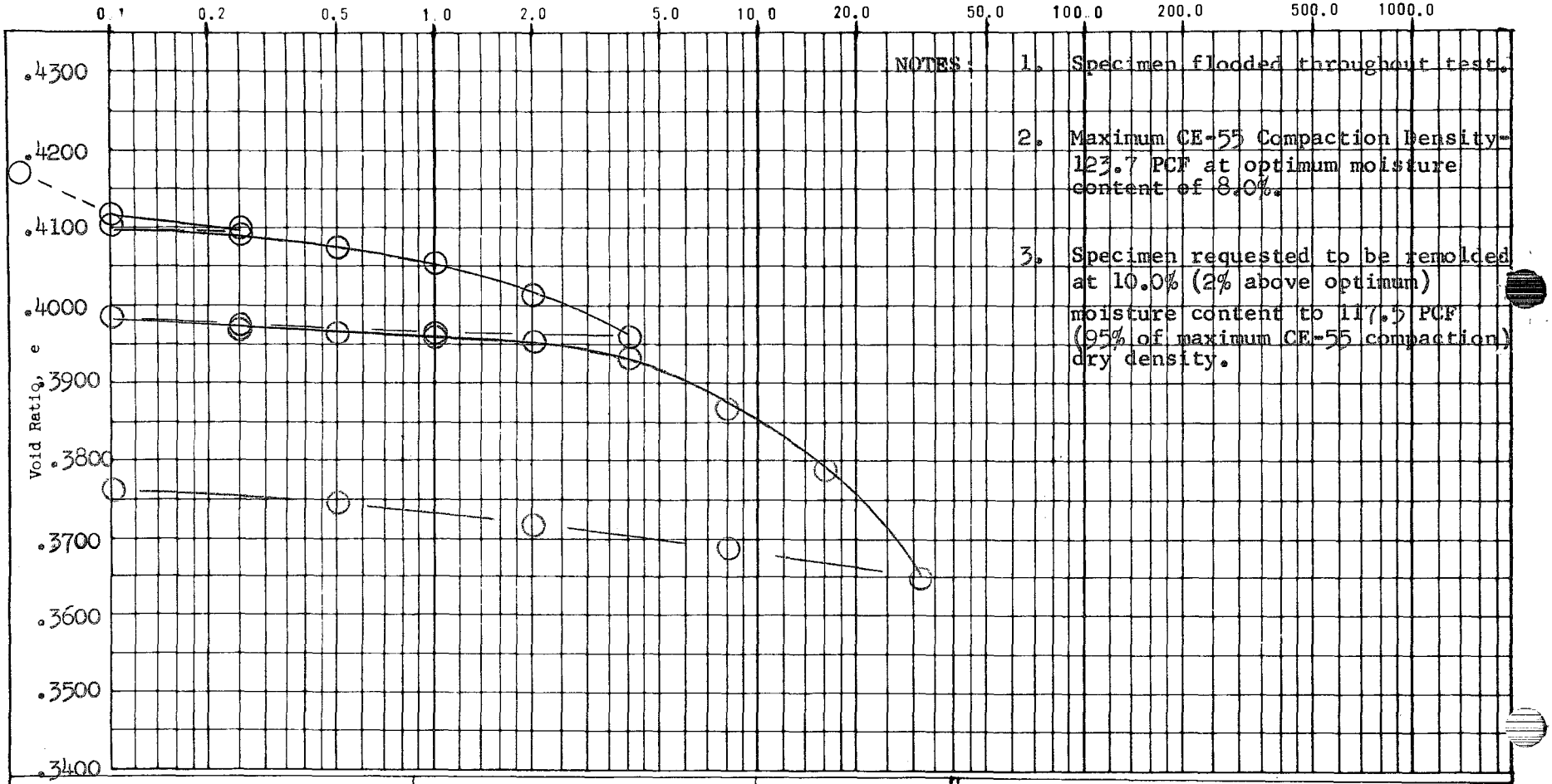
Project Ft. Benning
Lab. No. 114/6205 Bottom*
Area EM Barracks Complex
Boring No. CS-34, Sample 1
Date 13 June 1975

ENG FORM 1 MAY 63 2087

* Nat R, Test

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY,
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 9063
REQ. NO. SAS-ENG-BEN-91



Type of Specimen Remolded		Before Test		After Test	
Diam 2.49 in.	Ht 1.00 in.	Water Content, w_o	10.3 %	w_f	14.1 %
Overburden Pressure, p_o	T/sq ft	Void Ratio, e_o	.417	e_f	.376
Preconsol. Pressure, p_c	T/sq ft	Saturation, S_o	65.7 %	S_f	100.0 %
Compression Index, C_c		Dry Density, γ_d	117.2 lb/ft^3		
Classification Tan Silty sand (SM)					
LL 15	G_s 2.66	See Lab classification data on form 2087			
PL NP	D_{10}= .01 mm				

Project Ft. Benning
Lab No. 114/6258
Area EM Barracks Complex
Boring No. CS-34 Sample No. 1
Depth EK 1.0'-3.0' Date 13 June 1975

CONSOLIDATION TEST REPORT

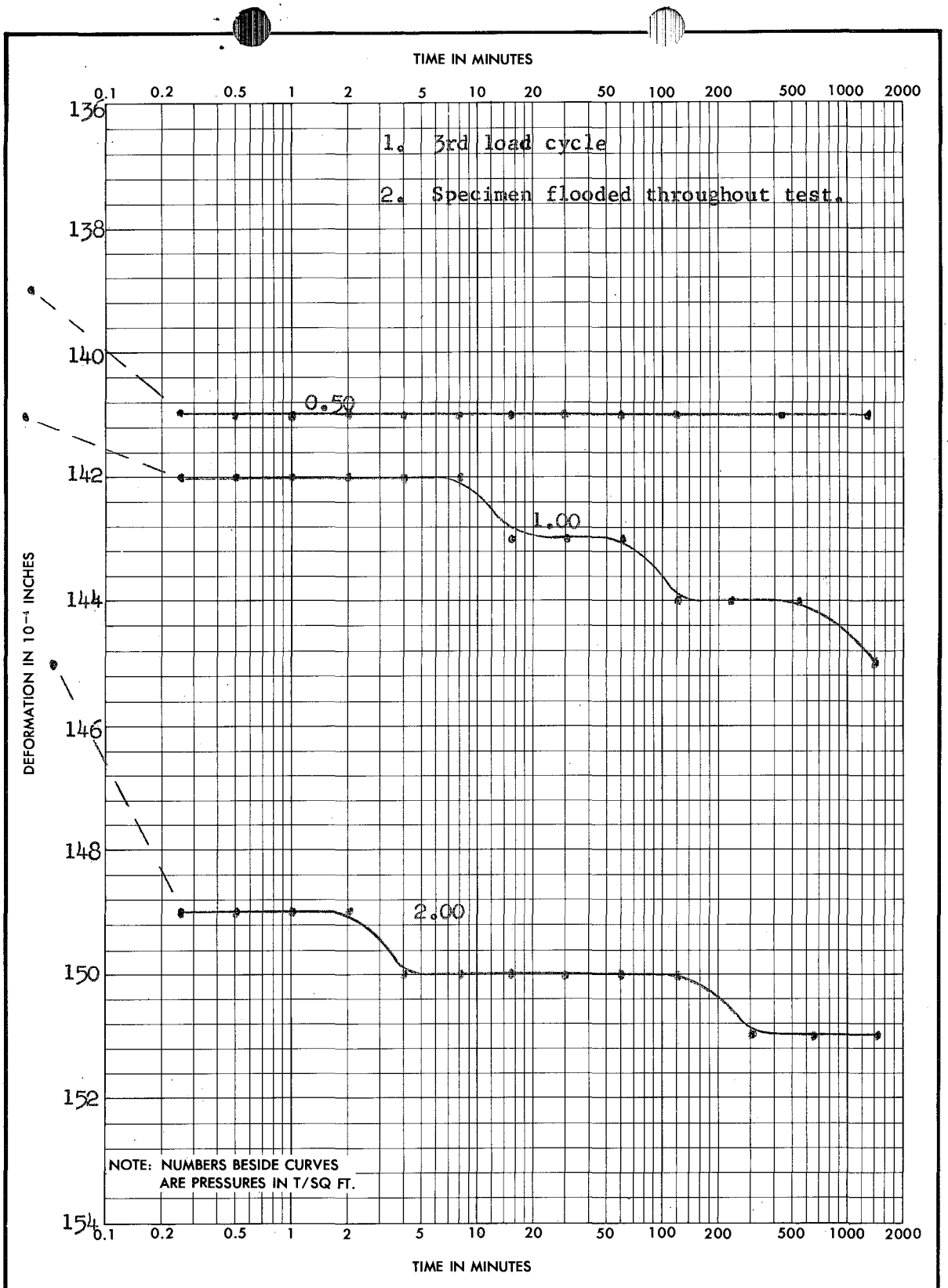
95 M

SAD FORM 2073-R
24 MAR 70

Previous editions are obsolete

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 9063
REQ. NO. SAS-ENG-BEN-91



PROJECT Ft. Benning

AREA EM Barracks Complex Lab. No. 114/6258

BORING NO. CS-34 | SAMPLE NO. 1 | DEPTH ~~XX~~ 1.0'-3.0' | DATE 13 June 1975

ENG FORM 2088 1 MAY 63 PREVIOUS EDITIONS ARE OBSOLETE.

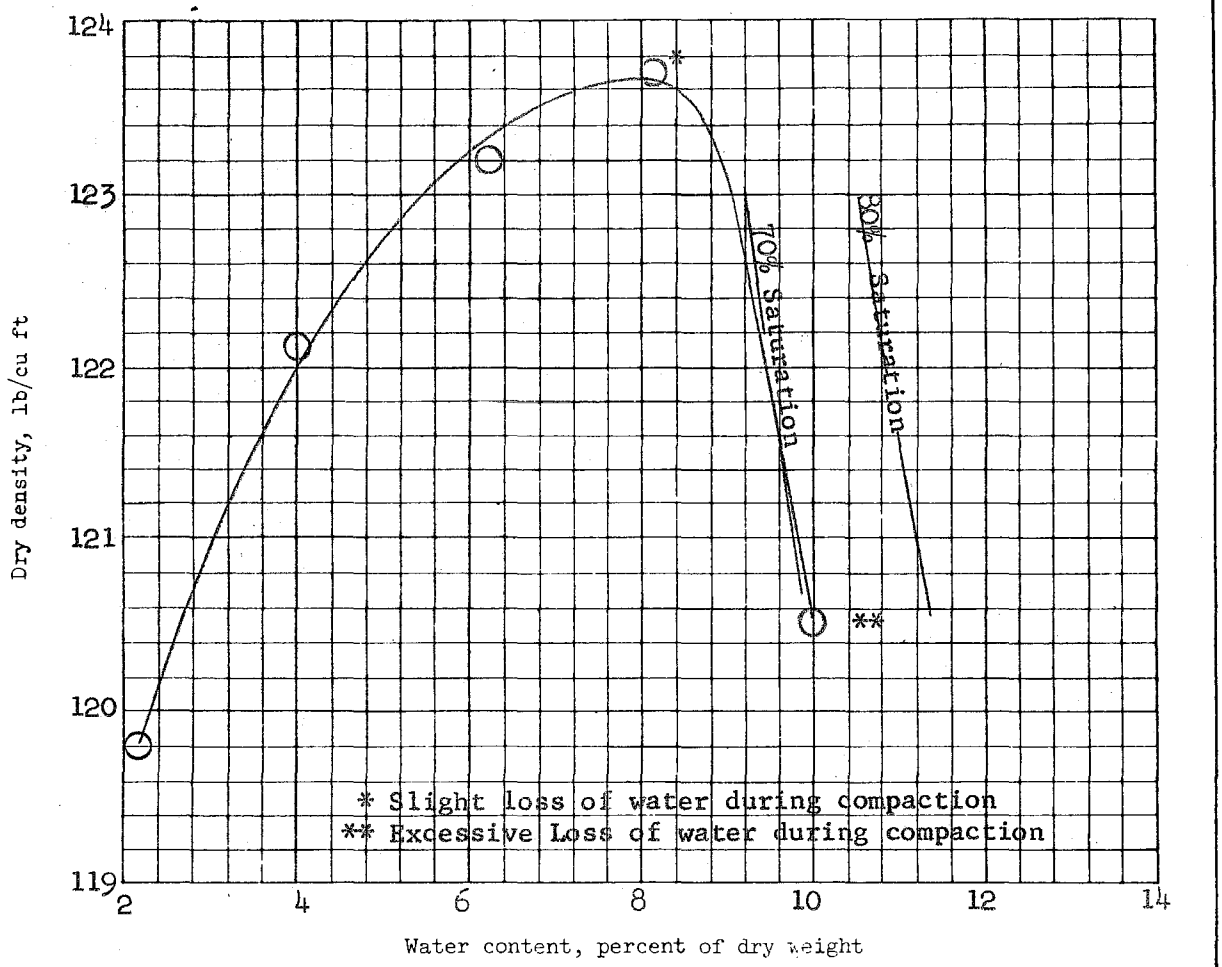
CONSOLIDATION TEST—TIME CURVES (TRANSLUCENT)

★ GPO : 1964 OF—715-965

95 MD

WORK ORDER NO. 9063
REQ. NO. SAS-ENG-BEN-91

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY,
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061



CE 55 compaction test (MIL STD 621A)

55 blows per each of 5 layers, with 10.0 lb rammer and 18.0 inch drop. 6.0 inch diameter mold

Sample No.	Depth	Classification	G	LL	PL	% > No. 4	% > 3/4 in
1	1.0'-3.0'	Tan silty sand (SM)	2.66	15	NP	0	0

Sample No. 1	Bags	Jar		
Natural water content, percent	--	11.4		
Optimum water content, percent	8.0	--		
Max dry density, lb/cu ft	123.7	--		

Remarks See Lab Classification Data on ENG Form 2087.

Project Ft. Benning

Lab. No. 114/6258

Area EM Barracks Complex

Boring No. CS-34 Date 13 June 1975

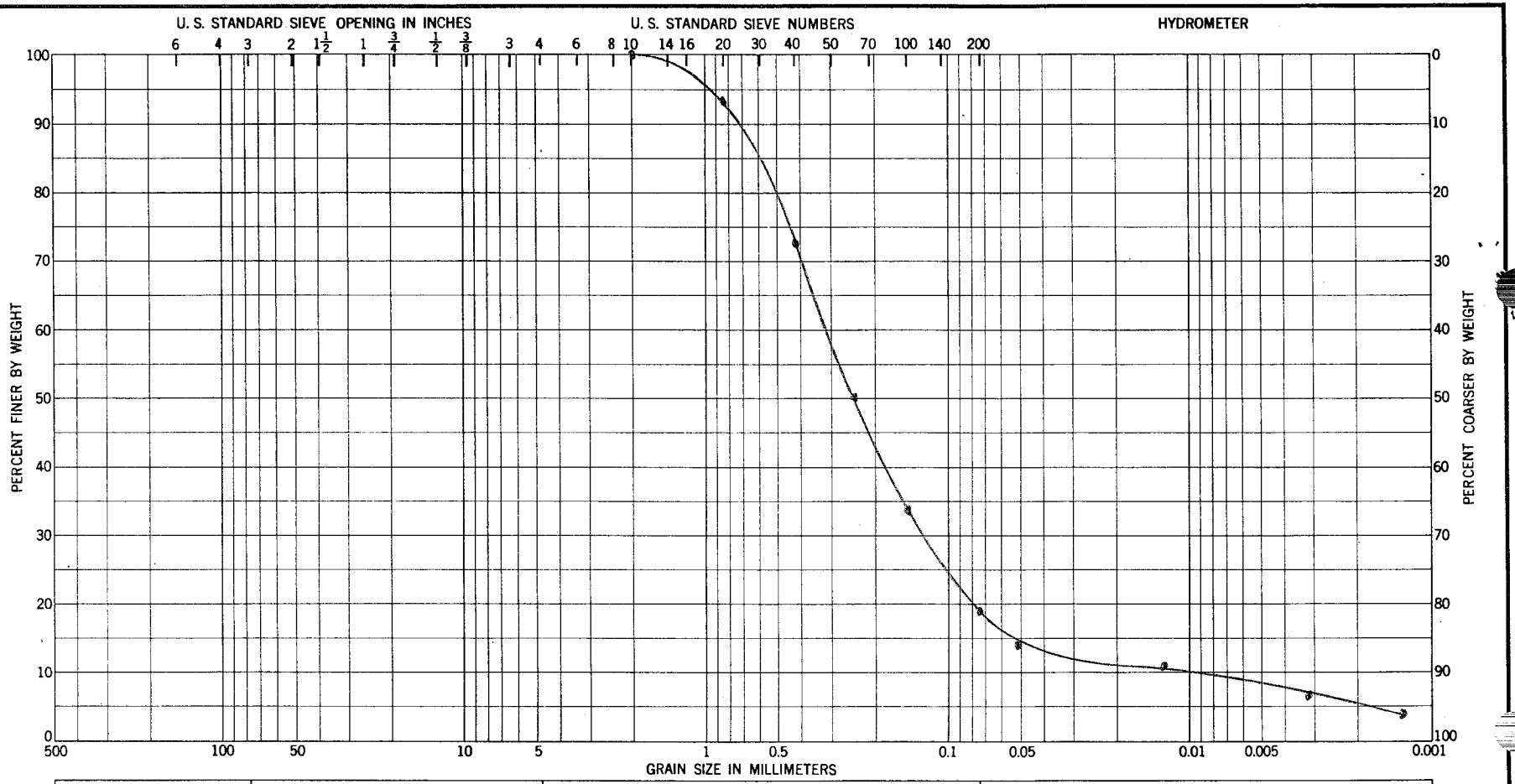
COMPACTION TEST REPORT

ENG FORM 1 JUN 65 2091

PREVIOUS EDITIONS ARE OBSOLETE

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 9063
REQ. NO. SAS-ENG-BEN-91



Sample No.	Depth	Classification	Nat w %	LL	PL	PI
1	1.0'-3.0'	Tan silty sand (SM)	11.4	15	NP	NP

GRADATION CURVES

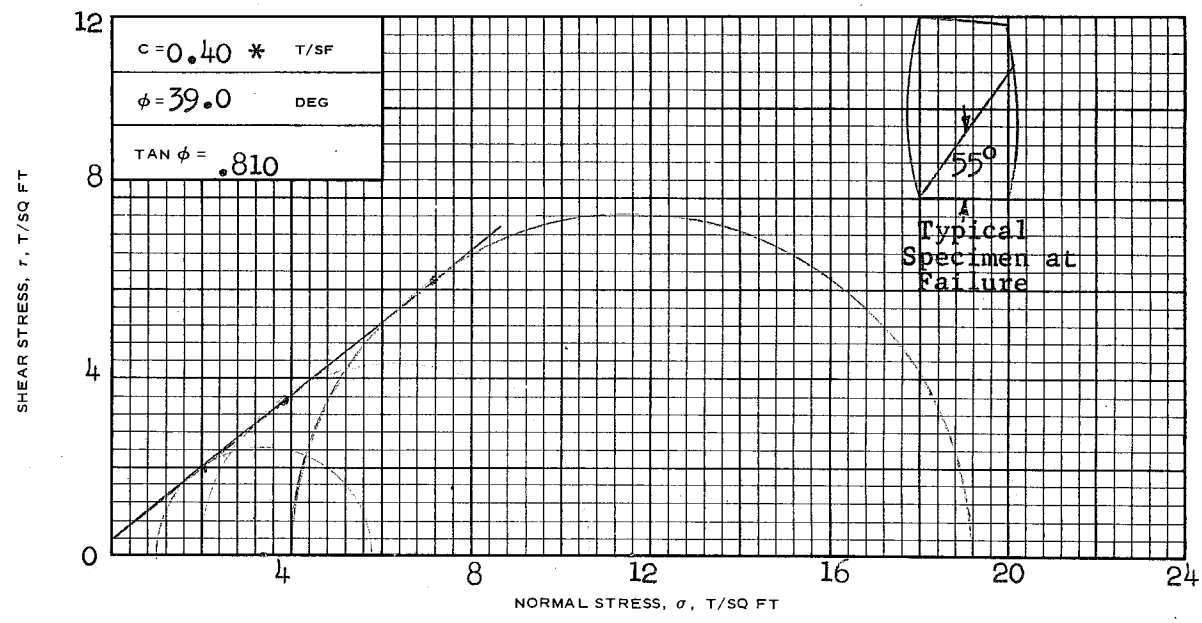
Project Ft. Benning
Lab. No. 114/6258 *
Area EM Barracks Complex
Boring No. CS-34, Sample 1
Date 13 June 1975

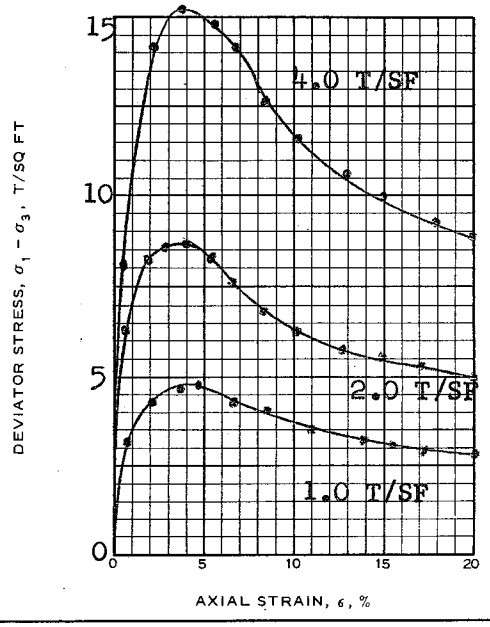
ENG FORM 1 MAY 63 2087

* Compaction, Nat R, $ Consol. Tests

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY,
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 9063
REQ. NO. SAS-ENG-BEN-91





SPECIMEN NO.			1	2	3
INITIAL	WATER CONTENT, %	w_o	9.7	9.7	9.7
	DRY DENSITY LB/ CU FT	γ_{d_o}	118.0	118.0	117.9
	SATURATION, %	S_o	63.0	63.0	63.4
	VOID RATIO	e_o	.408	.408	.409
BEFORE SHEAR	WATER CONTENT, %	w_c	8.7	8.7	8.6
	DRY DENSITY LB/CU FT	γ_{d_c}	118.7	119.1	119.6
	SATURATION, %	S_c	58.1	58.7	59.2
	VOID RATIO	e_c	.399	.394	.388
	FINAL BACK PRESSURE, T/SQ FT	u_o	--	--	--
MINOR PRINCIPAL STRESS, T/SQ FT		σ_3	1.00	2.00	4.00
MAXIMUM DEVIATOR STRESS, T/SQ FT		$(\sigma_1 - \sigma_3)_{MAX}$	4.77	8.68	15.15
TIME TO $(\sigma_1 - \sigma_3)_{MAX}$, MIN		t_f	30	25	25
ULTIMATE DEVIATOR STRESS, T/SQ FT		$(\sigma_1 - \sigma_3)_{ULT}$	3.10	5.53	9.94
INITIAL DIAMETER, IN.		D_o	1.38	1.38	1.38
INITIAL HEIGHT, IN.		H_o	3.08	3.08	3.08

CONTROLLED-Strain (.15%/min.) TEST

DESCRIPTION OF SPECIMENS Tan Silty sand (SM)

*Apparent Cohesion probably not applicable to design analyses.

LL 15 | PL NP | PI NP | G_s 2.66 | TYPE OF SPECIMEN Remolded | TYPE OF TEST Nat R

REMARKS: 1 See Lab classification data on ENG Form 2087

2 Maximum CE-55 compaction density-123.7 PCF at optimum moisture content of 8.0%.

PROJECT Ft. Benning
Area: EM Barracks Complex
BORING NO. CS-34 | SAMPLE NO. 1
DEPTH/~~XXX~~ 1.0'-3.0'
LABORATORY SADEN-L | DATE 13 June 1975

TRIAXIAL COMPRESSION TEST REPORT

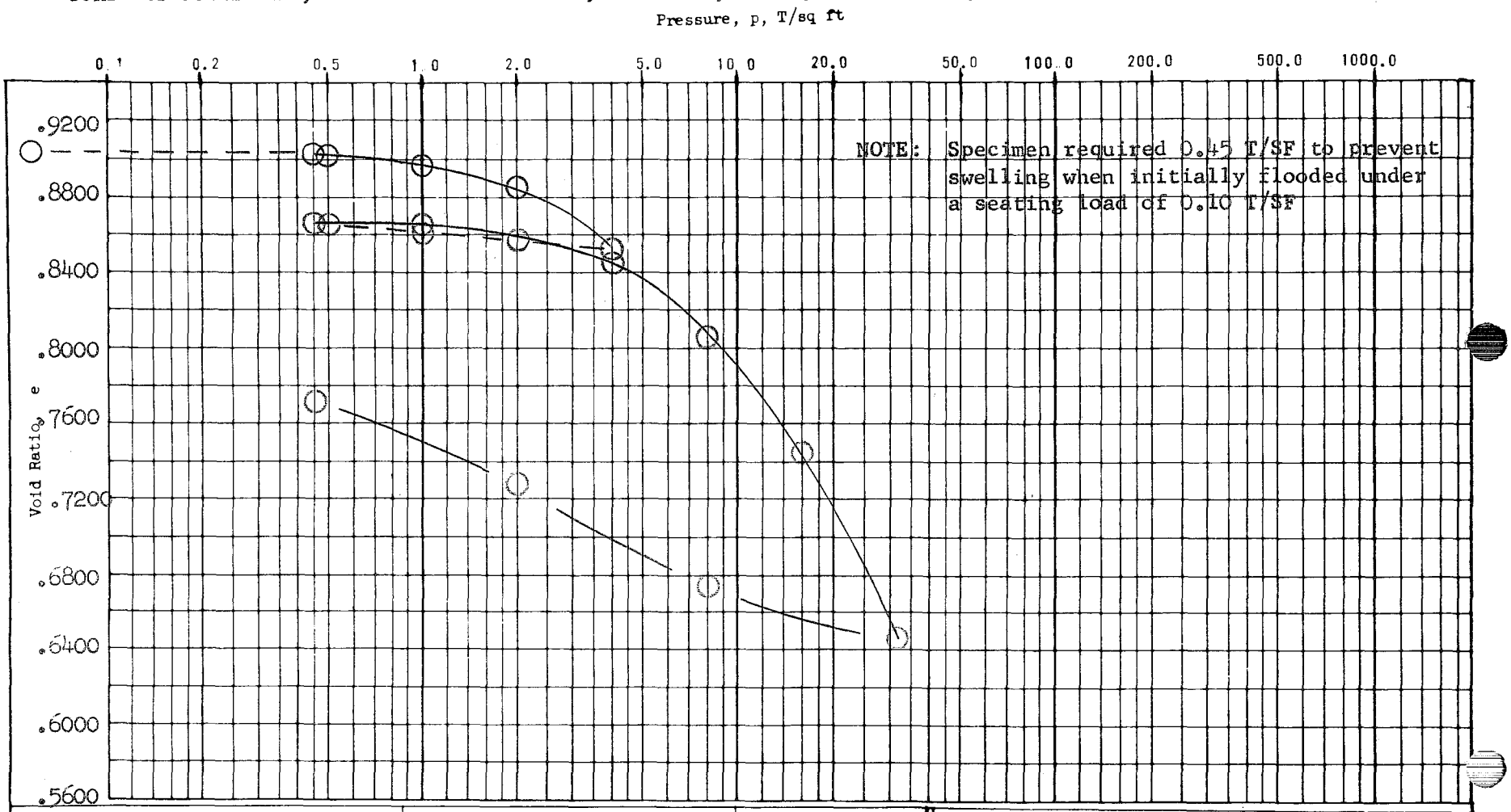
ENG FORM NO. 2089 REV JUNE 1970 PREVIOUS EDITION IS OBSOLETE TRANSLUCENT (EM 1110-2-1906)

3 Specimen requested to be remolded at 10.0% (2% above optimum) moisture content to 117.5PCF (95% of maximum CE55 Compaction) Dry Density.

Lab. No. 114/623

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 9063
REQ. NO. SAS-ENG-BEN-91



Type of Specimen Undisturbed		Before Test		After Test	
Diam 2.49 in.	Ht 1.00 in.	Water Content, w_o	33.3 %	w_f	28.7 %
Overburden Pressure, p_o T/sq ft		Void Ratio, e_o	.902	e_f	.772
Preconsol. Pressure, p_c T/sq ft		Saturation, S_o	99.2 %	S_f	100 %
Compression Index, C_c		Dry Density, γ_d	88.3 lb/ft^3		
Classification Lt. Grayish tan fat clay (CH) w/a trace of sand					
LL 87	G_s 2.69	1. See Lab Classification data on Form 2087.			
PL 34	D_{10} <.001 mm	2. Specimen Flooded Throughout test.			

Project Ft. Benning
Lab. No. 114/6206
Area EM Barracks Complex
Boring No. CS 36 | Sample No. 1
Depth 15.0'-17.0' | Date 13 June 1975

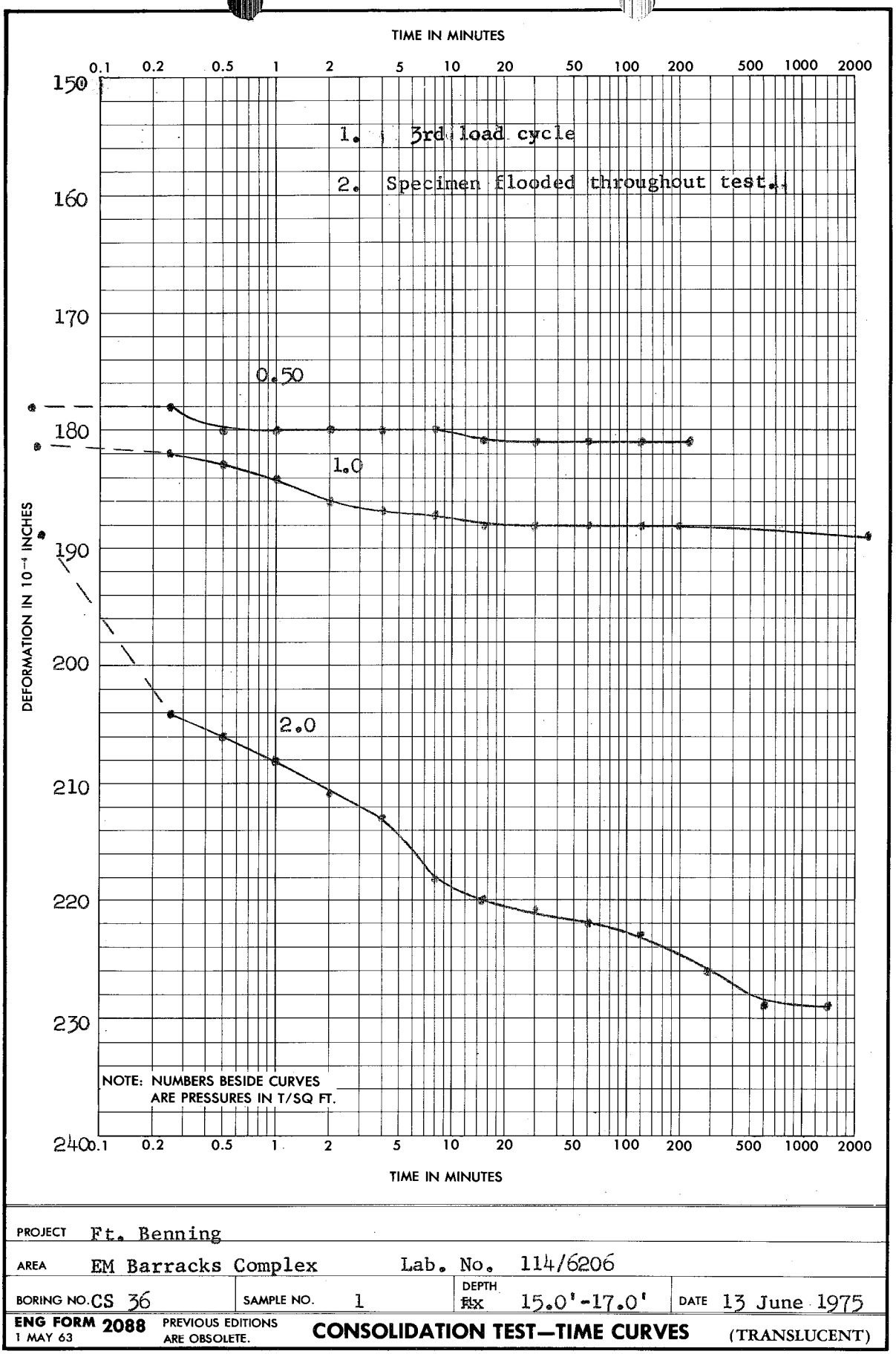
CONSOLIDATION TEST REPORT

SAD FORM 2073-R
24 MAR 70

Previous editions are obsolete

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 9063
REQ. NO. SAS-ENG-BEN-91



PROJECT	Ft. Benning			
AREA	EM Barracks Complex	Lab. No. 114/6206		
BORING NO. CS 36	SAMPLE NO. 1	DEPTH ~~Fix~~ 15.0'-17.0'	DATE 13 June 1975	

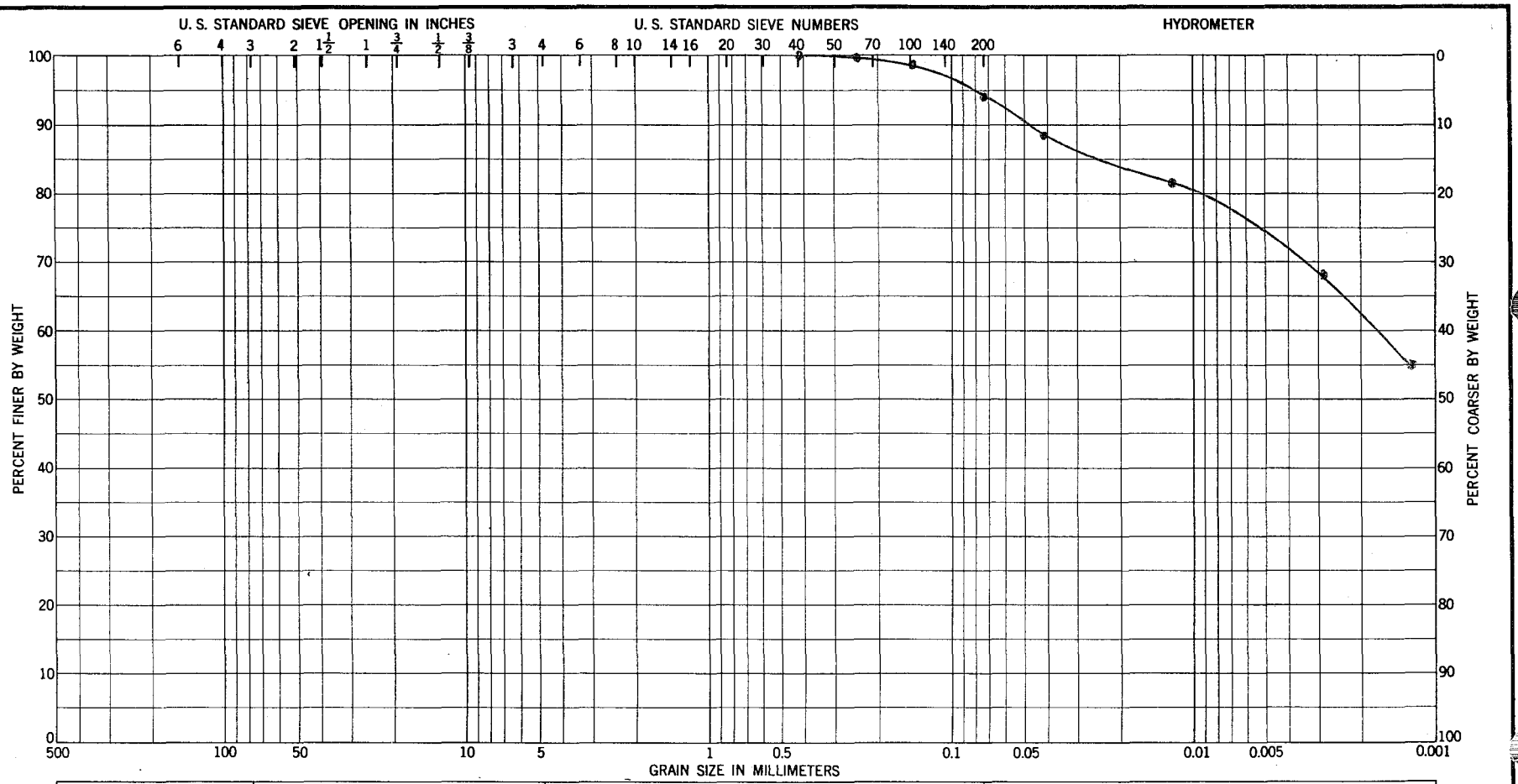
ENG FORM 2088 1 MAY 63 PREVIOUS EDITIONS ARE OBSOLETE.

CONSOLIDATION TEST—TIME CURVES (TRANSLUCENT)

* GPO : 1964 OF—715-965

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 9063
REQ. NO. SAS-ENG-BEN-91



Sample No.	~~Elev~~ Depth	Classification	Nat w %	LL	PL	PI
1	15.0'-17.0'	Lt. Grayish tan fat clay (CH) w/a trace of sand	35.0	87	34	53

GRADATION CURVES

Project Ft. Benning
Lab. No. 114/6206 (Consol. Test)
Area EM Barracks Complex
Boring No. CS-36, Sample 1
Date 13 June 1975

ENG FORM 1 MAY 63 2087

SUBSURFACE EXPLORATION
AND
GEOTECHNICAL ENGINEERING REPORT
(PRELIMINARY)

Trainee Barracks Upgrade Program (TBUP) Building 3425
LI 69147, FY11
Fort Benning, Georgia

By
Soils Section
Geotechnical & HTRW Branch
U.S. Army Engineer District, Savannah

March 2009

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b. Area and Site Geology	3
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ATTACHMENT A: Foundation Design Analysis for Trainee Barracks #4
ATTACHMENT B: Soil Test Boring Location Plan
ATTACHMENT C: Soil Test Boring Logs
ATTACHMENT D: Soil Laboratory Test Data

SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING REPORT (PRELIMINARY)

Trainee Barracks Upgrade Program (TBUP) Building 3425
LI 69147, FY 11
Fort Benning, Georgia

1. PURPOSE. The Government has used previous investigations for the preparation of this report. This subsurface characterization report provides a general overview of the site conditions, including subsurface soil and groundwater conditions, with detailed descriptions provided on the individual archived soil boring logs.

2. QUALIFICATION OF REPORT. There were no investigations completed specifically for the barracks renovations/addition. Existing subsurface data has been collected and used to characterize the subsurface soil and groundwater conditions. No effort was made to define, delineate, or designate any area of environmental concern or of contamination. The contractor's team shall include a licensed geotechnical engineer to interpret the report and develop foundation and earthwork recommendations and design parameters. Additional subsurface investigations and/or laboratory analyses required to determine site soil conditions and develop the final design shall be performed under the direction of a licensed geotechnical engineer and shall be the full responsibility of the contractor. A final geotechnical evaluation report shall be prepared by the licensed geotechnical engineer and submitted along with the first site design submittal.

3. PROJECT DESCRIPTION. The proposed project is the Trainee Barracks Upgrade Program for Building 3425. The project includes the reconfiguration of the existing Dining Facility into Classroom space, the retrofitting of the current Classroom space and the current Battalion Headquarters space along with the expansion of the Battalion Headquarters by 2,000 square feet. This work will involve the technological upgrade of existing building areas, systems, equipment, fixtures and other components (i.e. architectural/structural, mechanical, plumbing, electrical/lighting, fire, alarm systems, and Energy Monitoring & Control Systems).

4. EXPLORATION PROCEDURES.

a. Site Reconnaissance. Prior to the preparation of this report, a geotechnical engineer visually inspected the proposed project site and surrounding areas to observe the existing conditions. The observations were used in preparing this report.

b. Field Exploration.

(1) Subsurface conditions at the project site were explored by soil test borings in 1984 for the design of the existing barracks. A foundation design analysis report was prepared at that time. The 1984 report, Foundation Design Analysis for Trainee Barracks #4 is included as Attachment A. The borings were performed at the approximate locations shown on the plan included in Attachment B. The 1984 report and associated boring logs/soil test data are being provided for information only. Any references (enclosure) in the 1984 report are not included. These were mainly edits to outdated specification sections.

(2) Boring locations were established in the field by an engineer by measuring distance along and offsets from 2nd Armored Division Road. The ground surface elevation at each boring location was determined by interpolation from the site topography survey. Since the measurements were not precise, the locations shown on the boring layout plans and the elevations on the drilling logs should be considered approximate.

(3) The soil test borings for the barracks design were drilled by Savannah District using a truck mounted Failing 314 drill rig and an all-terrain-vehicle mounted CME 45 drill rig. Continuous split-barrel sampling with Standard Penetration Testing (SPT) was performed on the borings. All soil sampling and Standard Penetration Testing were in substantial accordance with ASTM D 1586. In the Standard Penetration Test, a soil sample is obtained with a standard 1 $^{3}/_{8}$-inch I.D. by 2-inch O.D. split-barrel sampler. The sampler is first seated 6 inches and then driven an additional 12 inches with blows from a 140 lb. hammer falling a distance of 30 inches. The number of blows required to drive the sampler the final 12 inches is recorded and is termed the "standard penetration resistance," or the "N-value." Penetration resistance, when properly evaluated, is an index of the soil's strength, density, and foundation support capability.

(4) Representative portions of the soil samples obtained from the borings were sealed in airtight containers and transported to the Savannah District office where they were examined by a geotechnical engineer. Classification of the soil samples was performed in general accordance with ASTM D 2488 (Visual-Manual Procedure for Description of Soils). The soil classifications include the use of the Unified Soil Classification System described in ASTM D 2487 (Classification of Soils for Engineering Purposes). Since the soil descriptions and classifications are based on visual examination, they should be considered approximate. No laboratory tests were performed on any samples collected from the soils investigation.

(5) Logs of the soil borings graphically depicting soil descriptions, standard penetration resistances, and groundwater levels are included in Attachment C.

5. SITE AND SUBSURFACE CONDITIONS.

a. Site Description. The site proposed for the Trainee Barracks Upgrade Program addition is Building 3425, near the intersection of 2nd Armored Division Road and Moye Road. The existing barracks were constructed in 1988 and are occupied by one battalion, (1,200

trainees) of Initial Entry Training Soldiers. The new construction is planned for the southeast side of Building 3425. It is possible that this portion of the site may contain loose fill material and/or possible building debris from the construction of the existing barracks.

b. Area and Site Geology.

(1) Fort Benning is located in the Coastal Plain physiographic province immediately south of the Fall Line, the demarcation separating the Coastal Plain from the Piedmont province. The Fall Line runs roughly east to west along the northern boundary of the base. The base is located in the Fall Line Zone where Cretaceous age sedimentary formations of the Coastal Plain overlap the deeply weathered metamorphic and igneous rocks of the Piedmont. In the Fort Benning area, the Cretaceous system includes, from oldest to youngest, the Tuscaloosa Formation, Eutaw Formation, Blufftown Formation, Cusseta Sand, and the Ripley Formation. The formations consist of poorly consolidated marine deposits of coarse to fine sands, gravel, micaceous clays, and shales. Soils derived from the Coastal Plain formations occupy about 85 percent of the land surface of Fort Benning.

(2) Younger deposits are also present at Fort Benning. Remnant terrace deposits occupy the tops of several ridges in the west-central portion of the installation; these are Pliocene in age and generally occur as isolated caps. The Kelley Hill section of the Fort Benning Cantonment is located on high alluvial terrace deposits of the Pleistocene Age, while to the west more recent low alluvial terrace deposits occupy both sides of the Chattahoochee River. These materials were deposited during times of high sea levels in the Pleistocene Epoch. The low alluvial terrace deposits are found in the area surrounding Lawson Army Airfield. They consist of sand, gravel, clay, organic material, and silt, and are pale yellow to medium gray in color. Wood pieces and dark gray clay are locally abundant. The deposits range in thickness from 33 to 49 feet.

c. Subsurface Soil Conditions.

(1) Field classifications indicate sandy materials are the predominant soil identified at the barracks site. These consisted mostly of clayey sands (SC), and silty sands (SM). Standard penetration resistances, or N-values, within these soils ranged from 2 to 100 for the sands. These resistances indicate that the relative density of the sandy soils range from very loose to very dense Interbedded layers of plastic clays (CH) and silts (MH) were encountered many of the borings. Standard penetration resistances, within these fine grained soils ranged from 8 to 77 indicating consistencies ranging from medium stiff to hard. Potential design-build contractors should note that there may be loose fill material and/or construction debris buried within the footprint of the new construction.

(2) The above subsurface description is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The boring logs should be reviewed for specific information at individual boring locations. The stratifications shown on the boring logs represent the conditions only at the actual boring locations. Variations may occur and should be expected between boring locations. The stratification lines shown on the

boring logs represent approximate boundaries between the subsurface materials; the actual transitions are typically more gradual.

d. Groundwater Conditions.

(1) Based on the borings drilled in 1984, the groundwater was encountered approximately 7 feet below the ground surface (approximately at elevation 265).

(2) It should be noted that groundwater conditions, including perched water, vary during periods of prolonged drought and excessive rainfall as well as seasonally. Therefore, fluctuations in the elevation of the groundwater and the occurrence of perched water conditions should be anticipated with changing climatic and rainfall conditions.

(3) Water should not be allowed to collect near the foundation or on floor slab areas of the building either during or after construction. Undercut or excavated areas should be sloped toward one corner to facilitate removal of any collected rainwater, groundwater or surface runoff. Positive site drainage should be provided to reduce infiltration of surface water around the perimeter of the building and beneath floor slabs.

6. DRAWINGS. The drawing showing the soil boring locations completed by the government is included in this RFP. These locations and the locations of any additional investigations (SPT borings, test pits, cone penetrometer tests, laboratory soils test data, etc.) performed by the AE's consulting geotechnical engineer shall be shown on the final design and on the project as-built drawings completed by the design build contractor. In addition, the selected design-build contractor shall show all boring logs, CPT soundings, and soil laboratory test data used for design on the final design drawings and on the as-built drawings.

7. SPECIFICATIONS. It is recommended that the AE use the Savannah District's EARTHWORK specification, 31 00 00, when editing the specifications for this project. The specification (SpecsIntact format) can be found at the following website, http://en.sas.usace.army.mil/enweb, under menus "Engineering Criteria" and "Guide Specs".

8. FINAL GEOTECHNICAL EVALUATION REPORT. A final geotechnical evaluation report shall be prepared by the contractor's licensed geotechnical engineer and submitted along with the first foundation design submittal. The geotechnical report shall summarize the subsurface conditions and provide recommendations for the design of appropriate foundations, floor slabs, retaining walls, embankments, roadways, and pavements. The report shall recommend the type of foundation system to be used, lateral load resistance capacities for foundation systems, and allowable bearing elevations for footings, grade beams, slabs, etc. An assessment of post-construction settlement potential including total and differential shall be provided. Recommendations regarding lateral earth pressures (active, at-rest, and passive) to be used in the design of retaining walls shall be provided. The report shall include the recommended spectral accelerations and Site Class for seismic design along with an evaluation of any seismic hazards and recommendations for mitigation, if required. Calculations shall be included to support the recommendations for bearing capacity, settlement, and pavement

sections. Supporting documentation shall be included for all recommended design parameters such as Site Class, shear strength, earth pressure coefficients, friction factors, subgrade modulus, California Bearing Ratio (CBR), etc. In addition, the report shall provide earthwork recommendations, expected frost penetration, expected ground-water levels, recommendations for dewatering and ground-water control, and identify the possible presence of any surface or subsurface features that may affect the construction of the project such as sinkholes, boulders, shallow rock, undocumented fill, old structures, soft areas, or unusual soil conditions.

ATTACHMENT A

Foundation Design Analysis for Trainee Barracks #4

FOUNDATION DESIGN
ANALYSIS REPORT
FOR
TRAINEE BARRACKS #4
FT. BENNING, GA
LI 321, FY 85

11 July 1984

1. General. A foundation design analysis for the subject facility has been completed. This analysis is based on data furnished by the AE on form SAS FL 363 dated 20 February 1984, borings taken at the proposed site, borings from nearby sites and associated laboratory testing. Any change in siting, filling, finished floor elevation, finished grade elevations or structural loads could possibly affect this analysis. Any of the above mentioned changes should be brought to the attention of the Geotechnical and Materials Branch so that a review of the foundation analysis can be made. Information from this analysis is presented in the following paragraphs for design use by the AE.

2. Bearing Capacity. The maximum allowable soil bearing value is 2000 psf. This value is based on the following:

a. A minimum footing width of 2.0 feet.

b. A minimum depth of 3.0 feet to the base of the footings, measured from finished floor, finished grade, or bottom of crawl space, whichever is lowest.

c. Special foundation requirements as presented in other paragraphs of this report are met.

d. The requirements of the specifications regarding materials, excavation, compaction and dewatering are followed.

3. Groundwater. Based on borings drilled in April 1984, the groundwater table was encountered approximately 7.0 feet below the top of ground, or at elevation 265. This is approximately 7.0 feet below the proposed finished floor elevation of 272.0 feet and 2 feet below the proposed basement/crawl space elevation of 267.0 feet. A vapor barrier and a 4-inch capillary water barrier are required below all interior slabs-on-grade and shall be shown on all applicable drawings. Foundation drains are not required.

4. Specifications. The Savannah District Guide Specification Section 2E1 entitled EXCAVATION, FILLING AND BACKFILLING FOR BUILDINGS dated September 1983 shall be used for the subject project. Certain amendments are presented in the following paragraphs which shall be included in this section verbatim. Also, the specification writer shall read the General and Technical Notes and include or delete other applicable requirements.

a. Amend subparagraph 1.2 as shown on Inclosure 1.

11 July 1984

b. Paragraph 2, DEFINITIONS, shall be completed as shown on Inclosure 2.

c. Amend subparagraph 2.7, Drilling Logs, as shown on Inclosure 3.

d. Amend subparagraph 5.2.2, Control of Groundwater, as shown on Inclosure 4.

e. Amend paragraph 5.7, Borrow, as shown on Inclosure 5.

f. Delete subparagraph 6.3.1, Moisture Content, which specifies percentage points as shown on Inclosure 6.

g. Delete subparagraph 6.5.1.4, Field Density Tests, as shown on Inclosure 7.

h. Soil treatment shall be specified as shown in paragraph 8 in Section 2E1.

i. A layer of CH material exists in several locations in the vicinity of the base of the crawl space. Excessive settlement is expected in this layer of material and removal is required. The following paragraph shall be added to the specifications, verbatim:

"5.1.1 Required Special Excavation. The area beneath the building and to a distance of 10.0 feet beyond the buildings' lines shall be excavated to elevation 260.00 ft. msl. Dewatering may be required in some areas of the excavation. Dewatering shall be as specified in paragraph: CONTROL OF GROUNDWATER."

j. Add the following paragraph, verbatim:

"5.8.1 Re-use of Special Excavation Materials. Materials excavated from the location specified in paragraph 5.1.1 may be re-used as fill below the structure provided they meet the satisfactory fill requirements and are free of organic material. All material determined to be unsatisfactory shall be disposed of in the designated spoil area."

5. Pavement Design Criteria. The soil types expected to be encountered under bituminous and/or concrete pavement, roads, and parking areas are SP, SM, and CH. Unsatisfactory subgrade soils shall be removed and replaced with satisfactory soils in accordance with the requirements of Section 2G3 of the specifications. The subgrade values of the satisfactory soils to be used in pavement design are as follows:

a. Flexible Pavement. Compacted subgrade, use CBR of 10.

b. Concrete Pavement.

(1) Corrected modulus subgrade soil reaction, use k of 150 pci.

11 July 1984

(2) Design 28-day concrete flexural strength, use 650 pci.

Materials classified as CH are prevalent in the top layers of soil in areas of the project. This material must be removed and replaced with suitable material in the top 18 inches of subgrade for minor roads and top 24 inches for major roads.

6. The following criteria should be used for design of retaining walls:

a. Coefficient of at-rest earth pressure (k_o) = 0.50

b. Coefficient of active earth pressure (k_a) = 0.33

c. Coefficient of passive earth pressure (k_p) = 3.00

d. Saturated soil density (δ_{sat}) = 130 pcf

e. Sliding friction, soil vs. concrete (u_f) = 0.35

7. The AE is reminded to show all drilling locations, identities, and types on an applicable p-plate with a note to read, "See Appendix A of the specifications for complete logs of borings".

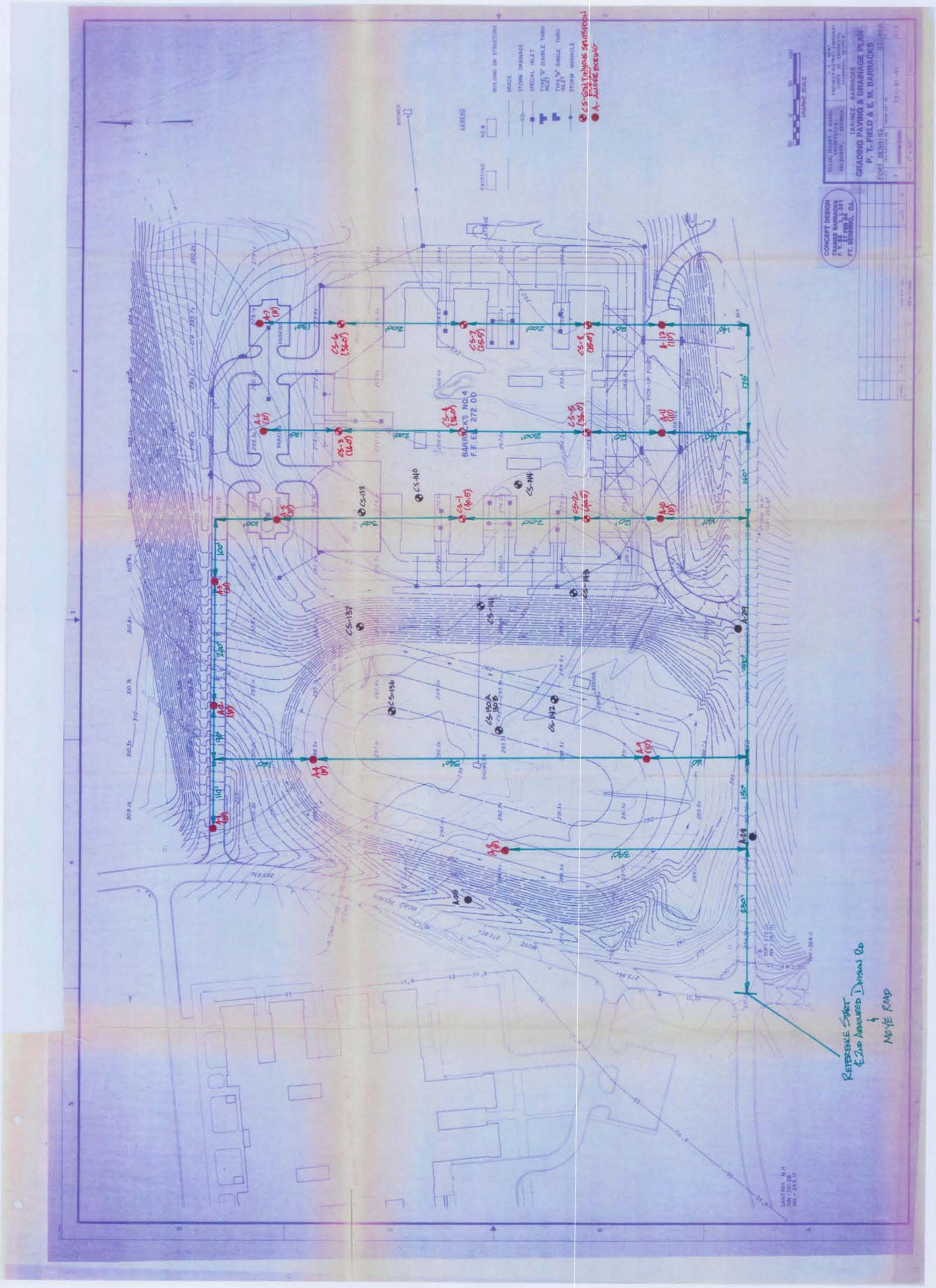
William A. Davidson

7 Incl
as

WILLIAM A. DAVIDSON, P.E.
Soils Section
Geotechnical and Materials Branch

ATTACHMENT B

Soil Test Boring Location Plan


GRADING PAVING & DRAINAGE PLAN
P. T. FIELD & E. M. BARRACKS
TRAINEE BARRACKS
FORT BENNING, GA.
CONCEPT DESIGN
BARRACKS NO. 4
F.F. EL. 272.00
LEGEND
BUILDING OR STRUCTURE
GRADE
STORM DRAINAGE
SPECIAL INLET
TYPE "B" DOUBLE THRU INLET
TYPE "B" SINGLE THRU INLET
STORM MANHOLE
CS-CONTINUOUS SPRITSPOON
A-AUGER BORING
REFERENCE START
℄ 2ND ARMORED DIVISION RD
MOYE ROAD

ATTACHMENT C

Soil Test Boring Logs

DRILLING LOG

DIVISION: SOUTH ATLANTIC
INSTALLATION: FORT BENNING, GA.
SHEET 1 OF 2 SHEETS

1. PROJECT: TRAINEE BARRACKS LI 321 FY-85
2. LOCATION (Coordinates or Station): SEE PLAN
3. DRILLING AGENCY: SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number): CS-1
5. NAME OF DRILLER: C.D. JUSTISS
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 40.5'
8. DEPTH DRILLED INTO ROCK: 0.0'
9. TOTAL DEPTH OF HOLE: 40.5'
10. SIZE AND TYPE OF BIT: 1 3/8" ID SPLITSPOON
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: FALLING 314
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 8; UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 17 APRIL 1984; COMPLETED 18 APRIL 1984
17. ELEVATION TOP OF HOLE: 276.0
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: Charles O. Griffin

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
276.0	0'					BLOWS 0'
274.0			SM- BROWN SILTY FINE SAND		JAR 1	7
						13
			SC- ORANGE CLAYEY	18.4	2	18
	5'		FINE SAND			W.T. 17.0' 5'
						Date 18 APRIL 1984
						Depth to water
						during drilling 29
267.0			RED AND BRIGHT ORANGE, VERY FINE GRAINED, TRACES OF MICA			41
						46
	10'		SM- BRIGHT ORANGE SILTY FINE SAND	13.3	3	10'
			BRIGHT ORANGE AND YELLOWISH TAN, FINE AND MEDIUM GRAINED			W.T. 17.3' 68
						Water table reading
			LIGHT BEIGE, TAN, ORANGE			24 hrs after 39
						hole completed
			BRIGHT ORANGE			37
				8.5	4	
	15'					36 15'
			FINE TO COARSE GRAINED, WET			37
						SAMPLE LAB NO. CLASS LL PL PI
						2 SM 48 28 20 18
						4 SM NP NP NP
	20'		YELLOW AND ORANGE, MEDIUM AND COARSE GRAINED EXTREMELY SATURATED			5 SP-SM NP NP NP 20 20'
						6 SC 34 15 19 23
			BRIGHT ORANGE			4
						7
	25'		TAN AND ORANGE, FINE TO COARSE GRAINED	19.0	5	25'
			MEDIUM TO COARSE GRAINED WITH GRAVEL			23
			LIGHT TAN AND WHITE, FINE AND MEDIUM GRAINED			29
			YELLOWISH TAN			70
246.0	30'					70 30'
			CONTINUED ON SHEET 2			

NOTE: Soils field classified in accordance with the Unified Soil Classification System

BLOWS PER FOOT: Number required to drive 1 3/8" ID splitspoon w/140 lb hammer falling 30".

DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE 276.0 | **Hole No. CS-1**

PROJECT: TRAINEE BARRACKS LI321 FY-85 | INSTALLATION: FORT BENNING, GA. | SHEET 2 OF 2 SHEETS

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOV-ERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	
246.0	30'	c	d % MOISTURE		JAR	g BLOWS	30'
			SM-YELLOWISH TAN FINE AND MEDIUM GRAINED SILTY SAND			100	
			ORANGE, BEIGE, LIGHT YELLOW			100/0.7	
						100/0.8	
	35'		BEIGE AND TAN				35'
240.0						100	
238.5			SC - ORANGE, GRAY, BEIGE, MEDIUM TO COARSE GRAINED CLAYEY SAND	14.4	6	100	
			SM - LIGHT TAN AND WHITE SILTY FINE SAND		7	77	
			ORANGE AND BEIGE FINE AND MEDIUM GRAINED				
235.5	40'				8	74	40'
			BOTTOM OF HOLE 40.5'				

Hole No. CS-2

DRILLING LOG

DIVISION: SOUTH ATLANTIC
INSTALLATION: FORT BENNING, GA.
SHEET 1 OF 2 SHEETS

1. PROJECT: TRAINEE BARRACKS CE 321 FY-85
2. LOCATION (Coordinates or Station): SEE PLAN
3. DRILLING AGENCY: SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number): CS-2
5. NAME OF DRILLER: C.D. JUSTISS
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 40.5'
8. DEPTH DRILLED INTO ROCK: 0.0'
9. TOTAL DEPTH OF HOLE: 40.5'
10. SIZE AND TYPE OF BIT: 1 3/8" ID SPLITSPOON
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: FAILING 314
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 12; UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 16 APRIL 1984; COMPLETED 16 APRIL 1984
17. ELEVATION TOP OF HOLE: 281.2
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: Charles D. Griffin

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% MOISTURE	BOX OR SAMPLE NO. JAR	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	BLOWS
281.2	0'b	c	d			g	0'
279.7			CL - DARK REDDISH ORANGE FINE SANDY SILTY CLAY	26.6	1		10
			SC - DARK REDDISH ORANGE FINE CLAYEY SAND	24.4	2	W.T. 26.0'	17
			ORANGE, TAN, WITH GRAY STREAKS			Date 16 APRIL 1984 Depth to water during drilling	45
	5'		ORANGE				5'
275.2							89
273.7			SM - BRIGHT REDDISH ORANGE SILTY FINE AND MEDIUM SAND, SLIGHTLY CLAYEY	12.4	3		90
			SC - REDDISH ORANGE CLAYEY FINE AND MEDIUM SAND		4	W.T. 25.1' Water table reading 24 hrs. after hole completed	100
270.7	10'						10'
			CH - ORANGE, GRAY, PURPLE, HARD FAT CLAY WITH LENSES OF CLAYEY SAND	20.9	5		45
269.2							37
			SC - GRAY, TAN, ORANGE, CLAYEY FINE SAND	13.1	6	SAMPLE NO / LAB CLASS / LL / PL / PI	45
			GRAY WITH RED STREAKS			1 CH 75 29 46	
	15'		ORANGE, RED, GRAY			2 CH 76 31 45	37 15'
264.7						5 SC-H 63 26 37	
			SM - ORANGE AND TAN SILTY FINE SAND		7	12 SM NP NP NP	45
			YELLOW				51
							41
	20'		TAN AND ORANGE, FINE AND MEDIUM GRAINED				20'
			BEIGE FINE TO COARSE SILTY SAND WITH GRAVEL	5.6	8		38
			BEIGE AND YELLOW				100/0.9
			BRIGHT ORANGE				70
	25'						25'
			MEDIUM GRAINED		9		50
			WITH GRAVEL				50
							73
251.2	30'		ORANGE AND BROWN FINE TO COARSE GRAINED SILTY SAND WITH GRAVEL				51 30'

CONTINUED ON SHEET 2

NOTE: Soils field classified in accordance with the Unified Soil Classification System.

BLOWS PER FOOT:
Number required to drive 1⅜" ID splitspoon w/140 lb. hammer falling 30".

DRILLING LOG (Cont Sheet) ELEVATION TOP OF HOLE **Hole No. CS-2**

PROJECT: TRAINEE BARRACKS LE 321 FY-85 | INSTALLATION: FORT BENNING, GA. | SHEET 2 OF 2 SHEETS

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOV-ERY / % MOISTURE	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	
	c		d		JAR	g	BLOWS
251 & 2	30'		SC - LIGHT GRAY AND BEIGE MEDIUM TO COARSE GRAINED CLAYEY SAND		10		70
248.2			TAN AND BEIGE				100/0.9
			SM - BEIGE SILTY FINE AND MEDIUM SAND		11		80
	35'		BEIGE, GRAY, ORANGE, WITH HARD CLAY LAYERS AND SOME GRAVEL				65
			BEIGE WITH CLAY BALLS AND GRAVEL				74
			LIGHT TAN FINE AND MEDIUM GRAINED SILTY SAND				88
240.7	40'		BEIGE AND ORANGE, FINE SILTY SAND	20.1	12		49
			BOTTOM OF HOLE 40.5'				

Hole No. CS-3

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Ft. Benning, Ga.	SHEET 1 OF 2 SHEETS

1. PROJECT: LI 321 FY 85 Trainee Barracks
2. LOCATION (Coordinates or Station): See plan
3. DRILLING AGENCY: Savannah District
4. HOLE NO. (As shown on drawing title and file number): CS-3
5. NAME OF DRILLER: Avery Yates
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 36.0'
8. DEPTH DRILLED INTO ROCK: 0.0'
9. TOTAL DEPTH OF HOLE: 36.0'
10. SIZE AND TYPE OF BIT: 1 3/8" ID Splitspoon
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: CME 45
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 7; UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE: STARTED 18 APRIL 84; COMPLETED 18 APRIL 84
17. ELEVATION TOP OF HOLE: 272.9'
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR: [signature]

ELEVATION (272.9')	DEPTH (0') b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	~~% CORE RECOVERY~~ % MOISTURE	BOX OR SAMPLE NO. JARS	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	BLOWS
			SM - TAN SILTY FINE SAND	5.5	1		6, 6, 6, 5
265.4'	5'					W.T. 14.0' Date 18 APRIL 84 Depth to water during drilling	17
			ML - GRAY AND ORANGE TAN MOTTLED, CLAYEY, SANDY MICACEOUS INORGANIC SILT	23.5	2		25, 22, 28
260.9'	10'						
			SM - RUST BROWN INDURATED 1/4" THICK (HARDPAN) SILTY SAND, FINE				52
			RUST TAN SILTY FINE TO VERY FINE SAND WITH RUSTBROW LAYERS	14.4	3	W.T. 12.6' Water table reading 24 hrs. after hole completed.	64
	15'		YELLOW TAN				17
255.9'			ORANGE TAN				16
			ML - ORANGE TAN CLAYEY, SANDY MICACEOUS INORGANIC SILT	20.6	4	SAMPLE NO / LAB CLASS / LL / PL / PI	28
	20'		GRAY			2 CH 51 21 30	24
250.4'			SANDY			3 SM NP NP NP	29
			SM BEIGE VERY FINE SILTY MICACEOUS SAND		5	4 SC 38 23 15	58
	25'		SLIGHTLY CLAYEY				89
245.9'							32
244.4'			SC - BEIGE VERY FINE CLAYEY MICACEOUS SAND		6		65
242.9	30'		SM - BEIGE VERY FINE SILTY MICACEOUS SAND				100/0.6

NOTE: Soils field classified in accordance with the Unific Soil Classification System.

BLOWS PER FOOT: Number required to drive 1 3/8" ID splitspoon [illegible] hammer falling 30".

DRILLING LOG (Cont Sheet) ELEVATION TOP OF HOLE 272.9' **Hole No.** CS-3

PROJECT LI 321 FY 85 TRAINEE BARRACKS | INSTALLATION FT. BENNING, GA. | SHEET 2 OF 2 SHEETS

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
242.9'	30'	c	d	e	JARS	g BLOWS
			SM- BEIGE VERY FINE SILTY MICACEOUS SAND			100/0.6'
			YELLOWISH TAN, FINE			100/6.5'
						100/0.5'
236.9'	35'					100/0.4'
			BOTTOM OF HOLE 36.0'			

30'
35'

DRILLING LOG

DIVISION: SOUTH ATLANTIC
INSTALLATION: FT BENNING GA
SHEET 1 OF 2 SHEETS

1. PROJECT 21 321 FY 85
TRAINEE BARRACKS
2. LOCATION (Coordinates or Station)
SEE PLAN
3. DRILLING AGENCY
SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number) CS-4
5. NAME OF DRILLER
AVERY YATES
6. DIRECTION OF HOLE
☑ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN 36.0'
8. DEPTH DRILLED INTO ROCK 0.0'
9. TOTAL DEPTH OF HOLE 36.0'
10. SIZE AND TYPE OF BIT 1 3/8" ID SPLITSPOON
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
MSL
12. MANUFACTURER'S DESIGNATION OF DRILL
CME 45
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 5; UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE: STARTED 17 APRIL 84; COMPLETED 17 APRIL 84
17. ELEVATION TOP OF HOLE 268.0'
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY / % MOISTURE	BOX OR SAMPLE NO. / JARS	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	BLOWS
268.0'	0' b	c	d			g	0'
			SM - TAN SILTY PEBBLEY FINE SAND		1		3
			TAN				2
	5'						9 5'
			RUST TAN			W.T. 12.0' Date 17 APRIL 84 Depth to water during drilling	34
				16.6	2		27
							29
	10'						29 10'
			GRANULE AND PEBBLES				31
						W.T. 10.5' Water table reading 24 hrs. after hole completed.	32
			RED BROWN				16 15'
	15'						
			YELLOWISH TAN				16
					3		30
						SAMPLE NO / LAB CLASS / LL / PL / PI: 2 SM NP NP NP; 5 CH 53 22 31	20 20'
	20'						40
			MEDIUM SAND				32
							38
	25'						28 25'
			BEIGE TAN		4		32
			SPARCE GRAVEL				60
			BEIGE TAN				61
238.0'	30'						30

NOTE: Soils field classified in accordance with the Unified Soil Classification System.

BLOWS PER FOOT: Number required to drive 1⅜" ID splitspoon w/140 lb. hammer falling 30"

DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE 268.0' | **Hole No.** C5-4

PROJECT C1 321 FY 85 TRAINEE BARRACKS | INSTALLATION FT. BENNING, GA | SHEET 2 OF 2 SHEETS

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE ~~RECOV-ERY~~ / % MOISTURE	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
238.0'	30' b	c	d		JARS	g BLOWS
			SM - BEIGE TAN SILTY FINE SAND			100/0.8'
235.0'						52
	35'		CH - RED, GRAY AND TAN MOTTLED SANDY SILTY CLAY			54
232.0'				28.0	5	60
			BOTTOM OF HOLE 36.0'			

30'

35'

Hole No. CS-5

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Ft. Benning, GA	SHEET 1 OF 2 SHEETS

1. PROJECT: LI 321 FY 85 Trainee Barracks
2. LOCATION (Coordinates or Station): See Plan
3. DRILLING AGENCY: Savannah District
4. HOLE NO. (As shown on drawing title and file number): CS-5
5. NAME OF DRILLER: Avery Yates
6. DIRECTION OF HOLE: [x] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 36.0'
8. DEPTH DRILLED INTO ROCK: 0.0'
9. TOTAL DEPTH OF HOLE: 36.0'
10. SIZE AND TYPE OF BIT: 1 3/8" ID Splitspoon
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: CME 45
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 10; UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 16 April 84; COMPLETED 17 April 84
17. ELEVATION TOP OF HOLE: 272.3'
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: [signature] III

ELEVATION 272.3'	DEPTH 0' b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	~~% CORE RECOVERY~~ % MOISTURE	BOX OR SAMPLE NO. JARS	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	BLOWS 0'
269.3'			SC - Red Brown Clayey Fine Sand w/ Roots and Organic Debris		1		5
266.3'	5'		SM - Tan Silty Fine Sand, Slightly Clayey	8.1	2	W.T. 6.0'	6, 24
263.3'			SC - Orange Tan Clayey Medium Sand		3	Date 16 April 84 Depth to water during drilling	15, 22
260.3'	10'		SM - Red Coarse to Medium Silty Sand		4		23, 15
258.8'			MH - Purple Micaceous Sandy Clayey Silt with Gray Mottling	17.1	5		15, 24
254.3'	15'		SC Gray Clayey Fine to Medium Sand	15.3	6	W.T. 7.2' Water table reading 24 hrs. after hole completed.	35, 32, 25
	20'		SM - Gray Medium to Coarse Silty Sand; Yellow Tan, Slightly Clayey		7		40, 31
252.8'			Fine to Medium Grained				43
	25'		CH - Gray Micaceous, Sandy, Silty, Fat Clay	26.8	8		21, 29
			Red Brown, Tan and Gray Mottled				45
242.3'	30'		Sandy	14.3	9		26, 72

SAMPLE NO	LAB CLASS	LL	PL	PI
5	SC	38	16	22
8	CH	54	25	29
9	CL	41	16	25

CONTINUED ON NEXT PAGE

NOTE: Soils field classified in accordance with the Unified Soil Classification System.

BLOWS PER FOOT: Number required to drive 1 3/8" ID splitspoon w/140 lb. hammer falling 30".

DRILLING LOG (Cont Sheet) ELEVATION TOP OF HOLE 272.3' **Hole No.** CS-5

PROJECT LI 321 FY 85 TRAINEE BARRACKS | INSTALLATION FT BENNING, GA | SHEET 2 OF 2 SHEETS

ELEVATION 242.3'	DEPTH 30' b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. JARS	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g BLOWS
			CH- RED BROWN, TAN AND GRAY MOTTLED, SANDY, SILTY FAT CLAY			72
237.8'						100/0.9
236.3	35'		SC - GRAY CLAYEY FINE SAND WITH TAN STREAKS		10	100/0.1' 42
			BOTTOM OF HOLE 36.0'			

30'

35'

Hole No. CS-6

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Ft Benning, GA	SHEET 1 OF 2 SHEETS

1. PROJECT LI 321 FY 85 — TRAINEE BARRACKS
2. LOCATION (Coordinates or Station): SEE PLAN
3. DRILLING AGENCY: SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number): CS-6
5. NAME OF DRILLER: AVERY YATES
6. DIRECTION OF HOLE: [x] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 36.0'
8. DEPTH DRILLED INTO ROCK: 0.0'
9. TOTAL DEPTH OF HOLE: 36.0'
10. SIZE AND TYPE OF BIT: 1 3/8" ID Split spoon
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: CME 45
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 10; UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 15 APRIL 84; COMPLETED 16 APRIL 84
17. ELEVATION TOP OF HOLE: 271.5'
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: John [illegible]

ELEVATION (271.5')	DEPTH (0')	LEGEND	CLASSIFICATION OF MATERIALS (Description)	~~% CORE RECOVERY~~ % MOISTURE	BOX OR SAMPLE NO. JARS	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) BLOWS
268.5'			SM - BROWN SILTY FINE SAND		1	
264.0'	5'		CH - RED ORANGE, GRAY AND TAN MOTTLED, SANDY, SILTY FAT CLAY, MICACEOUS	15.1	2	W.T. 9.0' Date 15 APRIL 84 Depth to water during drilling
261.0'	10'		MH - RUST TAN WITH GRAY CLAYEY, SANDY MICACEOUS SILT	24.2	3	
255.0'	15'		SM - RUST TAN MEDIUM TO FINE SAND WITH GRANULES; MEDIUM TO COARSE; SMALL GRAVEL		4	
253.5'			CL - LIGHT BROWN LEAN CLAY WITH CARBONACIOUS MATERIAL	28.8	5	W.T. 12.0' Water table reading 24 hrs. after hole completed.
252.0'			CH - GRAY FAT (EUTAW-LIKE) CLAY WITH CARBONACIOUS MATERIAL	25.0	6	
244.5'	20', 25'		SM - BEIGE FINE SILTY SAND WITH LARGE GRAVEL		7	
243.0'			CL - LIGHT GRAY BROWN SANDY SILTY MICACEOUS LEAN CLAY W/ CARBONACEOUS MATERIAL		8	
241.5'	30'		CH - GRAY FAT (EUTAW-LIKE) CLAY WITH CARBONACEOUS MATERIAL	15.8	9	

CONTINUED ON NEXT PAGE

SAMPLE NO	LAB CLASS	LL	PL	PI
2	SC-H	51	23	28
3	CH	58	23	35
5	MH	60	32	28
6	MH	57	31	26
9	CL	36	19	17

BLOWS PER [illegible]

Number required to drive 1 3/8" ID splitspoon w/140 lb. hammer falling 30".

NOTE: Soils field classified in accordance with the Unified Soil Classification System.

DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE 271.5' | **Hole No.** C5-6

PROJECT 41321 FY 85 TRAINEE BARRACKS | INSTALLATION FT. BENNING, GA | SHEET 2 OF 2 SHEETS

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
241.5'	30.0'	c	d	e	TARS	g
			CH- GRAY FAT (TUTAW LIKE) CLAY W/ CARBONACIOUS MATERIAL			BLOWS 30'
			SANDY			100
238.5'						53
			SC- GRAY FAT CLAYEY MICACEOUS SAND		10	100/0.4'
	35'					35'
235.5'						42
			BOTTOM OF HOLE 36.0'			

Hole No. CS-7

DRILLING LOG

DIVISION: SOUTH ATLANTIC
INSTALLATION: FT BENNING, GA
SHEET 1 OF 1 SHEETS

1. PROJECT: 21 321 FY-85 TRAINEE BARRACKS
2. LOCATION (Coordinates or Station): SEE PLAN
3. DRILLING AGENCY: SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number): CS-7
5. NAME OF DRILLER: AVERY YATES
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 25.5'
8. DEPTH DRILLED INTO ROCK: 0.0'
9. TOTAL DEPTH OF HOLE: 25.5'
10. SIZE AND TYPE OF BIT: 1 3/8" ID SPLITSPOON
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: CME 45
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 6; UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 15 APRIL 84; COMPLETED 15 APRIL 84
17. ELEVATION TOP OF HOLE: 263.8'
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: [signature]

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	% MOISTURE	BOX OR SAMPLE NO. JARS	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	BLOWS
263.8'	0'							0'
262.3'			SM- BROWN AND TAN SILTY FINE SAND		8.9	1		7
			SC - RUST TAN CLAYEY FINE SAND			2		11
259.3'			GRAY AND RUST TAN MOTTLED, MICACEOUS					18
	5'		SM- ORANGE TAN WITH GRAY SILTY FINE SAND		14.7	3	W.T. 8.0' Date 15 APRIL 84 Depth to water during drilling	5'
			GRANULES					30
								33
	10'		YELLOW, MICACEOUS			4		26
								26 10'
							W.T. 7.5' Water table reading 24 hrs. after hole completed.	36
248.8'								36
	15'		CH - GRAY MICACEOUS SILTY SANDY FAT CLAY, LIGHT PURPLE + TAN MOTTLING		19.1	5		42 15'
247.3'								100/4"
			SC - GRAY WITH LIGHT PURPLE AND TAN MOTTLING CLAYEY FINE TO MEDIUM SAND WITH GRANULES		9.6	6		77
	20'						SAMPLE LAB NO CLASS LL PL PI 3 SM NP NP NP 5 CL 46 21 25 6 SC 41 16 25	93 28
			GRAY					45
								34
								22
238.3'	25'							16 25'
			BOTTOM OF HOLE 25.5'					

NOTE: Soils field classified in accordance with the Unified Soil Classification System.

BLOWS PER FOOT: Number required to drive 1 3/8" ID splitspoon w/140 lb. hammer falling 30".

Hole No. CS-8

DRILLING LOG

DIVISION: SOUTH ATLANTIC
INSTALLATION: FT. BENNING, GA
SHEET 1 OF 1 SHEETS

1. PROJECT: 21 321 FY 85 — TRAINEE BARRACKS
2. LOCATION (Coordinates or Station): SEE PLAN
3. DRILLING AGENCY: SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number): CS-8
5. NAME OF DRILLER: AVERY YATES
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 15.0'
8. DEPTH DRILLED INTO ROCK: 0.0'
9. TOTAL DEPTH OF HOLE: 15.0'
10. SIZE AND TYPE OF BIT: 1 3/8" ID SPLIT SPOON
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: CME 45
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 6; UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 15 APRIL 84; COMPLETED 15 APRIL 84
17. ELEVATION TOP OF HOLE: 260.2'
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: John [illegible]

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOV-ERY	% MOISTURE	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)	BLOWS
260.2'	0'							0
			SM - TAN SILTY FINE SAND			1		
			BROWN AND TAN				W.T. NOT ENCOUNTERED	8
							Date 15 APRIL 84	5
255.7'							Depth to water	8
254.2'	5		SC - TAN CLAYEY FINE SAND W/ GRANULES	10.9		2	during drilling	5
			SM - BEIGE AND TAN SILTY FINE TO MEDIUM SAND	7.6		3		15
			SLIGHTLY CLAYEY					20
251.2'							W.T. DRY	21
	10		CH - GRAY WITH ORANGE STREAKS SANDY SILTY FAT CLAY	32.6		4	Water table reading 24 hrs. after hole completed.	9
248.2'								10
246.7'			SC - GRAY WITH RUST TAN STREAKS, CLAYEY, MICACEOUS, VERY FINE SAND WITH MH BINDER	18.2		5		13
								22
245.2'	15					6		20
								15

NOTE: Soils field classified in accordance with the Unified Soil Classification System.

SAMPLE NO	LAB CLASS	LL	PL	PI
2	SC	35	19	16
4	CH	68	26	42

DRILLING LOG

DIVISION: SOUTH ATLANTIC
INSTALLATION: FORT BENNING, GA.
SHEET 1 OF 1 SHEETS

1. PROJECT: TRAINEE BARRACKS CI 321 FY-85
2. LOCATION (Coordinates or Station): SEE PLAN
3. DRILLING AGENCY: SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number): A-1
5. NAME OF DRILLER: C. JUSTISS AND F. WHITE
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 10.0'
8. DEPTH DRILLED INTO ROCK: 0.0'
9. TOTAL DEPTH OF HOLE: 10.0'
10. SIZE AND TYPE OF BIT: 4" HAND AUGER
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL:
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 3; UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 15 APRIL 1984; COMPLETED 15 APRIL 1984
17. ELEVATION TOP OF HOLE: 301.2
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: Charles D. Griffin

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOV-ERY	% MOISTURE	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
301.2	0'		SM - REDDISH ORANGE SILTY FINE AND MEDIUM SAND		10.2	1	
			WITH THIN LAYER OF CLAYEY SAND				W.T. NOT ENCOUNTERED Date 15 APRIL 1984 Depth to water during drilling
	2'		TAN				
			LIGHT BROWN				W.T. DRY Water table reading 24 hrs. after hole completed.
297.2	4'		SC - TAN FINE CLAYEY SAND		13.8	2	
	6'		ORANGE AND TAN				SAMPLE NO 2; LAB CLASS SC; LL 30; PL 18; PI 12
	8'						
						3	
291.2	10'		BOTTOM OF HOLE 10.0'				

NOTE: Soils field classified in accordance with the Unified Soil Classification System.

Hole No. A-2

DRILLING LOG

DIVISION	SOUTH ATLANTIC
INSTALLATION	FORT BENNING, GA.
SHEET	1 OF 1 SHEETS

1. PROJECT: TRAINEE BARRACKS CE 321 FY-85
2. LOCATION (Coordinates or Station): SEE PLAN
3. DRILLING AGENCY: SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number): A-2
5. NAME OF DRILLER: C. JUSTISS AND F. WHITE
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 10.0'
8. DEPTH DRILLED INTO ROCK: 0.0'
9. TOTAL DEPTH OF HOLE: 10.0'
10. SIZE AND TYPE OF BIT: 4" HAND AUGER
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL:
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 4; UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 15 APR. 1984; COMPLETED 15 APR. 1984
17. ELEVATION TOP OF HOLE: 302.4
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: Charles D. Griffin

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY / % MOISTURE	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
302.4	0'					
			SM- TAN SILTY FINE SAND	10.7	1	W.T. 4.8' Date 15 APRIL 1984 Depth to water during drilling
300.4	2'		SC- TAN FINE CLAYEY SAND	14.4	2	
	4'		ORANGE AND TAN			W.T. 4.4' Water table reading 24 hrs. after hole completed.
	6'		ORANGE, GRAY, TAN, FINE GRAINED, EXTREMELY WET	22.3	3	SAMPLE NO / LAB CLASS / LL / PL / PI: 1 SM NP NP NP; 3 SC 30 18 12
	8'					
292.4	10'				4	
			BOTTOM OF HOLE 10.0'			

NOTE: Soils field classified in accordance with the Unified Soil Classification System.

DRILLING LOG

DIVISION: SOUTH ATLANTIC

INSTALLATION: FORT BENNING, GA.

SHEET 1 OF 1 SHEETS

1. PROJECT: TRAINEE BARRACKS CE321 FY-85
2. LOCATION (Coordinates or Station): SEE PLAN
3. DRILLING AGENCY: SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number): A-3
5. NAME OF DRILLER: C. JUSTISS AND E. WHITE
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 10.0'
8. DEPTH DRILLED INTO ROCK: 0.0'
9. TOTAL DEPTH OF HOLE: 10.0'
10. SIZE AND TYPE OF BIT: 4" HAND AUGER
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL:
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 4; UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 15 APRIL 1984; COMPLETED 15 APRIL 1984
17. ELEVATION TOP OF HOLE: 298.3
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: Charles D. Griffin

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	% MOISTURE	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
298.3	0'						0'
			SM- TAN SILTY FINE SAND		6.7	1	
296.8							W.T. 7.0' Date 15 APRIL 19.84 Depth to water during drilling
	2'		SC- TAN FINE CLAYEY SAND WITH SOME GRAVEL		12.4	2	2'
	4'						W.T. 6.3' Water table reading 24 hrs. after hole completed. 4'
			TAN AND GRAY, FINE AND MEDIUM GRAINED, WET				SAMPLE LAB NO CLASS LL PL PI
	6'		ORANGE, GRAY, TAN				6'
291.8							
			SM- LIGHT TAN AND LIGHT GRAY SILTY FINE AND MEDIUM SAND			3	
290.3	8'						8'
			SC- TAN AND GRAY CLAYEY FINE AND MEDIUM SAND ORANGE AND GRAY		16.5	4	
288.3	10'		BROWN, GRAY, TAN				10'
			BOTTOM OF HOLE 10.0'				

NOTE: Soils field classified in accordance with the Unified Soil Classification System.

Hole No. A-4

DRILLING LOG

DIVISION: SOUTH ATLANTIC
INSTALLATION: FORT BENNING, GA.
SHEET 1 OF 1 SHEETS

1. PROJECT: TRAINEE BARRACKS CI 321 FY-85
2. LOCATION (Coordinates or Station): SEE PLAN
3. DRILLING AGENCY: SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number): A-4
5. NAME OF DRILLER: C. JUSTISS AND E. WHITE
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 10.0'
8. DEPTH DRILLED INTO ROCK: 0.0'
9. TOTAL DEPTH OF HOLE: 10.0'
10. SIZE AND TYPE OF BIT: 4" HAND AUGER
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL:
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 4; UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 15 APRIL 1984; COMPLETED 15 APRIL 1984
17. ELEVATION TOP OF HOLE: 298.9
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: Charles D. Griffin

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% MOISTURE	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
298.9	0'					
298.4			SC - TAN FINE CLAYEY SAND	19.2	1	
			SM - TAN SILTY FINE SAND		2	W.T. NOT ENCOUNTERED Date 15 APRIL 1984 Depth to water during drilling
	2'					
295.9						
	4'		SC - TAN FINE CLAYEY SAND	14.2	3	W.T. DRY Water table reading 24 hrs. after hole completed.
			ORANGE AND TAN			SAMPLE LAB NO CLASS LL PL PI 1 CL 35 19 16
	6'		WITH GRAY STREAKS			
	8'		TAN AND GRAY			
			TAN, PURPLE, GRAY			
288.9	10'		RED AND GRAY		4	
			BOTTOM OF HOLE 10.0'			

NOTE: Soils field classified in accordance with the Unified Soil Classification System.

DRILLING LOG

DIVISION: SOUTH ATLANTIC
INSTALLATION: FORT BENNING, GA.
SHEET 1 OF 1 SHEETS

1. PROJECT: TRAINEE BARRACKS CI 321 FY-85
2. LOCATION (Coordinates or Station): SEE PLAN
3. DRILLING AGENCY: SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number): A-5
5. NAME OF DRILLER: P.W. JUSTISS
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 10.0'
8. DEPTH DRILLED INTO ROCK: 0.0'
9. TOTAL DEPTH OF HOLE: 10.0'
10. SIZE AND TYPE OF BIT: 4" HAND AUGER
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL:
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 4; UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 18 APRIL 1984; COMPLETED 18 APRIL 1984
17. ELEVATION TOP OF HOLE: 287.6
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: Charles D. Griffin

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	% MOISTURE	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
287.6	0'						0'
			SM - TAN SILTY FINE SAND			1	
286.6							
			SC - TAN CLAYEY FINE AND MEDIUM SAND		15.7	2	W.T. NOT ENCOUNTERED Date 18 APRIL 1984 Depth to water during drilling
	2'						2'
			TAN AND GRAY				
							W.T. DRY Water table reading 24 hrs. after hole completed.
	4'		ORANGE, RED, GRAY				4'
					15.8	3	
	6'						6'
							SAMPLE NO. / LAB CLASS / LL / PL / PI 2 SC 47 20 27
	8'		FINE GRAINED				8'
			GRAY AND TAN, MEDIUM GRAINED, VERY MOIST				
277.6	10'		GRAY AND ORANGE FINE GRAINED, WITH LAYERS OF FAT CLAY		29.3	4	10'
			BOTTOM OF HOLE 10.0'				
			NOTE: Soils field classified in accordance with the Unified Soil Classification System.				

DRILLING LOG

DIVISION: SOUTH ATLANTIC

INSTALLATION: FORT BENNING, GA.

SHEET 1 OF 1 SHEETS

1. PROJECT: TRAINEE BARRACKS LI 321 FY-85
2. LOCATION (Coordinates or Station): SEE PLAN
3. DRILLING AGENCY: SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number): A-6
5. NAME OF DRILLER: F.D. WHITE
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 10.0'
8. DEPTH DRILLED INTO ROCK: 0.0'
9. TOTAL DEPTH OF HOLE: 10.0'
10. SIZE AND TYPE OF BIT: 4" HAND AUGER
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL:
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 4; UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 18 APRIL 1984; COMPLETED 18 APRIL 1984
17. ELEVATION TOP OF HOLE: 284.0
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: Charles D. Griffin

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	% MOISTURE	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
284.0	0'						
			SM- TAN SILTY FINE SAND			1	W.T. NOT ENCOUNTERED Date 18 APRIL 1984 Depth to water during drilling
282.0	2'				14.1	2	
			SC- TAN FINE CLAYEY SAND				W.T. DRY Water table reading 24 hrs. after hole completed.
	4'						
			REDDISH ORANGE AND TAN		15.8	3	
	6'						
			RED, TAN, ORANGE				
			RED AND GRAY				
	8'						
			RED WITH TAN STREAKS				
274.0	10'		RED, GRAY, ORANGE, FINE CLAYEY SAND		19.9	4	
			BOTTOM OF HOLE 10.0'				

NOTE: Soils field classified in accordance with the Unified Soil Classification System.

DRILLING LOG

DIVISION: SOUTH ATLANTIC
INSTALLATION: FORT BENNING, GA.
SHEET 1 OF 1 SHEETS

1. PROJECT: TRAINEE BARRACKS LI 321 FY-85
2. LOCATION (Coordinates or Station): SEE PLAN
3. DRILLING AGENCY: SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number): A-7
5. NAME OF DRILLER: C. D. JUSTISS
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 10.0'
8. DEPTH DRILLED INTO ROCK: 0.0'
9. TOTAL DEPTH OF HOLE: 10.0'
10. SIZE AND TYPE OF BIT: 4" HAND AUGER
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL:
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 4; UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 18 APRIL 1984; COMPLETED 18 APRIL 1984
17. ELEVATION TOP OF HOLE: 278.7
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: Charles D. Griffin

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% MOISTURE	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
278.7	0'					0'
			SM - TAN SILTY FINE SAND	12.1	1	W.T. NOT ENCOUNTERED Date 18 APRIL 1984 Depth to water during drilling
	2'					2'
275.7						
			SC - TAN CLAYEY FINE AND MEDIUM SAND		2	W.T. DRY Water table reading 24 hrs. after hole completed.
	4'					4'
			TAN AND ORANGE, FINE GRAINED		3	SAMPLE LAB NO. CLASS LL PL PI
	6'					6'
			RED, GRAY, ORANGE			1 SM NP NP NP
			WITH SOME LARGE SIZE GRAVEL			4 MH 62 33 29
	8'					8'
269.7			ORANGE, RED, GRAY, FINE AND MEDIUM GRAINED WITH SOME TRACES OF MICA			
			ML - LIGHT GRAY AND ORANGE INORGANIC SILT	20.6	4	
268.7	10'					10'
			BOTTOM OF HOLE 10.0'			
			NOTE: Soils field classified in accordance with the Unified Soil Classification System.			

Hole No. A-8

DRILLING LOG

DIVISION: SOUTH ATLANTIC
INSTALLATION: FORT BENNING, GA.
SHEET 1 OF 1 SHEETS

1. PROJECT: TRAINEE BARRACKS CI 321 FY-85
2. LOCATION (Coordinates or Station): SEE PLAN
3. DRILLING AGENCY: SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number): A-8
5. NAME OF DRILLER: C. JUSTISS AND F. WHITE
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 10.0'
8. DEPTH DRILLED INTO ROCK: 0.0'
9. TOTAL DEPTH OF HOLE: 10.0'
10. SIZE AND TYPE OF BIT: 4" HAND AUGER
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL:
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 4; UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 15 APRIL 1984; COMPLETED 15 APRIL 1984
17. ELEVATION TOP OF HOLE: 288.5
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: Charles D. Griffin

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	% MOISTURE	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
288.5	0'					JAR	
			SM - TAN SILTY FINE SAND			1	W.T. NOT ENCOUNTERED Date 15 APRIL 1984 Depth to water during drilling
	2'		FINE AND MEDIUM GRAINED				
285.0			SC - TAN AND ORANGE CLAYEY FINE AND MEDIUM SAND		12.6	2	W.T. DRY Water table reading 24 hrs. after hole completed.
	4'		FINE GRAINED CLAYEY SAND, WITH SEAMS OF HARD CLAY				
	6'		ORANGE, TAN, GRAY, VERY MOIST				
281.0			PINK, GRAY, ORANGE				
	8'		SM - LIGHT ORANGE FINE SILTY SAND			3	
			TAN				
278.5	10'		TAN AND ORANGE FINE AND MEDIUM GRAINED, SLIGHTLY WET			4	
			BOTTOM OF HOLE 10.0'				

NOTE: Soils field classified in accordance with the Unified Soil Classification System.

DRILLING LOG

DIVISION: SOUTH ATLANTIC

INSTALLATION: FORT BENNING, GA.

SHEET 1 OF 1 SHEETS

1. PROJECT: TRAINEE BARRACKS CT 321 FY-85
2. LOCATION (Coordinates or Station): SEE PLAN
3. DRILLING AGENCY: SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number): A-9
5. NAME OF DRILLER: C. JUSTISS AND F. WHITE
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 10.0'
8. DEPTH DRILLED INTO ROCK: 0.0'
9. TOTAL DEPTH OF HOLE: 10.0'
10. SIZE AND TYPE OF BIT: 4" HAND AUGER
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL:
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 3; UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 15 APRIL 1984; COMPLETED 15 APRIL 1984
17. ELEVATION TOP OF HOLE: 291.0
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: Charles D. Griffin

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY / % MOISTURE	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
291.0	0'					
			SM - TAN SILTY FINE SAND		1	W.T. 6.0' Date 15 APRIL 1984 Depth to water during drilling
	2'					
288.0						
			SC - TAN CLAYEY FINE AND MEDIUM SAND	16.5	2	W.T. 5.4' Water table reading 24 hrs. after hole completed.
	4'		BRIGHT ORANGE AND TAN			
			ORANGE, RED, TAN			
	6'		WET			
	8'		WITH STREAKS OF FAT CLAY			
			TAN, ORANGE, GRAY, FAT FINE GRAINED CLAYEY SAND	31.7	3	
281.0	10'		BOTTOM OF HOLE 10.0'			

NOTE: Soils field classified in accordance with the Unified Soil Classification System.

Hole No. A-10

DRILLING LOG

DIVISION: SOUTH ATLANTIC
INSTALLATION: FORT BENNING, GA.
SHEET 1 OF 1 SHEETS

1. PROJECT: TRAINEE BARRACKS CI 321 FY-85
2. LOCATION (Coordinates or Station): SEE PLAN
3. DRILLING AGENCY: SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number): A-10
5. NAME OF DRILLER: C.D. JUSTISS
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 10.0'
8. DEPTH DRILLED INTO ROCK: 0.0'
9. TOTAL DEPTH OF HOLE: 10.0'
10. SIZE AND TYPE OF BIT: 4" AUGER
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: FAILING 314
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 3; UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 16 APRIL 1984; COMPLETED 16 APRIL 1984
17. ELEVATION TOP OF HOLE: 268.0
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: Charles D. Griffin

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	% MOISTURE	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
268.0	0'					JAR	
			SC - ORANGE AND TAN CLAYEY FINE SAND		18.6	1	W.T. NOT ENCOUNTERED Date 16 APRIL 1984 Depth to water during drilling
	2'						
	4'		ORANGE AND GRAY				W.T. DRY Water table reading 24 hrs. after hole completed.
263.5			CH - GRAY WITH ORANGE STREAKS FINE SANDY FAT CLAY, HARD, STIFF		21.9	2	
262.0	6'						
			SM - BRIGHT ORANGE AND YELLOWISH TAN SILTY FINE SAND			3	SAMPLE NO 2; LAB CLASS CH; LL 73; PL 27; PI 46
	8'		ORANGE AND GRAY, FINE AND MEDIUM GRAINED				
258.0	10'		BOTTOM OF HOLE 10.0'				

NOTE: Soils field classified in accordance with the Unified Soil Classification System.

DRILLING LOG

DIVISION: SOUTH ATLANTIC

INSTALLATION: FORT BENNING, GA.

SHEET 1 OF 1 SHEETS

1. PROJECT: TRAINEE BARRACKS LI 321 FY-85
2. LOCATION (Coordinates or Station): SEE PLAN
3. DRILLING AGENCY: SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number): A-11
5. NAME OF DRILLER: C.D. JUSTISS
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 10.0'
8. DEPTH DRILLED INTO ROCK: 0.0'
9. TOTAL DEPTH OF HOLE: 10.0'
10. SIZE AND TYPE OF BIT: 4" AUGER
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: FAILING 314
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 3; UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 16 APRIL 1984; COMPLETED 16 APRIL 1984
17. ELEVATION TOP OF HOLE: 262.5
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: Charles D. Griffin

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY / % MOISTURE	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
262.5	0'				JAR	0'
			SC - REDDISH ORANGE FINE CLAYEY SAND, VERY MOIST	34.1	1	
260.5	2'					W.T. NOT ENCOUNTERED Date 16 APRIL 1984 Depth to water during drilling 2'
			SM - REDDISH ORANGE SILTY FINE AND MEDIUM SAND		2	
	4'					W.T. DRY Water table reading 24 hrs. after hole completed. 4'
			BROWN			
	6'					SAMPLE NO. / LAB CLASS / LL / PL / PI: 1 / CH / 52 / 22 / 30 6'
255.0						
	8'		SC - BROWN, TAN, ORANGE, FINE AND MEDIUM GRAINED CLAYEY SAND	16.1	3	8'
252.5	10'					10'
			BOTTOM OF HOLE 10.0'			

NOTE: Soils field classified in accordance with the Unified Soil Classification System.

Hole No. A-12

DRILLING LOG

DIVISION: SOUTH ATLANTIC
INSTALLATION: FORT BENNING, GA.
SHEET 1 OF 1 SHEETS

1. PROJECT: TRAINEE BARRACKS CE 321 FY-85
2. LOCATION (Coordinates or Station): SEE PLAN
3. DRILLING AGENCY: SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number): A-12
5. NAME OF DRILLER: C.D. JUSTISS
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 10.0'
8. DEPTH DRILLED INTO ROCK: 0.0'
9. TOTAL DEPTH OF HOLE: 10.0'
10. SIZE AND TYPE OF BIT: 4" AUGER
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: FAILING 314
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 3; UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 16 APRIL 1984; COMPLETED 16 APRIL 1984
17. ELEVATION TOP OF HOLE: 259.4
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: Charles D. Griffin

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% MOISTURE	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
259.4	0'						
			SM- BRIGHT ORANGE SILTY FINE SAND	6.0		1	W.T. Not Encountered Date 16 APRIL 1984 Depth to water during drilling
	2'		BROWN				W.T. DRY Water table reading 24 hrs. after hole completed.
254.4	4'						
			SC- ORANGE AND TAN FINE AND MEDIUM GRAINED CLAYEY SAND	16.6		2	
	6'						
	8'		YELLOWISH TAN AND LIGHT ORANGE	13.0		3	
249.4	10'		BOTTOM OF HOLE 10.0'				

NOTE: Soils field classified in accordance with the Unified Soil Classification System.

Hole No. CS-143

DRILLING LOG

DIVISION: SOUTH ATLANTIC
INSTALLATION: FORT BENNING
SHEET 1 OF 2 SHEETS

1. PROJECT: TRAINEE BARRACKS No. 4 E.M. BARRACKS COMPLEX FY-77
2. LOCATION (Coordinates or Station): SEE PLAN
3. DRILLING AGENCY: SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number): CS-143
5. NAME OF DRILLER: STARLING B.
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE: 60.0'
10. SIZE AND TYPE OF BIT: 1 3/8" ID SPLITSPOON
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: FAILING 1400
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 15; UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE: STARTED 1 JULY 1975; COMPLETED 2 JULY 1975
17. ELEVATION TOP OF HOLE: 292.7
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR: Charles D. Griffin

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY / Moisture Content e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	BLOWS
	0'		SC- TAN AND BROWN CLAYEY SAND	7.3	1		12
			RED, TAN			W.T. 35.0'	44
			RED AND ORANGE, MICACEOUS	13.9	2	Date 1 JULY 1975 Depth to water during drilling	45
	5'		W/THIN FAT CLAY LAYERS				34
			CH- RED, ORANGE, GRAY, FAT CLAY, W/SILTY AND CLAYEY SAND LAYERS	27.9	3		40
	10'						32
			SM- TAN AND YELLOW FINE SILTY SAND	0.5	4		31
			PINK, YELLOW, TAN W/FAT CLAY LAYERS			W.T. 10.4' Water table reading 24 hrs. after hole completed.	29
			BRIGHT ORANGE, TAN, W/RED STREAKS				35
	15'		W/THIN FAT CLAY LAYERS				39
			TAN AND YELLOW	0.0	5	Lab. Classification Sample Nº 2 SC-H 3 CH 5 SP-SM 8 SM-SC 11 SM-SC 12 SC 14 CH	40
			PINK, YELLOW, TAN				58
			BRIGHT ORANGE		6		68
	20'						72
			CH- PINK, ORANGE, GRAY, FAT CLAY, W/SILTY SAND LAYERS	17.4	7		50
			SC- PINK, GRAY, ORANGE, CLAYEY FINE SAND	6.1	8		52
	25'		LIGHT GRAY				60
			ORANGE, GRAY, PINK, VERY SANDY				58
							29
	30'		CONTINUED ON Sheet No. 2				22

NOTE: Soils field classified in accordance with the Unified Soil Classification System.

BLOWS PER FOOT: Number required to drive 1⅜" ID splitspoon w/140 lb. hammer falling 30".

DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE 292.7 | **Hole No.** CS-143

PROJECT TRAINEE BARRACKS No. 4 E.M. BARRACKS COMPLEX FY-77 | INSTALLATION FORT BENNING, GA. | SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	BLOWS	
	30'		SM- ORANGE SILTY FINE SAND		9			
			BRIGHT ORANGE				61	
							70	
	35'		FINE, MEDIUM, AND COARSE GRAIN SAND W/ GRAVEL		10		58	35'
							43	
							33	
							35	
	40'		GC- BRIGHT ORANGE SILTY AND CLAYEY GRAVEL	11.2	11		15	40'
			MH- YELLOW AND GRAY SANDY AND CLAYEY INORGANIC SILT	12.6	12		31	
							74	
	45'		YELLOW, TAN, GRAY				60	45'
							35	
			W/ PURPLE STREAKS				59	
							77	
	50'		PURPLE, TAN, GRAY, HIGHLY MICACEOUS		13		100/0.8	50'
							83	
							94	
	55'		ML- GRAY AND RED INORGANIC SILT	15.5	14		91	55'
							64	
							70	
	60'		BOTTOM OF HOLE 60.0'	10.0	15		100/0.5	60'

Hole No. CS-144

DRILLING LOG

DIVISION: SOUTH ATLANTIC
INSTALLATION: FORT BENNING
SHEET 1 OF 2 SHEETS

1. PROJECT: TRAINEE BARRACKS No. 4 E. N. BARRACKS COMPLEX FY-77
2. LOCATION (Coordinates or Station): SEE PLAN
3. DRILLING AGENCY: SAVANNAH DISTRICT
4. HOLE NO. (As shown on drawing title and file number): CS-144
5. NAME OF DRILLER: STARLING B.
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE: 60.0'
10. SIZE AND TYPE OF BIT: 1 3/8" ID SPLITSPOON
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: FAILING 1400
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 11; UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES
15. ELEVATION GROUND WATER
16. DATE HOLE: STARTED 2 JULY 1975; COMPLETED 3 JULY 1975
17. ELEVATION TOP OF HOLE: 275.3
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR: Charles D. Griffin

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0'		SC- GRAY AND ORANGE CLAYEY FINE SAND	Moisture Content		BLOWS 0'
			TAN	10.1	1	10
			TAN, PINK, GRAY			13
						W.T. 18.5' 31 5'
	5'		MH- GRAY AND ORANGE SANDY AND CLAYEY SILT	11.9	2	Date 2 JULY 1975 Depth to water during drilling 34
			TAN W/ RED STREAKS			33
						34
	10'		TAN, GRAY, PINK SANDY AND CLAYEY	12.4	3	25 10'
						W.T. 9.3' 28
			SM- BRIGHT ORANGE FINE SILTY SAND		4	Water table reading 48
						24 hrs. after hole completed. 100 15'
	15'		W/ GRAVEL			100/0.8
			W/ BROWN STREAKS AND THIN LAYERS OF SILT			Lab. Classification 34
			BRIGHT ORANGE			Sample No. 1 SM-SC
			W/ GRAVEL	19.1	5	2 SC 24 20'
	20'					5 SM 21
						6 SM
						7 SM-SC 31
						10 CH 35
						60 25'
	25'		LIGHT TAN AND WHITE INTERBEDED W/ SILT YELLOWISH TAN AT 25.5'			64
						65
			SP- YELLOW POORLY GRADED SAND	10.7	6	60 30'
	30'		CONTINUED ON SHEET No. 2			

NOTE: Soils field classified in accordance with the Unified Soil Classification System.

BLOWS PER FOOT: Number required to drive 1⅜" ID splitspoon w/140 lb. hammer falling 30"

DRILLING LOG (Cont Sheet) | F TION TOP OF HOLE 275.3 | **Hole No.** CS-144

PROJECT: TRAINEE BARRACKS No. 4 E.M. BARRACKS COMPLEX FY-11 | INSTALLATION: FORT BENNING | SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	35'		MH- LIGHT GRAY SANDY INORGANIC SILT	22.2	7	BLOWS 30' 66
			W/LAYERS OF SILTY SAND			77
			TAN AND YELLOW			53 35'
						55
			SM- YELLOW AND TAN SILTY COARSE SAND		8	100/0.8
	40'		TAN, YELLOW, PINK			86 40'
						91
						81
			MH- PINK, ORANGE, GRAY,	9.5	9	70
	45'		CLAYEY INORGANIC SILT			100/0.5 45'
						100/0.9
			PURPLE AND GRAY CLAYEY INORGANIC SILT			83
	50'					98 50'
			SANDY AND CLAYEY, MICACEOUS	11.8	10	100/0.4
						100/0.7
						94
	55'		CLAYEY			100/0.5 55'
						100
			PURPLE, RED, GRAY, ORANGE, MOTTLED, SANDY AND CLAYEY	11.4	11	96
	60'					100/0.7 60'

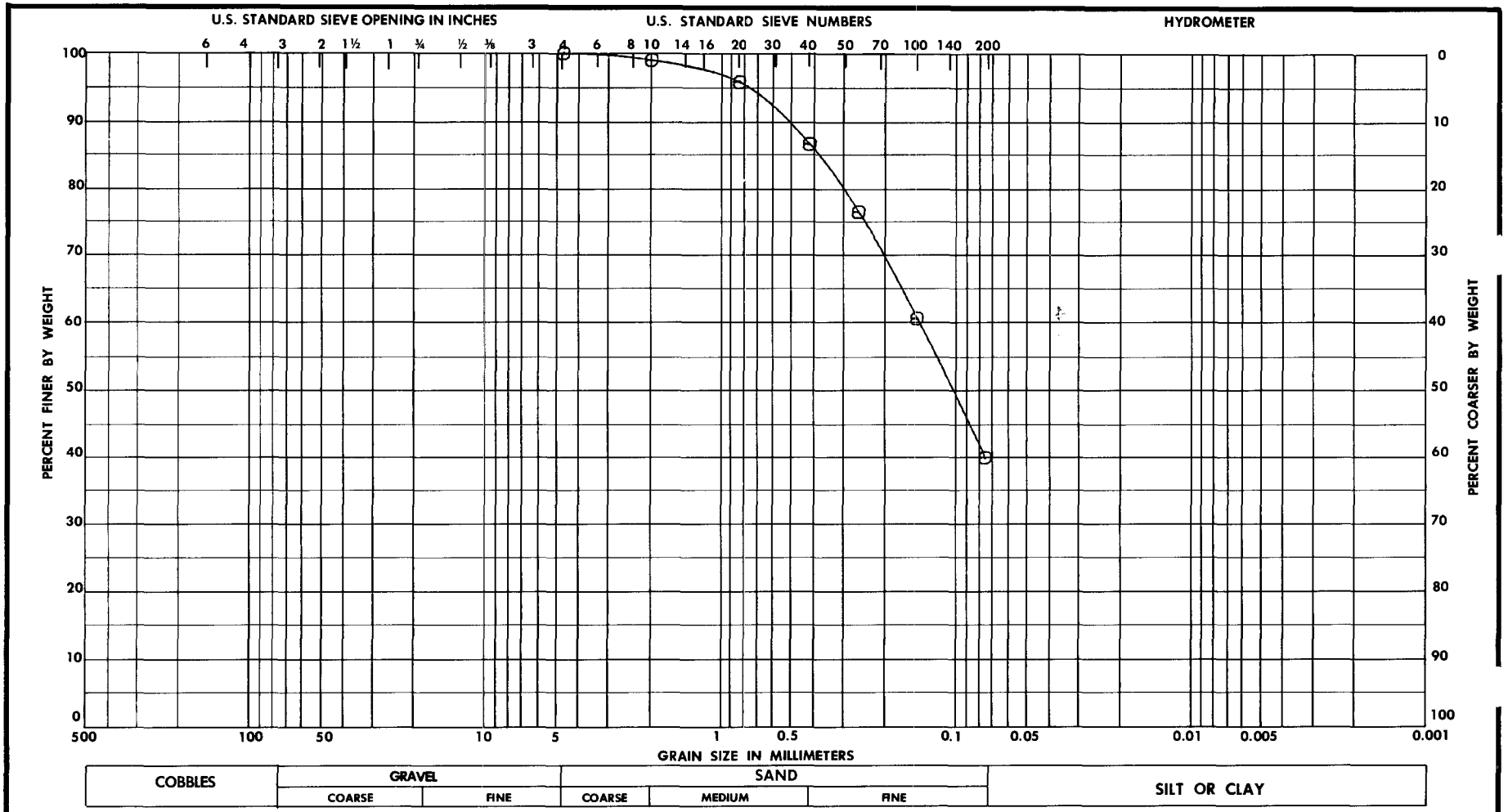
ATTACHMENT D

Soil Laboratory Test Data

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	~~Elev or~~ Depth	Classification	Nat w %	LL	PL	PI
2	3.0-4.5'	SILTY SAND (SM)	18.4	48	28	20
		REDDISH BROWN, plastic fines				
		(within 1% of A line)				

GRADATION CURVES

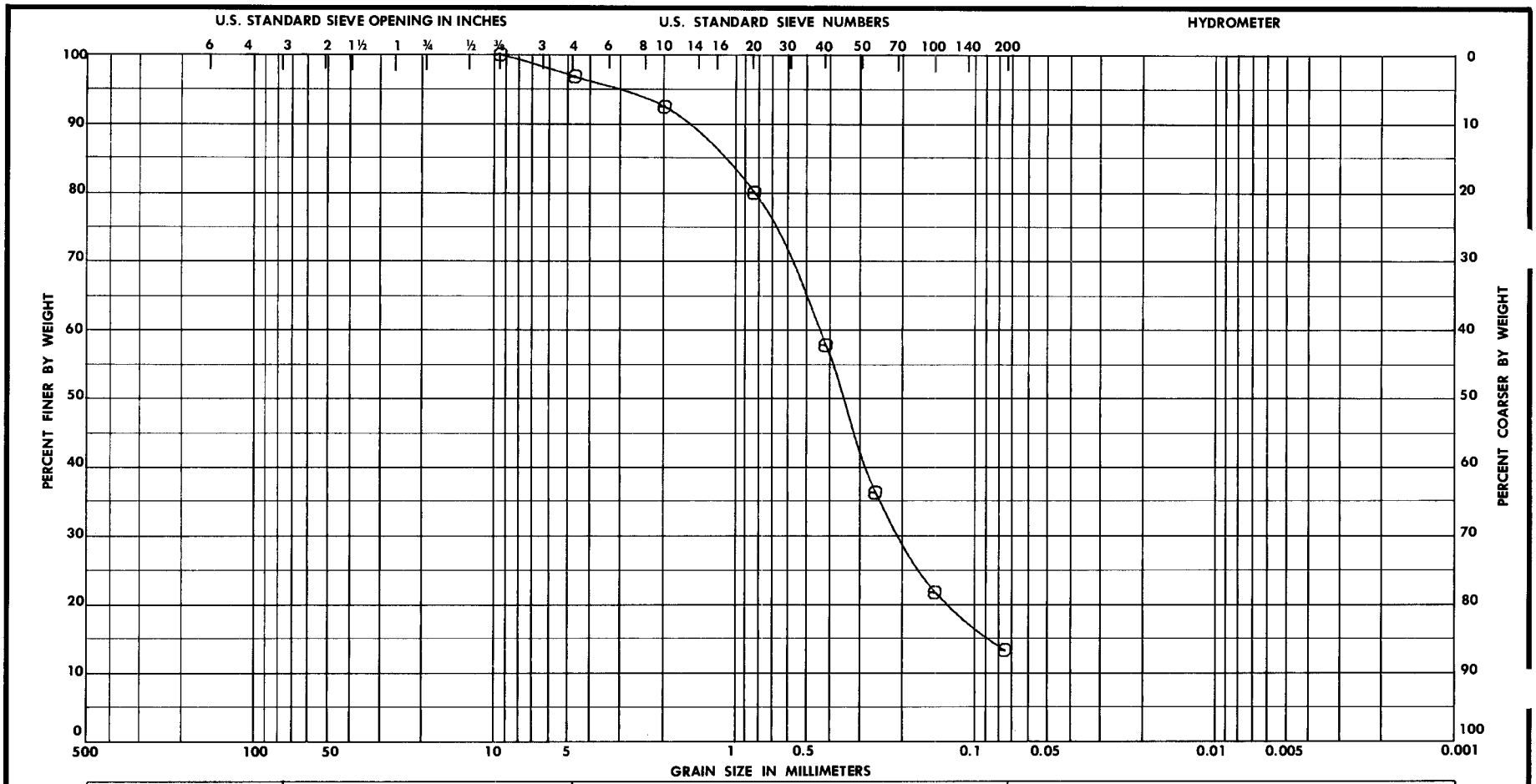
Project FT. BENNING, GA. LI-321-FY85
TRAINEE BARRACKS #4
Area LAB NO. 114/1858
Boring No. CS-1 SAMPLE NO. 2
Date 06/22/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	~~Test~~ Depth	VISUAL Classification	Nat w %	LL	PL	PI
4	13.5-15.0'	SILTY SAND (SM)	8.5	NP	NP	NP
		LT.YELLOW AND TAN WITH A				
		TRACE OF GRAVEL AND MICA				

GRADATION CURVES

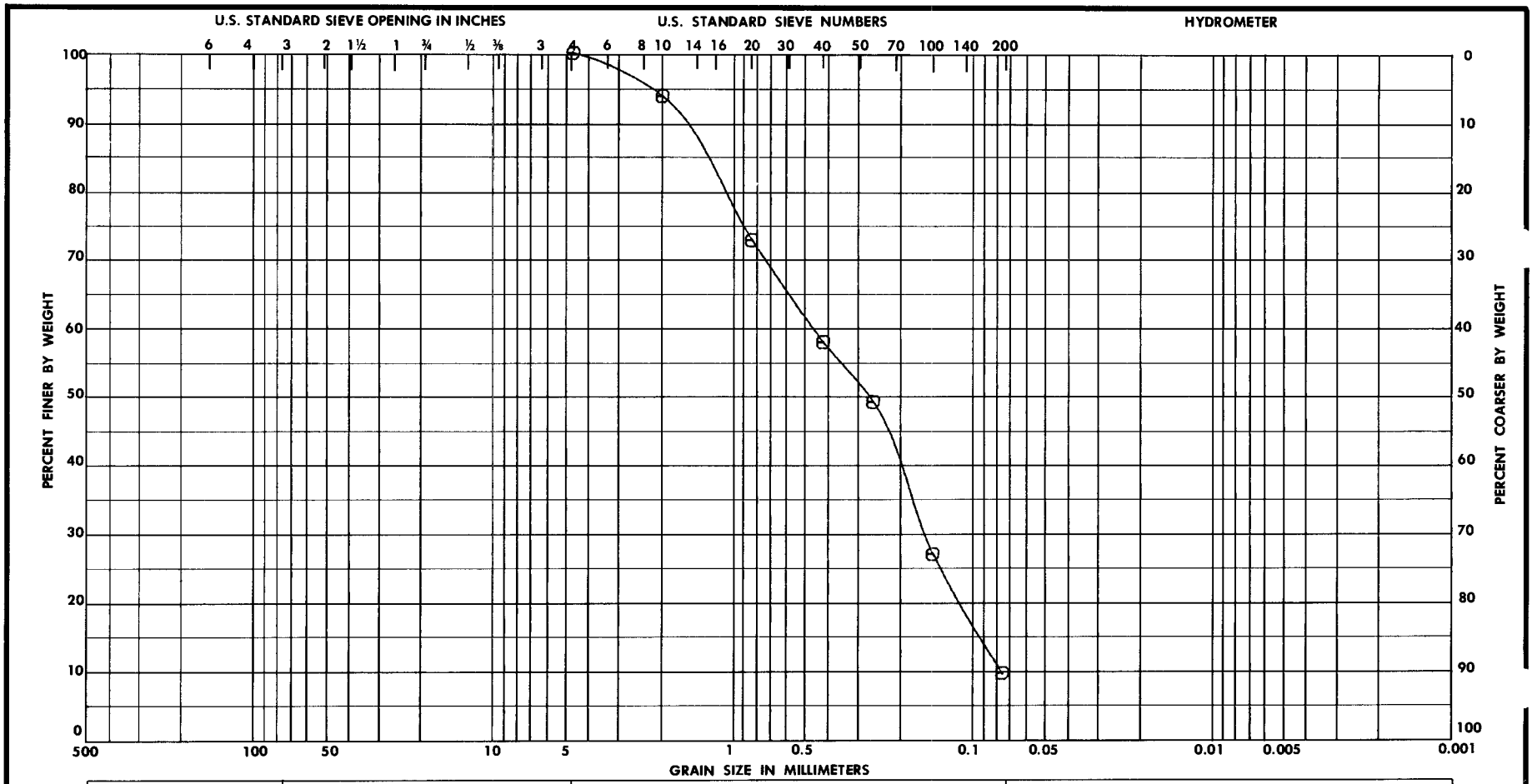
Project FT.BENNING,GA.L1-321-FY85
TRAINEE BARRACKS #4
Area LAB NO.114/1860
Boring No. CS-1 SAMPLE NO. 4
Date 06/22/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	~~Elev or~~ Depth	VISUAL Classification	Nat w %	LL	PL	PI
5	24.0-25.5'	POORLY GRADED SILTY SAND	19.3	NP	NP	NP
		(SP-SM)				
		LT.YELLOWISH TAN WITH A TRACE				
		OF MICA				

GRADATION CURVES

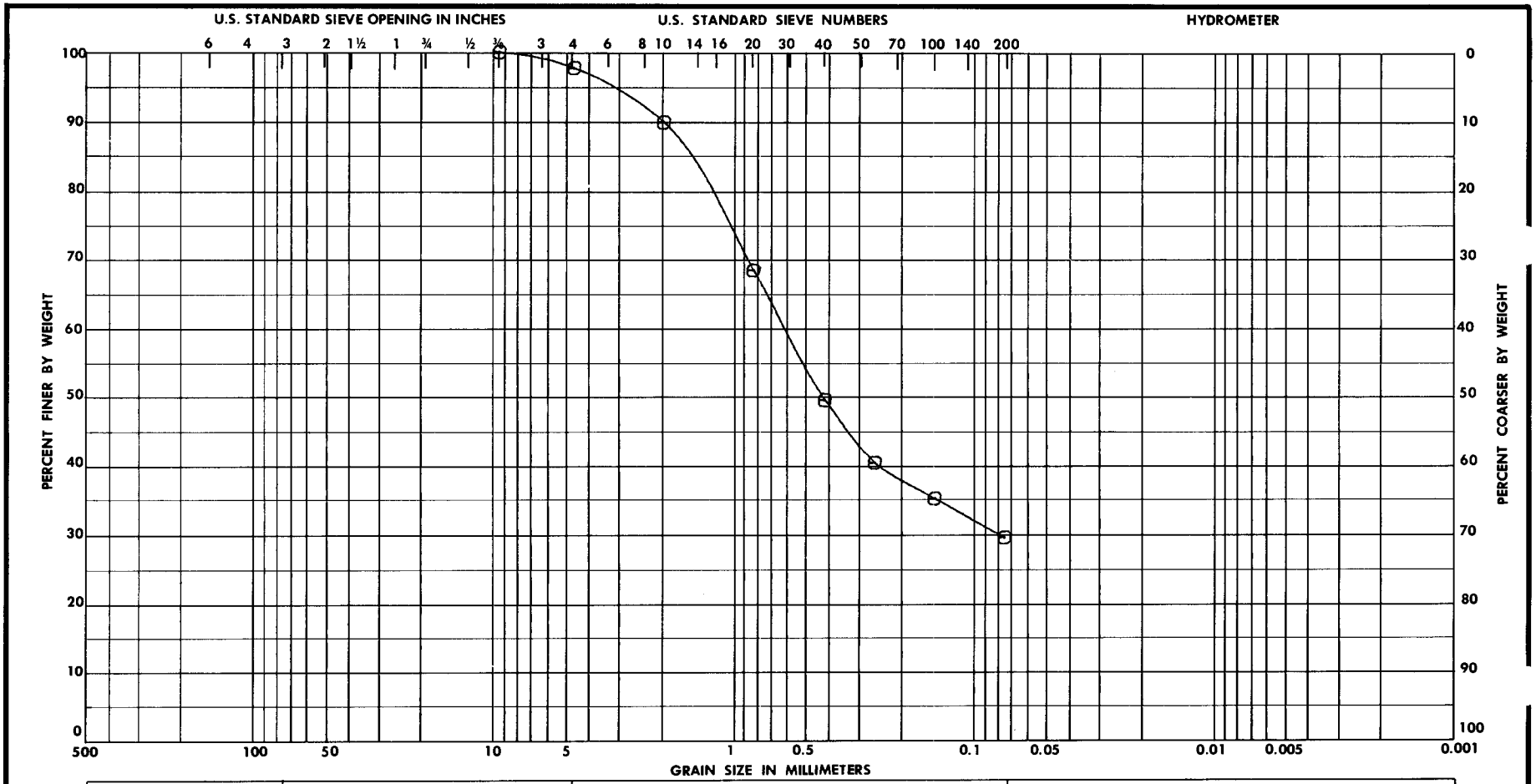
Project FT.BENNING,GA.LI-321-FY85
TRAINEE BARRACKS #4
Area LAB NO.114/1861
Boring No. CS-1 SAMPLE NO. 5
Date 06/22/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	~~Elev or~~ Depth	Classification	Nat w %	LL	PL	PI
6	36.0-37.5'	CLAYEY SAND (SC)	14.4	34	15	19
		LT.GRAY WITH A TRACE OF				
		GRAVEL AND MICA				

GRADATION CURVES

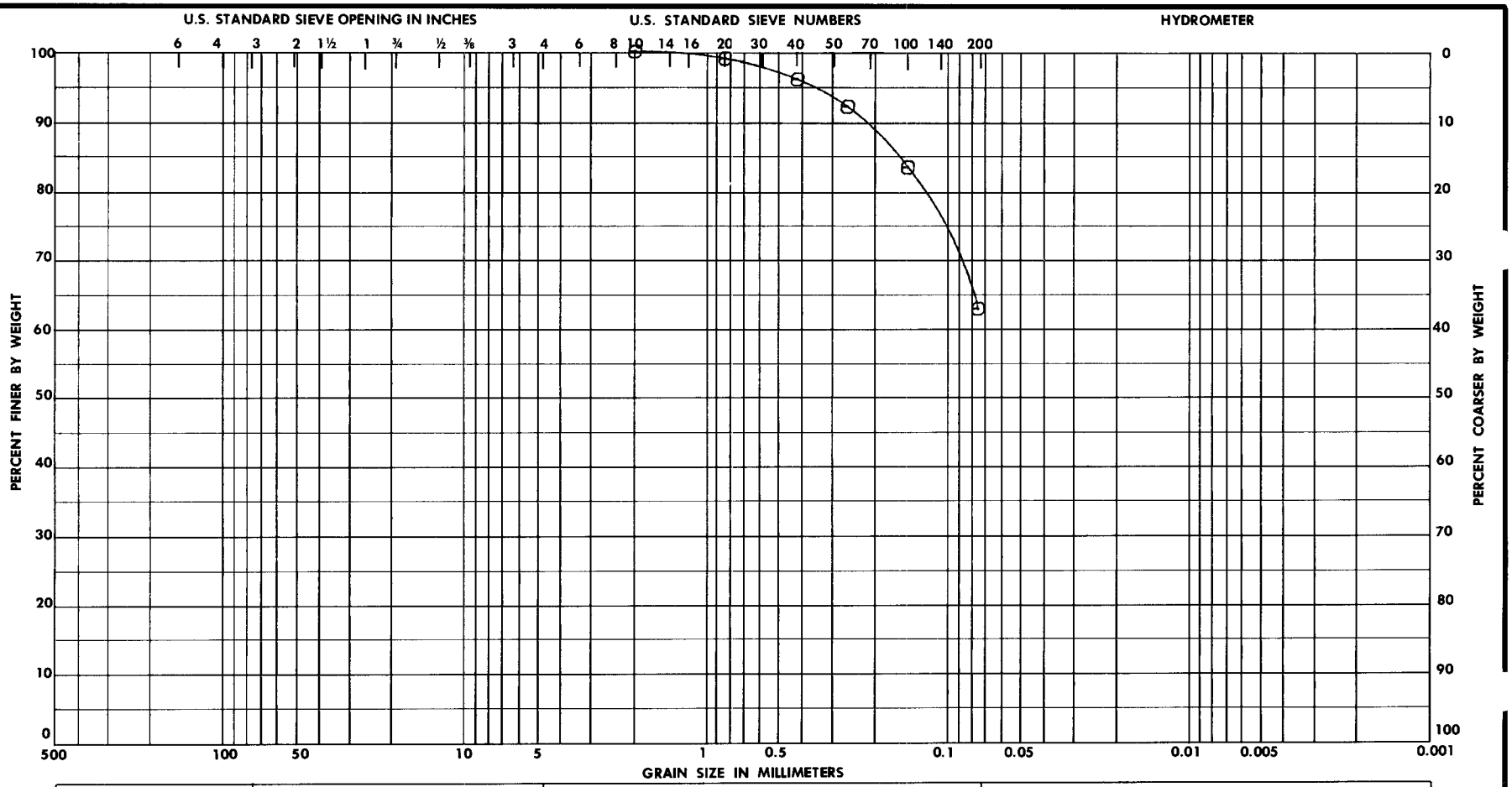
Project FT.BENNING,GA.L1-321-FY85
TRAINEE BARRACKS #4
Area LAB NO.114/1862
Boring No. CS-1 SAMPLE NO. 6
Date 06/22/84

ENG FORM 1 MAY 63 **2087**

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	~~Elev. or~~ Depth	Classification	Nat w %	LL	PL	PI
1	0.0-1.5'	FAT CLAY (CH)	26.6	75	29	46
		RED AND BROWN, SANDY WITH A				
		TRACE OF MICA				

GRADATION CURVES

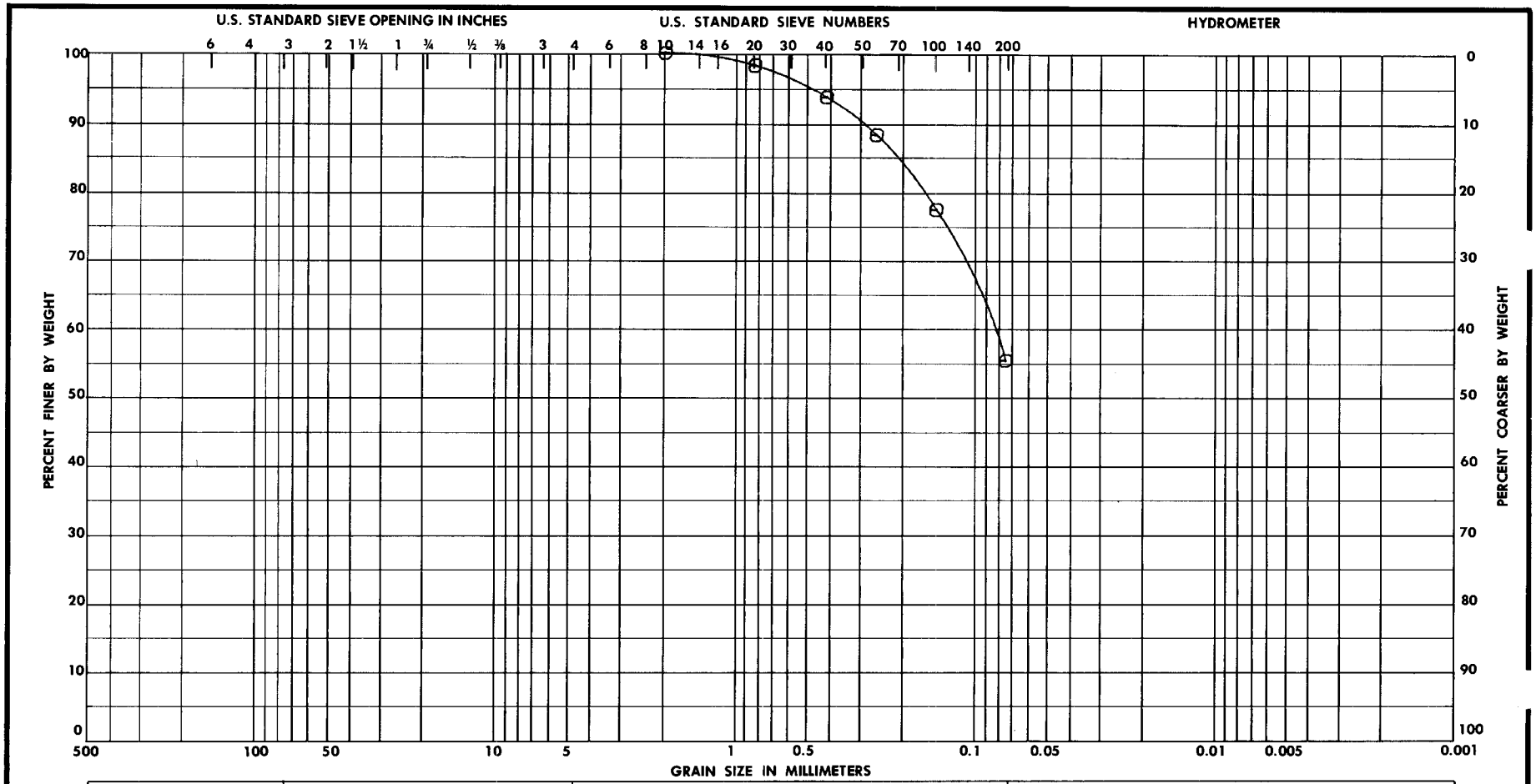
Project FT. BENNING, GA. LI-321-FY85
TRAINEE BARRACKS #4
Area LAB NO. 114/1865
Boring No. CS-2 SAMPLE NO. 1
Date 06/22/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	~~Elev or~~ Depth	Classification	Nat w %	LL	PL	PI
2	1.5-3.0'	FAT CLAY (CH)	24.4	76	31	45
		REDDISH BROWN, SANDY				

GRADATION CURVES

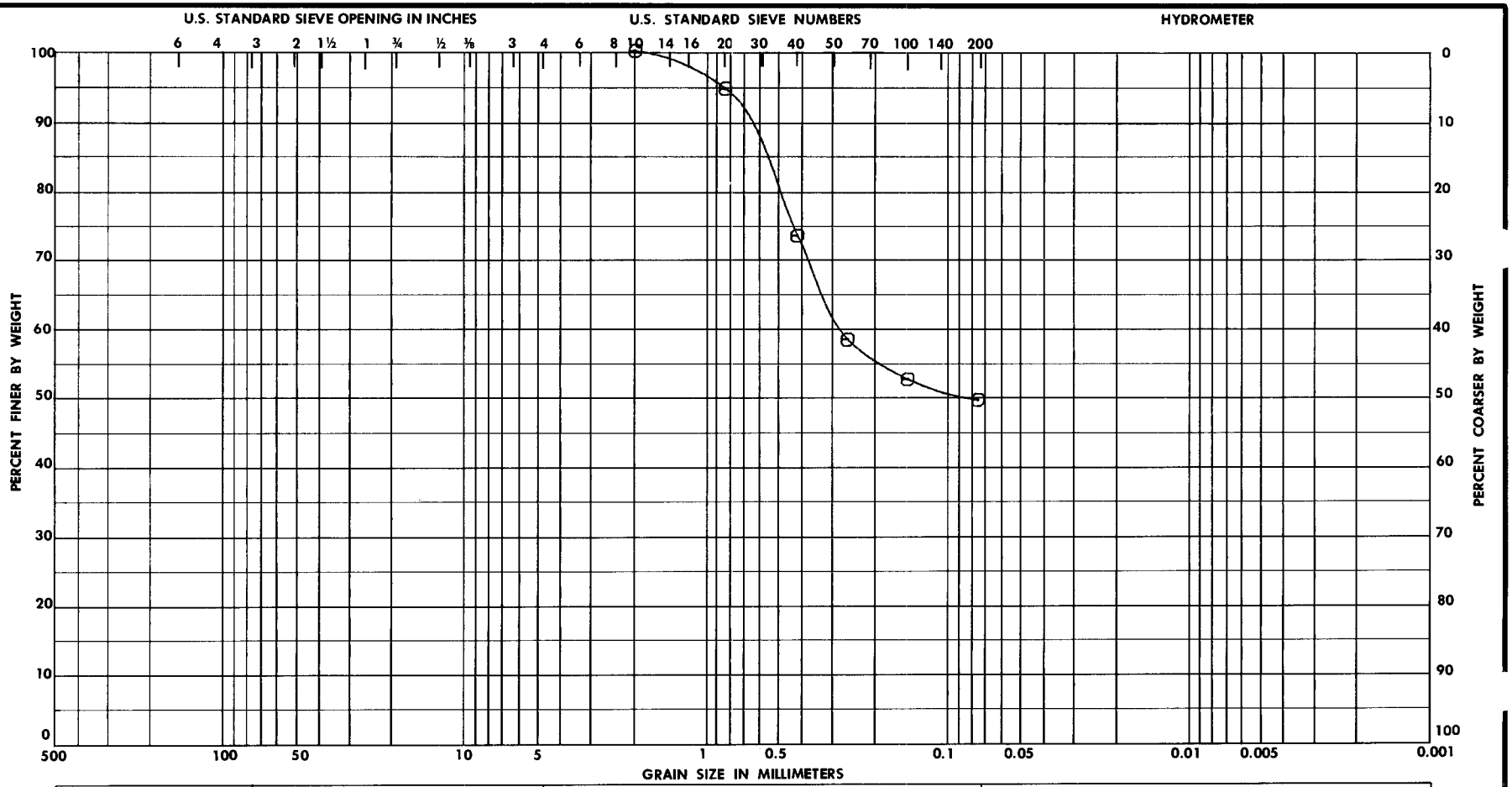
Project FT. BENNING, GA. L1-321-FY85
TRAINEE BARRACKS #4
Area LAB NO. 114/1866
Boring No. CS-2 SAMPLE NO. 2
Date 06/22/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	~~Elev. or~~ Depth	Classification	Nat w %	LL	PL	PI
5	10.5-12.0'	CLAYEY SAND, HIGH LL (SC-H)	20.9	63	26	37
		TAN AND RED WITH A TRACE OF				
		MICA				

GRADATION CURVES

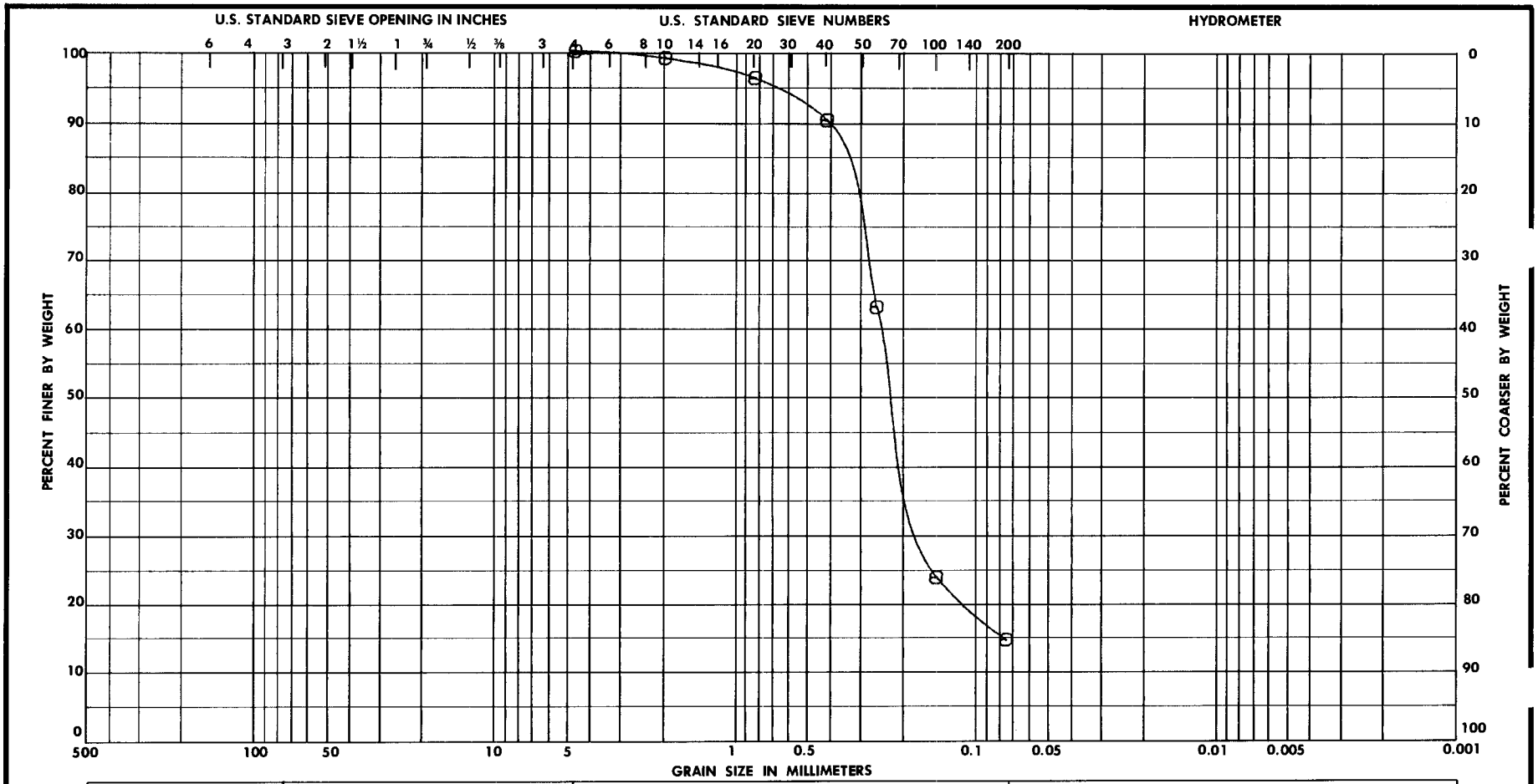
Project FT. BENNING, GA. LI-321-FY85
TRAINEE BARRACKS #4
Area LAB NO. 114/1869
Boring No. CS-2 SAMPLE NO. 5
Date 06/22/84

ENG FORM 1 MAY 63 **2087**

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	Elev or Depth	VISUAL Classification	Nat w %	LL	PL	PI
12	39.0-40.5'	SILTY SAND (SM)	20.1	NP	NP	NP
		LT.GRAY WITH A TRACE OF MICA				

GRADATION CURVES

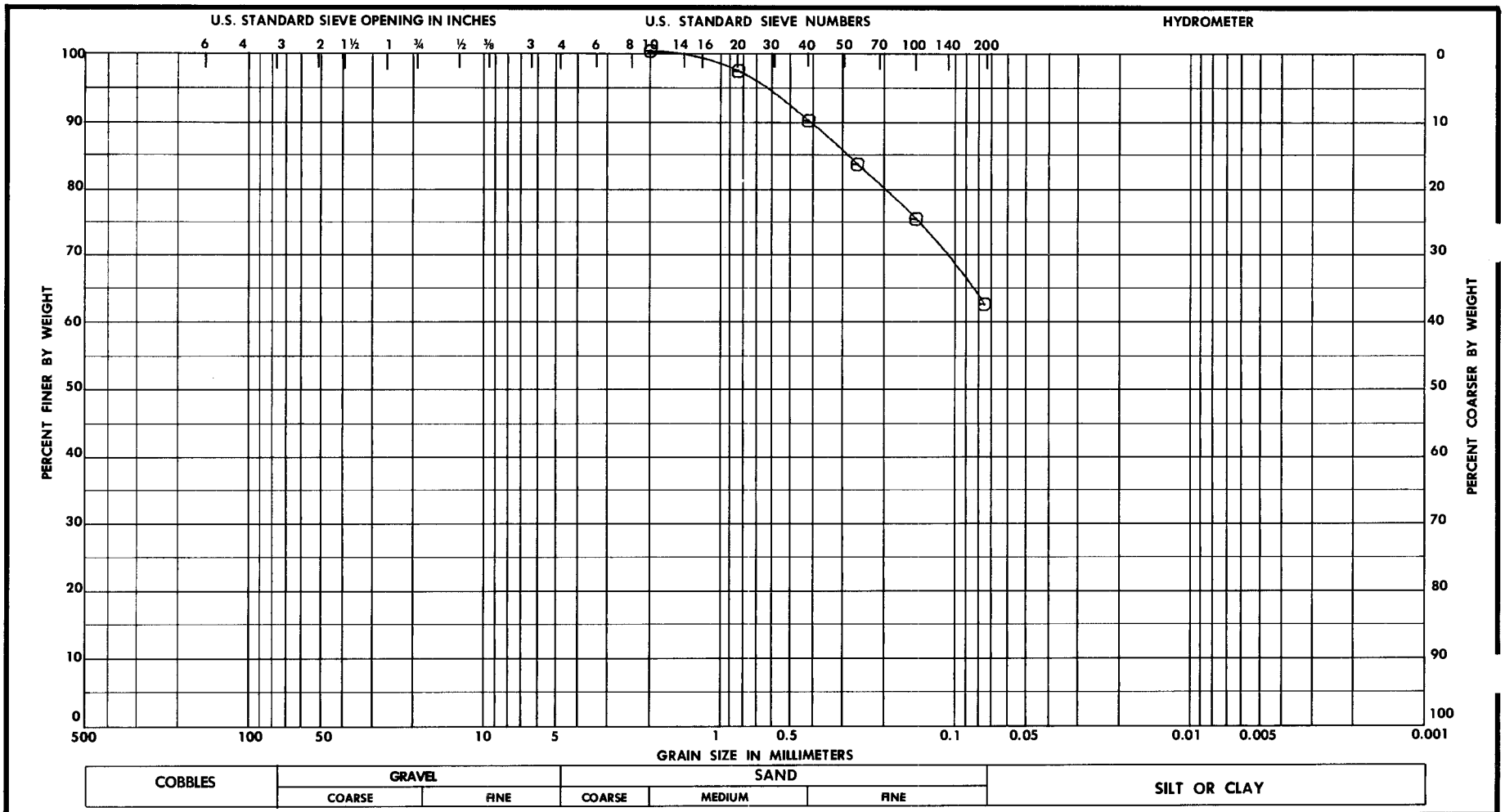
Project FT.BENNING,GA.L1-321-FY85
TRAINEE BARRACKS #4
Area LAB NO.114/1876
Boring No. CS-2 SAMPLE NO. 12
Date 06/22/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	~~Elev or~~ Depth	Classification	Nat w %	LL	PL	PI
2	7.5-9.0'	FAT CLAY (CH)	23.5	51	21	30
		LT.GRAY,SANDY				

GRADATION CURVES

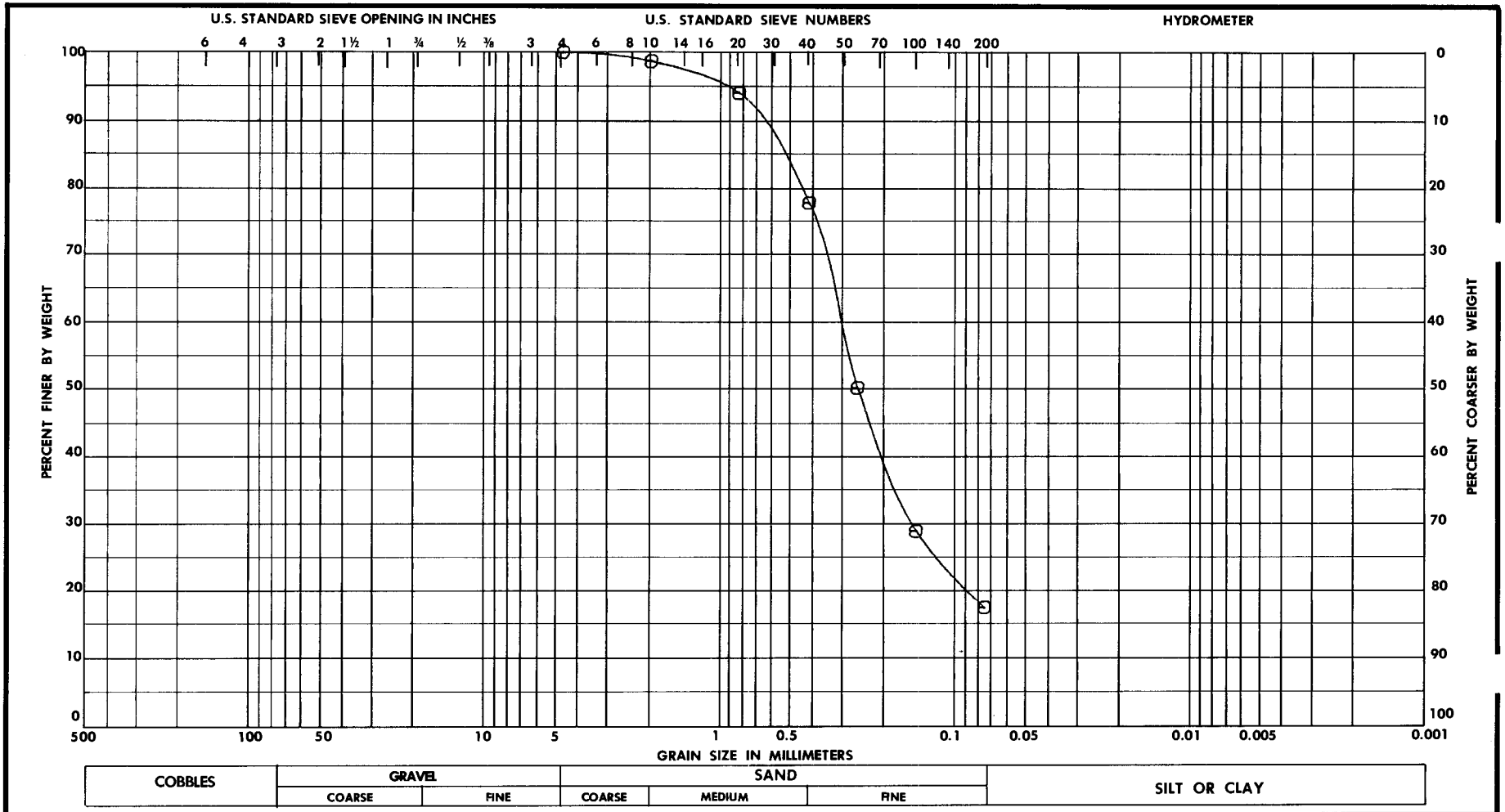
Project FT.BENNING,GA.LI-321-FY85
TRAINEE BARRACKS #4
Area LAB NO.114/1878
Boring No. CS-3 SAMPLE NO. 2
Date 06/22/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	~~Elev or~~ Depth	VISUAL Classification	Nat w %	LL	PL	PI
3	13.5-15.0'	SILTY SAND (SM)	14.4	NP	NP	NP
		REDDISH BROWN				

GRADATION CURVES

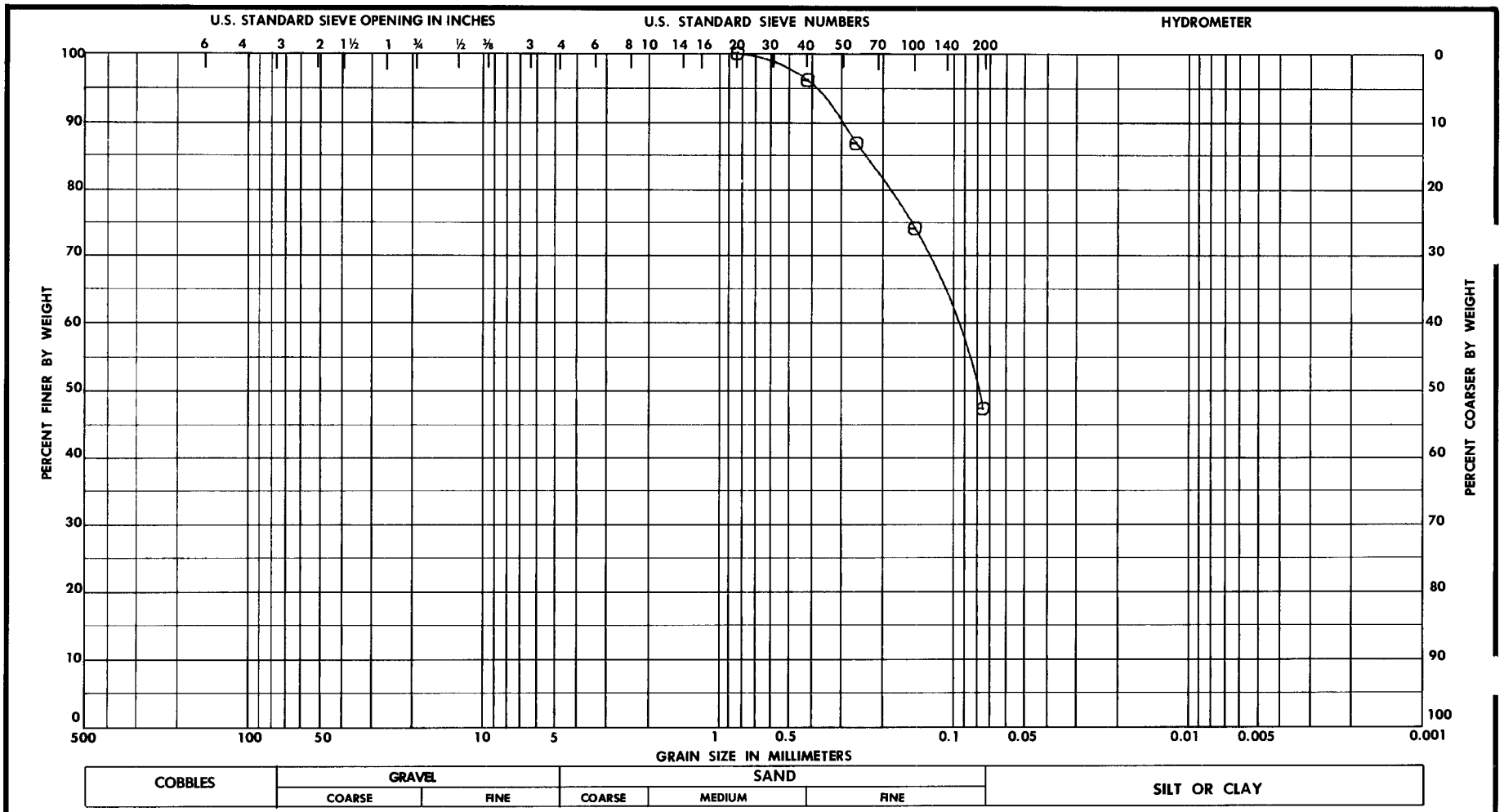
Project FT.BENNING,GA.LI-321-FY85
TRAINEE BARRACKS #4
Area LAB NO.114/1879
Boring No. CS-3 SAMPLE NO. 3
Date 06/22/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	~~Elev or~~ Depth	Classification	Nat w %	LL	PL	PI
4	18.0-19.5'	CLAYEY SAND (SC)	20.6	38	23	15
		YELLOWISH BROWN WITH A TRACE				
		OF MICA				

GRADATION CURVES

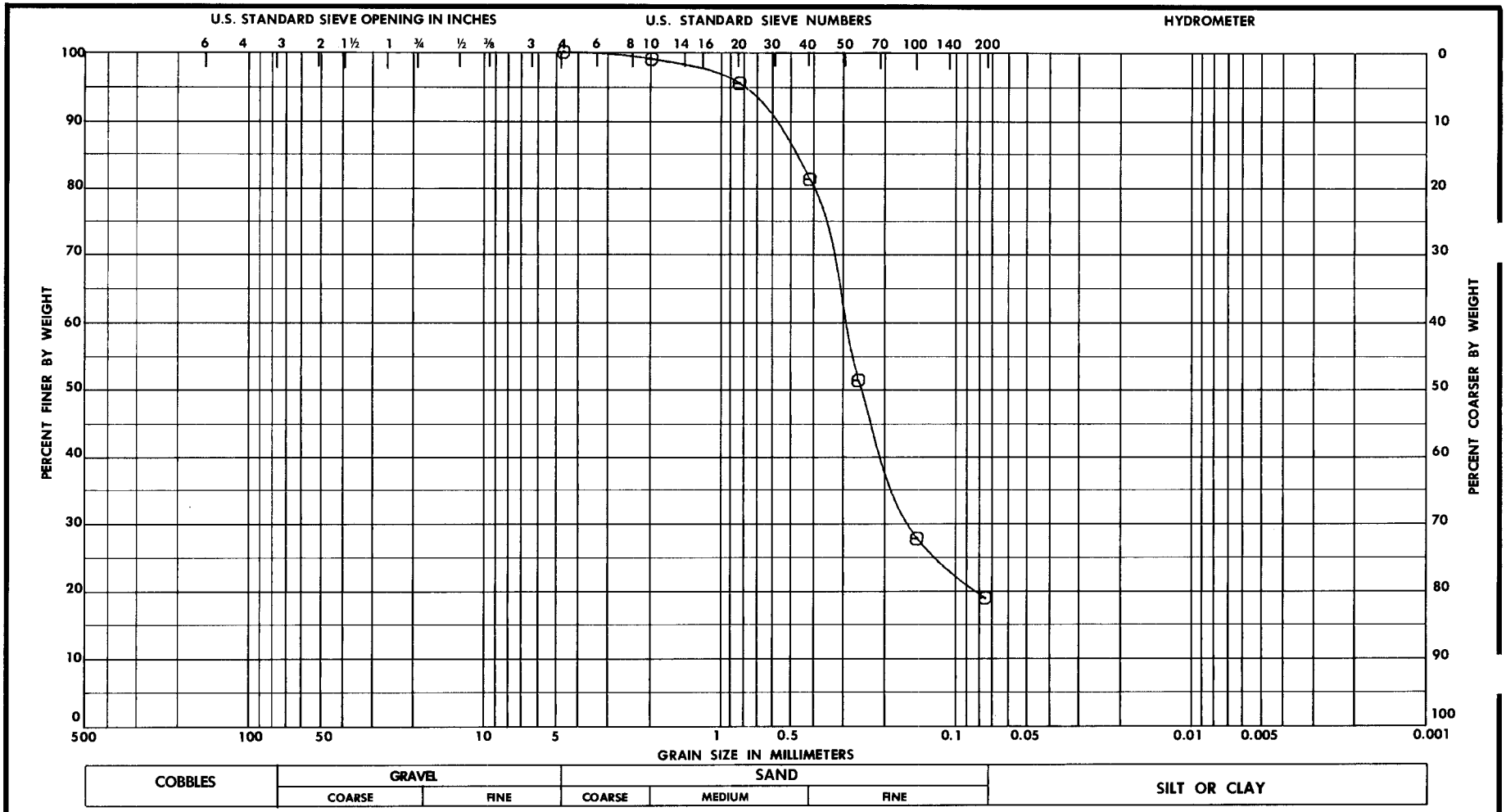
Project FT. BENNING, GA. L1-321-FY85
TRAINEE BARRACKS #4
Area LAB NO. 114/1880
Boring No. CS-3 SAMPLE NO. 4
Date 06/22/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	~~Elev or~~ Depth	VISUAL Classification	Nat w %	LL	PL	PI
2	7.5-9.0'	SILTY SAND (SM)	16.6	NP	NP	NP
		YELLOWISH BROWN				

GRADATION CURVES

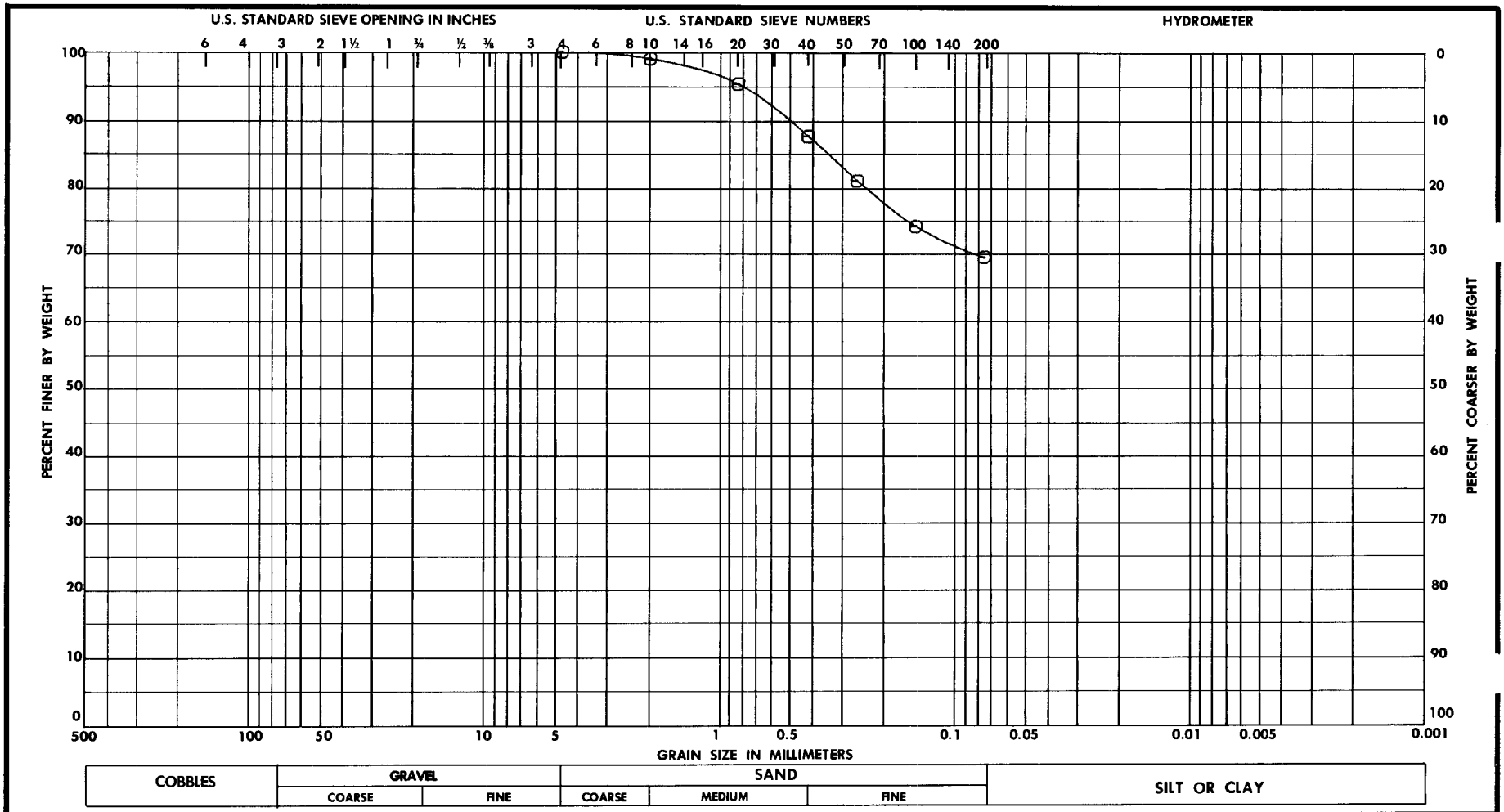
Project FT. BENNING, GA. L1-321-FY85
TRAINEE BARRACKS #4
Area LAB NO. 114/1885
Boring No. CS-4 SAMPLE NO. 2
Date 06/22/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	~~Elev or~~ Depth	Classification	Nat w %	LL	PL	PI
5	34.5-36.0'	FAT CLAY (CH)	28.0	53	22	31
		REDDISH BROWN WITH SOME SAND				

GRADATION CURVES

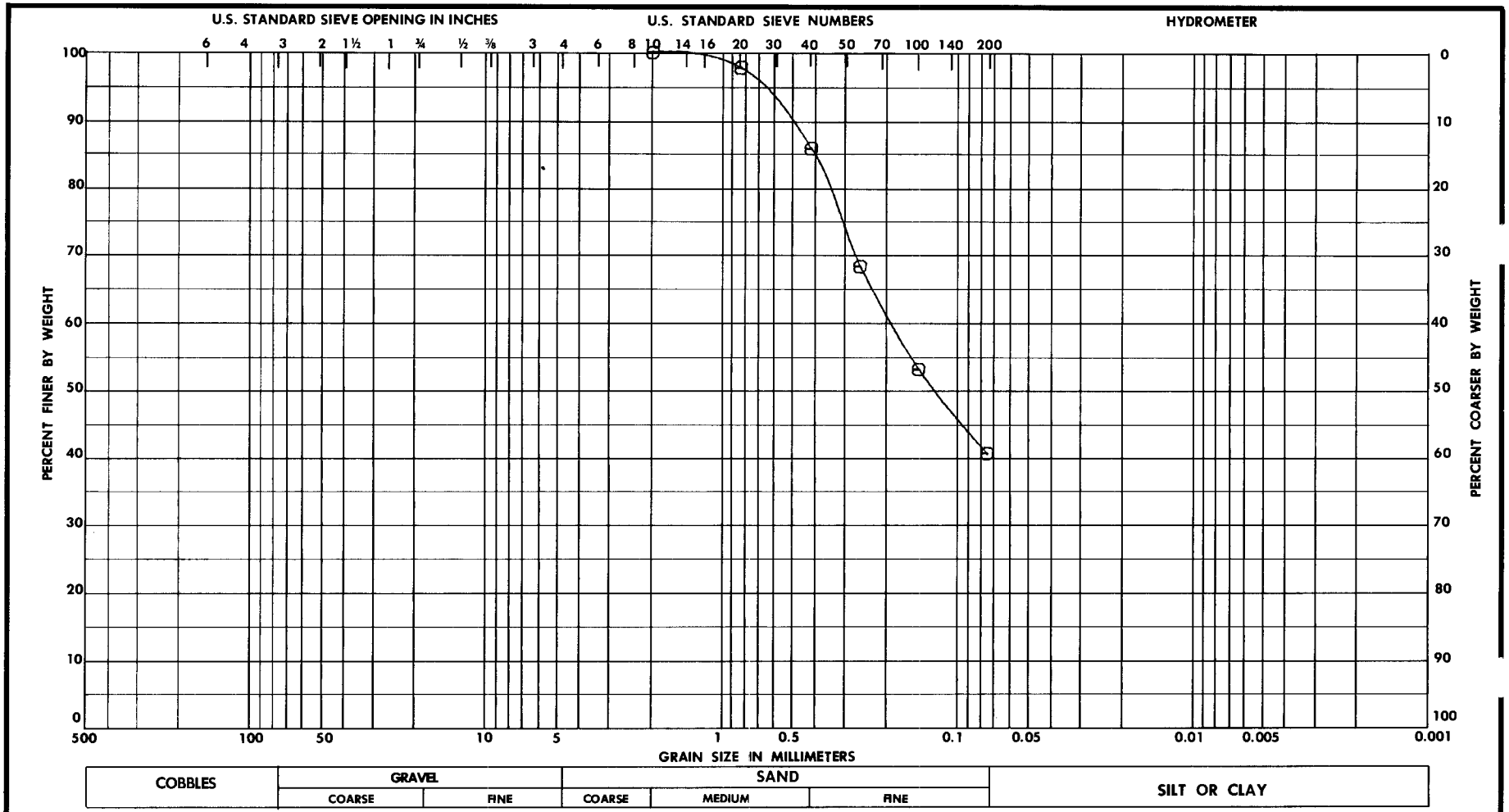
Project FT. BENNING, GA. L1-321-FY85
TRAINEE BARRACKS #4
Area LAB NO. 114/1888
Boring No. CS-4 SAMPLE NO. 5
Date 06/22/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	~~Elev or~~ Depth	Classification	Nat w %	LL	PL	PI
5	12.0-13.5'	CLAYEY SAND (SC)	17.1	38	16	22
		TAN AND PURPLE				

GRADATION CURVES

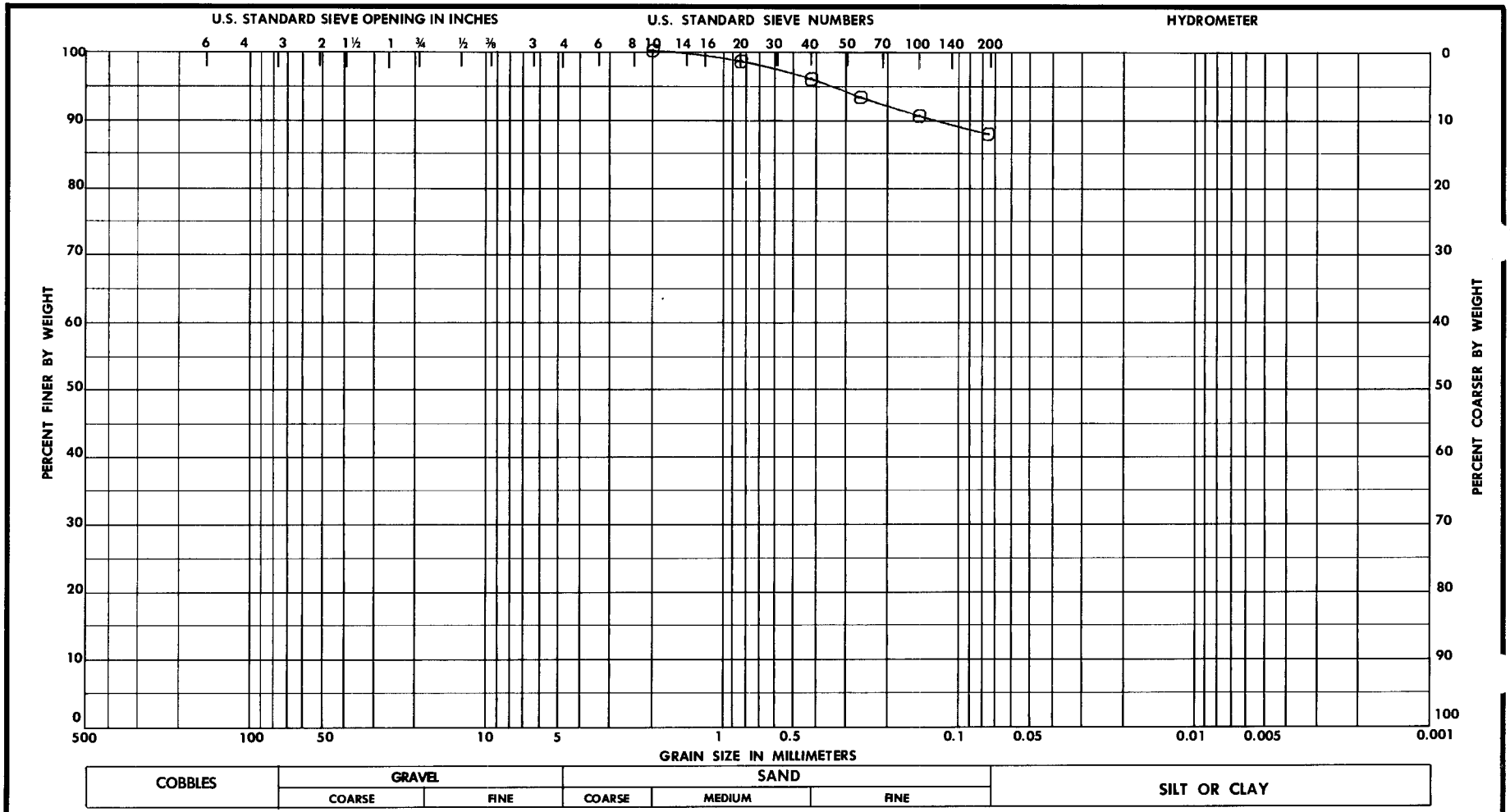
Project FT. BENNING, GA. L1-321-FY85
TRAINEE BARRACKS #4
Area LAB NO. 114/1893
Boring No. CS-5 SAMPLE NO. 5
Date 06/22/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	~~Elev or~~ Depth	Classification	Nat w %	LL	PL	PI
8	24.0-25.5'	FAT CLAY (CH)	26.8	54	25	29
		TAN, GRAY AND RED WITH A				
		LITTLE SAND				

GRADATION CURVES

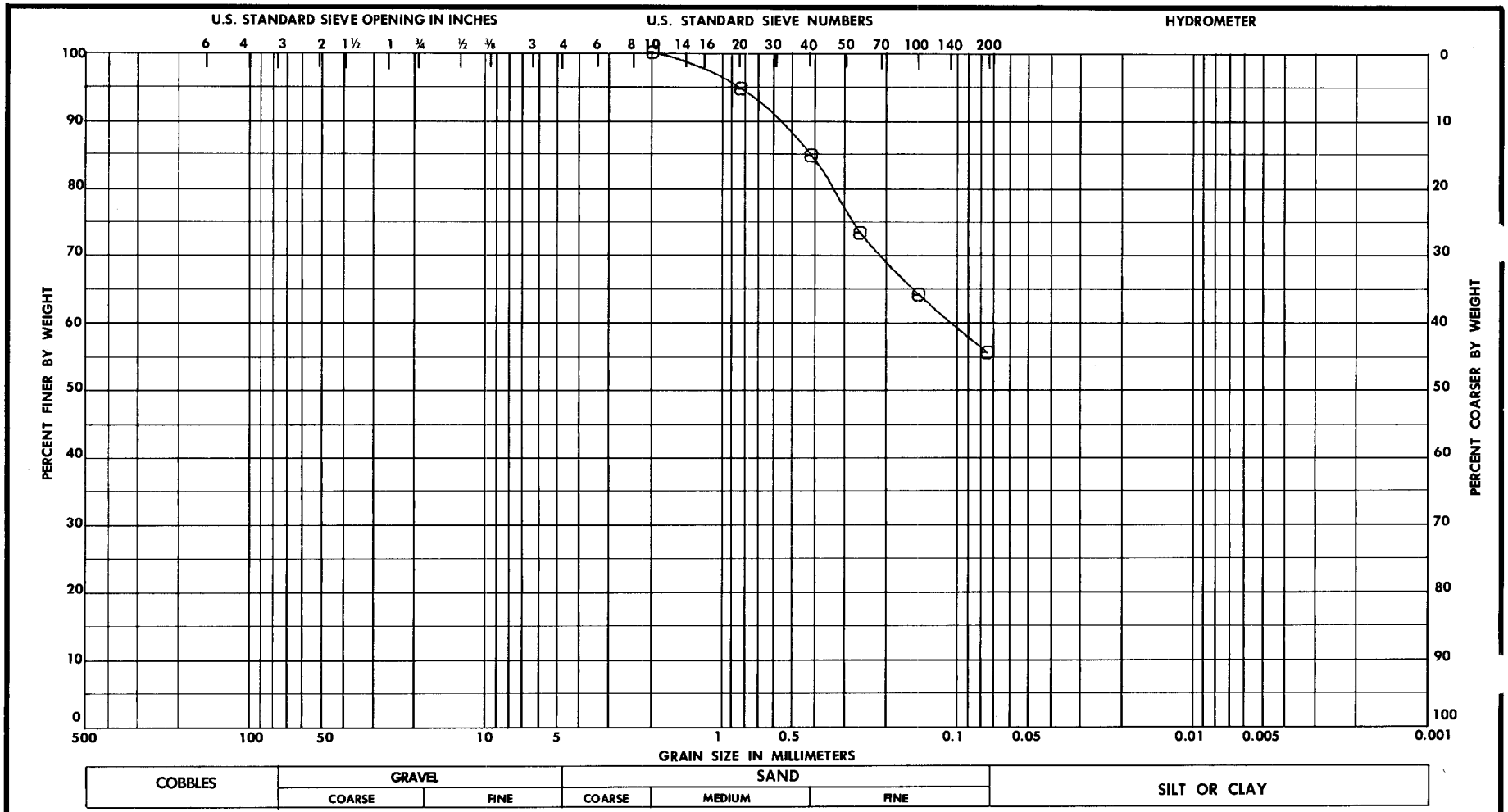
Project FT. BENNING, GA. L1-321-FY85
TRAINEE BARRACKS #4
Area LAB NO. 114/1896
Boring No. CS-5 SAMPLE NO. 8
Date 06/22/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	~~Elev or~~ Depth	Classification	Nat w %	LL	PL	PI
9	28.5-30.0'	LEAN CLAY (CL)	14.3	41	16	25
		LT.GRAY,SANDY				

GRADATION CURVES

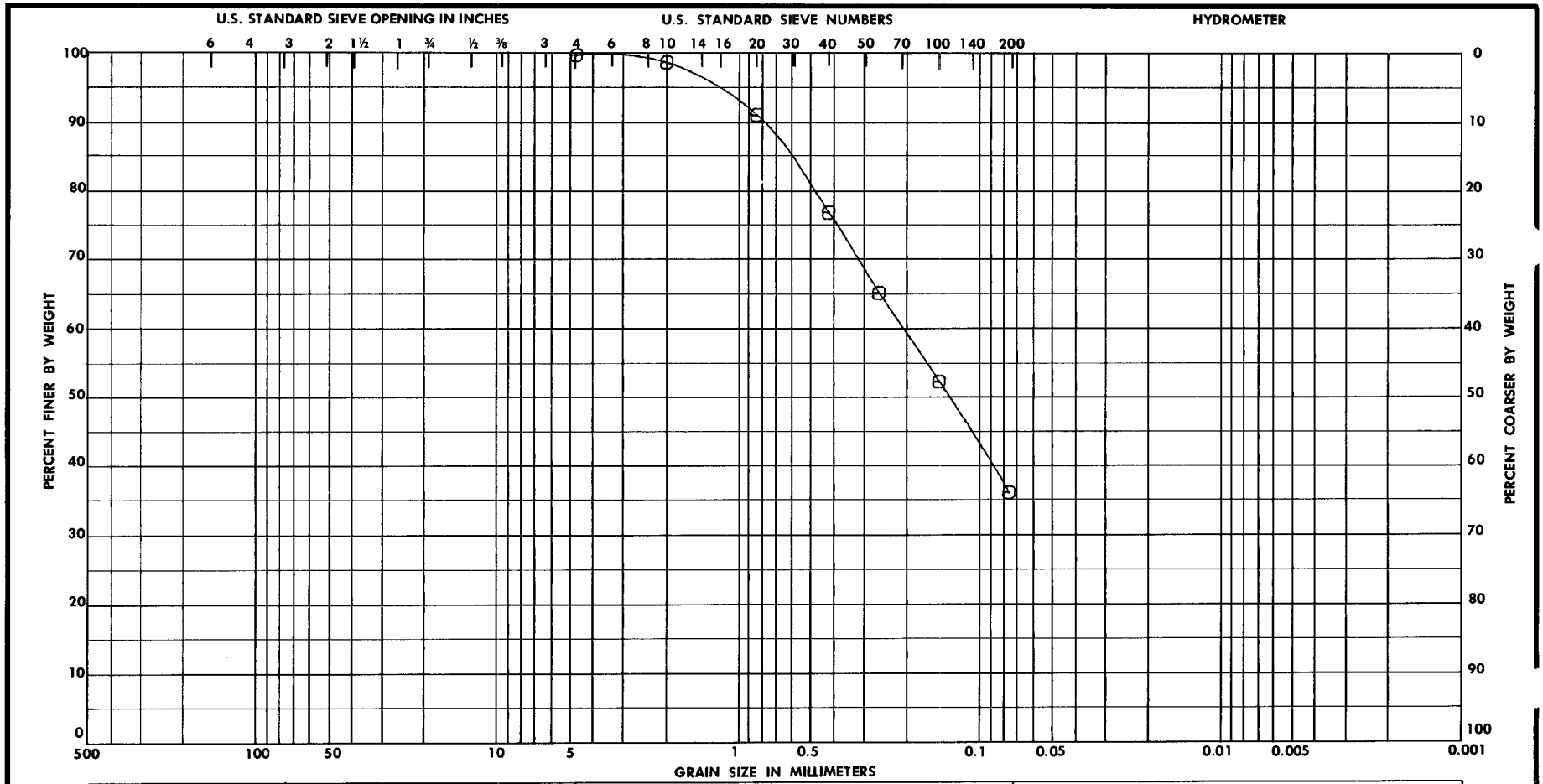
Project FT.BENNING,GA.LI-321-FY85
TRAINEE BARRACKS #4
Area LAB NO.114/1897
Boring No. CS-5 SAMPLE NO. 9
Date 06/22/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
2	3.0-4.5'	CLAYEY SAND, HIGH LL (SC-H)	15.1	51	23	28
		YELLOWISH BROWN				

GRADATION CURVES

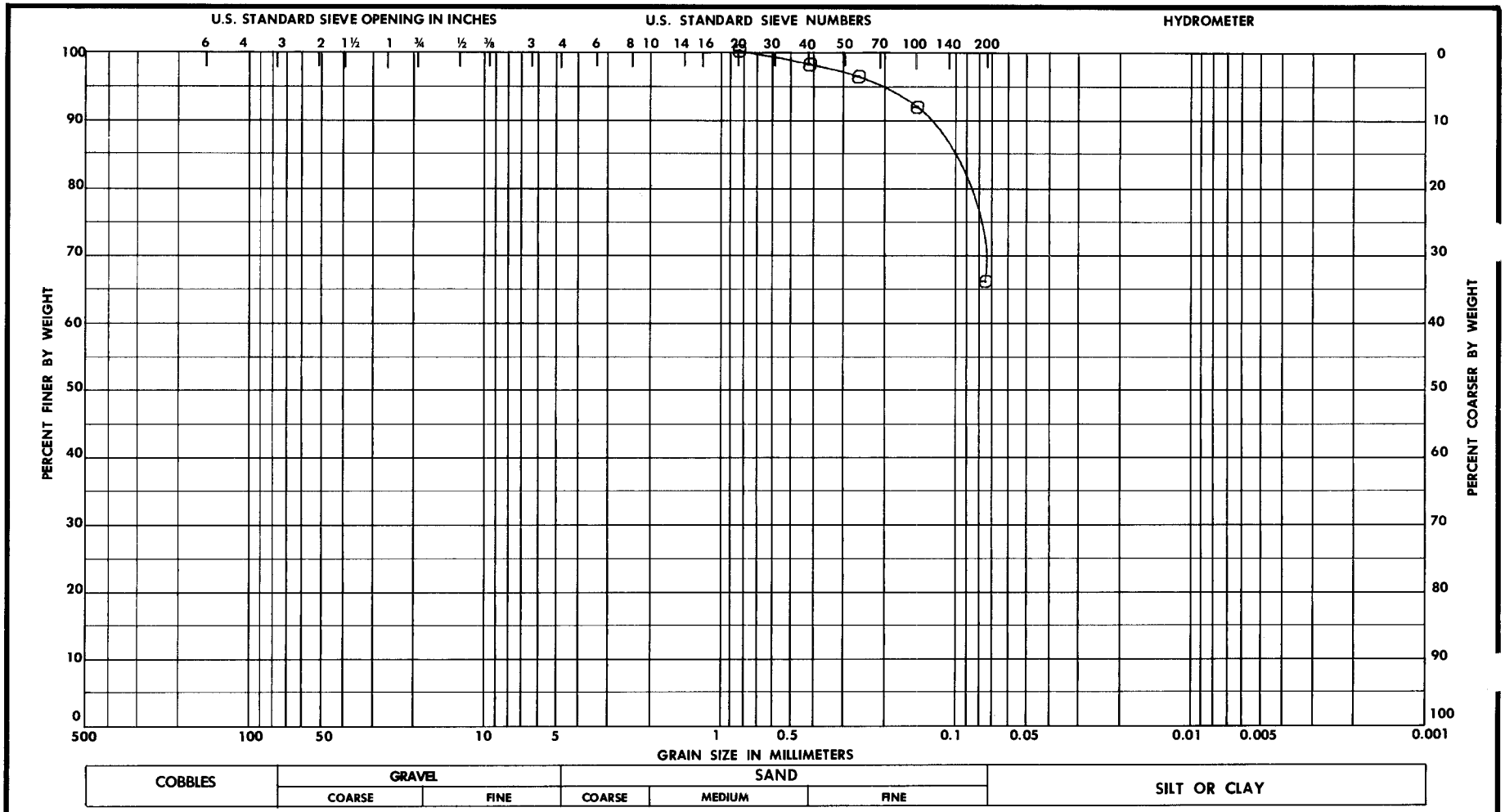
Project FT. BENNING, GA. L1-321-FY85
TRAINEE BARRACKS #4
Area LAB NO. 114/1900
Boring No. CS-6 SAMPLE NO. 2
Date 06/22/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
3	7.5-9.0'	FAT CLAY (CH)	24.2	58	23	35
		LT.GRAY WITH SOME SAND				

GRADATION CURVES

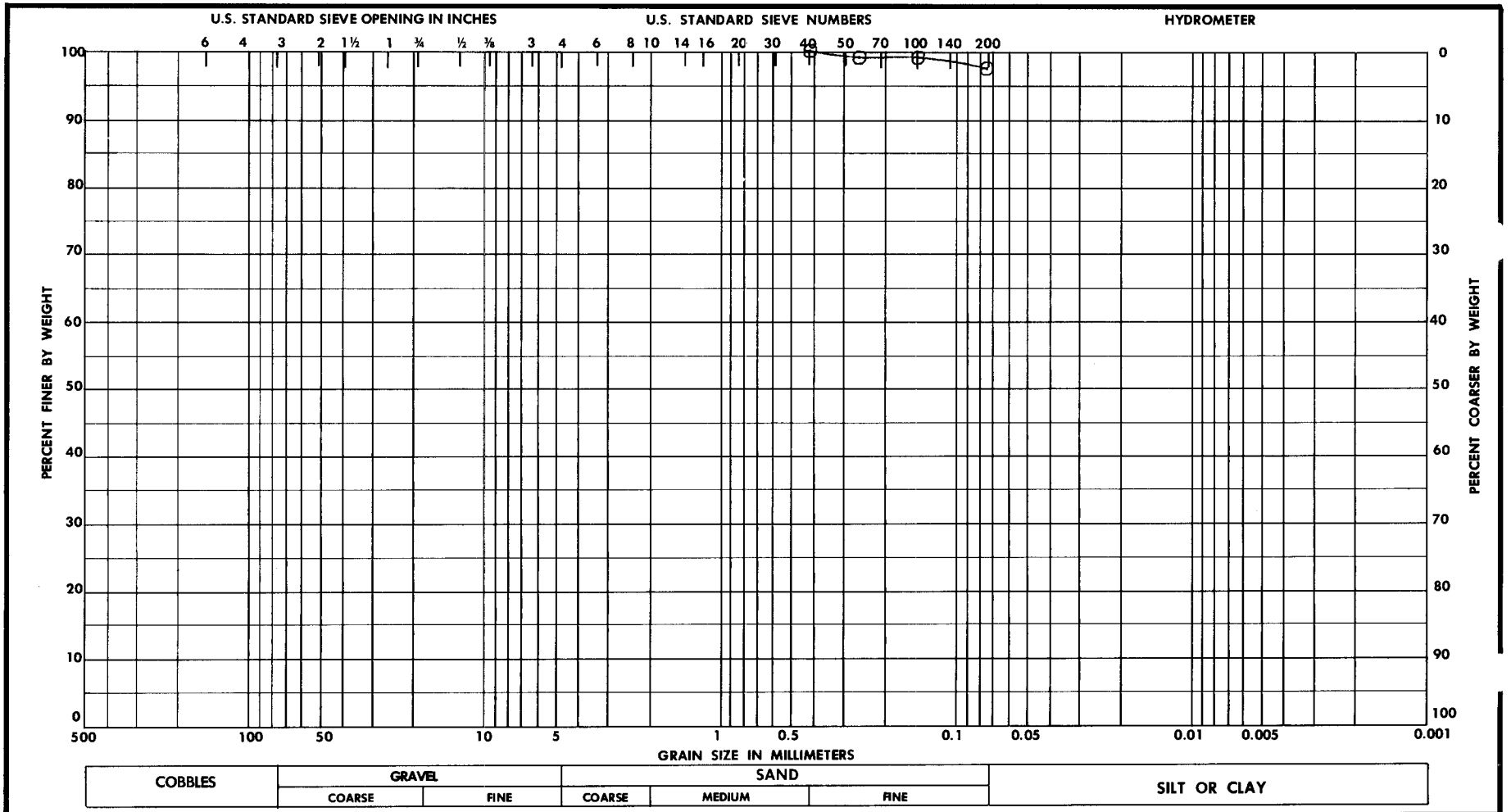
Project: FT.BENNING,GA.LI-321-FY85
TRAINEE BARRACKS #4
Area: LAB NO.114/1901
Boring No. CS-6 SAMPLE NO. 3
Date: 06/22/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	~~Elev. or~~ Depth	Classification	Nat w %	LL	PL	PI
5	16.5-18.0'	INORGANIC SILT, HIGH LL (MH)	28.8	60	32	28
		DK. GRAY AND TAN, CLAYEY WITH				
		A TRACE OF SAND AND MICA				

GRADATION CURVES

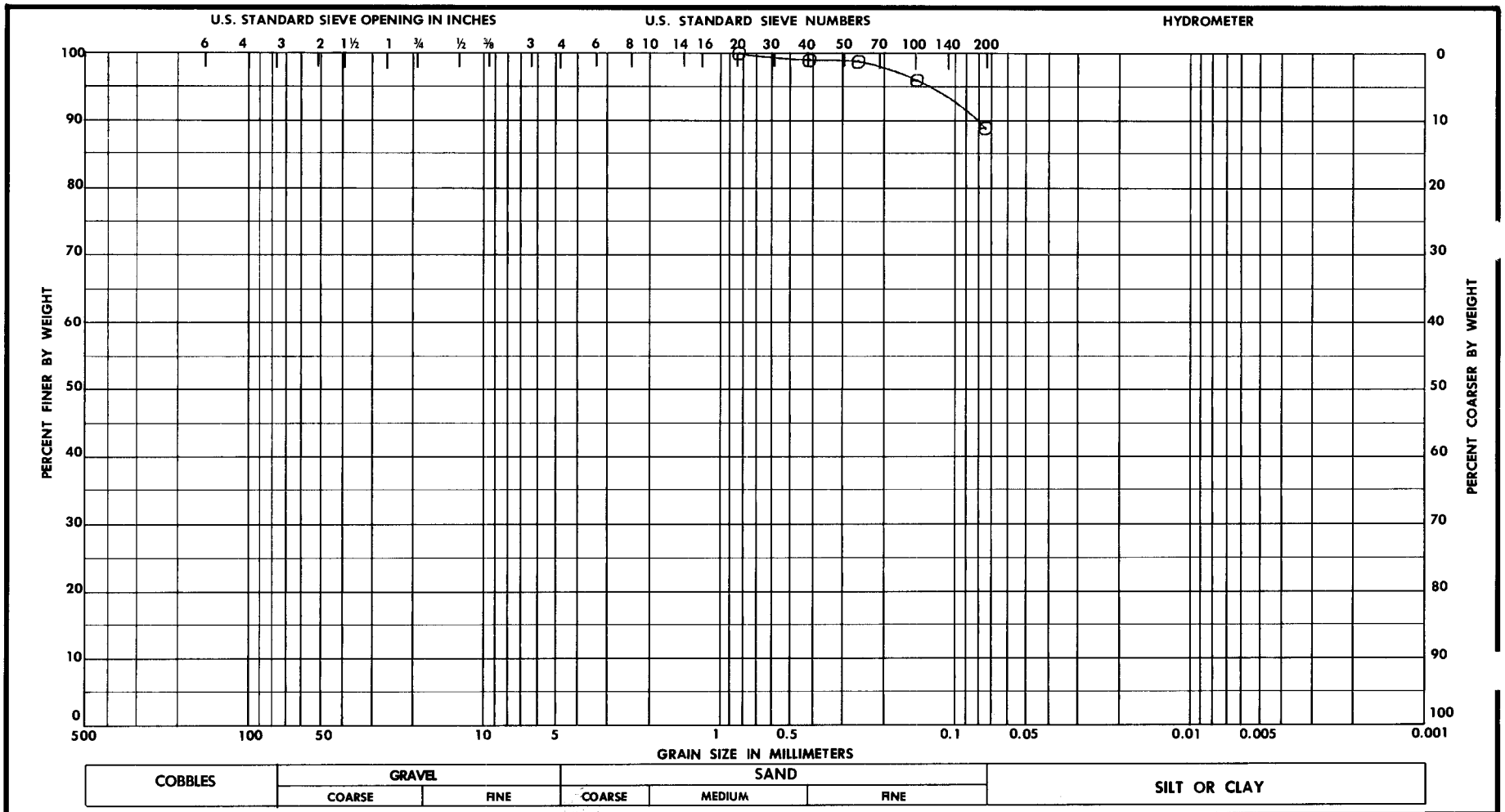
Project FT. BENNING, GA. LI-321-FY85
TRAINEE BARRACKS #4
Area LAB NO. 114/1903
Boring No. CS-6 SAMPLE NO. 5
Date 06/22/84

ENG FORM 1 MAY 63 **2087**

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	~~Elev or~~ Depth	Classification	Nat w %	LL	PL	PI
6	18.0-19.5'	INORGANIC SILT, HIGH LL (MH)	25.3	57	31	26
		DK. GRAY, CLAYEY WITH A LITTLE				
		SAND				

GRADATION CURVES

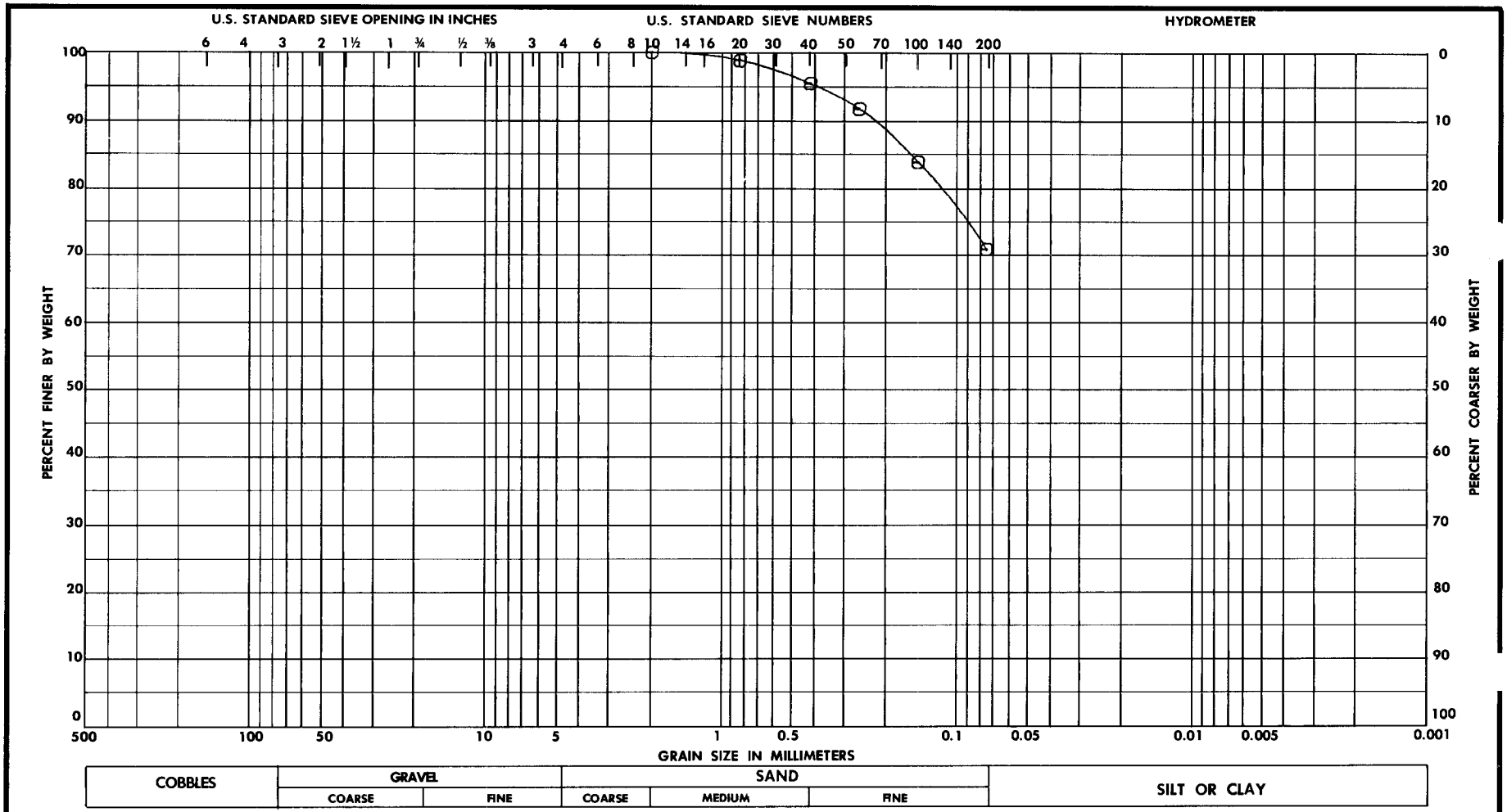
Project FT. BENNING, GA. LI-321-FY85
TRAINEE BARRACKS #4
Area LAB NO. 114/1904
Boring No. CS-6 SAMPLE NO. 6
Date 06/22/84

ENG FORM 1 MAY 63 **2087**

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	~~Elev or~~ Depth	Classification	Nat w %	LL	PL	PI
9	28.5-30.0'	LEAN CLAY (CL)	15.8	36	19	17
		LT.GRAY WITH SOME SAND				

GRADATION CURVES

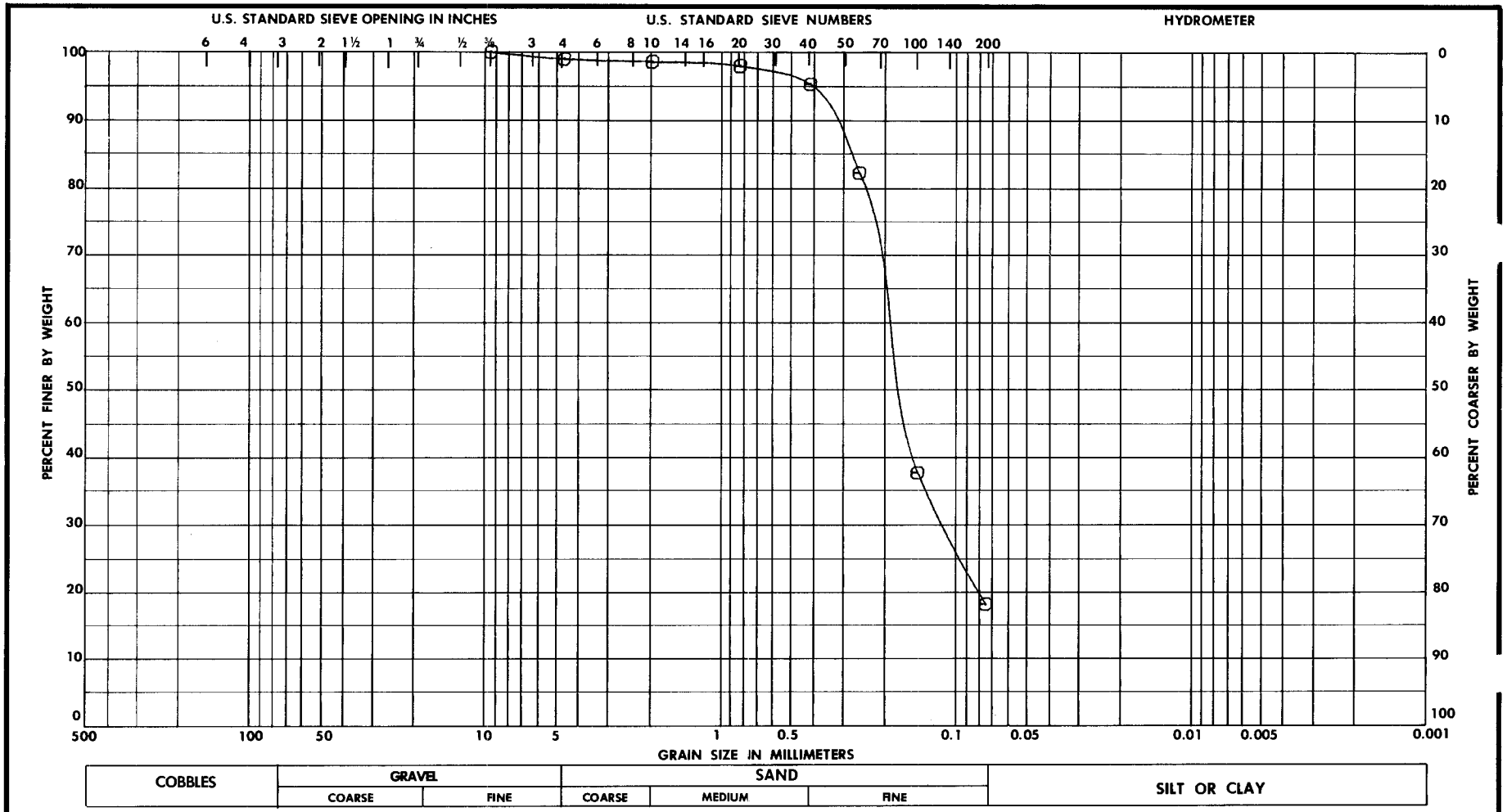
Project FT.BENNING,GA.L1-321-FY85
TRAINEE BARRACKS #4
Area LAB NO.114/1907
Boring No. CS-6 SAMPLE NO. 9
Date 06/22/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	Elev or Depth	VISUAL Classification	Nat w %	LL	PL	PI
3	4.5-6.0'	SILTY SAND (SM)	14.7	NP	NP	NP
		ORANGE AND TAN, with a trace				
		of gravel				

GRADATION CURVES

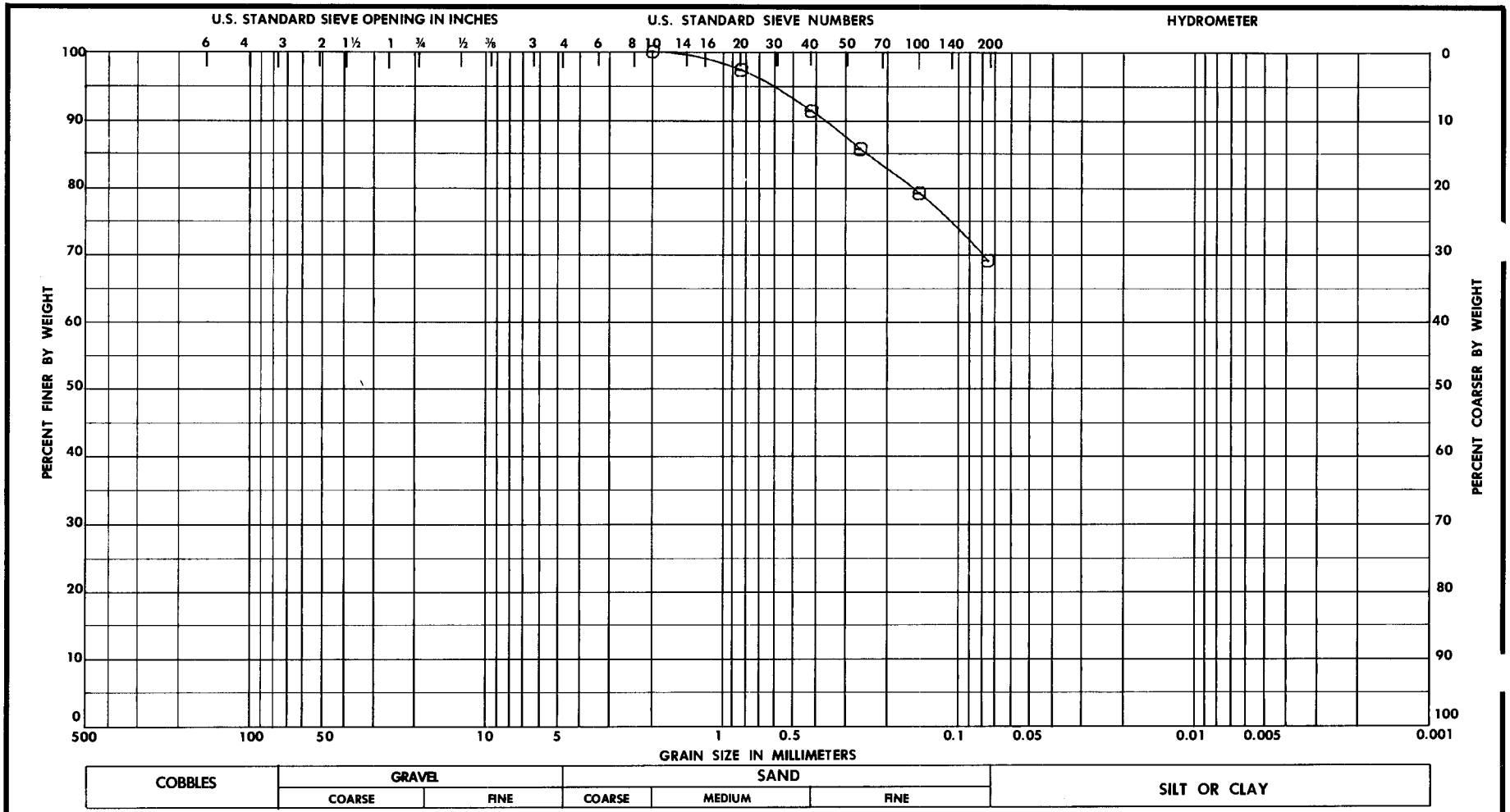
Project FT. BENNING, GA. L1-321-FY85
TRAINEE BARRACKS #4
Area LAB NO. 114/1911
Boring No. CS-7 SAMPLE NO. 3
Date 06/22/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	~~Elev or~~ Depth	Classification	Nat w %	LL	PL	PI
5	15.0-16.5'	LEAN CLAY (CL)	19.1	46	21	25
		GRAY AND TAN WITH SOME SAND				

GRADATION CURVES

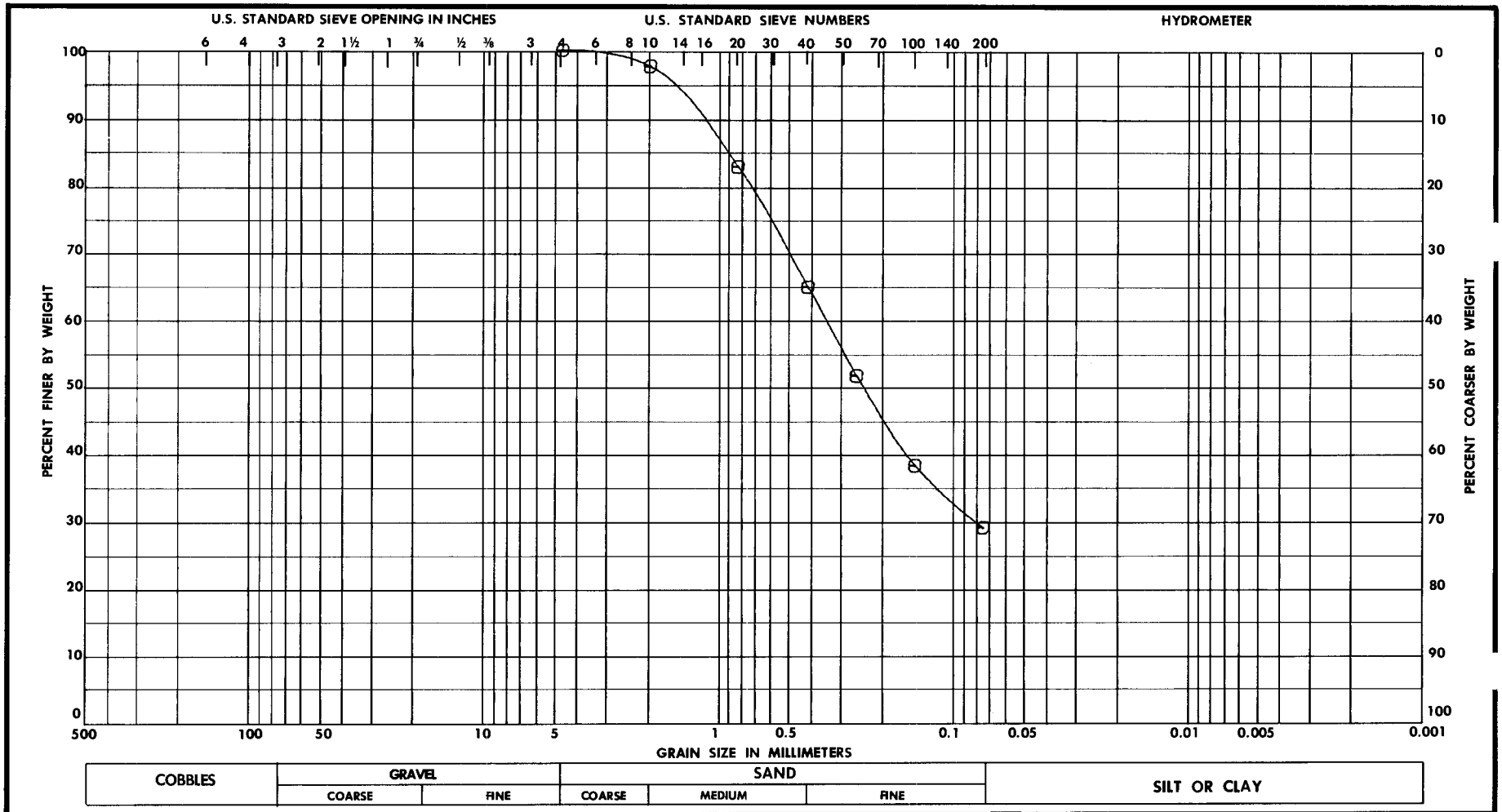
Project FT. BENNING, GA. L1-321-FY85
TRAINEE BARRACKS #4
Area LAB NO. 114/1913
Boring No. CS-7 SAMPLE NO. 5
Date 06/22/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	~~Elev or~~ Depth	Classification	Nat w %	LL	PL	PI
6	16.5-18.0'	CLAYEY SAND (SC)	9.6	41	16	25
		GRAY AND LT.TAN				

GRADATION CURVES

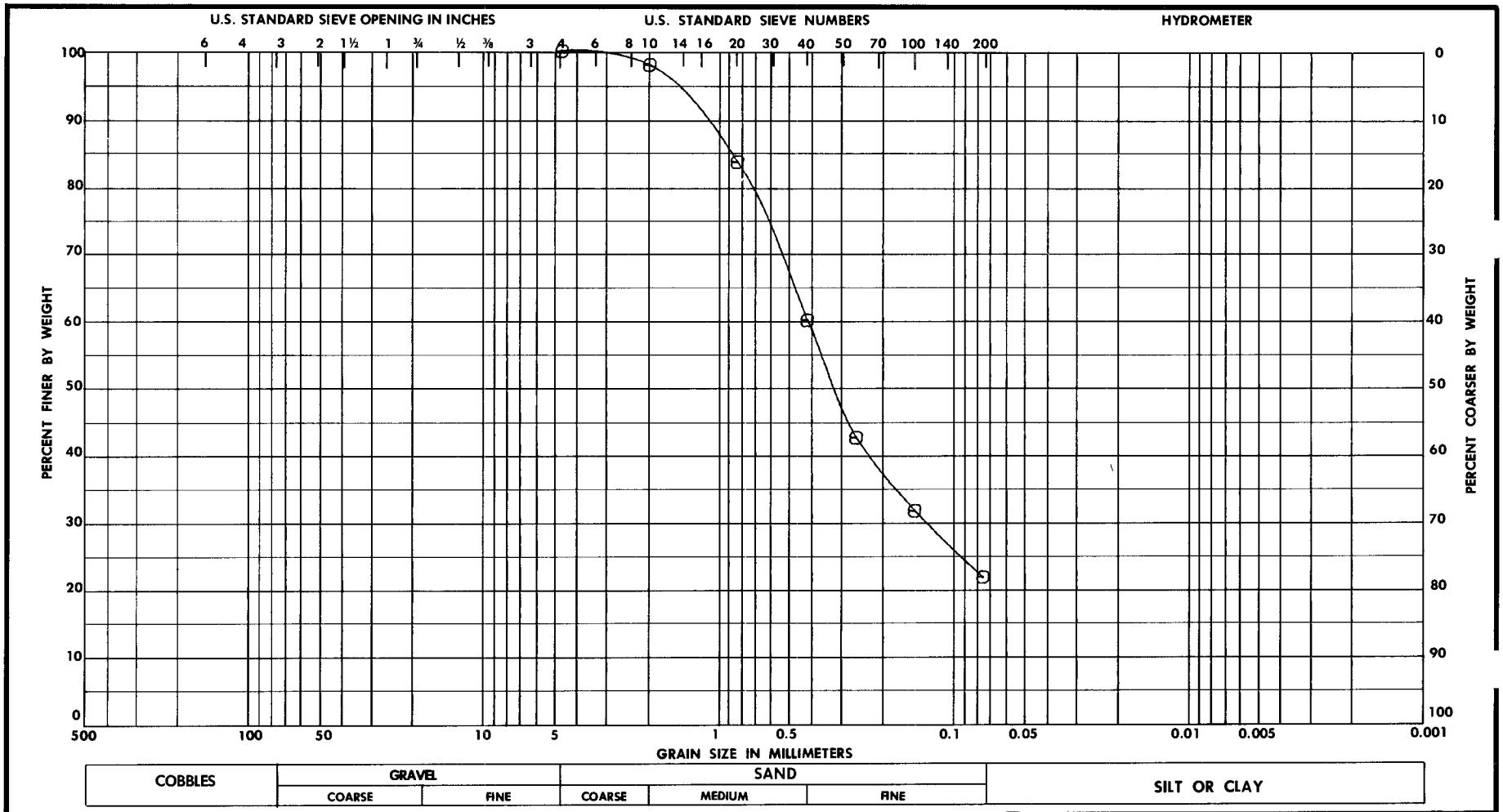
Project: FT.BENNING,GA.L1-321-FY85
TRAINEE BARRACKS #4
Area: LAB NO.114/1914
Boring No. CS-7 SAMPLE NO. 6
Date: 06/22/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	~~Elev or~~ Depth	Classification	Nat w %	LL	PL	PI
2	4.5-6.0'	CLAYEY SAND (SC)	10.9	35	19	16
		TAN				

GRADATION CURVES

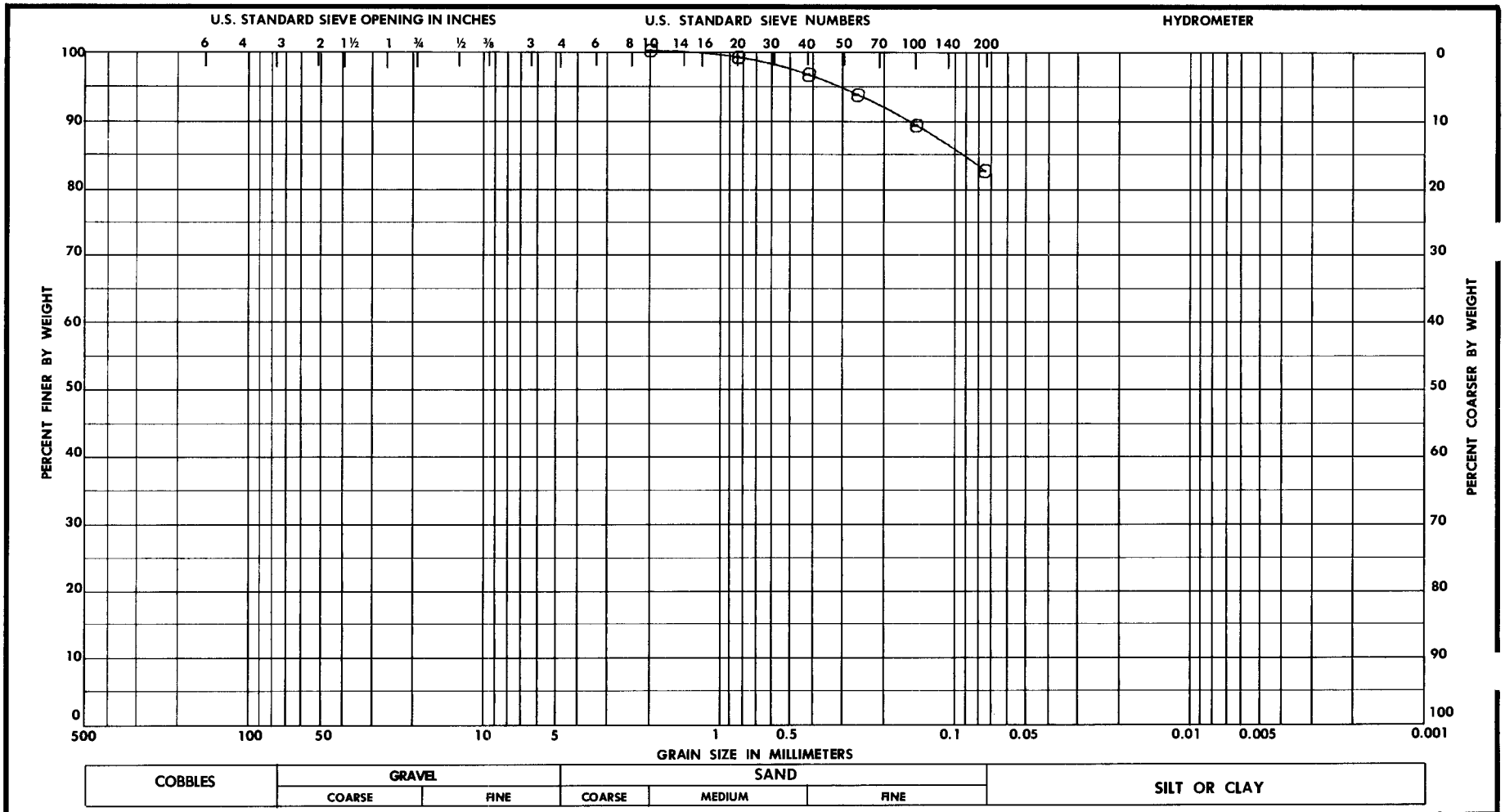
Project FT. BENNING, GA. L1-321-FY85
TRAINEE BARRACKS #4
Area LAB NO. 114/1916
Boring No. CS-8 SAMPLE NO. 2
Date 06/22/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
4	9.0-10.5'	FAT CLAY (CH)	32.6	68	26	42
		GRAY WITH A LITTLE SAND				

GRADATION CURVES

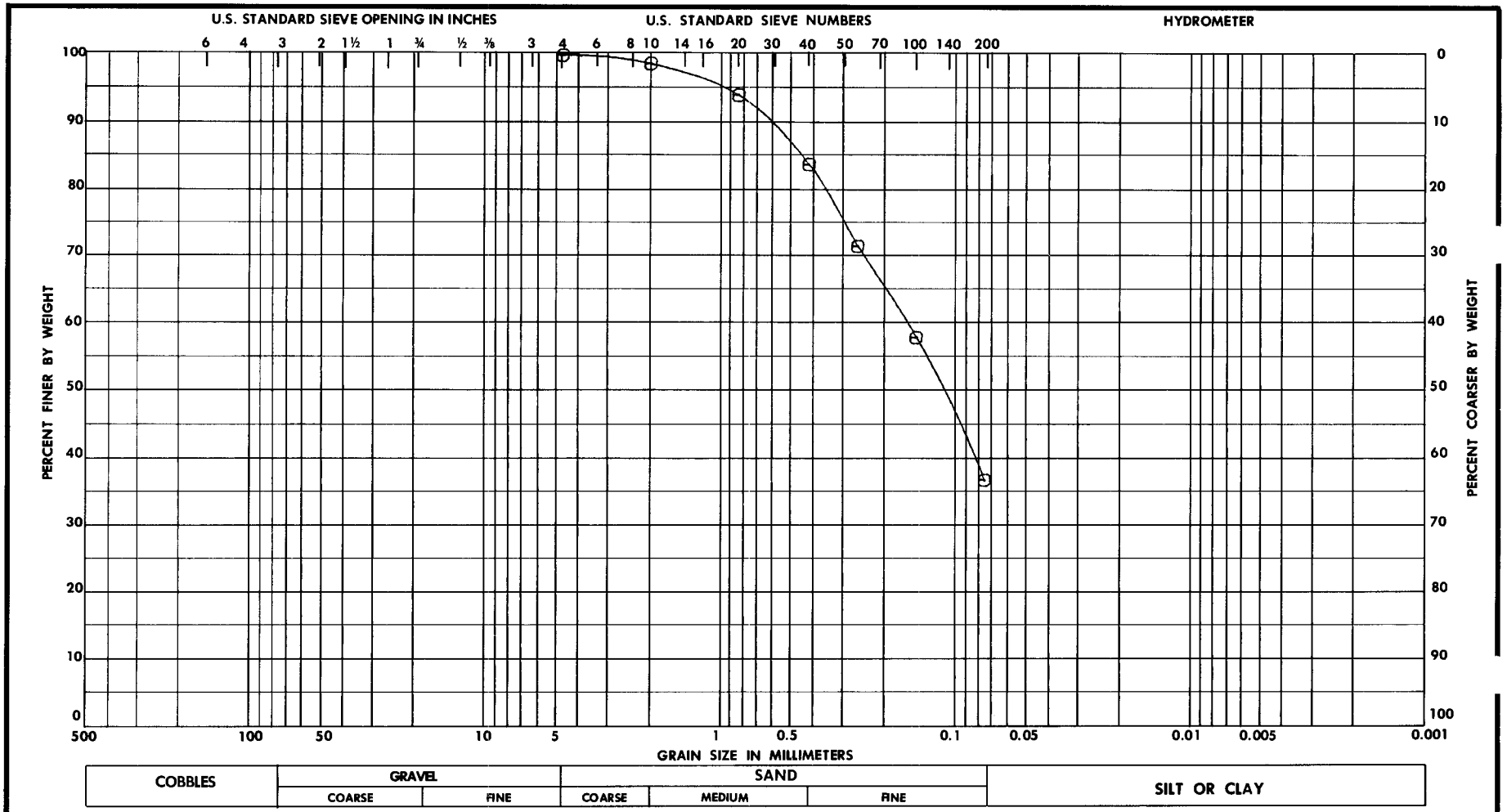
Project FT.BENNING,GA.LI-321-FY85
TRAINEE BARRACKS #4
Area LAB NO.114/1918
Boring No. CS-8 SAMPLE NO. 4
Date 06/22/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
2	4.0-5.0'	CLAYEY SAND (SC)	13.8	30	18	12
		TAN				

GRADATION CURVES

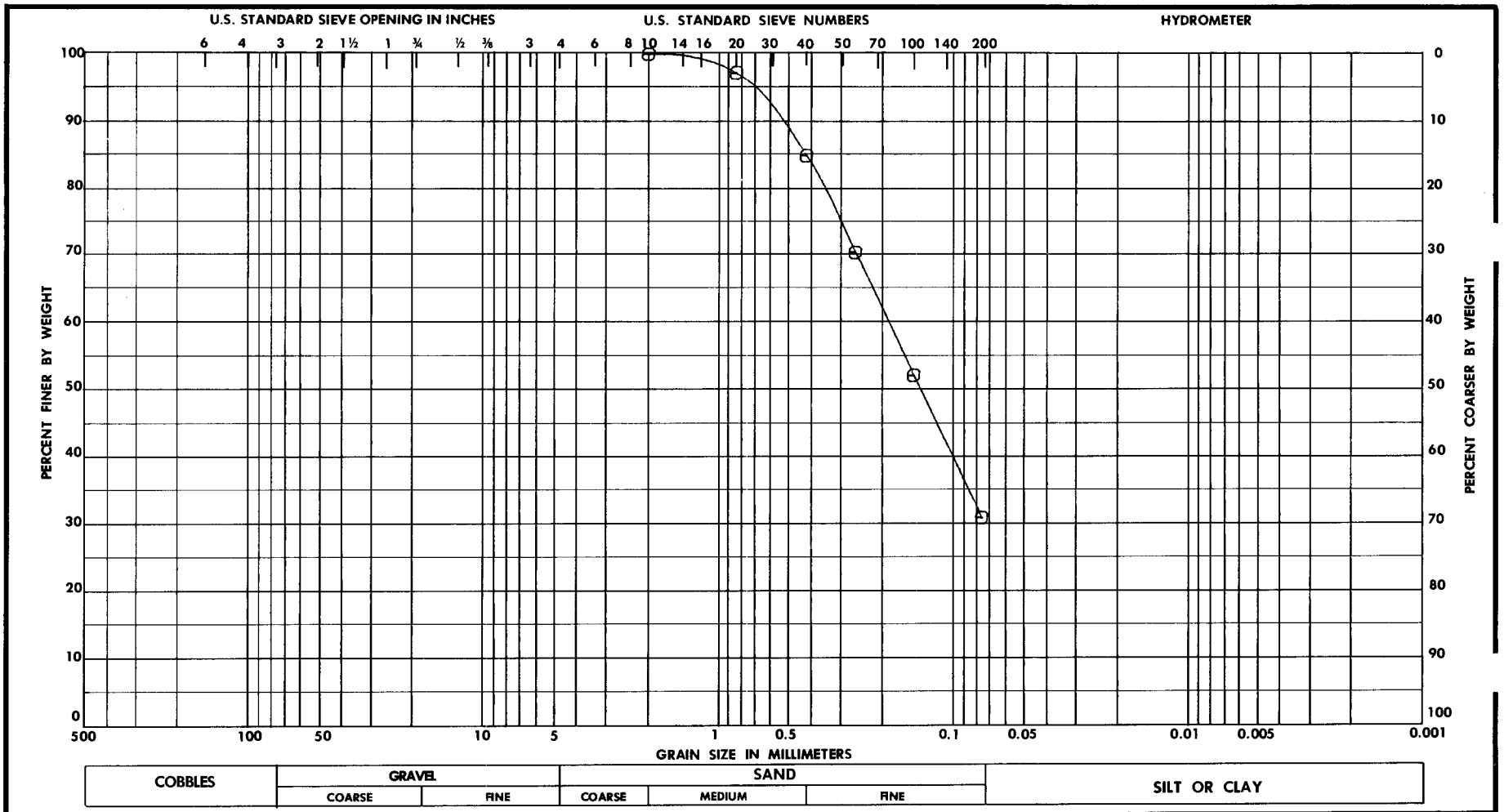
Project FT. BENNING, GA. LI-321-FY85
TRAINEE BARRACKS #4
Area LAB NO. 114/1922
Boring No. A-1 SAMPLE NO. 2
Date 06/22/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	Elev or Depth	VISUAL Classification	Nat w %	LL	PL	PI
1	0.0-1.0'	SILTY SAND (SM)	10.7	NP	NP	NP
		DK.BROWN WITH A TRACE OF				
		ORGANIC FINES				

GRADATION CURVES

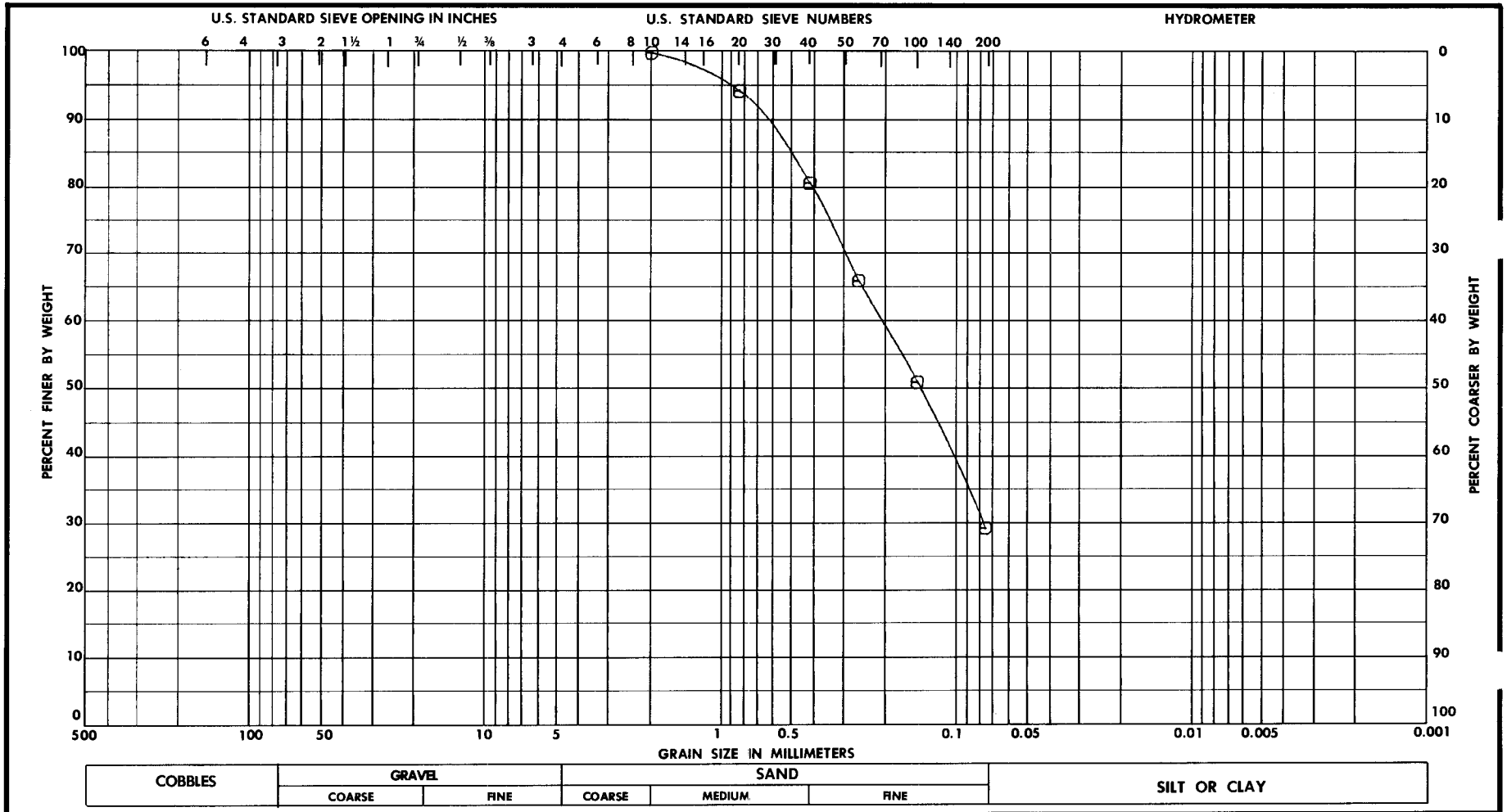
Project FT.BENNING,GA.L1-321-FY85
TRAINEE BARRACKS #4
Area LAB NO.114/1924
Boring No. A-2 SAMPLE NO. 1
Date 06/22/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
3	6.0-7.0'	CLAYEY SAND (SC)	22.3	30	18	12
		ORANGE, GRAY AND TAN				

GRADATION CURVES

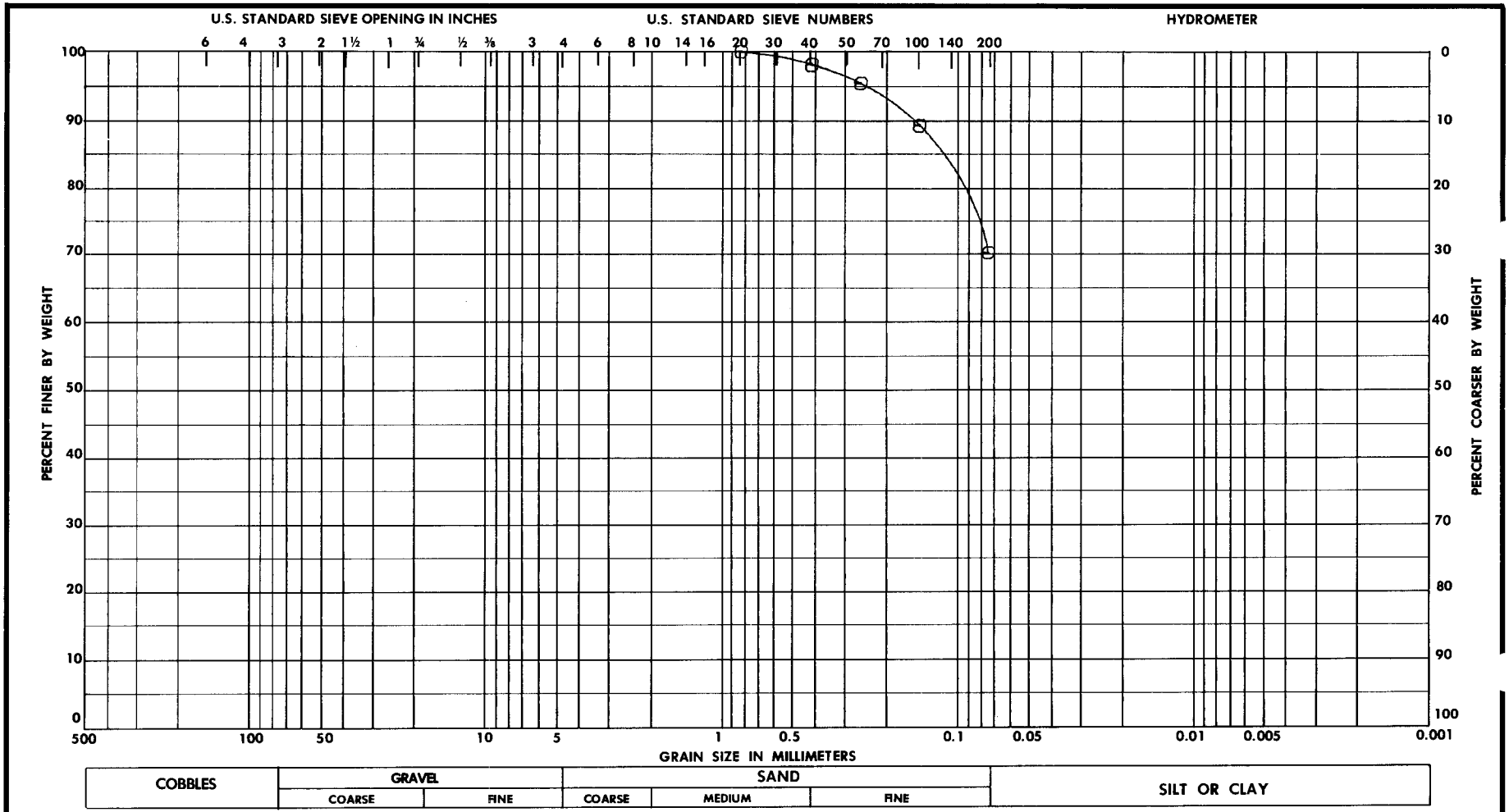
Project FT. BENNING, GA. LI-321-FY85
TRAINEE BARRACKS #4
Area LAB NO. 114/1926
Boring No. A-2 SAMPLE NO. 3
Date 06/22/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	~~Elev or~~ Depth	Classification	Nat w %	LL	PL	PI
1	0.0-0.5'	LEAN CLAY (CL)	19.2	35	19	16
		BROWN AND TAN WITH SOME SAND				

GRADATION CURVES

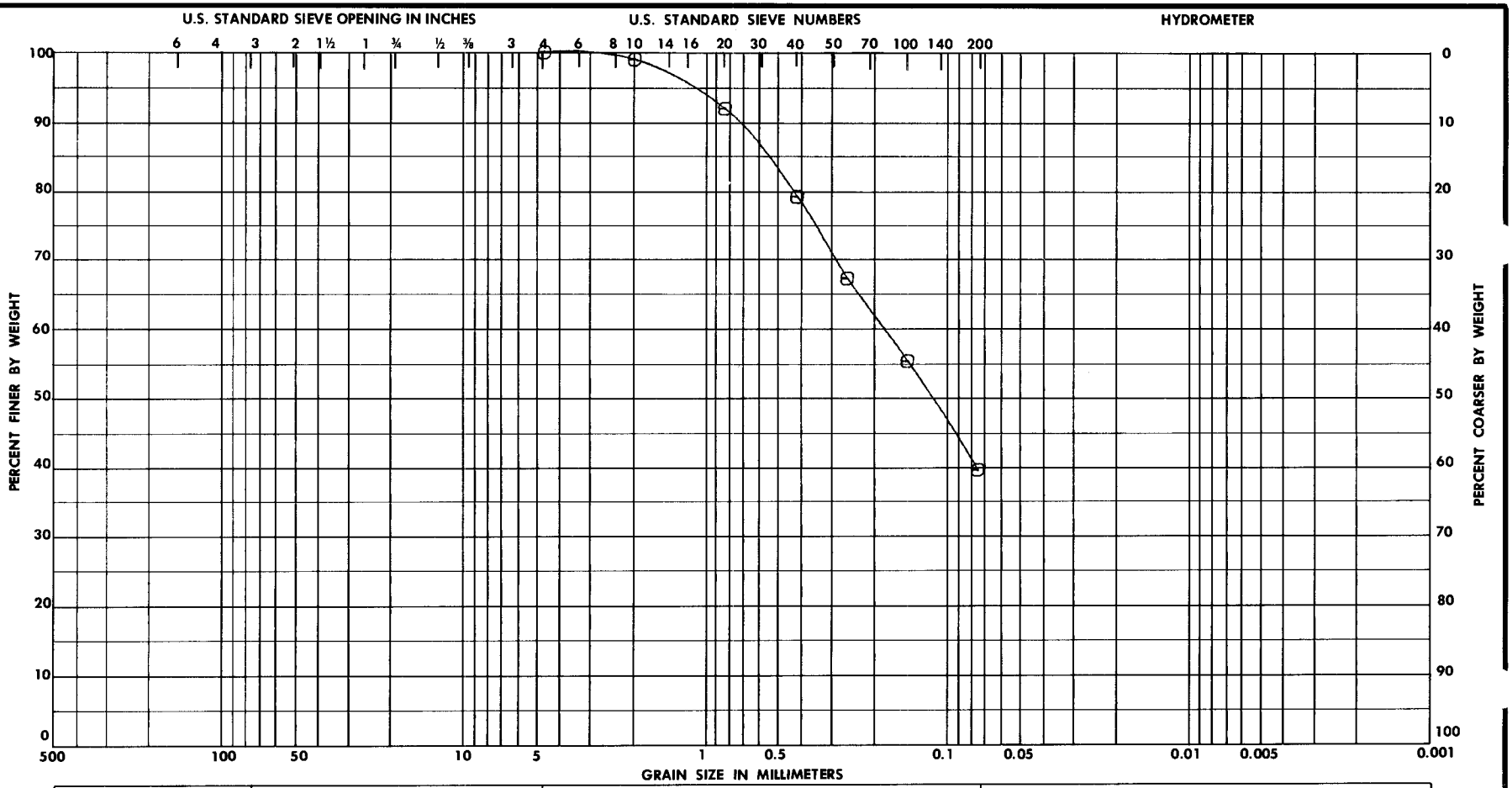
Project FT. BENNING, GA. LI-321-FY85
TRAINEE BARRACKS #4
Area LAB NO. 114/1932
Boring No. A-4 SAMPLE NO. 1
Date 06/26/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	~~Elev or~~ Depth	Classification	Nat w %	LL	PL	PI
2	1.0-2.0'	CLAYEY SAND (SC)	15.7	47	20	27
		TAN				

GRADATION CURVES

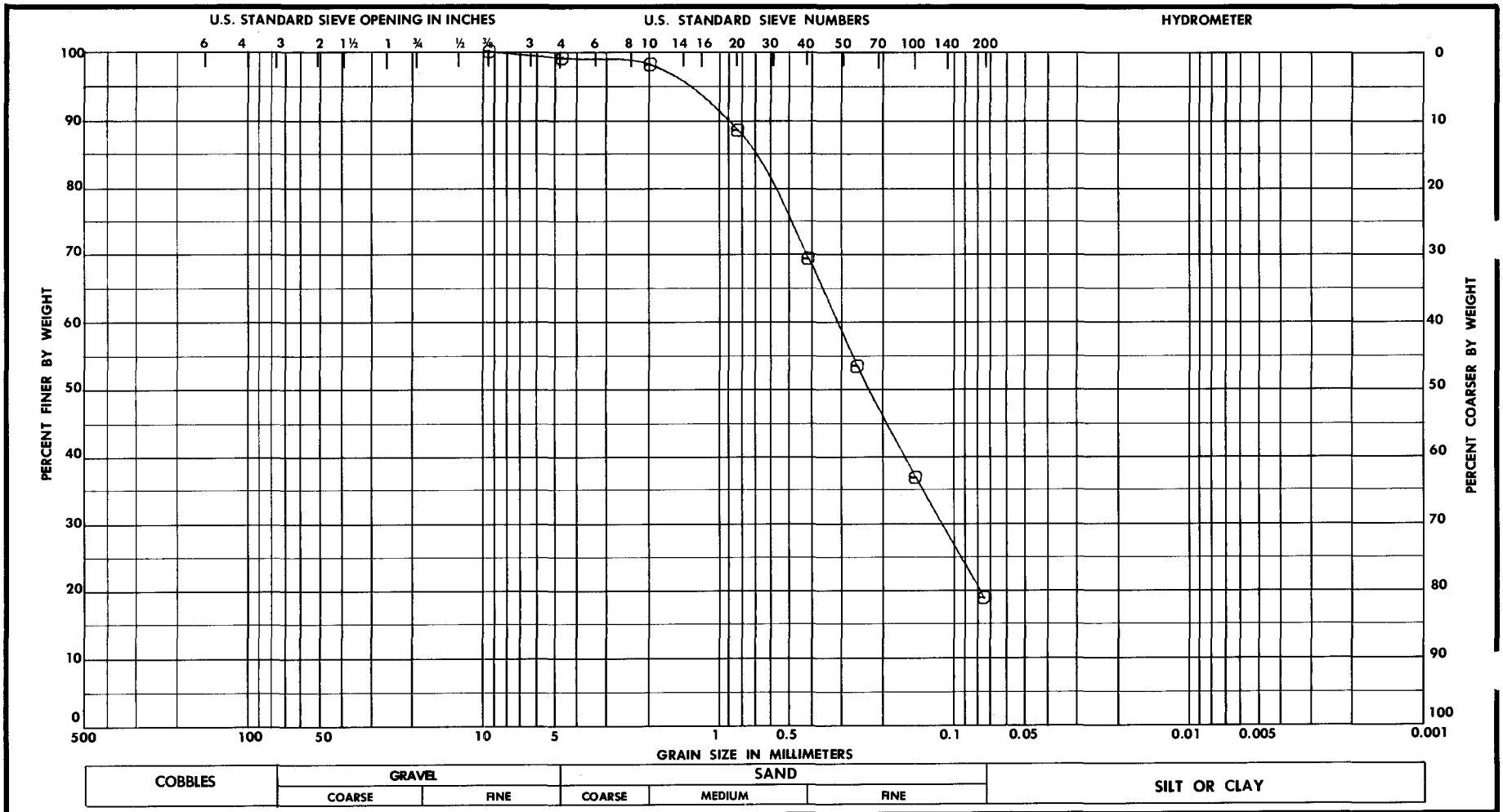
Project FT. BENNING, GA. L1-321-FY85
TRAINEE BARRACKS #4
Area LAB NO. 114/1937
Boring No. A-5 SAMPLE NO. 2
Date 06/26/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	~~Elev or~~ Depth	VISUAL Classification	Nat w %	LL	PL	PI
1	0.0-1.0'	SILTY SAND (SM)	12.1	NP	NP	NP
		BROWN WITH A TRACE OF GRAVEL				

GRADATION CURVES

Project FT. BENNING, GA. L1-321-FY85
TRAINEE BARRACKS #4

Area LAB NO. 114/1944

Boring No. A-7 SAMPLE NO. 1

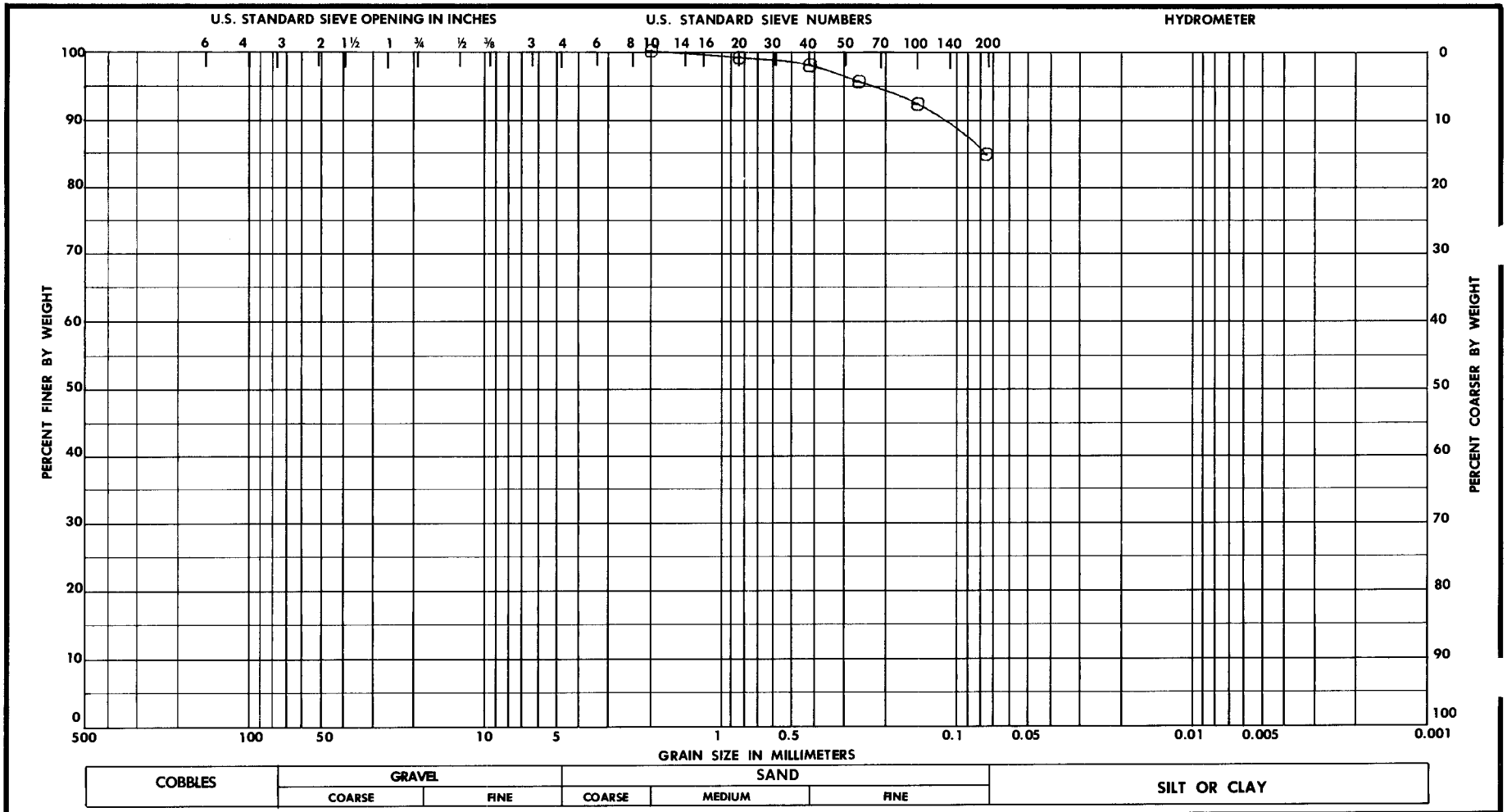
Date 06/26/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	~~Elev or~~ Depth	Classification	Nat w %	LL	PL	PI
4	9.0-10.0'	INORGANIC SILT, HIGH LL (MH)	20.6	62	33	29
		TAN, CLAYEY WITH A LITTLE SAND				
		AND A TRACE OF MICA				

GRADATION CURVES

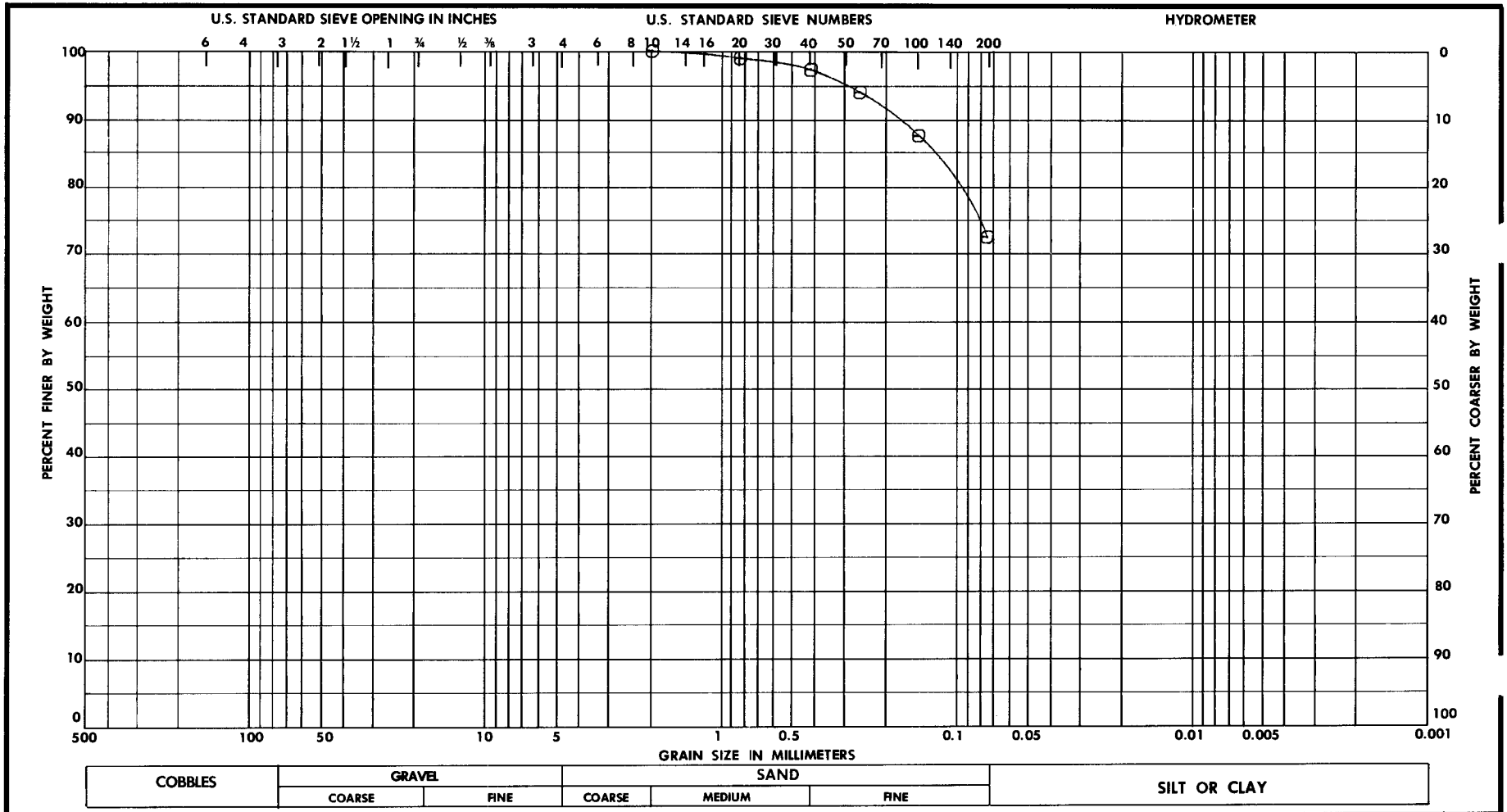
Project FT. BENNING, GA. L1-321-FY85
TRAINEE BARRACKS #4
Area LAB NO. 114/1947
Boring No. A-7 SAMPLE NO. 4
Date 06/26/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
2	4.5-5.5'	FAT CLAY (CH)	21.9	73	27	46
		TAN AND LT.GRAY WITH SOME				
		SAND				

GRADATION CURVES

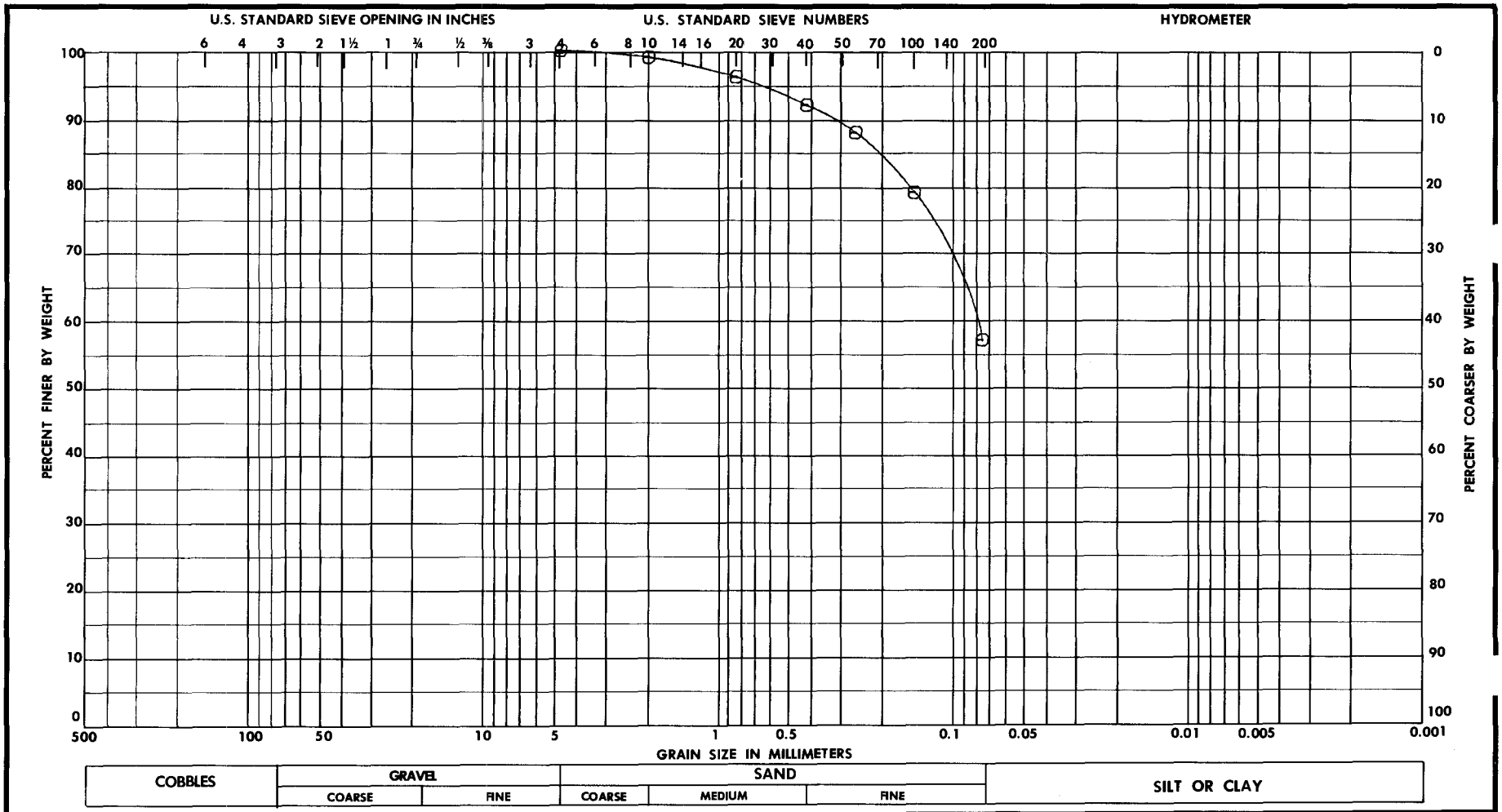
Project FT.BENNING,GA.LI-321-FY85
TRAINEE BARRACKS #4
Area LAB NO.114/1956
Boring No. A-10 SAMPLE NO. 2
Date 06/26/84

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30060

W.O. No. 4017

Req. No. SAS-ENG-BEN-156



Sample No.	~~Elev or~~ Depth	Classification	Nat w %	LL	PL	PI
1	0.0-1.5'	FAT CLAY (CH)	34.1	52	22	30
		REDDISH TAN, SANDY				

GRADATION CURVES

Project FT. BENNING, GA. L1-321-FY85
TRAINEE BARRACKS #4
Area LAB NO. 114/1958
Boring No. A-11 SAMPLE NO. 1
Date 06/26/84

ENG FORM 1 MAY 63 2087

APPENDIX B
List of Drawings

Not Used

1. SITE ELECTRICAL

1.1. GENERAL REQUIREMENTS

1.1.1. Site coordination meetings shall be held at the start of design and when necessary thereafter. Meetings shall include all applicable parties including the installation Directorate of Public Works (DPW), Network Enterprise Command (NEC), the privatized electric utility company, the local cable television (CATV) company, the Design-Build Contractor and the Contracting Officer's Representative (COR). All design, demolition and construction work including schedules, capacities, equipment selection, equipment locations, utility routing, connection points and final connection responsibilities shall be addressed.

1.1.2. All coordination including exchanges of information between the Design-Build Contractor and the installation DPW, NEC, the privatized electric utility company, the local CATV company information and other utility entities shall be routed through the COR unless otherwise directed.

1.2. ELECTRICAL PRIMARY DISTRIBUTION

1.2.1. The existing primary power distribution system at Fort Benning is a 12470/7200 volts, three-phase, four-wire, grounded wye system. The primary distribution system and the site lighting is owned, managed, and maintained by a privatized electric utility company.

1.2.2. The primary distribution system within the project site shall be provided by the electric utility company and shall be a loop feed underground system where possible, and shall include primary conductors, ductlines, manholes, switches, sectionalizing cabinets, transformers with concrete pads, grounding, and metering. The electric utility company shall design and construct the primary distribution system in accordance with IEEE C2 National Electrical Safety Code and the RUS standards. No above ground distribution equipment shall be located within 33 feet of buildings.

1.2.3. The privatized electric utility company at Fort Benning is Flint Electric EMC. The point of contact is Walker Fricks at (478) 988-3510. All work done by the electric utility company shall be under a separate contract with the Government. This work is NOT part of this RFP.

1.2.4. The Design-Build Contractor shall develop a schedule with the electric utility company concerning transformer delivery times and any offsite utility upgrade projects required to provide power to this project. All schedules shall be coordinated to insure that all projects are completed without compromising the Beneficial Occupancy Date. The Design-Build Contractor shall furnish demand load data to the privatized utility and the COR in a timely manner to facilitate transformer procurement

1.2.5. The privatized electric utility company shall demolish existing exterior primary lines and equipment no longer required on the project site(s).

1.2.6. Outages on the existing systems shall be scheduled for off peak times (nights and weekends) and shall be approved by DPW. A minimum of 2 weeks advance notification of outage shall be given. Full preparation shall be done before the outage to minimize the downtime duration.

1.3. ELECTRICAL SECONDARY DISTRIBUTION

1.3.1. The Design-Build Contractor shall be responsible for installing secondary service ductlines to the secondary compartment of the transformer. Secondary service ductlines shall be direct-burial, thick wall type except concrete encasement shall be provided in areas subject to vehicular traffic. Transitions from below-grade to above-grade shall be galvanized rigid steel. Fittings for steel conduit shall be steel threaded or compression type. Secondary service ductlines shall include one spare duct sized to match the filled ducts.

1.3.2. The Design-Build Contractor shall be responsible for installing secondary service cable from the building service equipment to the secondary compartment of the transformer. The cables shall be of sufficient length to facilitate their connection to the secondary lugs of the transformer. Installation of the cable terminators and connection to the transformer shall be done by the electric utility company. The Design-Build Contractor shall coordinate transformer sizes and locations and shall obtain transformer impedances from the privatized electric utility company to perform electrical calculations.

1.3.3. The Design-Build Contractor shall provide a 1-inch conduit from the electric utility meter to a data collection point located inside the building communications room.

1.4. SITE LIGHTING

1.4.1. Site lighting, defined as all exterior lighting outside of the building 5 foot line, is owned and maintained by the privatized electric utility company. Site lighting includes roadway, walkway, parking, physical training (PT) field, sports and area lighting.

1.4.2. Site lighting within the project site shall be designed by the Design-Build Contractor. The design shall comply with the recommendations of the Illuminating Engineering Society of North America (IESNA) and shall be based on the standard fixtures of the electric utility company approved for use at Fort Benning. The Design-Build Contractor is responsible for ensuring that site lighting achieves LEED credit if the site lighting credit is part of the Contractor's strategy for achieving the LEED Silver rating.

1.4.3. Site lighting including fixtures, poles, foundations, conduit and wiring shall be procured and installed by the electric utility company. Site lighting circuits shall be fed from utility transformers; no site lighting circuits shall originate within a building.

1.4.4. The privatized electric utility company at Fort Benning is Flint Electric EMC. The point of contact is Walker Fricks at (478) 988-3510. All work done by the electric utility company shall be under a separate contract with the Government. This work is NOT part of this RFP.

1.4.5. The privatized electric utility company shall demolish existing lighting structures and associated site conduit and wiring no longer required on the project site(s).

1.4.6. The Design-Build Contractor shall be responsible for the design and construction of exterior lighting mounted on the new buildings. Wall mounted site lighting fixtures shall be the fully shrouded, full cut-off type, compatible with the building architecture. Lighting of walkways within 5-feet of the building shall be the responsibility of the Design-Build Contractor.

1.4.7. The Design-Build Contractor shall calculate the site lighting power densities and shall demonstrate compliance with the requirements of ASHRAE 90.1. The Design-Build Contractor shall coordinate with the privatized electric utility company to obtain information required to calculate the site lighting power densities.

2. EXTERIOR COMMUNICATIONS

2.1. The telecommunications design shall be coordinated with and approved by the Network Enterprise Command (NEC) Quality Assurance Officer prior to construction. The NEC point of contact is Jim Lance at (706) 545-3333, email address: lancej@benning.army.mil. An alternate point of contact is Christopher Mickey at (706) 545-1355.

2.2. The Design-Build Contractor shall design and install the complete outside plant (OSP) telecommunications infrastructure in accordance with the Technical Guide for Installation Information Infrastructure Architecture (I3A) and Appendix: Outside Plant Conduit and Manhole

Installation Requirements.

2.3. All ductlines shall include one duct with 3-way Maxcell innerduct.

2.4. A minimum of 4 weeks advance notification shall be provided by the Design-Build Contractor prior to any demolition of communication lines or equipment. Notice shall be provided to NEC through the COR.

3. CABLE TELEVISION (CATV)

The local cable television (CATV) company at Fort Benning is Windjammer. Windjammer shall provide and install service cabling throughout the project site, terminating in the main communications room of each building. The Design-Build Contractor shall coordinate site work and site/facility interfaces with Windjammer. Contact James Kerr is the point of contact and can be reached at 256-297-0835

4. NATURAL GAS

Natural Gas service on this installation is privatized. Contact Omer McCants of Atmos Energy (706-576-2993) for gas service information.

5. WATER AND SEWER

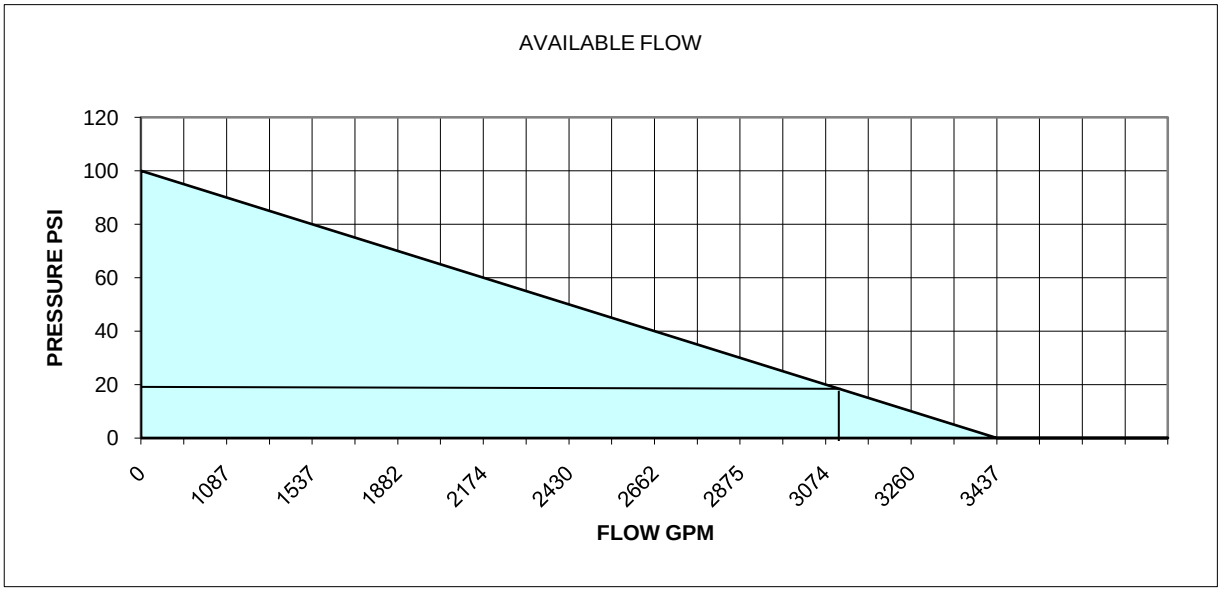
5.1. Columbus Water Works owns water and sanitary sewer. Mark Graham is the point of contact, 706-587-0409.
5.2. Columbus Water Works requirements are located in Appendix EE which includes directions to their website and specifications.

WATER FLOW TEST SUMMARY SHEET

Hydrants are located along 8" water line arround building 3105

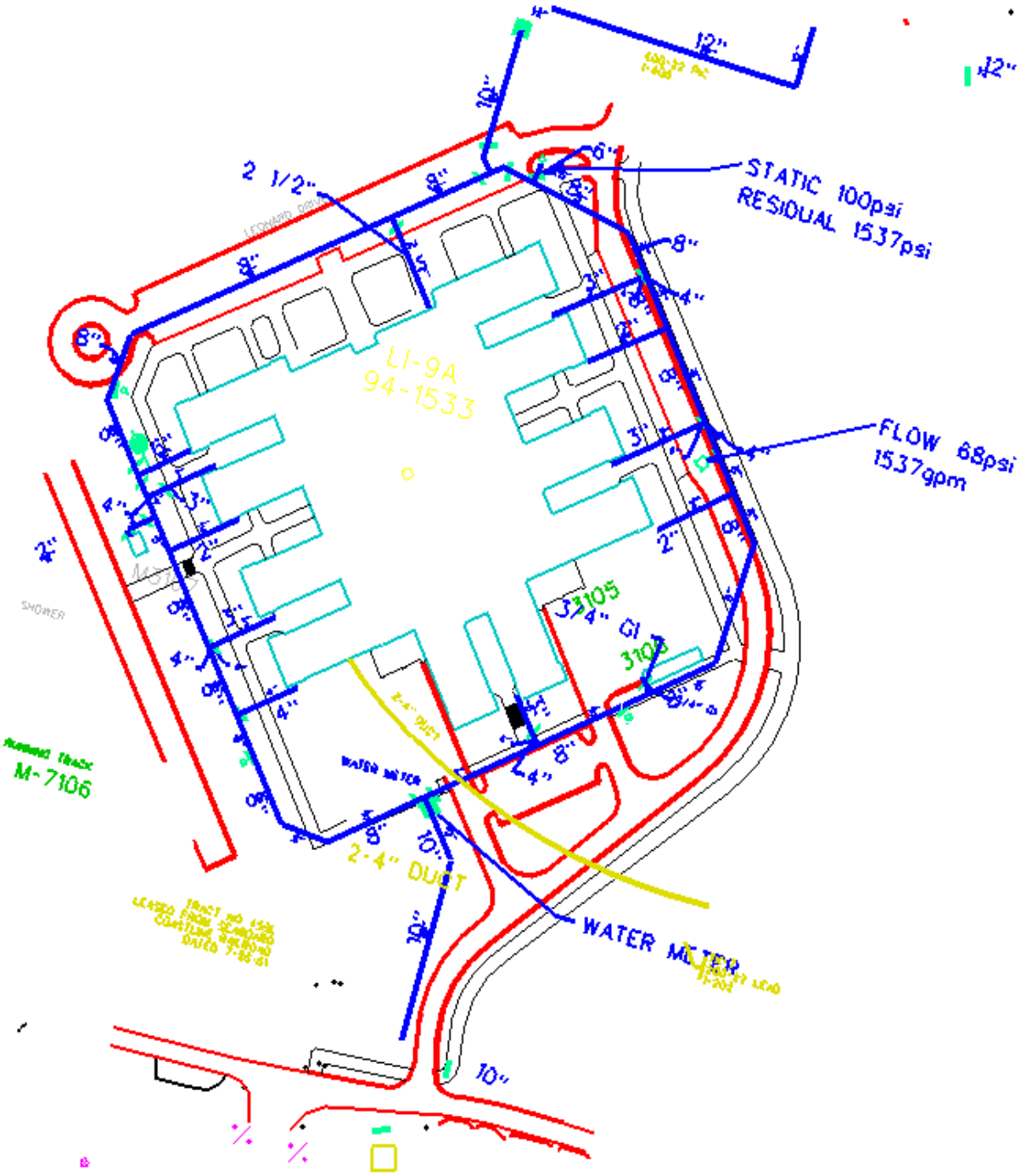
	FLOW		PRESSURE		HOSE DEMAND	
	(GPM)	(LPM)	(PSI)	(BARS)	(GPM)	(LPM)
STATIC	0	0	100	6.89	500	1895
RESIDUAL	1537	5825.23	80	5.512		

FLOW		PRESSURE		FLOW HOSE DEMAND		PRESSURE	
(GPM)	(LPM)	(PSI)	(BARS)	(GPM)	(LPM)	(PSI)	(BARS)
0	0	100	6.9	-500	-1895	100	6.9
769	2913	95	6.5	269	1018	95	6.5
1087	4119	90	6.2	587	2224	90	6.2
1331	5045	85	5.9	831	3150	85	5.9
1537	5825	80	5.5	1037	3930	80	5.5
1718	6513	75	5.2	1218	4618	75	5.2
1882	7134	70	4.8	1382	5239	70	4.8
2033	7706	65	4.5	1533	5811	65	4.5
2174	8238	60	4.1	1674	6343	60	4.1
2306	8738	55	3.8	1806	6843	55	3.8
2430	9210	50	3.4	1930	7315	50	3.4
2549	9660	45	3.1	2049	7765	45	3.1
2662	10090	40	2.8	2162	8195	40	2.8
2771	10502	35	2.4	2271	8607	35	2.4
2875	10898	30	2.1	2375	9003	30	2.1
2976	11281	25	1.7	2476	9386	25	1.7
3074	11650	20	1.4	2574	9755	20	1.4
3169	12009	15	1.0	2669	10114	15	1.0
3260	12357	10	0.7	2760	10462	10	0.7
3350	12696	5	0.3	2850	10801	5	0.3
3437	13026	0	0.0	2937	11131	0	0.0



WATER FLOW TEST SUMMARY SHEET

Hydrants are located along 8" water line arround building 3105

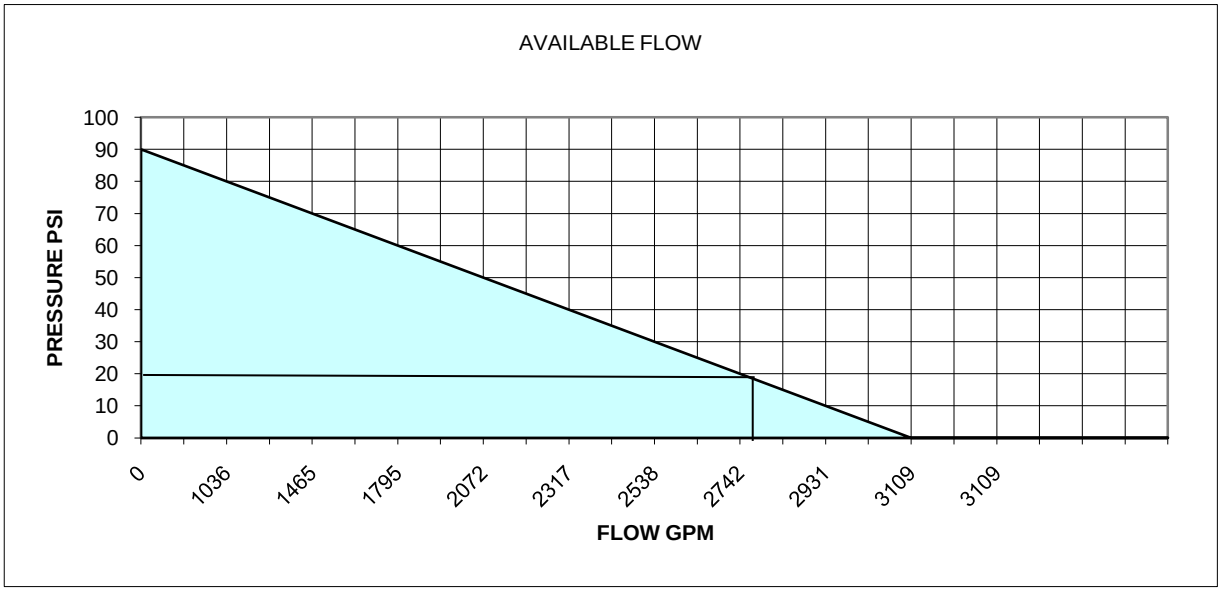


WATER FLOW TEST SUMMARY SHEET

Hydrants are located along 8" water line along Armor Drive

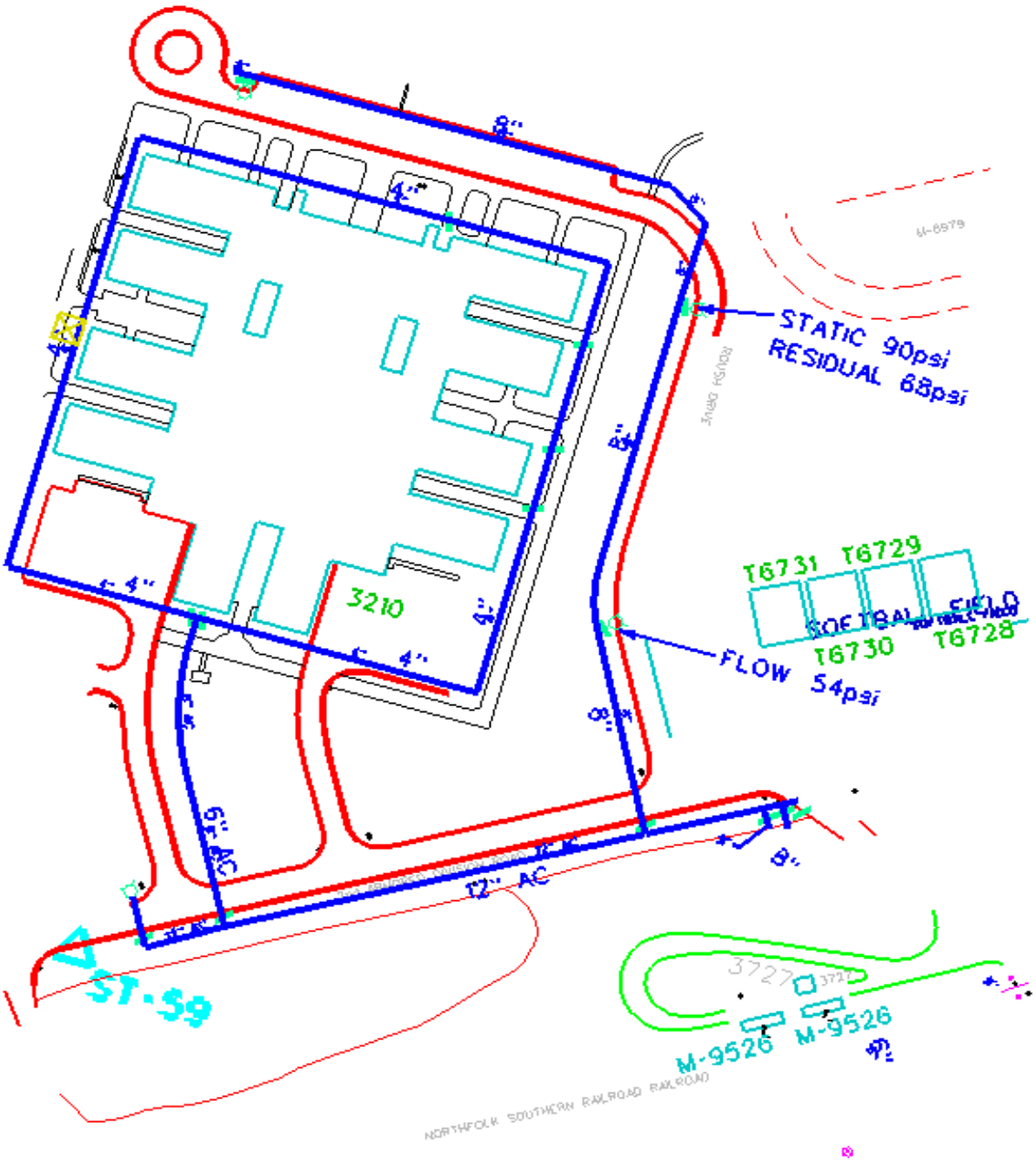
	FLOW		PRESSURE		HOSE DEMAND	
	(GPM)	(LPM)	(PSI)	(BARS)	(GPM)	(LPM)
STATIC	0	0	90	6.201	500	1895
RESIDUAL	1537	5825.23	68	4.6852		

FLOW		PRESSURE		FLOW HOSE DEMAND		PRESSURE	
(GPM)	(LPM)	(PSI)	(BARS)	(GPM)	(LPM)	(PSI)	(BARS)
0	0	90	6.2	-500	-1895	90	6.2
733	2777	85	5.9	233	882	85	5.9
1036	3927	80	5.5	536	2032	80	5.5
1269	4810	75	5.2	769	2915	75	5.2
1465	5554	70	4.8	965	3659	70	4.8
1638	6210	65	4.5	1138	4315	65	4.5
1795	6802	60	4.1	1295	4907	60	4.1
1939	7347	55	3.8	1439	5452	55	3.8
2072	7855	50	3.4	1572	5960	50	3.4
2198	8331	45	3.1	1698	6436	45	3.1
2317	8782	40	2.8	1817	6887	40	2.8
2430	9210	35	2.4	1930	7315	35	2.4
2538	9620	30	2.1	2038	7725	30	2.1
2642	10013	25	1.7	2142	8118	25	1.7
2742	10391	20	1.4	2242	8496	20	1.4
2838	10756	15	1.0	2338	8861	15	1.0
2931	11108	10	0.7	2431	9213	10	0.7
3021	11450	5	0.3	2521	9555	5	0.3
3109	11782	0	0.0	2609	9887	0	0.0
3109	11782	0	0.0	2609	9887	0	0.0
3109	11782	0	0.0	2609	9887	0	0.0



WATER FLOW TEST SUMMARY SHEET

Hydrants are located along 8" water line along Armor Drive

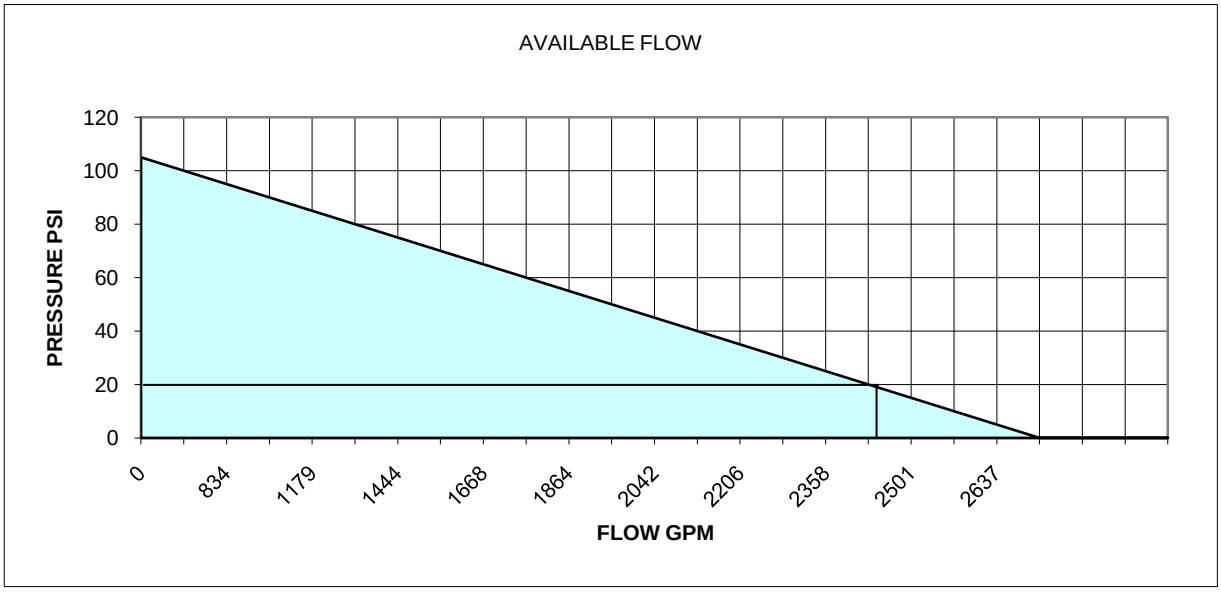


WATER FLOW TEST SUMMARY SHEET

Hydrants are located along 8" water line along 2nd Armord Division Road

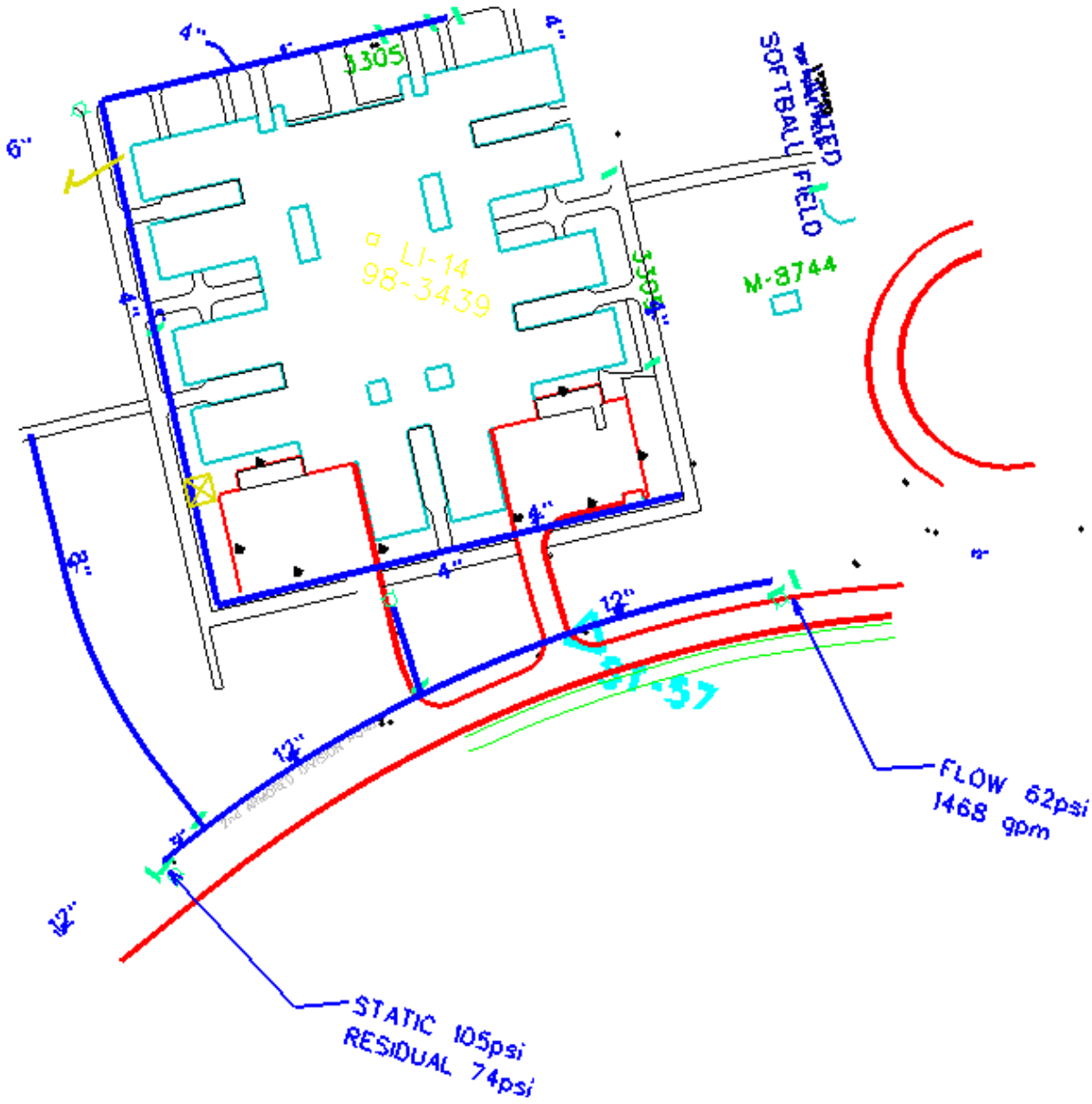
	FLOW		PRESSURE		HOSE DEMAND	
	(GPM)	(LPM)	(PSI)	(BARS)	(GPM)	(LPM)
STATIC	0	0	105	7.2345	500	1895
RESIDUAL	1468	5563.72	74	5.0986		

FLOW		PRESSURE		FLOW HOSE DEMAND		PRESSURE	
(GPM)	(LPM)	(PSI)	(BARS)	(GPM)	(LPM)	(PSI)	(BARS)
0	0	105	7.2	-500	-1895	105	7.2
590	2234	100	6.9	90	339	100	6.9
834	3160	95	6.5	334	1265	95	6.5
1021	3870	90	6.2	521	1975	90	6.2
1179	4469	85	5.9	679	2574	85	5.9
1318	4996	80	5.5	818	3101	80	5.5
1444	5473	75	5.2	944	3578	75	5.2
1560	5912	70	4.8	1060	4017	70	4.8
1668	6320	65	4.5	1168	4425	65	4.5
1769	6703	60	4.1	1269	4808	60	4.1
1864	7066	55	3.8	1364	5171	55	3.8
1955	7411	50	3.4	1455	5516	50	3.4
2042	7740	45	3.1	1542	5845	45	3.1
2126	8056	40	2.8	1626	6161	40	2.8
2206	8361	35	2.4	1706	6466	35	2.4
2283	8654	30	2.1	1783	6759	30	2.1
2358	8938	25	1.7	1858	7043	25	1.7
2431	9213	20	1.4	1931	7318	20	1.4
2501	9480	15	1.0	2001	7585	15	1.0
2570	9740	10	0.7	2070	7845	10	0.7
2637	9993	5	0.3	2137	8098	5	0.3



WATER FLOW TEST SUMMARY SHEET

Hydrants are located along 8" water line along 2nd Armord Division Road



US Army Corps of Engineers®

Savannah District
Environmental and Materials Unit

Hazardous Building Materials Survey

Building No. 3405
Fort Benning, Georgia

Prepared by Jason Garrett Hart

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The findings of this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

Hazardous Building Materials Survey **March 2010**

Building 3405
Fort Benning, Georgia

by Jason Garrett Hart

Final Report

Prepared for: **U.S. Army Corps of Engineers**
Savannah District

Hazardous Building Materials Survey Report

Introduction

Background

Building 3405 is a three story 250,000 square foot barracks complex concrete block and steel frame structure that was built in 1979. Exterior and original interior walls are constructed of concrete block. Interior walls are a mix of gypsum and painted CMU. The floor system is of slab on grade design mostly covered with vinyl floor tiles. The roof system is built-up roofing membrane over foam on concrete decking. Rooms on the building floor plans are arbitrarily numbered for identification in this report only.

Description of study

Investigation

This report documents the hazardous building materials survey of Building No. 3405 at Fort Benning, Georgia conducted on 23-26 March 2010 by U.S. Army Corps of Engineers Savannah District employees Jason Hart and Tim Jones. This report includes only building materials located at the time of inspection. The investigation includes a visual identification and location of such items as: fluorescent and mercury-vapor lights, including possible PCB containing ballasts; battery back-up exit lights and emergency lights; mercury-containing thermostats and switches; refrigerant containing air conditioners, water fountains and ice makers; above and below ground storage tanks; transformers; built in chemical type fire suppression systems; smoke detectors; and lead building materials. Other hazardous building materials not listed above may also be included at the discretion of the inspectors. Asbestos is excluded from this inspection as it is covered separately in an asbestos inspection report. A single paint scrape sample was collected to determine lead content. The sample was analyzed by Test America. The analytical report is included as Appendix 1 at the end of this report.

Conclusions

The following information gathered during the survey of Building 3405 is presented in attached information:

a. *Light Count:* The fluorescent and mercury vapor light count results are presented in Table 1.

b. *Lead Building Materials:* No lead building materials were noted in the building.

c. *Compressed Refrigerant Gas:* (24) Drinking fountains, (4) large refrigerator, (3) small refrigerators, (4) large walk-in coolers, and (3) de-humidifiers were located within the building. (3) Large walk-in coolers were located outside the building. (22) Wall unit heat pumps were located within the building. The central air conditioning systems in this building do not appear to contain refrigerant gas. This equipment is assumed to contain refrigerant gas that should be recovered prior to demolition.

d. *Portable Fire Extinguishers:* (57) Portable fire extinguishers were located within the building.

e. *Above and Underground Storage Tanks:* No evidence of an AST/UST was noted during the survey of the building.

f. *Mercury Thermometers:* (28) Mercury thermometers were found within the mechanical room

g. *Smoke Detectors:* (377) Smoke detectors were located within the building.

h. *Alarm Panels:* (13) Alarm Panels were located within the building. This equipment is assumed to contain back-up batteries that should be recovered prior to demolition.

i. Transformers: (30) Transformers were found within the building and surrounding area.

j. Grease Trap: (1) 11 gallon grease trap was located on the premises.

Tables

TABLE 1
FORT BENNING BUILDING 3405
FLUORESCENT AND MERCURY LIGHT FIXTURES

AREA IDENTIFICATION	# & TYPE LIGHTS PRESENT	DESCRIPTION OF LIGHTS
Interior	233	1 Bulb, 1 Foot Long Fluorescent Fixtures
Interior	2	2 Bulb, 2 Foot Long Fluorescent Fixtures
Interior	26	1 Bulb, 4 Foot Long Fluorescent Fixtures
Interior / Exterior	2,731	2 Bulb, 4 Foot Long Fluorescent Fixtures
Interior	99	Battery Back-up Emergency Lights
Interior	114	Battery Back-up Exit Signs
Interior	63	Screw-In Fluorescent
Interior	1	Box 4 ft Fluorescent Bulbs
Exterior	7	Square Mercury Lights

TABLE 2
FORT BENNING BUILDING 3405
LEAD BUILDING COMPONENTS

BUILDING COMPONENT	DESCRIPTION	LOCATION	ESTIMATED NUMBER
Lead Pipe Flashings	Roof flashing	Roof	50

Savannah District
Environmental and Materials Unit

US Army Corps of Engineers®

Asbestos Survey

Building No. 3405
Fort Benning, Georgia

Prepared by Jason Garrett Hart

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Asbestos Survey **March 2010**

Building No. 3405
Fort Benning, Georgia

Prepared by: Jason Garrett Hart

Final report

Prepared for: **U.S. Army Corps of Engineers**
Savannah District

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Asbestos Inspection Report

Introduction

Scope of the Investigation

This report documents the asbestos inspection and survey of Building No. 3405 at Fort Benning; Georgia conducted on 23 – 26 & 29 March 2010 by Savannah District U.S. Army Corps of Engineers employees Jason Hart and Tim Jones. The survey was conducted in general accordance with the regulatory guidelines in the Asbestos Hazard Emergency Response Act (AHERA) (40 CFR Part 763 Subpart E Sections 763.80-763.88) and "Guidance for Controlling Asbestos-Containing Materials in Buildings" (Purple Book) (EPA publication number 560/5-85-024). Although not required by the AHERA guidelines, roof and other exterior miscellaneous materials were also inspected and sampled.

Background

Building 3405 is a three-story 250,000 square foot concrete block and steel frame barracks complex that was built between 1977 - 1979. Exterior and original interior walls are constructed of concrete block. Interior walls are a mix of gypsum and painted CMU. The floor system is of slab on grade design mostly covered with vinyl floor tiles. The roof system is built-up roofing membrane over foam on concrete decking. Rooms on the building floor plans are arbitrarily numbered for identification in this report only.

Description of study

Investigation

All accessible areas of Building No. 3405 were visually inspected for suspected asbestos containing materials (ACM) by an accredited inspector. This report details ACM as identified at the time of inspection only.

Bulk samples of suspect ACM's were collected. The bulk samples were analyzed by Carolina Environmental, Inc. The laboratory is accredited by the National Voluntary Laboratory Accredited Program (NVLAP Accreditation sponsored by the National Institute of Standards and Technology (NIST)). A copy of their accreditation certificate is included in Appendix C. The samples were analyzed by the accepted method of polarized light microscopy (PLM) using EPA's "Interim Method for Determining

Asbestos in Insulation Samples", EPA-600/M4-82-020. The lab's analytical report is included in Appendix A.

In compliance with the AHERA regulations, material is considered an Asbestos Containing Material (ACM) when it contains greater than one percent asbestos. Likewise, in this report, any material containing concentrations greater than one percent asbestos will be considered "positive". Occasionally, materials containing less than one percent asbestos, or not sampled, are assumed to be a "positive" asbestos containing material at the discretion of the inspector. A narrative discussion of the AHERA ACM types (i.e., thermal systems insulation, miscellaneous and surfacing materials) found in Building No. 3405 is included in this report where relevant. Bulk sample information appears on Table 1. Estimated quantities of individual asbestos containing materials appear on Table 2. Material characterization of asbestos containing materials appears on Table 3. The approximate location where each bulk sample was obtained is shown on the building floor plans, which appear as Figures. Positive ACM samples are indicated on the floor plan Figures with their numbers enclosed in squares and, where possible, locations of positive ACM are identified. Samples testing negative for asbestos are indicated on the floor plan Figures with their numbers enclosed in circles. It is reasonable to assume that all materials similar to those testing positive also contain positive amounts of asbestos and should be treated as such.

Conclusions

Thermal Systems Insulation (TSI)

TSI is insulation material applied to pipes, fittings, tanks, ducts, or on other interior structural components to prevent heat loss or gain, or water condensation, or for other purposes.

No asbestos containing TSI was located within Building 3405.

Miscellaneous Materials

Miscellaneous materials include building material on structural components, structural members or fixtures, such as floor and ceiling tiles, and do not include surfacing or TSI. In the past, there were a great number of miscellaneous building materials that had asbestos fibers added to them during the manufacturing process to increase durability and fireproofing qualities. The following suspect miscellaneous materials at Building No. 3405 were found to contain or were assumed to contain asbestos:

a. *White Mastic:* White mastic found on the foil-backed fiberglass duct insulation was found to contain asbestos. The ducts are mostly located in mechanical rooms and above the tiled drop ceilings throughout the building. However, these ducts are also found above the hard plaster ceilings around the exterior of the building. White mastic found on the domestic water piping system throughout the building contains asbestos. Some of the material is troweled over fiberglass pipe insulation. It is also found troweled on the cement insulation found on the large hot water tanks found in the mechanical rooms of the laundry rooms. The white mastic on the dual-temp HVAC piping in the 2nd floor mechanical rooms also contains asbestos. These mechanical rooms are specifically located on the sides of the building shared by two companies. - (Refer to Tables 1, 2 & 3 for specific information and Figures 1, 2 & 3 for sample locations).

b. *Gray Caulking Material:* Gray Caulk found around the louvers of the mechanical rooms was found to contain asbestos. Specifically, it is found in the seam between the brick wall and the metal louver. - (Refer to Tables 1, 2 and 3 for specific information, Figure 1 for sample locations).

c. *White Caulking Material:* Caulking material found on the exterior door frames contains asbestos. - (Refer to Tables 1, 2 & 3 for specific information and Figures 1 & 2 for sample locations).

d. *Dark Brown Caulking Material:* Caulking material found in the exterior expansion joints was found to contain asbestos. The joints run vertical in the exterior walls of the building. The material is also found in the exterior stairwells in the vertical seams of the brick. - (Refer to Tables 1, 2 & 3 for specific information and Figure 1 for sample locations).

e. *Black Mastic:* Black mastic found on the concrete floor, under the tiles, contains asbestos. - (Refer to Tables 1, 2 & 3 for specific information and Figures 1, 2 & 3 for sample locations).

f. *Flashing Cement:* Flashing cement found around the roofing curbs and penetrations was found to contain asbestos. The material is also found on the

seams of the multi-layer flashings found on the roof curbs. - (Refer to Tables 1, 2 & 3 for specific information and Figures 4 & 5 for sample locations).

g. *Flashing Membrane:* The flashing membrane along the edges of the built-up roof was found to contain asbestos. The flashing membrane is also found around the roofing penetrations on the curbs. The flashing membrane is assumed to extend 3 ft out from the curbs found around the roof and roofing penetrations and is quantified accordingly. - (Refer to Tables 1, 2 & 3 for specific information and Figures 4 & 5 for sample locations).

h. *Mail Slot Pillows:* In the administrative areas at the base of all the barracks sections, there are mail collection boxes. Four of the five of these boxes is cushioned with a white colored pillow. These pillows are covered with a woven asbestos cloth. One of the pillows could not be located and two of the boxes are still locked. It is assumed that two pillows still exist within these locked mail collection boxes. - (Refer to Tables 1, 2 & 3 for specific information and Figure 1 for sample locations).

i. *Flange Gaskets:* Flange gaskets within the mechanical room are assumed to contain asbestos. Specific locations are not described or located. These gaskets are assumed to exist in the piping systems throughout the mechanical rooms. - (Refer to 2 & 3 for specific information).

Surfacing Material

Surfacing material is friable material that is sprayed on, troweled on, or otherwise applied to surfaces for decorative or other purposes.

No asbestos containing surfacing material was located within Building 3405.

TABLE 1
SUSPECT ACM SAMPLES
FORT BENNING, BUILDING 3405

FIELD ID	DESCRIPTION	LOCATION	ASBESTOS TYPE & %
3405-1-1	White Mastic	Room 8, over fiberglass on 3" OD domestic H_2O pipe	NAD
3405-1-2	Ceiling Tile	Room 8, typical ceiling tile w/large worm holes	NAD
3405-1-3	Floor Tile & Mastic	Room 2, 12 x 12 blue mottled floor tile w/ yellow adhesive (upper layer)	NAD
3405-1-4	**Floor Tile & Mastic**	**Room 2, brown mottled floor tile w/ black mastic (lower layer)**	**Tile NAD, mastic 5% chrysotile**
3405-1-5	**White Mastic**	**Room 1, on foil-backed fiberglass duct insulation**	**2% chrysotile**
3405-1-6	Vinyl Base Molding & Adhesive	Room 1, @ base of wall	NAD
3405-1-7	Brown Adhesive	Room 3, on wall	NAD
3405-1-8	Ceiling Tile	Room 3, older ceiling tile with smoke detector attached	NAD
3405-1-9	Ceiling Tile	Room 4, newer 2 x 2 ceiling tile w/ small worm holes	NAD
3405-1-10	White Mastic	Room 4, on fiberglass roof drain insulation	NAD
3405-1-11	Floor Tile & Mastic	Room 4, 12 x 12 blue mottled floor tile w/ yellow adhesive (upper layer under carpet)	NAD
3405-1-12	Floor Tile & Mastic	Room 4, 12 x 12 tan mottled floor tile w/ yellow adhesive (middle layer)	NAD
3405-1-13	Floor Tile & Mastic	Room 4, tan mottled floor tile w/ yellow adhesive (lower layer)	NAD
3405-1-14	Gypsum Board & Drywall Joint Compound	Room 4, on wall	NAD
3405-1-15	Ceiling Tile	Room 5, same as # 3405-1-9	NAD
3405-1-16	Fireproofing	Room 5, above drop ceiling grid on metal floor decking	NAD
3405-1-17	Fireproofing	Room 5, above drop ceiling grid on metal floor decking	NAD

3405-1-18	Gypsum Board & Drywall Joint Compound	Room 5, on wall	NAD
3405-1-19	Floor Tile & Mastic	Room 14, 12 x 12 brown mottled floor tile w/ yellow adhesive (upper layer)	NAD
3405-1-20	**Floor Tile & Mastic**	**Room 14, 12 x 12 brown mottled floor tile w/ black mastic (lower layer)**	**Tile NAD, mastic 5% chrysotile**
3405-1-21	**White Mastic**	**Room 14, on foil-backed fiberglass duct insulation**	**2% chrysotile**
3405-1-22	White Mastic	**Room 14, over fiberglass on 12" OD HVAC elbow**	NAD
3405-1-23	White Mastic	Room 14, on roof drain pipe	NAD
3405-1-24	Caulking Material	Room 14, around metal door frame against CMU wall	NAD
3405-1-25	**Floor Tile & Mastic**	**Room 7, 12 x 12 brown mottled floor tile w/ tan and black mastic (lower layer)**	**Tile NAD, mastic 2% chrysotile**
3405-1-26	Ceiling Tile	Room 10, white newer patch tile in ceiling grid	NAD
3405-1-27	Ceiling Tile	Room 6, old scrap tiles above ceiling grid w/ white backing	NAD
3405-1-28	Ceiling Tile	Room 11, old scrap tiles above ceiling grid w/ white backing	NAD
3405-1-29	Drywall Joint Compound	Room 11, on wall	NAD
3405-1-30	Textured Surfacing	Room 1, on wall	NAD
3405-1-31	Drywall Joint Comp. & Textured Surfacing	Room 18, on wall	NAD
3405-1-32	Drywall Joint Comp. & Textured Surfacing	Room 1, on wall	NAD
3405-1-33	Gypsum Board, DWJC & Textured Surf	Room 1, on wall	NAD
3405-1-34	Fireproofing	Room 1, on vertical beam in chase wall	NAD
3405-1-35	Fireproofing	Room 1, on vertical beam in chase wall	NAD
3405-1-36	Fireproofing	Room 1, on vertical beam in chase wall	NAD
3405-1-37	Vinyl Base Molding & Adhesive	Room 17, @ base of wall	NAD
3405-1-38	Floor Tile & Mastic	Room 17, 12 x 12 olive patch tile	NAD

3405-1-39	Floor Tile & Mastic	Room 17, 12 x 12 white patch tile	NAD
3405-1-40	Floor Tile & Mastic	Room 17, 12 x 12 red patch tile	Tile NAD, mastic < 1% chrysotile
3405-1-41	Ceiling Tile	Room 17, 2 x 4 older tile with large worm holes in metal ceiling grid	NAD
3405-1-42	Fireproofing	Room 16, on vertical beam in chase wall	NAD
3405-1-43	**Floor Tile & Mastic**	**Room 45, 12 x 12 olive tile w/ black mastic**	**Tile NAD, mastic 3% chrysotile**
3405-1-44	**White Mastic**	**Room 45, on foil-backed fiberglass duct insulation**	**5% chrysotile**
3405-1-45	Caulking Material	Room 45, between door frame and wall	NAD
3405-1-46	**White Mastic**	**Room 80, on foil-backed fiberglass duct insulation**	**5% chrysotile**
3405-1-47	Ceiling Tile	Room 80, 2 x 4 typical tile w/ large worm holes	NAD
3405-1-48	Ceiling Tile	Room 80, old scrap tiles above ceiling grid w/ white backing	NAD
3405-1-49	Ceiling Tile	Room 80, 2 x 4 newer patch tile w/ small worm holes	NAD
3405-1-50	Floor Tile & Mastic	Room 80, 12 x 12 blue/gray tile w/ black mastic	Tile NAD, mastic < 1% chrysotile
3405-1-51	Floor Tile & Mastic	Room 80, 12 x 12 off-white tile w/ tan mastic	NAD
3405-1-52	Vinyl Base Molding & Adhesive	Room 80, @ base of wall	NAD
3405-1-53	Fireproofing	Room 80, on vertical beam in chase wall	NAD
3405-1-54	White Mastic	Room 99, over fiberglass on 3” OD domestic H_2O pipe	NAD
3405-1-55	Plaster	Room 99, on ceiling brown base coat	NAD
3405-1-56	Plaster	Room 103, on ceiling white coat	NAD
3405-1-57	White Mastic	Room 104, over fiberglass on 3” OD domestic H_2O pipe	NAD
3405-1-58	Caulking Material	Room 137, between door frame & CMU wall	< 1% chrysotile
3405-1-59	Plaster	Room 137, on ceiling white coat	NAD
3405-1-60	Caulking Material	Room 137, on wall in expansion joint	< 1% chrysotile

3405-1-61	Sink Undercoating	Room 108, black, spray applied under sink	NAD
3405-1-62	Sink Undercoating	Room 108, black, spray applied under sink	NAD
3405-1-63	Caulking Material	Room 107, on wall between backsplash & sink	NAD
3405-1-64	Cloth & White Mastic	Room 105, over fiberglass & and plastic on elbows	NAD
3405-1-65	Plaster	Room 105, on ceiling white coat	NAD
3405-1-66	Cloth & White Mastic	Room 104, over fiberglass on HVAC piping	NAD
3405-1-67	Plaster	Room 104, on ceiling brown base coat	NAD
3405-1-68	Brown Adhesive	Room 104, behind steel corner protector on wall	NAD
3405-1-69	Plaster	Room 103, on ceiling brown base coat	NAD
3405-1-70	**White Mastic**	**Room 101, on foil-backed fiberglass duct insulation**	**5% chrysotile**
3405-1-71	Plaster	Room 101, on ceiling white coat	NAD
3405-1-72	Floor Tile & Mastic	Room 79, 12 x 12 blue/gray tile w/ black mastic	NAD
3405-1-73	Floor Tile & Mastic	Room 79, 12 x 12 off-white tile w/ black mastic	NAD
3405-1-74	Ceiling Tile	Room 79, 2 x 4 typical tile w/ large worm holes	NAD
3405-1-75	Ceiling Tile	Room 79, 2 x 4 newer patch tile w/ small worm holes	NAD
3405-1-76	Ceiling Tile	Room 79, old scrap tiles above ceiling grid w/ white backing	NAD
3405-1-77	Vinyl Base Molding & Adhesive	Room 79, @ base of wall	NAD
3405-1-78	White Mastic	Room 84, over fiberglass on dual-temp H_2O pipe @ supply valve	NAD
3405-1-79	White Mastic	Room 84, over fiberglass on HVAC hot H_2O supply line	NAD
3405-1-80	White Mastic	Room 84, over fiberglass on HVAC chilled H_2O supply line	NAD
3405-1-81	White Mastic	Room 84, over fiberglass on domestic hot H_2O pipe	NAD
3405-1-82	Cloth & White Mastic	Room 84, over fiberglass on dual-temp H_2O return elbow	NAD

3405-1-83	White Mastic	Room 84, over fiberglass on abandoned domestic H_2O pipe coming out of wall	NAD
3405-1-84	Fireproofing	Room 84, on metal decking @ ceiling	NAD
3405-1-85	Fireproofing	Room 84, on metal decking @ ceiling	NAD
3405-1-86	Black Pipe Coating	Room 84, @ ground on 12" OD abandoned steam header	NAD
3405-1-87	Caulking Material	Room 138, between door frame & brick wall	NAD
3405-1-88	Fireproofing	Room 138, @ ceiling on columns & metal decking	NAD
3405-M-89	Fireproofing	Room 138, @ ceiling on columns & metal decking	NAD
3405-M-90	White Mastic	Room 138, over fiberglass on HVAC pipe	NAD
3405-1-91	**Floor Tile & Mastic**	**Room 133, 12 x 12 brown mottled floor tile w/ black mastic**	**Tile NAD, mastic 5% chrysotile**
3405-1-92	Ceiling Tile	Room 133, old scrap tiles above ceiling grid w/ white backing	NAD
3405-1-93	**Caulking Material**	**Room 133, between door frame & wall**	**2% chrysotile**
3405-E-94	**Caulking Material**	**Courtyard, on metal expansion joint in wall**	**5% chrysotile**
3405-1-95	Expansion Joint Filler	Room 133, between wall and poured concrete floor	NAD
3405-1-96	**White Mastic**	**Room 135, on foil-backed fiberglass duct insulation**	**3% chrysotile**
3405-1-97	**White Mastic**	**Room 135, over fiberglass on 3" OD domestic H_2O pipe**	**3% chrysotile**
3405-1-98	**Woven Pillow Cover**	**Room 129, @ wall in collection area of USPS mail drop slot**	**65% chrysotile**
3405-1-99	**Floor Tile & Mastic**	**Room 129, 12 x 12 tan mottled tile w/ yellow adhesive & black mastic**	**Tile NAD, mastic 5% chrysotile**
3405-1-100	**Floor Tile & Mastic**	**Room 131, 12 x 12 brown mottled floor tile w/ black mastic**	**Tile NAD, mastic 5% chrysotile**
3405-1-101	Brown Adhesive	Room 130, on wall where sign was removed	NAD
3405-R-102	Built-up Roofing Membrane	On roof, @ center	NAD

3405-R-103	Tan Powdery Insulation	On roof, below BUR @ center	NAD
3405-R-104	Flashing Cement	On roof, newer soft material	NAD
3405-R-105	Flashing Cement	On roof, older material turned gray	NAD
3405-R-106	Flashing Cement	On roof, older material turned gray	NAD
3405-R-107	Pitch Pan Filler	On roof, black tar	NAD
3405-R-108	Pitch Pan Filler	On roof, below black tar	NAD
3405-R-109	Built-up Roofing Membrane	On roof, @ center	NAD
3405-R-110	Tan Powdery Insulation	On roof, below BUR @ center	NAD
3405-R-111	Built-up Roofing Membrane	On roof, @ edge	NAD
3405-R-112	Multi-layer Flashing	On roof, at edge of BUR against wall	NAD
3405-R-113	Built-up Roofing Membrane	On roof, @ center	NAD
3405-R-114	Tan Powdery Insulation	On roof, below BUR @ center	NAD
3405-R-115	Multi-layer Flashing	On roof, at edge of BUR against wall	NAD
3405-R-116	Flashing Cement	On roof, older material turned gray at seams of multi layer flashing	NAD
3405-R-117	Built-up Roofing Membrane	On roof, @ edge	NAD
3405-R-118	Flashing Cement	On roof, older material turned gray at seams of multi layer flashing	NAD
3405-R-119	**Built-up Roofing Membrane**	**On roof, @ edge of mechanical room roofing enclosure**	**Surface 5% chrysotile, membrane NAD**
3405-R-120	Built-up Roofing Membrane	On roof, @ center of mechanical room roofing enclosure	NAD
3405-R-121	**Flashing Cement**	**On roof, turned gray on edge of mechanical room BUR**	**5% chrysotile**
3405-1-122	**Floor Tile & Mastic**	**Room 97, 12 x 12 red tile w/ yellow adhesive & black mastic below**	**Tile NAD, mastic 5% chrysotile**
3405-1-123	**Floor Tile & Mastic**	**Room 97, 12 x 12 red tile w/ yellow adhesive & black mastic below**	**Tile NAD, mastic 3% chrysotile**
3405-M-124	White Mastic	Room 95, on fiberglass duct insulation	NAD
3405-M-125	Fireproofing	Room 95, spray applied on vertical beam	NAD

3405-M-126	Tape Insulation	Room 95, on handle of shut-off valve	NAD
3405-1-127	**Floor Tile & Mastic**	**Room 93, 12 x 12 pink tile w/ black & white streaks w/ black mastic**	**Tile NAD, mastic 5% chrysotile**
3405-1-128	**Woven Pillow Cover**	**Room 51, @ wall in collection area of USPS mail drop slot**	**65% chrysotile**
3405-E-129	Brown Adhesive	Exterior, on wall where sign was removed	NAD
3405-E-130	**Caulking Material**	**Exterior, @ between metal louver and brick wall**	**5% chrysotile**
3405-M-131	White Mastic	Room 47, on fiberglass duct insulation	NAD
3405-M-132	Tape Insulation	Room 47, on handle of shut-off valve	NAD
3405-1-133	Expansion Joint Filler	Room 41, between wall and poured concrete floor	NAD
3405-M-134	Gray Duct Sealer	Room 42, on bare metal duct	NAD
3405-M-135	Fireproofing	Room 42, @ ceiling on columns & metal decking	NAD
3405-M-136	**White Mastic**	**Room 42, over fiberglass insulation on tank**	**5% chrysotile**
3405-M-137	Fireproofing	Room26, @ ceiling on columns & metal decking	NAD
3405-M-138	Caulking Material	Room 26, red fire-stop caulk on CMU wall penetrations	NAD
3405-1-139	Ceiling Tile	Room 29, old scrap tiles above ceiling grid w/ white backing	NAD
3405-M-140	Tape Insulation	Room 31, on handle of shut-off valve	NAD
3405-1-141	Vinyl Base Molding & Adhesive	Room 32, @ base of wall	NAD
3405-1-142	**Floor Tile & Mastic**	**Room 32, 12 x 12 dark blue tile w/ black mastic**	**Tile NAD, mastic 5% chrysotile**
3405-1-143	Floor Tile & Mastic	Room 75, 12 x 12 black tile w/ yellow adhesive & black mastic	Tile NAD, mastic < 1% chrysotile
3405-M-144	White Mastic	Room 77, on foil-backed fiberglass duct insulation	NAD
3405-1-145	White Mastic	Room 139, on foil-backed fiberglass duct insulation	NAD
3405-1-146	Drywall Joint Compound	Room 139, on wall	NAD
3405-1-147	Fireproofing	Room 141, @ ceiling on columns & metal decking	NAD

3405-1-148	**Cement Insulation**	**Room 148, behind valve @ bottom of tank**	**Surface material 2% chrysotile, cement insulation NAD**
3405-2-149	White Mastic	Room 195, on foil-backed fiberglass duct insulation (in MR)	NAD
3405-2-150	White Mastic	Room 194, on foil-backed fiberglass duct insulation above ceiling	NAD
3405-2-151	**Floor Tile & Mastic**	**Room 194, 12 x 12 brown mottled tile w/ black mastic**	**Tile NAD, mastic 5% chrysotile**
3405-2-152	Floor Tile & Mastic	Room 194, 12 x 12 white patch tile w/ black mastic	NAD
3405-2-153	Caulking Material	Room 194, between door frame and CMU wall	NAD
3405-2-154	Floor Tile & Mastic	Room 181, 12 x 12 tan mottled tile w/ yellow adhesive and black mastic below	NAD
3405-2-155	Ceiling Tile	Room 184, 2 x 4 older tile with symmetrical pin prick pattern	NAD
3405-3-156	**Floor Tile & Mastic**	**Room 289, 12 x 12 off-white tile w/ yellow adhesive & black mastic below**	**Tile NAD, mastic 3% chrysotile**
3405-3-157	Floor Tile & Mastic	Room 284, 12 x 12 dark blue tile w/ black mastic	NAD
3405-3-158	Floor Tile & Mastic	Room 284, 12 x 12 gray mottled tile w/ yellow adhesive	NAD
3405-3-159	**Floor Tile & Mastic**	**Room 298, 12 x 12 black tile w/ yellow adhesive & black mastic**	**Tile NAD, mastic 5% chrysotile**
3405-1-160	Drywall Joint Compound	Room 70a, on wall	NAD
3405-M-161	**Cement Insulation**	**Room 70b, behind valve @ bottom of tank**	**Surface material 2% chrysotile, cement insulation NAD**
3405-M-162	Tape Insulation	Room 206, on handle of shut-off valve	NAD
3405-2-163	**Floor Tile & Mastic**	**Room 200, 12 x 12 light brown patch tile w/ black mastic**	**Tile NAD, mastic 3% chrysotile**
3405-2-164	**Floor Tile & Mastic**	**Room 201, 12 x 12 dark gray tile w/ tan adhesive & black mastic**	**Tile NAD, mastic 3% chrysotile**

3405-2-165	**Floor Tile & Mastic**	**Room 201, 12 x 12 light gray tile w/ yellow adhesive & black mastic**	**Tile NAD, mastic 3% chrysotile**
3405-2-166	Brown Adhesive	Room 201, on wall where sign was removed	NAD
3405-2-167	**Floor Tile & Mastic**	**Room 208, 12 x 12 red tile w/ yellow adhesive & black mastic**	**Tile NAD, mastic 2% chrysotile**
3405-2-168	**White Mastic**	**Room 216, over fiberglass on 14" OD dual-temp H_2O pipe @ valve above pump**	**2% chrysotile**
3405-R-169	Flashing Cement	On roof, above metal flashing on brick wall	NAD
3405-3-170	**Caulking Material**	**Exterior, white between door frame and wall**	**5% chrysotile**
3405-3-171	Fireproofing	Room 315, @ ceiling on columns & metal decking	NAD
3405-3-172	Floor Tile & Mastic	Room 315, 12 x 12 tan mottled tile	NAD
3405-3-173	Floor Tile	Room 315, 12 x 12 blue/green tile	NAD
3405-3-174	Floor Tile & Mastic	Room 303, 12 x 12 green tile w/ yellow adhesive over black mastic	NAD
3405-3-175	Ceiling Tile	Room 305, 2 x 4 older tile with symmetrical pin prick pattern	NAD
3405-3-176	White Mastic	Room 305, on insulation 6" OD roof drain	NAD
3405-3-177	Floor Tile & Mastic	Room 318, 12 x 12 green tile w/ yellow adhesive over black mastic	NAD
3405-2-178	Fireproofing	Room 234, @ ceiling on columns & metal decking	NAD
3405-2-179	**Floor Tile & Mastic**	**Room 230, 12 x 12 light brown patch tile w/ black mastic**	**Tile NAD, mastic 2% chrysotile**
3405-2-180	**Floor Tile & Mastic**	**Room 230, 12 x 12 rose/pink patch tile w/ black mastic**	**Tile NAD, mastic 2% chrysotile**
3405-3-181	Brown Adhesive	Room 321, on wall where sign was removed	NAD
3405-3-182	**Floor Tile & Mastic**	**Room 321, 12 x 12 dark brown patch tile w/ black mastic**	**Tile NAD, mastic 2% chrysotile**

3405-1-183	**Cement Insulation**	**Room 63, on bottom of tank**	**Surface material 2% chrysotile, cement insulation NAD**
3405-1-184	**White Mastic**	**Room 63, over fiberglass on side of tank near clean out port**	**2% chrysotile**
3405-1-185	Drywall Joint Compound	Room 64, on wall	NAD
3405-1-186	Cement Insulation	Room 62, on top of tank	NAD
3405-1-187	Drywall Joint Compound	Room 61, on wall	NAD
3405-2-188	Fireproofing	Room 147, @ ceiling on columns & metal decking	NAD
3405-2-189	**White Mastic**	**Room 163, over fiberglass on 14" OD dual-temp H_2O pipe @ valve near pump**	**3% chrysotile**
3405-3-190	Caulking Material	Room 257, where HVAC pipes penetrate floor	NAD
3405-2-191	**Floor Tile & Mastic**	**Room 174, 12 x 12 yellow tile w/ tan mastic & black mastic**	**Tile NAD, mastic 2% chrysotile**
3405-2-192	Floor Tile & Mastic	Room 176, 12 x 12 yellow tile w/ tan mastic & black mastic	NAD
3405-2-193	**Floor Tile & Mastic**	**Room 168, 12 x 12 green tile w/ black mastic**	**Tile NAD, mastic 5% chrysotile**
3405-2-194	**Floor Tile & Mastic**	**Room 168, 12 x 12 white tile w/ black mastic**	**Tile NAD, mastic 5% chrysotile**
3405-3-195	**Floor Tile & Mastic**	**Room 168, 12 x 12 gray tile w/ black mastic**	**Tile NAD, mastic 5% chrysotile**
3405-3-196	Fireproofing	Room 269, @ ceiling on columns & metal decking	NAD
3405-3-197	**Floor Tile & Mastic**	**Room 270, 12 x 12 medium blue tile w/ black mastic**	**Tile NAD, mastic 5% chrysotile**
3405-2-198	Floor Coating	Exterior, on floor, gray non-slip coating	NAD
3405-2-199	**White Mastic**	**Exterior, on foil-backed fiberglass duct insulation**	**2% chrysotile**
3405-2-200	Ceiling Tile	Room 243, 2 x 2 brilliant white tile w/ small wormholes	NAD
3405-2-201	Floor Tile & Mastic	Room 244, 12 x 12 white & gray tile w/ black mastic (under tile)	NAD
3405-2-202	Floor Tile & Mastic	Room 243, 12 x 12 tan/black mottled tile w/ yellow adhesive	NAD
3405-2-203	Floor Tile & Mastic	Room 243, 12 x 12 rose/pink patch tile w/ yellow adhesive	NAD

3405-2-204	Floor Tile & Mastic	Room 241, 12 x 12 tan/black tile w/ yellow adhesive	NAD
3405-2-205	Floor Tile & Mastic	Room 241, 12 x 12 rose/pink patch tile w/ yellow adhesive	NAD
3405-2-206	Drywall Joint Compound & Textured Paint	Room 241, on wall	NAD
3405-2-207	Drywall Joint Compound & Textured Paint	Room 240, on wall	NAD
3405-2-208	Carpet Adhesive & Mastic	Room 237, on floor under carpet	NAD
3405-2-209	Drywall Joint Compound & Textured Paint	Room 246, on wall	NAD
3405-3-210	Drywall Joint Compound	Room 342, on wall	NAD
3405-3-211	Carpet Adhesive & Mastic	Room 347, on floor	NAD
3405-E-212	Caulking Material	Exterior, light brown material between precast concrete siding panels	NAD
3405-E-213	**Caulking Material**	**Exterior, dark brown material on brick**	**5% chrysotile**
3405-E-214	Black Foam & Adhesive	Exterior, between plaster ceiling & brick wall	NAD
3405-E-215	Caulking Material	Exterior, white material between plaster ceiling & brick wall	NAD
3405-E-216	**Caulking Material**	**Exterior, dark brown material between metal expansion joint against brick**	**5% chrysotile**
3405-E-217	Floor Coating	Exterior, on floor, gray non-slip coating	NAD
3405-E-218	Cloth & Black Coating	Exterior, on mini roof area on 2nd floor	NAD
3405-E-219	Cloth & Black Coating	Exterior, on mini roof area on 2nd floor	NAD
3405-E-220	**Cement Pipe**	**Exterior, scrap piece laying on mini roof area on 2nd floor (3rd down from left)**	**35% chrysotile, 2% crocidolite**
3405-E-221	Caulking Material	Exterior, light brown material between precast concrete siding panels	NAD

3405-E-222	Caulking Material	Exterior, white material between plaster ceiling & brick wall	NAD
3405-E-223	**Caulking Material**	**Exterior, dark brown material on brick**	**5% chrysotile**
3405-E-224	Caulking Material	Exterior, white material between glass pane & metal frame of window	NAD
3405-E-225	Caulking Material	Exterior, white material between glass pane & metal frame of window	NAD
3405-R-226	Flashing Cement	On roof, black material on curb & random locations	NAD
3405-R-227	Flashing Cement	On roof, black material on curb & random locations	NAD
3405-R-228	Flashing Cement	On roof, sticky black material	NAD
3405-R-229	Built-Up Roofing Membrane	On roof, @ center	NAD
3405-R-230	Multi-Layer Flashing	On roof, @ edge	NAD
3405-R-231	Built-Up Roofing Membrane	On roof, @ edge	NAD
3405-R-232	Built-Up Roofing Membrane	On roof, @ center	NAD
3405-R-233	Flashing Cement	On roof, black material @ newer patch	NAD
3405-R-234	Roof Patching Material	On roof, black material @ patch	NAD
3405-R-235	**Multi-Layer Flashing**	**On roof, @ edge on seam**	**Surface material < 1% chrysotile, multi-layer flashing NAD**
3405-R-236	Built-Up Roofing Membrane	On roof, @ center	NAD
3405-R-237	Flashing Cement	On roof, on curb cap corner	NAD
3405-R-238	Multi-Layer Flashing	On roof, @ edge not on seam	NAD
3405-R-239	**Built-Up Roofing Membrane**	**On roof, @ edge**	**Membrane type 1 NAD, membrane type 2 5% chrysotile**
3405-1-240	Caulking Material	Room 8, around sink	NAD

Samples testing positive for asbestos indicated in **BOLD** type

NAD = No Asbestos Detected

TABLE 2
ACM QUANTITY SUMMARY
FORT BENNING, BUILDING 3405

Homogeneous Area	UNITS	Functional Space									
		INTERIOR	EXTERIOR	MECHANICAL ROOM	ROOF						TOTALS
Black Mastic on Floor	S.F.	136,000	0	0	0						136,000 S.F.
White Mastic on Ductwork	S.F.	5,000 (min)	0	0	0						5,000 S.F. (min)
White Mastic on Domestic Piping and Hot Water Tanks	S.F.	3,000 (min)	0	2,000 (min)	0						5,000 S.F. (min)
Woven Pillows	Ea	4	0	0	0						4 Ea.
Gray Caulk	L.F.	0	350	0	0						350 L.F.
Dark Brown Caulk	L.F.	0	1,250	0	0						1,250 L.F.
Caulk Around Door Frame	S.F.	0	2,925	0	0						2,925 L.F.
Flashing Cement	S.F.	0	0	0	**						**
Roof Flashing Membrane	S.F.	0	0	0	24,500						24,500 S.F.
Flange Gaskets	Ea.	0	0	100 (min)	0						100 Ea. (min)

S.F. = Square Foot, L.F. = Linear Foot, C.F. = Cubic Foot

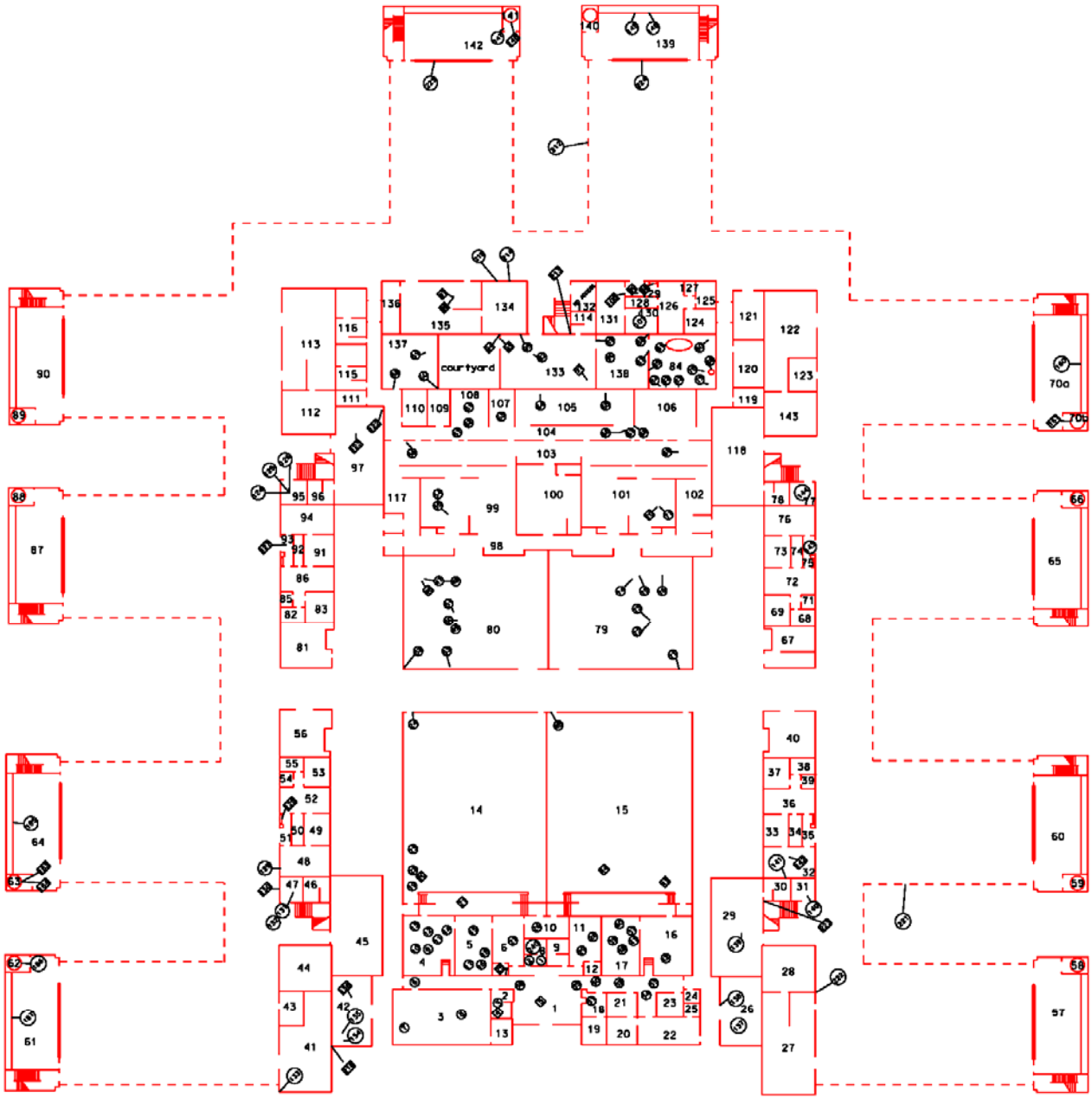
**** = See Roof Flashing Membrane totals for estimated quantities.**

TABLE 3
MATERIAL CHARACTERIZATION AND ASSESSMENT
FORT BENNING, BUILDING 3405

MATERIAL		CHARACTERISTICS			ASSESSMENT	
Type	**Description**	**Asbestos Yes/No/Assumed**	**Quantity**	**Friable / Non-friable**	**Condition**	**Disturbance Potential**
Miscellaneous	Black Mastic on Floor	Yes	136,000 S.F.	Non-friable	Good	Low
TSI	White Mastic on Ductwork	Yes	5,000 S.F. (min)	Non-friable	Good	Low
TSI	White Mastic on Domestic Piping and Hot Water Tanks	Yes	5,000 S.F. (min)	Non-friable	Good	Low
Miscellaneous	Woven Pillows	Yes	4 Ea.	Non-friable	Good	Low
Miscellaneous	Gray Caulk	Yes	350 L.F.	Non-friable	Good	Low
Miscellaneous	Dark Brown Caulk	Yes	1,250 L.F.	Non-friable	Good	Low
Miscellaneous	White Caulk on Door Frame	Yes	2,925 L.F.	Non-friable	Good	Low
Miscellaneous	Flashing Cement	Yes	**	Non-friable	Good	Low
Miscellaneous	Built-Up Roofing Membrane	Yes	24,500 S.F.	Non-friable	Good	Low
Miscellaneous	Flange Gaskets	Assumed	100 Ea. (min)	Non-friable	Good	Low

S.F. = Square Foot, L.F. = Linear Foot, C.F. = Cubic Foot, Ea. = Each

Figure 1



BUILDING 3405

1st Floor

Figure 2

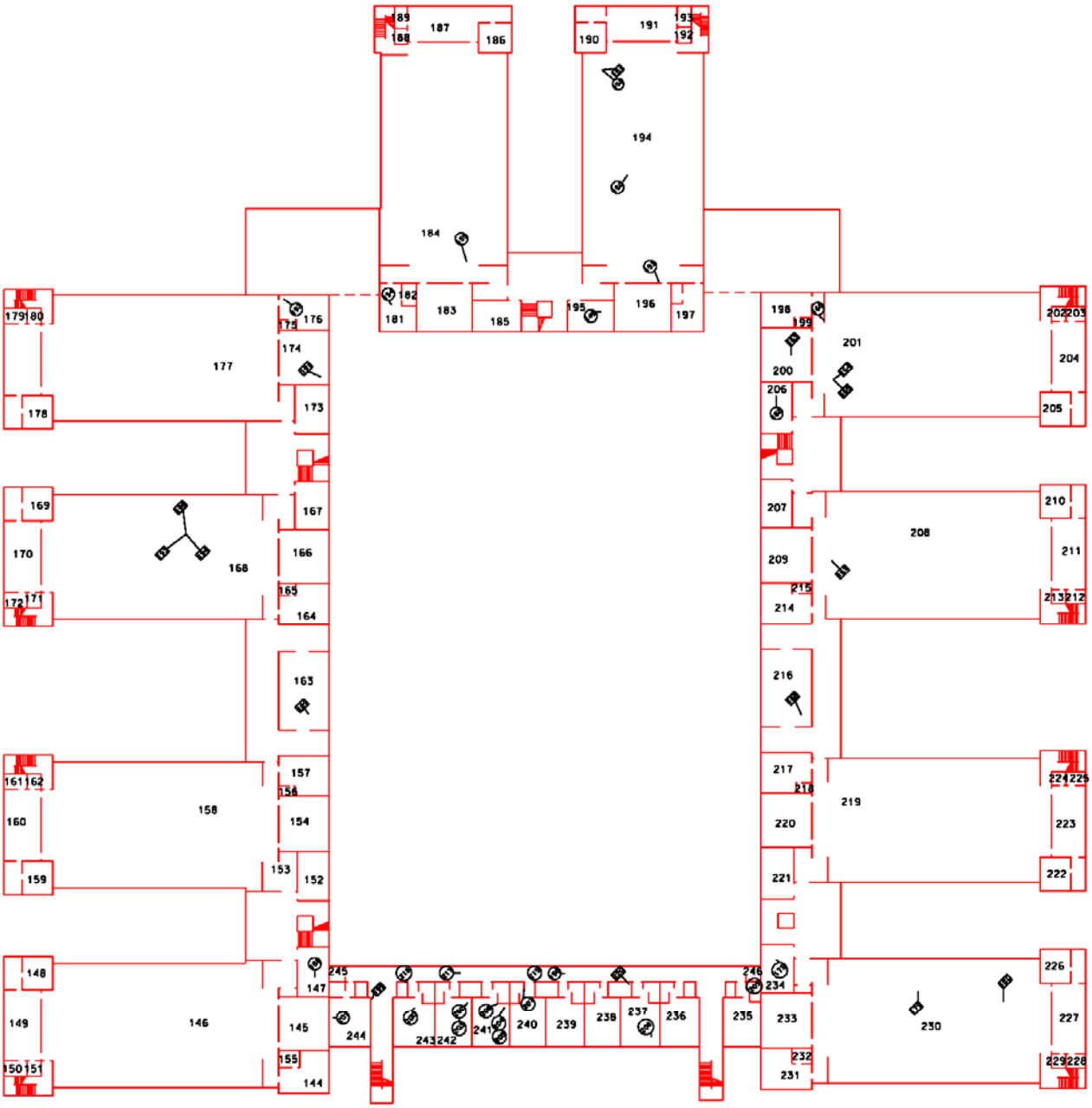


Figure 3

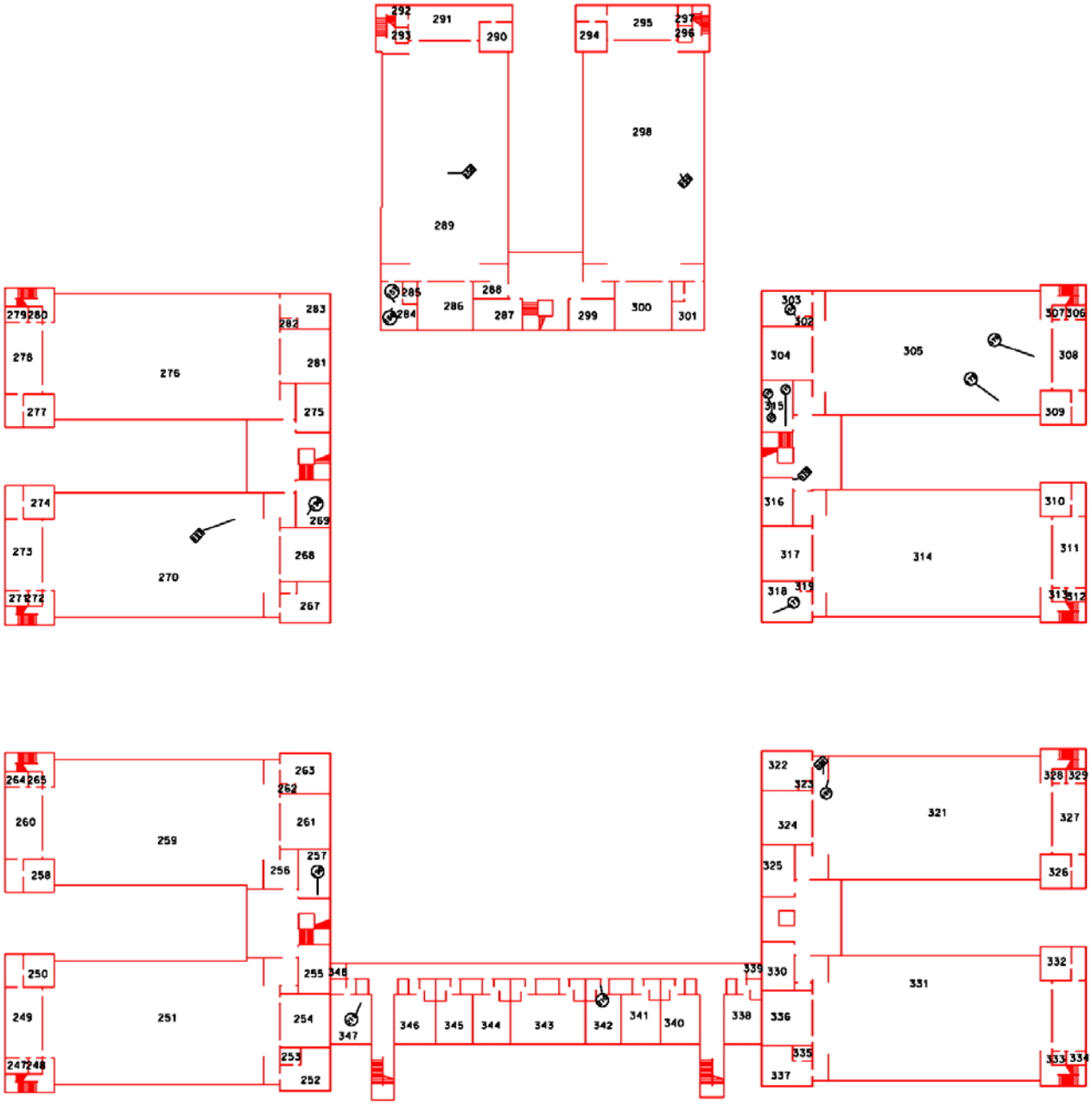
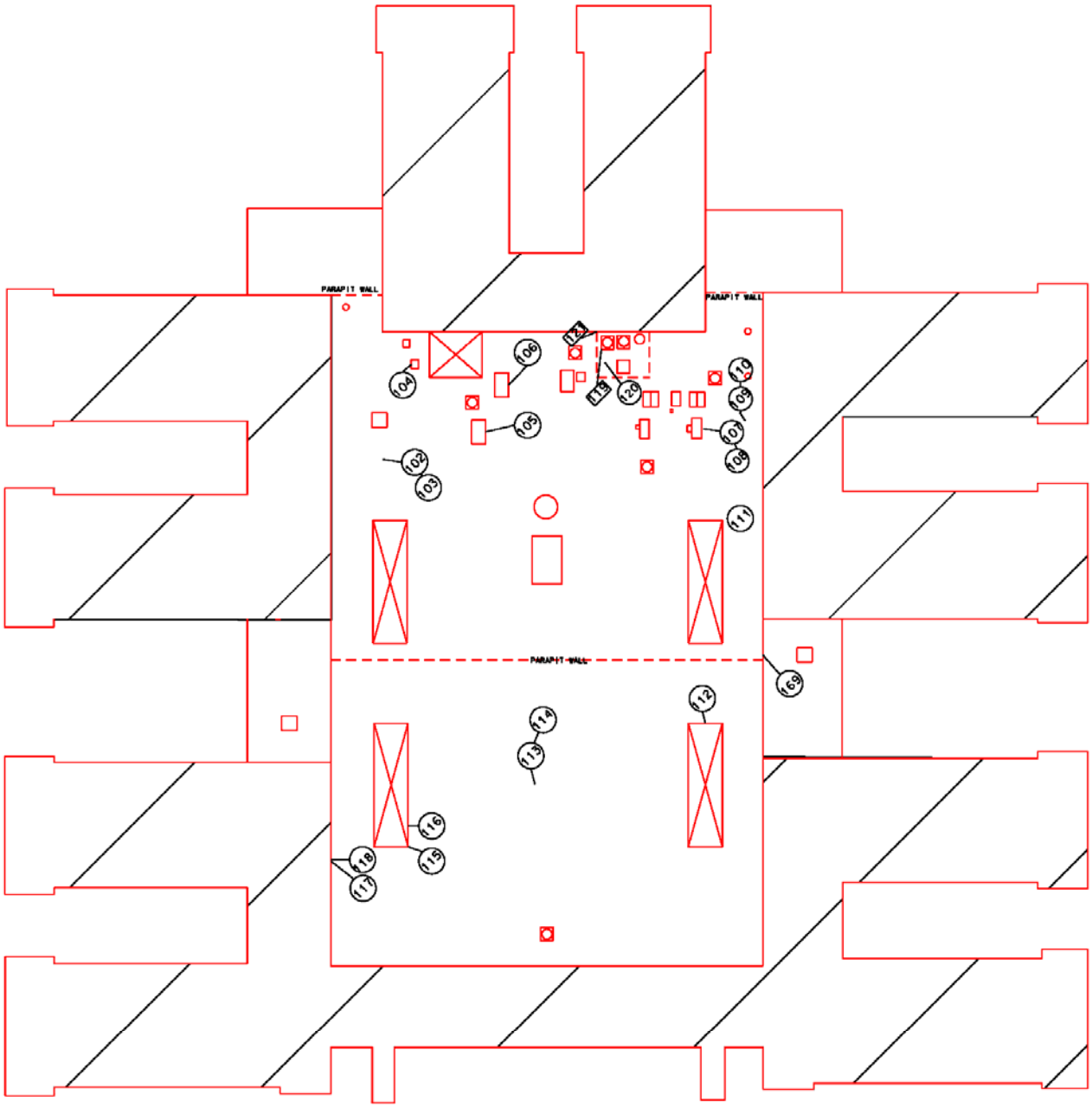
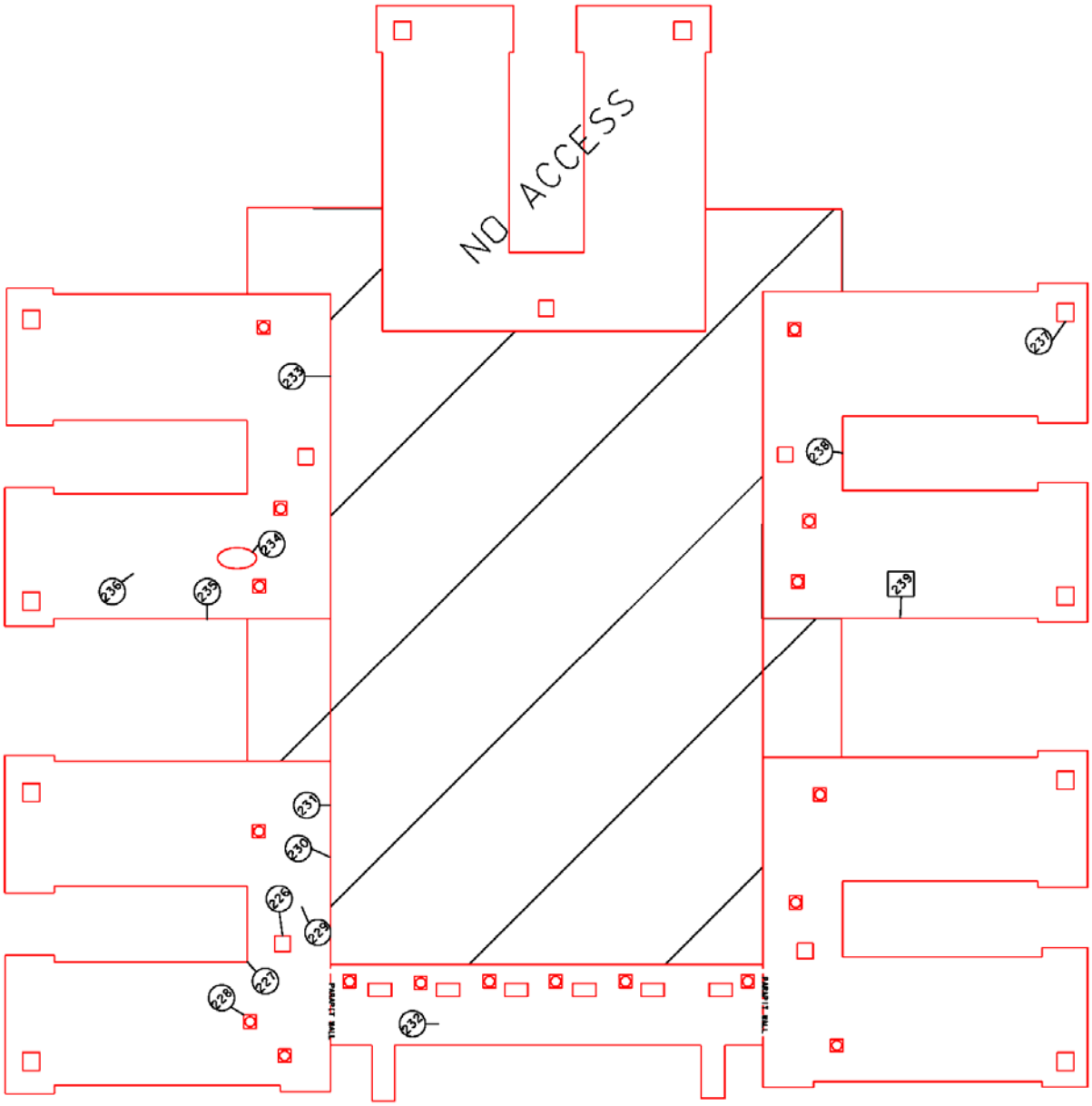


Figure 4



BUILDING 3405
2nd Floor Roof

Figure 5



BUILDING 3405

3rd Floor Roof

Appendix A

Analytical Report, Carolina Environmental, Inc.

CAROLINA ENVIRONMENTAL, INC.
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LABORATORY REPORT
ASBESTOS BULK ANALYSIS

Client: **US Army Corps of Engineers - Savannah District - EMU9**
200 North Cobb Parkway, Bldg. 400 Ste. 404
Marietta , GA 30062

Project: Ft. Benning Bldg. 3405; 10257

CEI Lab Code: A10-2163
Received: 04-01-10
Analyzed: 04-03-10
Reported: 04-03-10
Analyst: Anna Malmberg/Lisa Ismail

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3405-1-1	A1007936	MASTIC Homogeneous, White, Non-fibrous, Bound BIND 100 % CELL <1 %	ND
Samples A1007936-A1008133 analyzed by Anna Malmberg.			
3405-1-2	A1007937	CEILING TILE Heterogeneous, Off-white, Tan, Fibrous, Loosely Bound PERL 20 % CELL 35 % BIND 15 % FBGL 30 %	ND
3405-1-3	A1007938A	FLOOR TILE Homogeneous, Grey, Non-fibrous, Bound VINYL 100 % MICA <1 %	ND
	A1007938B	MASTIC Homogeneous, Clear, Tan, Fibrous, Bound MAST 98 % CELL 2 % MICA <1 %	ND
3405-1-4	A1007939A	MASTIC Homogeneous, Clear, Fibrous, Bound MAST 98 % CELL 2 % MICA <1 %	ND
	A1007939B	FLOOR TILE Homogeneous, Beige, Grey, Non-fibrous, Bound VINYL 100 % MICA <1 %	ND

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Lab Code: A10-2163

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
	A1007939C	MASTIC	CHRY 5%
	Homogeneous,	Black, Fibrous, Bound	
		CHRY 5% MAST 90 % CELL 3 %	
		MICA 2 %	
3405-1-5	A1007940	MASTIC (ONLY)	CHRY 2%
	Homogeneous,	White, Fibrous, Bound	
		CHRY 2% MAST 95 % CELL <1 %	
		MICA 3 % TALC <1 %	
3405-1-6	A1007941A	BASE MOLDING	ND
	Homogeneous,	Black, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1007941B	ADHESIVE	ND
	Heterogeneous,	Off-white, Brown, Non-fibrous, Bound	
		MAST 100 % CELL <1 %	
		MICA <1 %	
3405-1-7	A1007942	ADHESIVE	ND
	Homogeneous,	Brown, Non-fibrous, Bound	
		MAST 100 % CELL <1 %	
		MICA <1 %	
3405-1-8	A1007943	CEILING TILE	ND
	Heterogeneous,	Off-white, Fibrous, Loosely Bound	
		PERL 20 % CELL 35 %	
		BIND 15 % FBGL 30 %	
3405-1-9	A1007944	CEILING TILE	ND
	Heterogeneous,	Off-white, Fibrous, Loosely Bound	
		PERL 20 % CELL 35 %	
		BIND 15 % FBGL 30 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3405-1-10	A1007945	MASTIC (ONLY)	ND
	Homogeneous,	White, Fibrous, Bound	
		MAST 95 % WOLL 2 %	
		MICA <1 % TALC 3 %	
3405-1-11	A1007946A	FLOOR TILE	ND
	Homogeneous,	Grey, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1007946B	MASTIC	ND
	Homogeneous,	Tan, Fibrous, Bound	
		MAST 98 % CELL 2 %	
		MICA <1 %	
3405-1-12	A1007947A	FLOOR TILE	ND
	Homogeneous,	Beige, Grey, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1007947B	MASTIC	ND
	Homogeneous,	Clear, Tan, Fibrous, Bound	
		MAST 98 % CELL 2 %	
		MICA <1 %	
3405-1-13	A1007948A	FLOOR TILE	ND
	Homogeneous,	Beige, Grey, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1007948B	MASTIC	ND
	Homogeneous,	Clear, Tan, Fibrous, Bound	
		MAST 98 % CELL 2 %	
		MICA <1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION					% ASBESTOS
3405-1-14	A1007949	DRYWALL/JOINT COMPOUND					ND
	Heterogeneous,	Off-white, Tan, Fibrous, Bound					
		GYPSUM	70 %	CELL	20 %		
		CACO	10 %				
3405-1-15	A1007950	CEILING TILE					ND
	Heterogeneous,	Off-white, Fibrous, Bound					
		PERL	20 %	CELL	35 %		
		BIND	15 %	FBGL	30 %		
3405-1-16	A1007951	FIREPROOFING					ND
	Homogeneous,	Tan, Fibrous, Loosely Bound					
		BIND	60 %	CELL	20 %		
		MICA	20 %				
3405-1-17	A1007952	FIREPROOFING					ND
	Homogeneous,	Tan, Fibrous, Loosely Bound					
		BIND	60 %	CELL	20 %		
		MICA	20 %				
3405-1-18	A1007953	DRYWALL/JOINT COMPOUND					ND
	Heterogeneous,	Off-white, Tan, Fibrous, Bound					
		GYPSUM	70 %	CELL	20 %		
		CACO	10 %	FBGL	<1 %		
3405-1-19	A1007954A	FLOOR TILE					ND
	Homogeneous,	Beige, Grey, Non-fibrous, Bound					
		VINYL	100 %				
		MICA	<1 %				
	A1007954B	MASTIC					ND
	Homogeneous,	Clear, Fibrous, Bound					
		MAST	98 %	CELL	2 %		
		MICA	<1 %				

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3405-1-20	A1007955A	MASTIC	ND
	Homogeneous,	Clear, Fibrous, Bound	
		MAST 98 % CELL 2 %	
		MICA <1 %	
	A1007955B	FLOOR TILE	ND
	Homogeneous,	Beige, Grey, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1007956B	MASTIC	CHRY 5%
	Homogeneous,	Black, Fibrous, Bound	
		CHRY 5% MAST 95 % CELL <1 %	
		MICA <1 %	
3405-1-21	A1007957	MASTIC (ONLY)	CHRY 2%
	Homogeneous,	White, Fibrous, Bound	
		CHRY 2% MAST 94 % CELL 2 %	
		MICA <1 % TALC 2 %	
3405-1-22	A1007958	MASTIC	ND
	Homogeneous,	White, Fibrous, Bound	
		MAST 96 % CELL 2 %	
		MICA <1 % WOLL 2 %	
3405-1-23	A1007959	MASTIC	ND
	Homogeneous,	White, Non-fibrous, Bound	
		MAST 98 % TALC 2 %	
		MICA <1 % NTREM <1 %	
3405-1-24	A1007960	CAULKING	ND
	Heterogeneous,	White, Non-fibrous, Bound	
		CAULK 95 % CELL <1 %	
		PAINT 5 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3405-1-25	A1007961A	FLOOR TILE	ND
	Homogeneous,	Beige, Grey, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1007961B	MASTIC	CHRY 2%
	Homogeneous,	Black, Fibrous, Bound	
		CHRY 2% MAST 96 % CELL 2 %	
		MICA <1 %	
3405-1-26	A1007962	CEILING TILE	ND
	Heterogeneous,	Off-white, Fibrous, Loosely Bound	
		PERL 20 % CELL 35 %	
		BIND 15 % FBGL 30 %	
3405-1-27	A1007963	CEILING TILE	ND
	Heterogeneous,	Off-white, Fibrous, Loosely Bound	
		PERL 20 % CELL 35 %	
		BIND 15 % FBGL 30 %	
3405-1-29	A1007964	JOINT COMPOUND	ND
	Heterogeneous,	White, Non-fibrous, Bound	
		CACO 80 % CELL <1 %	
		MICA 10 %	
		PAINT 10 %	
3405-1-30	A1007965	TEXTURED SURFACING	ND
	Heterogeneous,	White, Fibrous, Bound	
		CACO 75 % CELL 5 %	
		MICA 10 %	
		PAINT 10 %	
3405-1-31	A1007966A	TEXTURED SURFACING	ND
	Heterogeneous,	White, Fibrous, Bound	
		CACO 80 % CELL <1 %	
		MICA 10 %	
		PAINT 10 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
	A1007966B	DRYWALL				ND
	Heterogeneous,	Off-white, Tan, Fibrous, Bound				
		GYPSUM	80 %	CELL	20 %	
No joint compound.						
3405-1-32	A1007967	TEXTURED SURFACING				ND
	Heterogeneous,	White, Fibrous, Bound				
		CACO	80 %	CELL	<1 %	
No drywall or joint compound.		MICA	10 %			
		PAINT	10 %			
3405-1-33	A1007968A	TEXTURED SURFACING				ND
	Heterogeneous,	White, Fibrous, Bound				
		CACO	80 %	CELL	<1 %	
		MICA	10 %			
		PAINT	10 %			
	A1007968B	DRYWALL				ND
	Heterogeneous,	Off-white, Tan, Fibrous, Bound				
		GYPSUM	80 %	CELL	20 %	
No joint compound.						
3405-1-34	A1007969	FIREPROOFING				ND
	Homogeneous,	Tan, Non-fibrous, Loosely Bound				
		BIND	60 %	CELL	20 %	
		MICA	20 %			
3405-1-35	A1007970	FIREPROOFING				ND
	Homogeneous,	Tan, Non-fibrous, Loosely Bound				
		BIND	60 %	CELL	20 %	
		MICA	20 %			
3405-1-36	A1007971	FIREPROOFING				ND
	Homogeneous,	Tan, Non-fibrous, Loosely Bound				
		BIND	60 %	CELL	20 %	
		MICA	20 %			

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3405-1-37	A1007972A	BASE MOLDING	ND
	Homogeneous,	Brown, Non-fibrous, Bound	
		VINYL 100 %	
		PAINT <1 %	
		MICA <1 %	
	A1007972B	MASTIC	ND
	Homogeneous,	Brown, Fibrous, Bound	
		MAST 100 % CELL <1 %	
		MICA <1 %	
3405-1-38	A1007973	FLOOR TILE	ND
	Homogeneous,	Brown, Non-fibrous, Bound	
		VINYL 100 %	
No mastic.		MICA <1 %	
3405-1-39	A1007974	FLOOR TILE	ND
	Homogeneous,	White, Non-fibrous, Bound	
		VINYL 100 %	
Insufficient mastic.		MICA <1 %	
3405-1-40	A1007975A	FLOOR TILE	ND
	Homogeneous,	Brown, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1007975B	MASTICS	CHRY <1%
	Heterogeneous,	Clear, Black, Fibrous, Bound	
		CHRY <1% MAST 98 % CELL 2 %	
Unable to separate black and clear mastics.		MICA <1 %	
3405-1-41	A1007976	CEILING TILE	ND
	Heterogeneous,	Off-white, Tan, Fibrous, Loosely Bound	
		PERL 20 % CELL 35 %	
		BIND 15 % FBGL 30 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3405-1-42	A1007977	FIREPROOFING	ND
	Heterogeneous,	Brown, Fibrous, Loosely Bound	
		BIND 60 % CELL 20 %	
		MICA 20 %	
3405-1-43	A1007978A	FLOOR TILE	ND
	Homogeneous,	Brown, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1007978B	MASTIC	CHRY 3%
	Homogeneous,	Brown, Fibrous, Bound	
		CHRY 3% MAST 95 % CELL <1 %	
		MICA 2 %	
3405-1-44	A1007979	MASTIC (ONLY)	CHRY 5%
	Homogeneous,	White, Fibrous, Bound	
		CHRY 5% MAST 95 % CELL <1 %	
		MICA <1 % TALC <1 %	
3405-1-45	A1007980	CAULKING	ND
	Homogeneous,	White, Non-fibrous, Bound	
		CAULK 100 % CELL <1 %	
		MICA <1 %	
3405-1-46	A1007981	MASTIC (ONLY)	CHRY 5%
	Homogeneous,	White, Fibrous, Bound	
		CHRY 5% MAST 95 % CELL <1 %	
		MICA <1 % TALC <1 %	
3405-1-47	A1007982	CEILING TILE	ND
	Heterogeneous,	Off-white, Fibrous, Loosely Bound	
		PERL 20 % CELL 35 %	
		BIND 15 % FBGL 30 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3405-1-48	A1007983	CEILING TILE Heterogeneous, Off-white, Fibrous, Loosely Bound PERL 20 % CELL 35 % BIND 15 % FBGL 30 %	ND
3405-1-49	A1007984	CEILING TILE Heterogeneous, Off-white, Fibrous, Loosely Bound PERL 20 % CELL 35 % BIND 15 % FBGL 30 %	ND
3405-1-50	A1007985A	FLOOR TILE Homogeneous, Grey, Non-fibrous, Bound VINYL 100 % MICA <1 %	ND
	A1007985B	MASTICS Heterogeneous, Tan, Black, Fibrous, Bound CHRY <1% MAST 98 % CELL 2 % Unable to separate black & tan mastic. MICA <1 %	CHRY <1%
3405-1-51	A1007986A	FLOOR TILE Homogeneous, White, Non-fibrous, Bound VINYL 100 % MICA <1 %	ND
	A1007986B	MASTIC Homogeneous, Tan, Fibrous, Bound MAST 98 % CELL 2 % MICA <1 %	ND
3405-1-52	A1007987A	BASE MOLDING Homogeneous, Grey, Non-fibrous, Bound VINYL 100 % MICA <1 %	ND

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
	A1007987B	MASTIC	ND
	Homogeneous,	Off-white, Brown, Non-fibrous, Bound	
		MAST 98 % CELL <1 %	
		PAINT 2 %	
3405-1-53	A1007988	FIREPROOFING	ND
	Homogeneous,	Brown, Fibrous, Loosely Bound	
		BIND 60 % CELL 20 %	
		MICA 20 %	
3405-1-54	A1007989	MASTIC (ONLY)	ND
	Homogeneous,	White, Fibrous, Loosely Bound	
		MAST 96 % TALC 2 %	
		MICA 2 % NTREM <1 %	
		CELL <1 %	
3405-1-55	A1007990	PLASTER	ND
	Homogeneous,	Off-white, Fibrous, Bound	
		PLAS 100 % CELL <1 %	
3405-1-56	A1007991	PLASTER	ND
	Heterogeneous,	White, Fibrous, Bound	
		PLAS 98 % CELL <1 %	
		PAINT 2 %	
3405-1-57	A1007992	MASTIC (ONLY)	ND
	Homogeneous,	White, Fibrous, Bound	
		MAST 96 % TALC 2 %	
		MICA 2 % NTREM <1 %	
		WOLL <1 %	
3405-1-58	A1007993	CAULKING	CHRY <1%
	Heterogeneous,	White, Fibrous, Bound	
		CHRY <1% MAST 95 % CELL <1 %	
		PAINT 5 %	
		MICA <1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
3405-1-59	A1007994	PLASTER				ND
	Heterogeneous,	White, Fibrous, Bound				
		PLAS	90 %	CELL	<1 %	
		PAINT	10 %			
3405-1-60	A1007995	CAULKING				CHRY <1%
	Heterogeneous,	White, Fibrous, Bound				
		CHRY <1% CAULK	90 %	CELL	<1 %	
		PAINT	10 %			
3405-1-61	A1007996	SINK UNDERCOATING				ND
	Homogeneous,	Black, Silver, Fibrous, Bound				
		TAR	90 %	CELL	<1 %	
		PAINT	10 %			
		MICA	<1 %			
3405-1-62	A1007997	SINK UNDERCOATING				ND
	Homogeneous,	Black, Silver, Fibrous, Bound				
		TAR	90 %	CELL	<1 %	
		PAINT	10 %			
		MICA	<1 %			
3405-1-63	A1007998	CAULKING				ND
	Homogeneous,	Grey, White, Non-fibrous, Bound				
		CAULK	100 %	CELL	<1 %	
		MICA	<1 %			
3405-1-64	A1007999	CLOTH & MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	33 %	FBGL	65 %	
		MICA	<1 %	WOLL	2 %	
3405-1-65	A1008000	PLASTER				ND
	Heterogeneous,	White, Non-fibrous, Bound				
		PLAS	80 %	CELL	<1 %	
		PAINT	20 %			

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3405-1-66	A1008001	CLOTH & MASTIC	ND
	Heterogeneous,	White, Non-fibrous, Bound	
		MAST 33 % FBGL 65 %	
		MICA <1 % TALC 2 %	
		NTREM <1 %	
3405-1-67	A1008002	PLASTER	ND
	Homogeneous,	Off-white, Non-fibrous, Bound	
		PLAS 100 % CELL <1 %	
3405-1-68	A1008003	ADHESIVE	ND
	Heterogeneous,	Brown, White, Non-fibrous, Bound	
		PLAS 95 % CELL <1 %	
		PAINT 5 %	
		MICA <1 %	
3405-1-69	A1008004	PLASTER	ND
	Homogeneous,	Grey, Non-fibrous, Bound	
		PLAS 90 % CELL <1 %	
		PERL 10 %	
		MICA <1 %	
3405-1-70	A1008005	MASTIC (ONLY)	CHRY 5%
	Homogeneous,	White, Fibrous, Bound	
		CHRY 5% MAST 95 % CELL <1 %	
		MICA <1 % TALC <1 %	
3405-1-71	A1008006A	PLASTER SKIM COAT	ND
	Heterogeneous,	White, Non-fibrous, Bound	
		PLAS 90 %	
		PAINT 10 %	
	A1008006B	PLASTER BASE COAT	ND
	Homogeneous,	Tan, Non-fibrous, Bound	
		PLAS 100 % CELL <1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3405-1-72	A1008007A	FLOOR TILE	ND
	Homogeneous,	White, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1008007B	MASTIC	ND
	Homogeneous,	Tan, Fibrous, Bound	
		MAST 98 % CELL 2 %	
		MICA <1 %	
3405-1-73	A1008008	FLOOR TILE	ND
	Homogeneous,	White, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1008008B	MASTIC	ND
	Homogeneous,	Tan, Fibrous, Bound	
		MAST 98 % CELL 2 %	
		MICA <1 %	
3405-1-74	A1008009	CEILING TILE	ND
	Heterogeneous,	Off-white, Fibrous, Loosely Bound	
		PERL 20 % CELL 35 %	
		BIND 15 % FBGL 30 %	
3405-1-75	A1008010	CEILING TILE	ND
	Heterogeneous,	Off-white, Fibrous, Loosely Bound	
		PERL 20 % CELL 35 %	
		BIND 15 % FBGL 30 %	
3405-1-76	A1008011	CEILING TILE	ND
	Heterogeneous,	Off-white, Fibrous, Loosely Bound	
		PERL 20 % CELL 35 %	
		BIND 15 % FBGL 30 %	

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Project: Ft. Benning Bldg. 3405; 10257

Lab Code: A10-2163

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION					% ASBESTOS
3405-1-77	A1008012A	BASE MOLDING					ND
	Homogeneous,	Black, Non-fibrous, Bound					
		VINYL	100 %				
		MICA	<1 %				
	A1008012B	MASTIC					ND
	Homogeneous,	Off-white, Non-fibrous, Bound					
		MAST	100 %	CELL	<1 %		
		MICA	<1 %				
3405-1-78	A1008013	MASTIC (ONLY)					ND
	Homogeneous,	White, Fibrous, Bound					
		MAST	95 %	WOLL	5 %		
Sample bag marked 3405-M-78		MICA	<1 %	CELL	<1 %		
3405-1-79	A1008014	MASTIC (ONLY)					ND
	Homogeneous,	White, Fibrous, Bound					
		MAST	95 %	WOLL	2 %		
Sample bag marked 3405-M-79		MICA	<1 %	CELL	3 %		
3405-1-80	A1008015	MASTIC (ONLY)					ND
	Homogeneous,	White, Fibrous, Bound					
		MAST	95 %	WOLL	5 %		
Sample bag marked 3405-M-80		MICA	<1 %	CELL	<1 %		
3405-1-81	A1008016	MASTIC (ONLY)					ND
	Homogeneous,	White, Fibrous, Bound					
		MAST	95 %	WOLL	5 %		
Sample bag marked 3405-M-81		MICA	<1 %	CELL	<1 %		
3405-1-82	A1008017	MASTIC (ONLY)					ND
	Homogeneous,	White, Fibrous, Bound					
		MAST	95 %	WOLL	5 %		
Sample bag marked 3405-M-82		MICA	<1 %	CELL	<1 %		

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION					% ASBESTOS
3405-1-83	A1008018	MASTIC (ONLY)					ND
	Homogeneous,	White, Fibrous, Bound					
		MAST	95 %	WOLL	2 %		
Sample bag marked 3405-M-83		MICA	<1 %	CELL	3 %		
3405-1-84	A1008019	FIREPROOFING					ND
	Homogeneous,	Grey, Fibrous, Loosely Bound					
		BIND	5 %	FBGL	95 %		
Sample bag marked 3405-M-84		MICA	<1 %	CELL	<1 %		
3405-1-85	A1008020	FIREPROOFING					ND
	Homogeneous,	Grey, Fibrous, Loosely Bound					
		BIND	5 %	FBGL	95 %		
Sample bag marked 3405-M-85		MICA	<1 %	CELL	<1 %		
3405-1-86	A1008021	PIPE COATING					ND
	Homogeneous,	Black, Fibrous, Bound					
		TAR	40 %	FBGL	60 %		
Sample bag marked 3405-M-86		MICA	<1 %	CELL	<1 %		
3405-1-87	A1008022	CAULKING					ND
	Homogeneous,	White, Non-fibrous, Bound					
		CAULK	93 %	CELL	5 %		
Sample bag marked 3405-M-87		MICA	<1 %	FBGL	2 %		
3405-1-88	A1008023	FIREPROOFING					ND
	Homogeneous,	Tan, Fibrous, Bound					
		BIND	55 %	CELL	20 %		
Sample bag marked 3405-M-88		MICA	20 %	FBGL	5 %		
3405-M-89	A1008024	FIREPROOFING					ND
	Homogeneous,	Tan, Fibrous, Bound					
		BIND	55 %	CELL	20 %		
		MICA	20 %	FBGL	5 %		

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3405-M-90	A1008025	MASTIC (ONLY)	ND
	Homogeneous,	White, Fibrous, Bound	
		MAST 98 % CELL <1 %	
		MICA <1 % WOLL 2 %	
3405-1-91	A1008026A	FLOOR TILE	ND
	Homogeneous,	Brown, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1008026B	MASTIC	CHRY 5%
	Homogeneous,	Black, Fibrous, Bound	
		CHRY 5% MAST 95 % CELL <1 %	
		MICA <1 %	
3405-1-92	A1008027	CEILING TILE	ND
	Heterogeneous,	Off-white, Fibrous, Loosely Bound	
		PERL 20 % CELL 35 %	
		BIND 15 % FBGL 30 %	
3405-1-93	A1008028	CAULKING	CHRY 2%
	Heterogeneous,	Off-white, Fibrous, Bound	
		CHRY 2% CAULK 93 % CELL <1 %	
		PAINT 5 %	
3405-E-94	A1008029	CAULKING	CHRY 5%
	Homogeneous,	Black, Fibrous, Bound	
		CHRY 5% CAULK 95 % CELL <1 %	
		MICA <1 %	
3405-1-95	A1008030	EXPANSION JOINT FILLER	ND
	Heterogeneous,	Black, Brown, Fibrous, Bound	
		TAR 40 % CELL 60 %	
		MICA <1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3405-1-96	A1008031	MASTIC	CHRY 3%
	Homogeneous,	White, Fibrous, Bound	
		CHRY 3% MAST 88 % CELL 2 %	
		MICA 2 % FBGL 5 %	
		TALC <1 %	
3405-1-97	A1008032	MASTIC (ONLY)	CHRY 3%
	Homogeneous,	White, Fibrous, Bound	
		CHRY 3% MAST 88 % CELL 2 %	
		MICA 2 % FBGL 5 %	
		TALC <1 %	
3405-1-98	A1008033	WOVEN PILLOW COVER	CHRY 65%
	Homogeneous,	Off-white, Fibrous, Loosely Bound	
		CHRY 65% BIND 15 % CELL 20 %	
3405-1-99	A1008034A	FLOOR TILE	ND
	Homogeneous,	Grey, Beige, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1008034B	MASTIC	CHRY 5%
	Homogeneous,	Black, Fibrous, Bound	
		CHRY 5% MAST 95 % CELL <1 %	
		MICA <1 %	
	A1008034C	MASTIC	ND
	Homogeneous,	Tan, Fibrous, Bound	
		MAST 100 % CELL <1 %	
		MICA <1 %	
3405-1-100	A1008035A	FLOOR TILE	ND
	Homogeneous,	Brown, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
	A1008035B Homogeneous,	MASTIC Black, Fibrous, Bound CHRY 5% MAST 95 % CELL <1 % MICA <1 %	CHRY 5%
3405-1-101	A1008036 Heterogeneous,	ADHESIVE White, Grey, Non-fibrous, Bound MAST 80 % CELL <1 % PAINT 20 %	ND
3405-R-102	A1008037 Heterogeneous,	BUILT-UP ROOFING MEMBRANE Black, Fibrous, Bound TAR 50 % FBGL 30 % MICA <1 % CELL 20 %	ND
3405-R-103	A1008038 Heterogeneous,	POWDERY INSULATION Tan, Fibrous, Loosely Bound BIND 15 % FBGL 65 % PERL 20 %	ND
3405-R-104	A1008039 Homogeneous,	FLASHING CEMENT Black, Fibrous, Loosely Bound TAR 85 % CELL 15 % MICA <1 %	ND
3405-R-105	A1008040 Homogeneous,	FLASHING CEMENT Black, Fibrous, Loosely Bound TAR 85 % CELL 15 % MICA <1 %	ND
3405-R-106	A1008041 Homogeneous,	FLASHING CEMENT Black, Fibrous, Loosely Bound TAR 85 % CELL 15 % MICA <1 %	ND

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
3405-R-107	A1008042	PITCH PAN FILLER				ND
	Homogeneous,	Black, Fibrous, Loosely Bound				
		TAR	85 %	CELL	15 %	
		MICA	<1 %			
3405-R-108	A1008043	PITCH PAN FILLER				ND
	Heterogeneous,	Black, Grey, Fibrous, Loosely Bound				
		TAR	50 %	CELL	10 %	
		BIND	40 %			
3405-R-109	A1008044	BUILT-UP ROOFING MEMBRANE				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	50 %	FBGL	35 %	
				CELL	15 %	
3405-R-110	A1008045	POWDERY INSULATION				ND
	Homogeneous,	Tan, Fibrous, Loosely Bound				
		BIND	15 %	CELL	65 %	
		PERL	20 %			
3405-R-111	A1008046	BUILT-UP ROOFING MEMBRANE				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	55 %	FBGL	35 %	
				CELL	10 %	
3405-R-112	A1008047	MULTI-LAYER FLASHING				ND
	Heterogeneous,	Black, Grey, Fibrous, Bound				
		TAR	45 %	SYNT	35 %	
		GRAV	10 %	FBGL	10 %	
3405-R-113	A1008048	BUILT-UP ROOFING MEMBRANE				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	55 %	FBGL	35 %	
				CELL	10 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3405-R-114	A1008049	POWDERY INSULATION	ND
	Homogeneous,	Tan, Fibrous, Loosely Bound	
		BIND 15 % CELL 65 %	
		PERL 20 %	
3405-R-115	A1008050	MULTI-LAYER FLASHING	ND
	Heterogeneous,	Black, Grey, Fibrous, Bound	
		TAR 45 % SYNT 45 %	
		GRAV 10 %	
3405-R-116	A1008051	FLASHING CEMENT	ND
	Heterogeneous,	Black, Grey, Fibrous, Bound	
		TAR 30 % CELL 10 %	
		GRAV 60 %	
3405-R-117	A1008052	BUILT-UP ROOFING MEMBRANE	ND
	Heterogeneous,	Black, Grey, Fibrous, Bound	
		TAR 45 % FBGL 35 %	
		SYNT 20 %	
3405-R-118	A1008053	FLASHING CEMENT	ND
	Heterogeneous,	Black, Grey, Fibrous, Bound	
		TAR 70 % CELL 10 %	
		GRAV 20 %	
3405-R-119	A1008054A	BUILT-UP ROOFING MEMBRANE, SURFACE	CHRY 5%
	Heterogeneous,	Black, Grey, Fibrous, Bound	
		CHRY 5% TAR 65 % CELL 10 %	
		GRAV 20 %	
	A1008054B	BUILT-UP ROOFING MEMBRANE	ND
	Heterogeneous,	Black, Fibrous, Bound	
		TAR 65 % FBGL 35 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3405-R-120	A1008055	BUILT-UP ROOFING MEMBRANE	ND
	Heterogeneous,	Black, Fibrous, Bound	
		TAR 55 % FBGL 35 %	
		CELL 10 %	
3405-R-121	A1008056	BUILT-UP ROOFING MEMBRANE	CHRY 5%
	Heterogeneous,	Black, Fibrous, Bound	
		CHRY 5% TAR 85 % CELL 5 %	
		GRAV 5 %	
3405-1-122	A1008057A	FLOOR TILE	ND
	Homogeneous,	Red, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1008057B	MASTIC	CHRY 5%
	Homogeneous,	Black, Fibrous, Bound	
		CHRY 5% MAST 95 % CELL <1 %	
		MICA <1 %	
	A1008057C	MASTIC	ND
	Homogeneous,	Tan, Fibrous, Bound	
		MAST 98 % CELL 2 %	
		MICA <1 %	
3405-1-123	A1008058A	FLOOR TILE	ND
	Homogeneous,	Red, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1008058B	MASTIC	CHRY 3%
	Homogeneous,	Black, Fibrous, Bound	
		CHRY 3% MAST 95 % CELL 2 %	
		MICA <1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
	A1008058C Homogeneous,	MASTIC Tan, Fibrous, Bound MAST 98 % CELL 2 % MICA <1 %	ND
3405-M-124	A1008059 Homogeneous,	MASTIC (ONLY) White, Fibrous, Bound MAST 90 % CELL 5 % MICA 3 % WOLL 2 %	ND
3405-M-125	A1008060 Homogeneous,	FIREPROOFING Grey, Fibrous, Loosely Bound BIND 35 % FBGL 65 % CELL <1 %	ND
3405-M-126	A1008061 Homogeneous,	TAPE INSULATION Black, Fibrous, Bound TAR 90 % CELL 10 % MICA <1 %	ND
3405-1-127	A1008062A Homogeneous,	FLOOR TILE Tan, Grey, Non-fibrous, Bound VINYL 100 % MICA <1 %	ND
	A1008062B Homogeneous,	MASTIC Black, Fibrous, Bound CHRY 5% MAST 95 % CELL <1 % MICA <1 %	CHRY 5%
	A1008062C Homogeneous,	MASTIC Tan, Fibrous, Bound MAST 98 % CELL 2 % MICA <1 %	ND

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3405-1-128	A1008063	WOVEN PILLOW COVER	CHRY 65%
	Homogeneous,	Off-white, Fibrous, Bound	
		CHRY 65% BIND 15 % CELL 20 %	
3405-E-129	A1008064	ADHESIVE	ND
	Homogeneous,	Tan, Non-fibrous, Bound	
		MAST 100 % CELL <1 %	
		MICA <1 %	
3405-E-130	A1008065	CAULKING	CHRY 5%
	Heterogeneous,	Brown, Black, Non-fibrous, Bound	
		CHRY 5% CAULK 95 % CELL <1 %	
		PAINT <1 %	
		MICA <1 %	
3405-M-131	A1008066	MASTIC (ONLY)	ND
	Homogeneous,	White, Fibrous, Bound	
		MAST 95 % CELL 5 %	
		MICA <1 % WOLL <1 %	
3405-M-132	A1008067	TAPE INSULATION	ND
	Heterogeneous,	Black, Tan, Fibrous, Bound	
		TAR 90 % CELL 10 %	
		PAINT <1 %	
3405-1-133	A1008067	EXPANSION JOINT FILLER	ND
	Heterogeneous,	Black, Brown, Fibrous, Bound	
		TAR 35 % CELL 65 %	
3405-M-134	A1008068	DUCT SEALER	ND
	Homogeneous,	Grey, Fibrous, Bound	
		BIND 100 % CELL <1 %	
		MICA <1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3405-M-135	A1008070	FIREPROOFING	ND
	Homogeneous,	Grey, Fibrous, Loosely Bound	
		BIND 35 % FBGL 65 %	
		MICA <1 % CELL <1 %	
3405-M-136	A1008071	MASTIC (ONLY)	CHRY 5%
	Homogeneous,	White, Fibrous, Bound	
		CHRY 5% MAST 93 % CELL 2 %	
		MICA <1 % WOLL <1 %	
3405-M-137	A1008072	FIREPROOFING	ND
	Homogeneous,	Grey, Fibrous, Loosely Bound	
		BIND 35 % FBGL 65 %	
		CELL <1 %	
3405-M-138	A1008073	CAULKING	ND
	Homogeneous,	Red, Fibrous, Bound	
		CAULK 90 % SYNT 5 %	
		MICA 5 % CELL <1 %	
3405-1-139	A1008074	CEILING TILE	ND
	Heterogeneous,	Off-white, Fibrous, Loosely Bound	
		PERL 20 % CELL 35 %	
		BIND 15 % FBGL 30 %	
3405-1-140	A1008075	TAPE INSULATION	ND
	Homogeneous,	Black, Fibrous, Bound	
		TAR 90 % CELL 10 %	
		MICA <1 %	
3405-1-141	A1008076A	BASE MOLDING	ND
	Homogeneous,	Brown, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
	A1008076B Homogeneous,	MASTIC Off-white, Non-fibrous, Bound MAST 100 % CELL <1 % MICA <1 %	ND
3405-1-142	A1008077A Homogeneous,	FLOOR TILE Blue, Non-fibrous, Bound VINYL 100 % MICA <1 %	ND
	A1008077B Homogeneous,	MASTIC Black, Fibrous, Bound CHRY 5% MAST 95 % CELL <1 % MICA <1 %	CHRY 5%
3405-1-143	A1008078A Homogeneous,	FLOOR TILE Black, Grey, Non-fibrous, Bound VINYL 100 % MICA <1 %	ND
Unable to separate black & tan mastics.	A1008078B Heterogeneous,	MASTICS Black, Tan, Non-fibrous, Bound CHRY <1% MAST 98 % CELL 2 % MICA <1 %	CHRY <1%
3405-M-144	A1008079 Homogeneous,	MASTIC (ONLY) White, Fibrous, Bound MAST 93 % CELL 5 % MICA <1 % WOLL 2 %	ND
3405-1-145	A1008080 Homogeneous,	MASTIC (ONLY) White, Fibrous, Bound MAST 97 % CELL 3 % MICA <1 %	ND

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3405-1-146	A1008081	JOINT COMPOUND	ND
	Heterogeneous,	White, Fibrous, Bound	
		CACO 93 % FBGL 5 %	
		MICA <1 % CELL <1 %	
		PAINT 2 %	
3405-1-147	A1008082	FIREPROOFING	ND
	Heterogeneous,	Grey, Fibrous, Loosely Bound	
		BIND 35 % FBGL 65 %	
		MICA <1 % CELL <1 %	
3405-1-148	A1008083A	SURFACE MATERIAL	CHRY 2%
	Homogeneous,	Off-white, Fibrous, Bound	
		CHRY 2% MAST 98 % FBGL <1 %	
		MICA <1 % CELL <1 %	
	A1008083B	CEMENT INSULATION	ND
	Homogeneous,	Off-white, Fibrous, Loosely Bound	
		BIND 70 % FBGL 30 %	
		MICA <1 % CELL <1 %	
3405-2-149	A1008084	MASTIC (ONLY)	ND
	Homogeneous,	White, Fibrous, Bound	
		MAST 98 % WOLL 2 %	
		MICA <1 % CELL <1 %	
3405-2-150	A1008085	MASTIC (ONLY)	ND
	Homogeneous,	White, Fibrous, Bound	
		MAST 100 % CELL <1 %	
		MICA <1 %	
3405-2-151	A1008086A	FLOOR TILE	ND
	Homogeneous,	Brown, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
	A1008086B	MASTIC	CHRY 5%
	Homogeneous,	Black, Fibrous, Bound	
		CHRY 5% MAST 95 % CELL <1 %	
		MICA <1 %	
3405-2-152	A1008087A	FLOOR TILE	ND
	Homogeneous,	Off-white, Beige, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1008087B	MASTIC	ND
	Homogeneous,	Clear, Fibrous, Bound	
		MAST 98 % CELL 2 %	
Insufficient black mastic.		MICA <1 %	
3405-2-153	A1008088	CAULKING	ND
	Heterogeneous,	White, Green, Non-fibrous, Bound	
		CAULK 95 % CELL <1 %	
		PAINT 5 %	
3405-2-154	A1008089A	FLOOR TILE	ND
	Homogeneous,	Off-white, Tan, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1008089B	MASTIC	ND
	Homogeneous,	Yellow, Non-fibrous, Bound	
		MAST 98 % CELL 2 %	
		MICA <1 %	
3405-2-155	A1008090	CEILING TILE	ND
	Heterogeneous,	Off-white, Fibrous, Loosely Bound	
		PERL 20 % CELL 35 %	
		BIND 15 % FBGL 30 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3405-3-156	A1008091A	FLOOR TILE	ND
	Homogeneous,	Off-white, Tan, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1008091B	MASTIC	CHRY 3%
	Homogeneous,	Black, Fibrous, Bound	
		CHRY 3% MAST 95 % CELL 2 %	
		MICA <1 %	
3405-3-157	A1008092A	FLOOR TILE	ND
	Homogeneous,	Blue, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1008092B	MASTIC	ND
	Homogeneous,	Yellow, Fibrous, Bound	
		MAST 98 % CELL 2 %	
		MICA <1 %	
3405-3-158	A1008093A	FLOOR TILE	ND
	Homogeneous,	Grey, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1008093B	MASTIC	ND
	Homogeneous,	Yellow, Fibrous, Bound	
		MAST 98 % CELL 2 %	
		MICA <1 %	
3405-3-159	A1008094A	FLOOR TILE	ND
	Homogeneous,	Black, Grey, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
	A1008094B Homogeneous,	MASTIC Black, Fibrous, Bound CHRY 5% MAST 95 % CELL <1 % MICA <1 %	CHRY 5%
3405-1-160	A1008095 Homogeneous,	JOINT COMPOUND Off-white, Fibrous, Bound CACO 75 % FBGL 5 % MICA 10 % CELL 5 % PAINT 5 %	ND
3405-M-161 Sample bag marked 3405-1-161.	A1008096A Homogeneous,	SURFACE MATERIAL Off-white, Fibrous, Bound CHRY 2% MAST 95 % FBGL 3 % MICA <1 % CELL <1 %	CHRY 2%
	A1008096B Homogeneous,	CEMENT INSULATION Off-white, Fibrous, Bound BIND 35 % FBGL 65 % MICA <1 % CELL <1 %	ND
3405-M-162 Sample bag marked 3405-2-162.	A1008097 Homogeneous,	TAPE INSULATION Black, Fibrous, Bound TAR 90 % CELL 10 % MICA <1 %	ND
3405-2-163	A1008098A Homogeneous,	FLOOR TILE Off-white, Tan, Non-fibrous, Bound VINYL 100 % MICA <1 %	ND
	A1008098B Homogeneous,	MASTIC Black, Fibrous, Bound CHRY 3% MAST 95 % CELL 2 % MICA <1 %	CHRY 3%

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3405-2-164	A1008099A	FLOOR TILE	ND
	Homogeneous,	Grey, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1008099B	MASTIC	CHRY 3%
	Homogeneous,	Black, Fibrous, Bound	
		CHRY 3% MAST 95 % CELL 2 %	
		MICA <1 %	
	A1008099C	MASTIC	ND
	Homogeneous,	Yellow, Fibrous, Bound	
		MAST 98 % CELL 2 %	
		MICA <1 %	
3405-2-165	A1008100A	FLOOR TILE	ND
	Homogeneous,	Grey, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1008100B	MASTIC	CHRY 3%
	Homogeneous,	Black, Fibrous, Bound	
		CHRY 3% MAST 95 % CELL 2 %	
		MICA <1 %	
	A1008100C	MASTIC	ND
	Homogeneous,	Yellow, Fibrous, Bound	
		MAST 98 % CELL 2 %	
		MICA <1 %	
3405-2-166	A1008101	ADHESIVE	ND
	Homogeneous,	Brown, Non-fibrous, Bound	
		MAST 100 % CELL <1 %	
		MICA <1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3405-2-167	A1008102A	FLOOR TILE	ND
	Homogeneous,	Red, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1008102B	MASTIC	CHRY 2%
	Heterogeneous,	Black, Clear, Fibrous, Bound	
		CHRY 2% MAST 95 % CELL 3 %	
Unable to separate black & clear mastic.		MICA <1 %	
3405-2-168	A1008103	MASTIC (ONLY)	CHRY 2%
	Homogeneous,	White, Fibrous, Bound	
		CHRY 2% MAST 98 % CELL <1 %	
		MICA <1 % FBGL <1 %	
3405-R-169	A1008104	FLASHING CEMENT	ND
	Homogeneous,	Black, Grey, Fibrous, Bound	
		TAR 90 % CELL 10 %	
		MICA <1 %	
3405-3-170	A1008105	CAULKING	CHRY 5%
	Homogeneous,	Off-white, Fibrous, Bound	
		CHRY 5% CAULK 95 % CELL <1 %	
		MICA <1 %	
3405-3-171	A1008106	FIREPROOFING	ND
	Homogeneous,	Grey, Fibrous, Loosely Bound	
		BIND 35 % FBGL 60 %	
		MICA <1 % CELL 5 %	
3405-3-172	A1008107	FLOOR TILE	ND
	Homogeneous,	Tan, Beige, Non-fibrous, Bound	
		VINYL 100 %	
No mastic.		MICA <1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION					% ASBESTOS
3405-3-173	A1008108	FLOOR TILE					ND
	Homogeneous,	Green, Non-fibrous, Bound					
		VINYL	100 %				
No mastic.		MICA	<1 %				
3405-3-174	A1008109A	FLOOR TILE					ND
	Homogeneous,	Green, Non-fibrous, Bound					
		VINYL	100 %				
		MICA	<1 %				
	A1008109B	MASTIC					ND
	Homogeneous,	Clear, Fibrous, Bound					
		MAST	98 %	CELL	2 %		
		MICA	<1 %				
3405-3-175	A1008110	CEILING TILE					ND
	Heterogeneous,	Off-white, Fibrous, Bound					
		PERL	20 %	CELL	35 %		
		BIND	15 %	FBGL	30 %		
3405-3-176	A1008111	MASTIC (ONLY)					ND
	Homogeneous,	White, Fibrous, Bound					
		MAST	96 %	FBGL	2 %		
		MICA	<1 %	WOLL	2 %		
				TALC	<1 %		
3405-3-177	A1008112A	FLOOR TILE					ND
	Homogeneous,	Green, Non-fibrous, Bound					
		VINYL	100 %				
		MICA	<1 %				
	A1008112B	MASTIC					ND
	Homogeneous,	Tan, Non-fibrous, Bound					
		MAST	98 %	CELL	2 %		
		MICA	<1 %				

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3405-2-178	A1008113	FIREPROOFING	ND
	Homogeneous,	Tan, Fibrous, Loosely Bound	
		BIND 70 % CELL 10 %	
		MICA 20 %	
3405-2-179	A1008114A	FLOOR TILE	ND
	Homogeneous,	Beige, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1008114B	MASTICS	CHRY 2%
	Heterogeneous,	Black, Tan, Fibrous, Bound	
		CHRY 2% MAST 95 % CELL 3 %	
Unable to separate black & tan mastics.		MICA <1 %	
3405-2-180	A1008115A	FLOOR TILE	ND
	Homogeneous,	Beige, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1008115B	MASTICS	CHRY 2%
	Heterogeneous,	Black, Tan, Fibrous, Bound	
		CHRY 2% MAST 95 % CELL 3 %	
Unable to separate black & tan mastics.		MICA <1 %	
3405-3-181	A1008116	ADHESIVE	ND
	Heterogeneous,	Brown, White, Non-fibrous, Bound	
		MAST 70 % CELL <1 %	
		PAINT 30 %	
		MICA <1 %	
3405-3-182	A1008117A	FLOOR TILE	ND
	Homogeneous,	Brown, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
	A1008117B	MASTICS	CHRY 2%
	Heterogeneous,	Black, Off-white, Non-fibrous, Bound	
		CHRY 2% MAST 98 % CELL <1 %	
Unable to separate black & off-white mastics.		MICA <1 %	
3405-1-183	A1008118A	SURFACE MATERIAL	CHRY 5%
	Homogeneous,	White, Fibrous, Bound	
		CHRY 5% MAST 93 % CELL 2 %	
		MICA <1 %	
	A1008118B	CEMENT INSULATION	ND
	Homogeneous,	Off-white, Fibrous, Loosely Bound	
		BIND 90 % FBGL 10 %	
		MICA <1 %	
3405-1-184	A1008119	MASTIC (ONLY)	CHRY 2%
	Homogeneous,	White, Fibrous, Bound	
		CHRY 2% MAST 96 % CELL 2 %	
		MICA <1 % TALC <1 %	
3405-1-185	A1008120	JOINT COMPOUND	ND
	Heterogeneous,	White, Fibrous, Bound	
		CACO 75 % FBGL 5 %	
		MICA 10 % CELL 5 %	
		PAINT 5 %	
3405-1-186	A1008121	CEMENT INSULATION	ND
	Homogeneous,	Off-white, Fibrous, Bound	
		BIND 90 % FBGL 10 %	
		MICA <1 % CELL <1 %	
3405-1-187	A1008122	JOINT COMPOUND	ND
	Homogeneous,	Off-white, Fibrous, Bound	
		CACO 75 % FBGL 5 %	
		MICA 10 % CELL 5 %	
		PAINT 5 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3405-2-188	A1008123	FIREPROOFING	ND
	Homogeneous,	Tan, Fibrous, Loosely Bound	
		BIND 70 % CELL 10 %	
		MICA 20 %	
3405-2-189	A1008124	MASTIC (ONLY)	CHRY 3%
	Homogeneous,	White, Fibrous, Bound	
		CHRY 3% MAST 95 % FBGL 2 %	
		MICA <1 % TALC <1 %	
		CELL <1 %	
3405-3-190	A1008125	CAULKING	ND
	Homogeneous,	Off-white, Non-fibrous, Bound	
		CAULK 100 % CELL <1 %	
		PAINT <1 %	
3405-2-191	A1008126A	FLOOR TILE	ND
	Homogeneous,	Cream, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1008126B	MASTICS	CHRY 2%
	Heterogeneous,	Black, Tan, Fibrous, Bound	
Unable to separate black & tan mastics.		CHRY 2% MAST 95 % CELL 3 %	
		MICA <1 %	
3405-2-192	A1008127A	FLOOR TILE	ND
	Homogeneous,	Cream, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1008127B	MASTIC	ND
	Homogeneous,	Tan, Fibrous, Bound	
		MAST 98 % CELL 2 %	
		MICA <1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3405-2-193	A1008128A	FLOOR TILE	ND
	Homogeneous,	Green, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1008128B	MASTIC	CHRY 5%
	Homogeneous,	Black, Fibrous, Bound	
		CHRY 5% MAST 95 % CELL <1 %	
		MICA <1 %	
3405-2-194	A1008129A	FLOOR TILE	ND
	Homogeneous,	White, Grey, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1008129B	MASTIC	CHRY 5%
	Homogeneous,	Black, Fibrous, Bound	
		CHRY 5% MAST 95 % CELL <1 %	
		MICA <1 %	
3405-3-195	A1008130A	FLOOR TILE	ND
	Homogeneous,	Black, Grey, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1008130B	MASTIC	CHRY 5%
	Homogeneous,	Black, Fibrous, Bound	
		CHRY 5% MAST 95 % CELL <1 %	
		MICA <1 %	
3405-3-196	A1008131	FIREPROOFING	ND
	Homogeneous,	Grey, Fibrous, Bound	
		BIND 30 % FBGL 65 %	
		CELL 5 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3405-3-197	A1008132A	FLOOR TILE	ND
	Homogeneous,	Blue, Non-fibrous, Bound	
		VINYL 100 %	
		MICA <1 %	
	A1008132B	MASTIC	CHRY 5%
	Homogeneous,	Black, Fibrous, Bound	
		CHRY 5% MAST 93 % CELL 2 %	
		MICA <1 %	
3405-2-198	A1008133	FLOOR COATING	ND
	Homogeneous,	Grey, Fibrous, Bound	
		BIND 60 % CELL <1 %	
		GRAV 40 %	
		MICA <1 %	
3405-2-199	A1008134	WHITE MASTIC	CHRY 2%
	Homogeneous,	White, Fibrous, Bound	
		CHRY 2% MAST 93 % WOLL 5 %	
Samples A1008134-A1008157 analyzed by Lisa Ismail.			
3405-2-200	A1008135	CEILING TILE	ND
	Homogeneous,	White, Grey, Fibrous, Bound	
		PAINT 10 % CELL 45 %	
		PERL 20 % FBGL 25 %	
3405-2-201	A1008136A	FLOOR TILE	ND
	Homogeneous,	White, Non-fibrous, Tightly Bound	
		VINYL 100 % CELL <1 %	
	A1008136B	MASTIC 1	ND
	Homogeneous,	Yellow, Non-fibrous, Bound	
		VINYL 100 % CELL <1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
	A1008136C	MASTIC 2	ND
	Homogeneous,	Black, Fibrous, Bound	
		VINYL 98 % CELL 2 %	
3405-2-202	A1008137A	FLOOR TILE	ND
	Homogeneous,	Grey, Non-fibrous, Tightly Bound	
		VINYL 100 % CELL <1 %	
	A1008137B	MASTIC	ND
	Homogeneous,	Yellow, Non-fibrous, Bound	
		VINYL 100 % CELL <1 %	
3405-2-203	A1008138A	FLOOR TILE	ND
	Homogeneous,	Tan, Non-fibrous, Tightly Bound	
		VINYL 100 % CELL <1 %	
	A1008138B	MASTIC	ND
	Homogeneous,	Yellow, Non-fibrous, Bound	
		VINYL 100 % CELL <1 %	
3405-2-204	A1008139A	FLOOR TILE	ND
	Homogeneous,	Grey, Non-fibrous, Tightly Bound	
		VINYL 100 % CELL <1 %	
	A1008139B	MASTIC	ND
	Homogeneous,	Yellow, Non-fibrous, Bound	
		VINYL 100 % CELL <1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3405-2-205	A1008140A	FLOOR TILE	ND
	Homogeneous,	Tan, Non-fibrous, Tightly Bound	
		VINYL 100 % CELL <1 %	
	A1008140B	MASTIC	ND
	Homogeneous,	Yellow, Non-fibrous, Bound	
		VINYL 100 % CELL <1 %	
3405-2-206	A1008141	DRYWALL JOINT COMPOUND & TEXTURED PAINT	ND
	Homogeneous,	Tan, White, Non-fibrous, Bound	
		PAINT 10 % CELL <1 %	
		BIND 90 %	
3405-2-207	A1008142	DRYWALL JOINT COMPOUND & TEXTURED PAINT	ND
	Homogeneous,	Tan, White, Non-fibrous, Bound	
		PAINT 10 % CELL <1 %	
		BIND 90 %	
3405-2-208	A1008143	CARPET ADHESIVE AND MASTIC	ND
	Homogeneous,	Tan, Grey, Non-fibrous, Bound	
		MAST 100 % SYNT <1 %	
3405-2-209	A1008144	DRYWALL JOINT COMPOUND & TEXTURED PAINT	ND
	Homogeneous,	Tan, White, Non-fibrous, Bound	
		PAINT 10 % CELL <1 %	
		BIND 90 %	
3405-3-210	A1008145	DRYWALL JOINT COMPOUND	ND
	Homogeneous,	Tan, White, Non-fibrous, Bound	
		PAINT 10 % CELL <1 %	
		BIND 90 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3405-3-211	A1008146	CARPET ADHESIVE & MASTIC	ND
	Homogeneous,	Brown, Non-fibrous, Bound	
		MAST 80 % CELL <1 %	
		BIND 20 %	
3405-E-212	A1008147	CAULKING MATERIAL	ND
	Homogeneous,	Tan, Non-fibrous, Bound	
		CAULK 100 % CELL <1 %	
3405-E-213	A1008148	CAULKING MATERIAL	CHRY 5%
	Homogeneous,	Black, Fibrous, Bound	
		CHRY 5% CAULK 95 % CELL <1 %	
3405-E-214	A1008149	BLACK FOAM & ADHESIVE	ND
	Homogeneous,	Black, Yellow, Non-fibrous, Bound	
		FOAM 80 % CELL <1 %	
		GRAV 15 %	
		MAST 5 %	
3405-E-215	A1008150	CAULKING MATERIAL	ND
	Homogeneous,	White, Non-fibrous, Bound	
		CAULK 100 % CELL <1 %	
3405-E-216	A1008151	CAULKING MATERIAL	CHRY 5%
	Homogeneous,	Brown, Fibrous, Bound	
		CHRY 5% CAULK 95 % CELL <1 %	
3405-E-217	A1008152	FLOOR COATING	ND
	Homogeneous,	Grey, Non-fibrous, Bound	
		GRAV 10 % CELL <1 %	
		BIND 90 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3405-E-218	A1008153 Homogeneous,	CLOTH & BLACK COATING Black, Non-fibrous, Bound BIND 100 % CELL <1 %	ND
3405-E-219	A1008154 Homogeneous,	CLOTH & BLACK COATING Black, Non-fibrous, Bound BIND 100 % CELL <1 %	ND
3405-E-220	A1008155 Homogeneous,	CEMENT PIPE Grey, Fibrous, Bound CHRY 35% BIND 63 % CROCI 2%	CHRY 35% CROC 2%
3405-E-221	A1008156 Homogeneous,	CAULKING MATERIAL Tan, Non-fibrous, Bound BIND 100 %	ND
3405-E-222	A1008157 Homogeneous,	CAULKING MATERIAL White, Non-fibrous, Bound BIND 100 % FBGL <1 %	ND
3405-E-223	A1008158 Homogeneous,	CAULKING MATERIAL Black, Fibrous, Bound CHRY 5% BIND 95 % CELL <1 %	CHRY 5%
3405-E-224	A1008159 Homogeneous,	CAULKING Grey, Non-fibrous, Bound BIND 100 % CELL <1 % MICA <1 % TALC <1 %	ND

Samples A1008159-A1008175analyzed by Anna Malmberg.

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION					% ASBESTOS
3405-E-225	A1008160	CAULKING					ND
	Homogeneous,	Grey, Non-fibrous, Bound					
		BIND	100 %	CELL	<1 %		
		MICA	<1 %	TALC	<1 %		
3405-R-226	A1008161	FLASHING CEMENT					ND
	Heterogeneous,	Black, Grey, Fibrous, Bound					
		TAR	70 %	CELL	20 %		
		GRAV	10 %				
3405-R-227	A1008162	FLASHING CEMENT					ND
	Heterogeneous,	Black, Grey, Fibrous, Bound					
		TAR	70 %	CELL	20 %		
		GRAV	10 %				
3405-R-228	A1008163	FLASHING CEMENT					ND
	Homogeneous,	Black, Fibrous, Bound					
		TAR	90 %	CELL	10 %		
3405-R-229	A1008164	BUILT-UP ROOFING MEMBRANE					ND
	Heterogeneous,	Black, Fibrous, Bound					
		TAR	55 %	FBGL	45 %		
3405-R-230	A1008165	MULTI-LAYER FLASHING					ND
	Heterogeneous,	Black, Grey, Fibrous, Bound					
		TAR	40 %	FBGL	20 %		
		GRAV	5 %	SYNT	35 %		
3405-R-231	A1008166	BUILT-UP ROOFING MEMBRANE					ND
	Heterogeneous,	Black, Fibrous, Bound					
		TAR	55 %	FBGL	45 %		

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION					% ASBESTOS
3405-R-232	A1008167	BUILT-UP ROOFING MEMBRANE					ND
	Heterogeneous,	Black, Fibrous, Bound					
			TAR	55 %	FBGL	45 %	
3405-R-233	A1008168	FLASHING CEMENT					ND
	Heterogeneous,	Black, Fibrous, Bound					
			TAR	85 %	CELL	10 %	
			MICA	<1 %	FBGL	5 %	
3405-R-234	A1008169	ROOF PATCHING MATERIAL					ND
	Heterogeneous,	Black, Fibrous, Bound					
			TAR	75 %	CELL	20 %	
			GRAV	5 %			
3405-R-235	A1008170A	MULTI-LAYER FLASHING, SURFACE					CHRY <1%
	Heterogeneous,	Black, Grey, Fibrous, Bound					
		CHRY <1%	TAR	75 %	CELL	20 %	
			GRAV	5 %			
	A1008170B	MULTI-LAYER FLASHING					ND
	Heterogeneous,	Black, Grey, Fibrous, Bound					
			TAR	55 %	FBGL	20 %	
			GRAV	5 %	SYNT	20 %	
3405-R-236	A1008171	BUILT-UP ROOFING MEMBRANE					ND
	Heterogeneous,	Black, Fibrous, Bound					
			TAR	55 %	FBGL	45 %	
3405-R-237	A1008172	FLASHING CEMENT					ND
	Heterogeneous,	Black, Grey, Fibrous, Bound					
			TAR	90 %	CELL	5 %	
			GRAV	5 %			

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3405-R-238	A1008173	MULTI-LAYER FLASHING	ND
	Heterogeneous,	Black, Grey, Fibrous, Bound	
		TAR 60 % FBGL 30 %	
		GRAV 5 % CELL 5 %	
3405-R-239	A1008174A	BUILT-UP ROOFING MEMBRANE, TYPE 1	ND
	Heterogeneous,	Black, Fibrous, Bound	
		TAR 55 % FBGL 45 %	
	A1008174B	BUILT-UP ROOFING MEMBRANE, TYPE 2	CHRY 5%
	Heterogeneous,	Black, Fibrous, Bound	
		CHRY 5% TAR 80 % CELL 15 %	
3405-1-240	A1008175	CAULKING	ND
	Homogeneous,	White, Non-fibrous, Bound	
		CAULK 100 %	
		MICA <1 %	

The following definitions apply to the abbreviations used in the ASBESTOS BULK ANALYSIS REPORT:

CHRY = Chrysotile	CELL = Cellulose	DEBR = Debris
AMOS = Amosite	FBGL = Fibrous Glass	BIND = Binder
CROC = Crocidolite	CACO = Calcium Carbonate	SILI = Silicates
TREM = Tremolite	SYNT = Synthetics	GRAV = Gravel
ANTH = Anthophyllite	WOLL = Wollastonite	MAST = Mastic
ACTN = Actinolite	CERWL = Ceramic Wool	PLAS = Plaster
N D = None Detected	NTREM = Non-Asbestiform Tremolite	PERL = Perlite
NANTH = Non-Asbestiform Anthophyllite	FBGY = Fibrous Gypsum	RUBR =Rubber
		VER =Vermiculite

CLIENT: US Army Corps of Engineers - Savannah District - EMU9

PROJECT: Ft. Benning Bldg. 3405; 10257
CEI LAB CODE: A10-2163

Stereoscopic microscopy and polarized light microscopy coupled with dispersion staining is the analytical technique used for sample identification. The percentage of each component is visually estimated by volume. These results pertain only to the samples analyzed. The samples were analyzed as submitted by the client and may not be representative of the larger material in question. Unless notified in writing to return samples, Carolina Environmental, Inc. will discard all bulk samples after 30 days.

Many vinyl floor tiles have been manufactured using greater than 1% asbestos. Often the asbestos was milled to a fiber size below the detection limit of polarized light microscopy. Therefore, a "None Detected" (ND) reading on vinyl floor tile does not necessarily exclude the presence of asbestos. Transmission electron microscopy provides a more conclusive form of analysis for vinyl floor tiles.

It is certified by the signature below that Carolina Environmental, Inc. is accredited by the National Voluntary Accreditation Program (NVLAP) for the analysis of asbestos in bulk materials. The accredited test method is EPA / 600 / M4-82 / 020 for the analysis of asbestos in building materials. Procedures described in EPA / 600 / R-93 / 116 have been incorporated where applicable. The detection limit for the method is 0.1% (trace amount). Carolina Environmental, Inc.'s NVLAP accreditation number is #101768-0. This report is not to be used to claim product endorsement by NVLAP or any agency of the U. S. Government. This report and its contents are only valid when reproduced in full. Dust and soil analyses for asbestos using PLM are not covered under NVLAP accreditation.

ANALYST Lisa Clomail

REVIEWED BY

Tianbao Bai, Ph.D.
Laboratory Director

End of Report

Appendix B

Sample Chain of Custody Forms

A10.2163 (240)
A1007936. A1008175

ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS

Project: **Ft. Benning Bldg. 3405**	Job No.: **10257**
Sampler: Tim Jones	Analysis: PLM

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
3/23/2010	3405-1-1	63157	White Mastic
3/23/2010	3405-1-2	63158	Ceiling Tile
3/23/2010	3405-1-3	63159	Floor Tile & Mastic
3/23/2010	3405-1-4	63160	Floor Tile & Mastic
3/23/2010	3405-1-5	63161	White Mastic
3/23/2010	3405-1-6	63162	Vinyl Base Molding & Adhesive
3/23/2010	3405-1-7	63163	Brown Adhesive
3/23/2010	3405-1-8	63164	Ceiling Tile
3/23/2010	3405-1-9	63165	Ceiling Tile
3/23/2010	3405-1-10	63166	White Mastic
3/23/2010	3405-1-11	63167	Floor Tile & Mastic
3/23/2010	3405-1-12	63168	Floor Tile & Mastic
3/23/2010	3405-1-13	63169	Floor Tile & Mastic
3/23/2010	3405-1-14	63170	Gypsum Board & Drywall Joint Compound
3/23/2010	3405-1-15	63171	Ceiling Tile
3/23/2010	3405-1-16	63172	Fireproofing
3/23/2010	3405-1-17	63173	Fireproofing
3/23/2010	3405-1-18	63174	Gypsum Board & Drywall Joint Compound
3/23/2010	3405-1-19	63175	Floor Tile & Mastic
3/23/2010	3405-1-20	63176	Floor Tile & Mastic
3/23/2010	3405-1-21	63177	White Mastic
3/23/2010	3405-1-22	63178	White Mastic

Relinquished By	Date	Time	Received By	Date	Time
Tim Jones	3-31-10	1400	Kristy Rudd	04/01/10	10:00am

A10.2163

ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS

Project: **Ft. Benning Bldg. 3405**	Job No.: **10257**
Sampler: Tim Jones	Analysis: PLM

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
3/23/2010	3405-1-23	63179	White Mastic
3/23/2010	3405-1-24	63180	Caulking Material
3/23/2010	3405-1-25	63181	Floor Tile & Mastic
3/23/2010	3405-1-26	63182	Ceiling Tile
3/23/2010	3405-1-27	63183	Ceiling Tile
3/23/2010	3405-1-28	63184	Ceiling Tile
3/23/2010	3405-1-29	63185	Drywall Joint Compound
3/23/2010	3405-1-30	63186	Textured Surfacing
3/23/2010	3405-1-31	63187	Drywall Joint Comp. & Textured Surfacing
3/23/2010	3405-1-32	63188	Drywall Joint Comp. & Textured Surfacing
3/23/2010	3405-1-33	63189	Gypsum Board, DWJC & Textured Surf
3/23/2010	3405-1-34	63190	Fireproofing
3/23/2010	3405-1-35	63191	Fireproofing
3/23/2010	3405-1-36	63192	Fireproofing
3/23/2010	3405-1-37	63193	Vinyl Base Molding & Adhesive
3/23/2010	3405-1-38	63194	Floor Tile & Mastic
3/23/2010	3405-1-39	63195	Floor Tile & Mastic
3/23/2010	3405-1-40	63196	Floor Tile & Mastic
3/23/2010	3405-1-41	63197	Ceiling Tile
3/23/2010	3405-1-42	63198	Fireproofing
3/23/2010	3405-1-43	63199	Floor Tile & Mastic
3/23/2010	3405-1-44	63200	White Mastic

Relinquished By	Date	Time	Received By	Date	Time
Tim Jones	3-31-10	1400			

A10.2163

ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS

Project:	**Ft. Benning Bldg. 3405**	Job No.:	**10257**
Sampler:	Tim Jones	Analysis:	PLM

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
3/24/2010	3405-1-45	63201	Caulking Material
3/24/2010	3405-1-46	63202	White Mastic
3/24/2010	3405-1-47	63203	Ceiling Tile
3/24/2010	3405-1-48	63204	Ceiling Tile
3/24/2010	3405-1-49	63205	Ceiling Tile
3/24/2010	3405-1-50	63206	Floor Tile & Mastic
3/24/2010	3405-1-51	63207	Floor Tile & Mastic
3/24/2010	3405-1-52	63208	Vinyl Base Molding & Adhesive
3/24/2010	3405-1-53	63209	Fireproofing
3/24/2010	3405-1-54	63210	White Mastic
3/24/2010	3405-1-55	63211	Plaster
3/24/2010	3405-1-56	63212	Plaster
3/24/2010	3405-1-57	63213	White Mastic
3/24/2010	3405-1-58	63214	Caulking Material
3/24/2010	3405-1-59	63215	Plaster
3/24/2010	3405-1-60	63216	Caulking Material
3/24/2010	3405-1-61	63217	Sink Undercoating
3/24/2010	3405-1-62	63218	Sink Undercoating
3/24/2010	3405-1-63	63219	Caulking Material
3/24/2010	3405-1-64	63220	Cloth & White Mastic
3/24/2010	3405-1-65	63221	Plaster
3/24/2010	3405-1-66	63222	Cloth & White Mastic

Relinquished By	Date	Time	Received By	Date	Time
Tim Jones	3-31-10	1400			

A10.2163

ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS

Project:	**Ft. Benning Bldg. 3405**	Job No.:	**10257**
Sampler:	Tim Jones	Analysis:	PLM

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
3/24/2010	3405-1-67	63223	Plaster
3/24/2010	3405-1-68	63224	Brown Adhesive
3/24/2010	3405-1-69	63225	Plaster
3/24/2010	3405-1-70	63226	White Mastic
3/24/2010	3405-1-71	63227	Plaster
3/24/2010	3405-1-72	63228	Floor Tile & Mastic
3/24/2010	3405-1-73	63229	Floor Tile & Mastic
3/24/2010	3405-1-74	63230	Ceiling Tile
3/24/2010	3405-1-75	63231	Ceiling Tile
3/24/2010	3405-1-76	63232	Ceiling Tile
3/24/2010	3405-1-77	63233	Vinyl Base Molding & Adhesive
3/24/2010	3405-1-78	63234	White Mastic
3/24/2010	3405-1-79	63235	White Mastic
3/24/2010	3405-1-80	63236	White Mastic
3/24/2010	3405-1-81	63237	White Mastic
3/24/2010	3405-1-82	63238	Cloth & White Mastic
3/24/2010	3405-1-83	63239	White Mastic
3/24/2010	3405-1-84	63240	Fireproofing
3/24/2010	3405-1-85	63241	Fireproofing
3/24/2010	3405-1-86	63242	Black Pipe Coating
3/24/2010	3405-1-87	63243	Caulking Material
3/24/2010	3405-1-88	63244	Fireproofing

Relinquished By	Date	Time	Received By	Date	Time
Tim Jones	3-31-10	1400			

A10.2163

ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS

Project:	**Ft. Benning Bldg. 3405**	Job No.:	**10257**
Sampler:	Tim Jones	Analysis:	PLM

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
3/24/2010	3405-M-89	63245	Fireproofing
3/24/2010	3405-M-90	63246	White Mastic
3/24/2010	3405-1-91	63247	Floor Tile & Mastic
3/24/2010	3405-1-92	63248	Ceiling Tile
3/24/2010	3405-1-93	63249	Caulking Material
3/24/2010	3405-E-94	63250	Caulking Material
3/24/2010	3405-1-95	63251	Expansion Joint Filler
3/24/2010	3405-1-96	63252	White Mastic
3/24/2010	3405-1-97	63253	White Mastic
3/24/2010	3405-1-98	63254	Woven Pillow Cover
3/24/2010	3405-1-99	63255	Floor Tile & Mastic
3/24/2010	3405-1-100	63256	Floor Tile & Mastic
3/24/2010	3405-1-101	63257	Brown Adhesive
3/24/2010	3405-R-102	63258	Built-up Roofing Membrane
3/24/2010	3405-R-103	63259	Tan Powdery Insulation
3/24/2010	3405-R-104	63260	Flashing Cement
3/24/2010	3405-R-105	63261	Flashing Cement
3/24/2010	3405-R-106	63262	Flashing Cement
3/24/2010	3405-R-107	63263	Pitch Pan Filler
3/24/2010	3405-R-108	63264	Pitch Pan Filler
3/24/2010	3405-R-109	63265	Built-up Roofing Membrane
3/24/2010	3405-R-110	63266	Tan Powdery Insulation

Relinquished By	Date	Time	Received By	Date	Time
Tim Jon	3-31-10	1400			

AD-2163

ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS

Project:	**Ft. Benning Bldg. 3405**	Job No.:	**10257**
Sampler:	Tim Jones	Analysis:	PLM

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
3/24/2010	3405-R-111	63267	Built-up Roofing Membrane
3/24/2010	3405-R-112	63268	Multi-layer Flashing
3/24/2010	3405-R-113	63269	Built-up Roofing Membrane
3/24/2010	3405-R-114	63270	Tan Powdery Insulation
3/24/2010	3405-R-115	63271	Multi-layer Flashing
3/24/2010	3405-R-116	63272	Flashing Cement
3/24/2010	3405-R-117	63273	Built-up Roofing Membrane
3/24/2010	3405-R-118	63274	Flashing Cement
3/24/2010	3405-R-119	63275	Built-up Roofing Membrane
3/24/2010	3405-R-120	63276	Built-up Roofing Membrane
3/24/2010	3405-R-121	63277	Flashing Cement
3/24/2010	3405-1-122	63278	Floor Tile & Mastic
3/24/2010	3405-1-123	63279	Floor Tile & Mastic
3/25/2010	3405-M-124	63280	White Mastic
3/25/2010	3405-M-125	63281	Fireproofing
3/25/2010	3405-M-126	63282	Tape Insulation
3/25/2010	3405-1-127	63283	Floor Tile & Mastic
3/25/2010	3405-1-128	63284	Woven Pillow Cover
3/25/2010	3405-E-129	63285	Brown Adhesive
3/25/2010	3405-E-130	63286	Caulking Material
3/25/2010	3405-M-131	63287	White Mastic
3/25/2010	3405-M-132	63288	Tape Insulation

Relinquished By	Date	Time	Received By	Date	Time
Tim Jones	3-31-10	1400			

A10.2163

ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS

Project:	**Ft. Benning Bldg. 3405**	Job No.:	**10257**
Sampler:	Tim Jones	Analysis:	PLM

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
3/25/2010	3405-1-133	63289	Expansion Joint Filler
3/25/2010	3405-M-134	63290	Gray Duct Sealer
3/25/2010	3405-M-135	63291	Fireproofing
3/25/2010	3405-M-136	63292	White Mastic
3/25/2010	3405-M-137	63293	Fireproofing
3/25/2010	3405-M-138	63294	Caulking Material
3/25/2010	3405-1-139	63295	Ceiling Tile
3/25/2010	3405-M-140	63296	Tape Insulation
3/25/2010	3405-1-141	63297	Vinyl Base Molding & Adhesive
3/25/2010	3405-1-142	63298	Floor Tile & Mastic
3/25/2010	3405-1-143	63299	Floor Tile & Mastic
3/25/2010	3405-M-144	63300	White Mastic
3/25/2010	3405-1-145	63301	White Mastic
3/25/2010	3405-1-146	63302	Drywall Joint Compound
3/25/2010	3405-1-147	63303	Fireproofing
3/25/2010	3405-1-148	63304	Cement Insulation
3/25/2010	3405-2-149	63305	White Mastic
3/25/2010	3405-2-150	63306	White Mastic
3/25/2010	3405-2-151	63307	Floor Tile & Mastic
3/25/2010	3405-2-152	63308	Floor Tile & Mastic
3/25/2010	3405-2-153	63309	Caulking Material
3/25/2010	3405-2-154	63310	Floor Tile & Mastic

Relinquished By	Date	Time	Received By	Date	Time
Tim Jones	3-31-10	1400			

A10. 2163

ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS

Project: **Ft. Benning Bldg. 3405**	Job No.: **10257**
Sampler: Tim Jones	Analysis: PLM

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
3/25/2010	3405-2-155	63311	Ceiling Tile
3/25/2010	3405-3-156	63312	Floor Tile & Mastic
3/25/2010	3405-3-157	63313	Floor Tile & Mastic
3/25/2010	3405-3-158	63314	Floor Tile & Mastic
3/25/2010	3405-3-159	63315	Floor Tile & Mastic
3/25/2010	3405-1-160	63316	Drywall Joint Compound
3/25/2010	3405-M-161	63317	Cement Insulation
3/25/2010	3405-M-162	63318	Tape Insulation
3/25/2010	3405-2-163	63319	Floor Tile & Mastic
3/25/2010	3405-2-164	63320	Floor Tile & Mastic
3/25/2010	3405-2-165	63321	Floor Tile & Mastic
3/25/2010	3405-2-166	63322	Brown Adhesive
3/25/2010	3405-2-167	63323	Floor Tile & Mastic
3/25/2010	3405-2-168	63324	White Mastic
3/25/2010	3405-R-169	63325	Flashing Cement
3/25/2010	3405-3-170	63326	Caulking Material
3/25/2010	3405-3-171	63327	Fireproofing
3/25/2010	3405-3-172	63328	Floor Tile & Mastic
3/25/2010	3405-3-173	63329	Floor Tile
3/25/2010	3405-3-174	63330	Floor Tile & Mastic
3/25/2010	3405-3-175	63331	Ceiling Tile
3/25/2010	3405-3-176	63332	White Mastic

Relinquished By	Date	Time	Received By	Date	Time
Tim Jones	3-31-10	1400			

A10.2163

ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS

Project: **Ft. Benning Bldg. 3405**	Job No.: **10257**
Sampler: Tim Jones	Analysis: PLM

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
3/25/2010	3405-3-177	63333	Floor Tile & Mastic
3/25/2010	3405-2-178	63334	Fireproofing
3/25/2010	3405-2-179	63335	Floor Tile & Mastic
3/25/2010	3405-2-180	63336	Floor Tile & Mastic
3/25/2010	3405-3-181	63337	Brown Adhesive
3/25/2010	3405-3-182	63338	Floor Tile & Mastic
3/25/2010	3405-1-183	63339	Cement Insulation
3/25/2010	3405-1-184	63340	White Mastic
3/25/2010	3405-1-185	63341	Drywall Joint Compound
3/25/2010	3405-1-186	63342	Cement Insulation
3/25/2010	3405-1-187	63343	Drywall Joint Compound
3/25/2010	3405-2-188	63344	Fireproofing
3/25/2010	3405-2-189	63345	White Mastic
3/25/2010	3405-3-190	63346	Caulking Material
3/26/2010	3405-2-191	63347	Floor Tile & Mastic
3/26/2010	3405-2-192	63348	Floor Tile & Mastic
3/26/2010	3405-2-193	63349	Floor Tile & Mastic
3/26/2010	3405-2-194	63350	Floor Tile & Mastic
3/26/2010	3405-3-195	63351	Floor Tile & Mastic
3/26/2010	3405-3-196	63352	Fireproofing
3/26/2010	3405-3-197	63353	Floor Tile & Mastic
3/26/2010	3405-2-198	63354	Floor Coating

Relinquished By	Date	Time	Received By	Date	Time
Tim Jones	3-31-10	1400			

A10-2163

ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS

Project:	**Ft. Benning Bldg. 3405**	Job No.:	**10257**
Sampler:	Tim Jones	Analysis:	PLM

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
3/26/2010	3405-2-199	63355	White Mastic
3/26/2010	3405-2-200	63356	Ceiling Tile
3/26/2010	3405-2-201	63357	Floor Tile & Mastic
3/26/2010	3405-2-202	63358	Floor Tile & Mastic
3/26/2010	3405-2-203	63359	Floor Tile & Mastic
3/26/2010	3405-2-204	63360	Floor Tile & Mastic
3/26/2010	3405-2-205	63361	Floor Tile & Mastic
3/26/2010	3405-2-206	63362	Drywall Joint Compound & Textured Paint
3/26/2010	3405-2-207	63363	Drywall Joint Compound & Textured Paint
3/26/2010	3405-2-208	63364	Carpet Adhesive & Mastic
3/26/2010	3405-2-209	63365	Drywall Joint Compound & Textured Paint
3/26/2010	3405-3-210	63366	Drywall Joint Compound
3/26/2010	3405-3-211	63367	Carpet Adhesive & Mastic
3/29/2010	3405-E-212	63368	Caulking Material
3/29/2010	3405-E-213	63369	Caulking Material
3/29/2010	3405-E-214	63370	Black Foam & Adhesive
3/29/2010	3405-E-215	63371	Caulking Material
3/29/2010	3405-E-216	63372	Caulking Material
3/29/2010	3405-E-217	63373	Floor Coating
3/29/2010	3405-E-218	63374	Cloth & Black Coating
3/29/2010	3405-E-219	63375	Cloth & Black Coating
3/29/2010	3405-E-220	63376	Cement Pipe

Relinquished By	Date	Time	Received By	Date	Time
Tim Jones	3-31-10	1400			

A10.2163

ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS

Project:	**Ft. Benning Bldg. 3405**	Job No.:	**10257**
Sampler:	Tim Jones	Analysis:	PLM

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
3/29/2010	3405-E-221	63377.	Caulking Material
3/29/2010	3405-E-222	63378	Caulking Material
3/29/2010	3405-E-223	63379	Caulking Material
3/29/2010	3405-E-224	63380	Caulking Material
3/29/2010	3405-E-225	63381	Caulking Material
3/30/2010	3405-R-226	63382	Flashing Cement
3/30/2010	3405-R-227	63383	Flashing Cement
3/30/2010	3405-R-228	63384	Flashing Cement
3/30/2010	3405-R-229	63385	Built-Up Roofing Membrane
3/30/2010	3405-R-230	63386	Multi-Layer Flashing
3/30/2010	3405-R-231	63387	Built-Up Roofing Membrane
3/30/2010	3405-R-232	63388	Built-Up Roofing Membrane
3/30/2010	3405-R-233	63389	Flashing Cement
3/30/2010	3405-R-234	63390	Roof Patching Material
3/30/2010	3405-R-235	63391	Multi-Layer Flashing
3/30/2010	3405-R-236	63392	Built-Up Roofing Membrane
3/30/2010	3405-R-237	63393	Flashing Cement
3/30/2010	3405-R-238	63394	Multi-Layer Flashing
3/30/2010	3405-R-239	63395	Built-Up Roofing Membrane
3/23/2010	3405-1-240	x	Caulking Material

Relinquished By	Date	Time	Received By	Date	Time
Tim Jones	3-31-10	1400			

Appendix C

Certifications and Accreditations

The Environmental Institute

Jason G. Hart

Social Security Number - XXX-XX-4136
Army Corps of Engineers - 200 N. Cobb Parkway, Suite 404 - Marietta, Georgia 30062

Has completed coursework and satisfactorily passed an examination that meets all criteria required for EPA/AHERA/ASHARA (TSCA Title II) Approved Reaccreditation and NESHAP Regulations Training

Asbestos in Buildings: Inspector Refresher

October 22, 2009
Course Date

11633
Certificate Number

October 22, 2009
Examination Date

October 21, 2010
Expiration Date

David W. Hogue - Principle Instructor / Training Manager

Rachel G. McCain - Exam Administrator

(Approved by the ABIH Certification Maintenance Committee for 1/2 CM point)
(American Indoor Air Quality Council Re-certification Credit Registration #09011202)
(Florida Provider Registration Number 0001342 - Course #0002805)
TEI - 1841 West Oak Parkway, Suite F - Marietta, Georgia 30062 - (770) 427-3600 - www.tei-atl.com

The Environmental Institute

Jason G. Hart

Social Security Number - XXX-XX-4136
U.S. Army Corps of Engineers - 200 North Cobb Parkway, Suite 404 - Marietta, Georgia 30062

Has completed coursework and satisfactorily passed

an examination that meets all criteria required for

EPA/AHERA/ASHARA (TSCA Title II) Approved Accreditation

and NESHAP Regulations Training

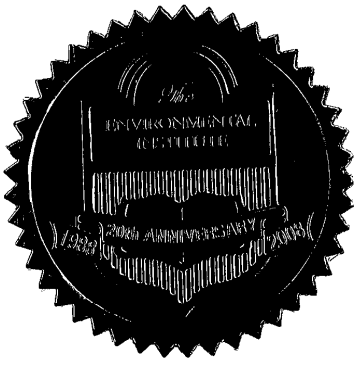
Asbestos in Buildings: Inspection and Assessment

December 8-10, 2008
Course Date

December 10, 2008
Examination Date

December 9, 2009
Expiration Date

4005
Certificate Number



David W. Hogue - Principle Instructor / Training Manager

Rachel G. McCain - Exam Administrator

(Florida Provider Registration Number 0001342 - Course #0004700)
TEI - 1841 West Oak Parkway, Suite F - Marietta, Georgia 30062 - (770) 427-3600 - www.tei-atl.com

The Environmental Institute

Tim Jones

Has completed coursework and satisfactorily passed

an examination that meets all criteria required for

EPA / AHERA (TSCA Title II) Approved Accreditation

and NESHAP Regulations Training

Asbestos in Buildings: Inspection and Assessment

February 10-12, 1997
Course Date

2360
Certificate Number

February 12, 1997
Examination Date

February 11, 1998
Expiration Date

William H. Spain - Course Director

Rachel G. McCain - Exam Administrator

TEI - 1300 Williams Drive, Suite E - Marietta, Georgia 30066 - (770) 427-3600

The Environmental Institute

Tim Jones

Social Security Number - XXX-XX-8826
USACE - 200 N. Cobb Parkway, Suite 404 - Marietta, Georgia 30062

Has completed coursework and satisfactorily passed an examination that meets all criteria required for EPA/AHERA/ASHARA (TSCA Title II) Approved Reaccreditation and NESHAP Regulations Training

Asbestos in Buildings: Inspector Refresher

September 24, 2009
Course Date

11600
Certificate Number

September 24, 2009
Examination Date

September 23, 2010
Expiration Date

David W. Hogue - Principle Instructor / Training Manager

Rachel G. McCain - Exam Administrator

(Approved by the ABIH Certification Maintenance Committee for 1/2 CM point)
(American Indoor Air Quality Council Re-certification Credit Registration #09011202)
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2009-04-01 through 2010-03-31

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DEPARTMENT OF COMMERCE * UNITED STATES OF AMERICA *

Sally S. Bruce

For the National Institute of Standards and Technology

NVLAP-01C (REV. 2009-01-28)

US Army Corps of Engineers®

Savannah District
Environmental and Materials Unit

Hazardous Building Materials Survey

Building No. 3425
Fort Benning, Georgia

Prepared by Timothy A. Jones

TYPICAL BUILDING, BUILDING 3425 SHOWN

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The findings of this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

Hazardous Building Materials Survey **May 2010**

Building 3425
Fort Benning, Georgia

by Timothy A. Jones

Final Report

Prepared for: **U.S. Army Corps of Engineers**
Savannah District

Hazardous Building Materials Survey Report

Introduction

Background

Building 3425 is a three story approximately 250,000 square foot barracks complex. The building is constructed of steel framework with masonry walls and concrete floors that was built in the late 1980s. The roof system is built-up roofing membrane over insulation on concrete decking. Rooms on the building floor plans are arbitrarily numbered for identification in this report only.

Description of study

Investigation

This report documents the hazardous building materials survey of Building No. 3425 at Fort Benning, Georgia conducted on 3-11 May 2010 by U.S. Army Corps of Engineers Savannah District employee Tim Jones. This report includes only building materials located at the time of inspection. The investigation includes a visual identification and location of such items as: fluorescent and mercury-vapor lights, including possible PCB containing ballasts; battery back-up exit lights and emergency lights; mercury-containing thermostats and switches; refrigerant containing air conditioners, water fountains and ice makers; above and below ground storage tanks; transformers; built in chemical type fire suppression systems; smoke detectors; and lead building materials. Other hazardous building materials not listed above may also be included at the discretion of the inspectors. Asbestos is excluded from this inspection as it is covered separately in an asbestos inspection report. The quantities listed below are estimates only.

Conclusions

The following information gathered during the survey of Building 3425 is presented in attached information:

a. *Light Count:* The fluorescent and mercury vapor light count results are presented in Table 1.

b. *Lead Building Materials:* Lead was located used as flashing on the plumbing vent pipes and roof drains on the roof. See table 2 for details.

c. *Compressed Refrigerant Gas:* (27) Drinking fountains, (48) refrigerators, (3) large walk-in coolers, and (4) de-humidifiers were located within the building. (3) Large walk-in coolers were located outside the building. (20) Wall unit heat pumps were located within the building. (5) Chest freezers were located in the company day rooms. (4) Small condensing units were located on the roof. This equipment is assumed to contain refrigerant gas that should be recovered prior to demolition.

d. *Portable Fire Extinguishers:* (83) Portable fire extinguishers were located within the building.

e. *Above and Underground Storage Tanks:* No evidence of an AST/UST was noted during the survey of the building.

f. *Mercury Thermometers& Switches:* (52) Mercury thermometers were found within the mechanical rooms. (2) Mercury switches were located on the boilers. Others may exist.

g. *Smoke Detectors:* (433) Smoke detectors were located within the building.

h. *Alarm Panels:* (7) Alarm Panels were located within the building. This equipment is assumed to contain back-up batteries that should be recovered prior to demolition.

i. Transformers: (22) Transformers were found within the building and surrounding area.

j. Grease Trap: (1) grease trap was located on the premises.

Tables

TABLE 1
FORT BENNING BUILDING 3425
FLUORESCENT AND MERCURY LIGHT FIXTURES

AREA IDENTIFICATION	# & TYPE LIGHTS PRESENT	DESCRIPTION OF LIGHTS
Interior	13	2 Bulb, 3 Foot Long Fluorescent Fixtures
Interior	39	2 Bulb, 2 Foot Long Fluorescent Fixtures
Interior / Exterior	1680	1 Bulb, 4 Foot Long Fluorescent Fixtures
Interior	39	1 Bulb, 2 Foot Long Fluorescent Fixtures
Interior	927	2 Bulb, 4 Foot Long Fluorescent Fixtures
Interior	82	3 Bulb, 4 Foot Long Fluorescent Fixtures
Interior	62	Battery Back-up Emergency Lights
Interior	101	Battery Back-up Exit Signs
Interior	63	Screw-In Fluorescent
Interior	1	Box 4 ft Fluorescent Bulbs
Exterior	28	Square Mercury Lights

TABLE 2
FORT BENNING BUILDING 3425
LEAD BUILDING COMPONENTS

BUILDING COMPONENT	DESCRIPTION	LOCATION	ESTIMATED NUMBER
Lead Pipe Flashings	Roof flashing	Roof	123
Lead Roof Drain Flashings	Roof flashing	Roof	92

Savannah District
Environmental and Materials Unit

US Army Corps of Engineers®

Asbestos Survey

Building No. 3425
Fort Benning, Georgia

Prepared by Timothy A. Jones

TYPICAL BUILDING, BUILDING 3405 SHOWN

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Asbestos Survey **May 2010**

Building No. 3425
Fort Benning, Georgia

Prepared by: Timothy A. Jones

Final report

Prepared for: **U.S. Army Corps of Engineers**
Savannah District

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Asbestos Inspection Report

Introduction

Scope of the Investigation

This report documents the asbestos inspection and survey of Building No. 3425 at Fort Benning; Georgia conducted on 3-11 May 2010 by Savannah District U.S. Army Corps of Engineers employee Tim Jones. The survey was conducted in general accordance with the regulatory guidelines in the Asbestos Hazard Emergency Response Act (AHERA) (40 CFR Part 763 Subpart E Sections 763.80-763.88) and "Guidance for Controlling Asbestos-Containing Materials in Buildings" (Purple Book) (EPA publication number 560/5-85-024). Although not required by the AHERA guidelines, roof and other exterior miscellaneous materials were also inspected and sampled.

Background

Building 3425 is a three-story 250,000 square foot concrete block and steel frame barracks complex that was reportedly built in 1988. Exterior and original interior walls are constructed of concrete block. Interior walls are mostly concrete block with a few gypsum board walls. The floor systems are concrete mostly covered with vinyl floor tiles. The roof system is built-up roofing membrane over insulation on concrete decking. Rooms on the building floor plans are arbitrarily numbered for identification in this report only.

Description of study

Investigation

All accessible areas of Building No. 3425 were visually inspected for suspected asbestos containing materials (ACM) by an accredited inspector. This report details ACM as identified at the time of inspection only.

Bulk samples of suspect ACM's were collected. The bulk samples were analyzed by Carolina Environmental, Inc. The laboratory is accredited by the National Voluntary Laboratory Accredited Program (NVLAP Accreditation sponsored by the National Institute of Standards and Technology (NIST)). A copy of their accreditation certificate is included in Appendix C. The samples were analyzed by the accepted method of polarized light microscopy (PLM) using EPA's "Interim Method for Determining

Asbestos in Insulation Samples", EPA-600/M4-82-020. The lab's analytical report is included in Appendix A.

In compliance with the AHERA regulations, material is considered an Asbestos Containing Material (ACM) when it contains greater than one percent asbestos. Likewise, in this report, any material containing concentrations greater than one percent asbestos will be considered "positive". Occasionally, materials containing less than one percent asbestos, or not sampled, are assumed to be a "positive" asbestos containing material at the discretion of the inspector. A narrative discussion of the AHERA ACM types (i.e., thermal systems insulation, miscellaneous and surfacing materials) found in Building No. 3425 is included in this report where relevant. Bulk sample information appears on Table 1. Estimated quantities of individual asbestos containing materials appear on Table 2. Material characterization of asbestos containing materials appears on Table 3. The approximate location where each bulk sample was obtained is shown on the building floor plans, which appear as Figures. Positive ACM samples are indicated on the floor plan Figures with their numbers enclosed in squares and, where possible, locations of positive ACM are identified. Samples testing negative for asbestos are indicated on the floor plan Figures with their numbers enclosed in circles. It is reasonable to assume that all materials similar to those testing positive also contain positive amounts of asbestos and should be treated as such.

Conclusions

Thermal Systems Insulation (TSI)

TSI is insulation material applied to pipes, fittings, tanks, ducts, or on other interior structural components to prevent heat loss or gain, or water condensation, or for other purposes.

No asbestos containing TSI was located within Building 3425.

Miscellaneous Materials

Miscellaneous materials include building material on structural components, structural members or fixtures, such as floor and ceiling tiles, and do not include surfacing or TSI. In the past, there were a great number of miscellaneous building materials that had asbestos fibers added to them during the manufacturing process to increase durability and fireproofing qualities. The following suspect miscellaneous materials at Building No. 3425 were found to contain or were assumed to contain asbestos:

a. *Gray Caulking Material:* Gray sticky caulking material used between window glass and metal frames in the first floor company day rooms (Rooms A114, B120,

D114 and F120), front admin entry area (Room G110) and the windows in the two dining rooms (Rooms F104 and F132) contains asbestos. - (Refer to Tables 1, 2 and 3 for specific information and Figure 1 for sample locations).

b. *Flashing Membrane:* The flashing membrane along the edges of the newer small raised built-up roof at the gravel stop above the newer mechanical (Room C117) room contains asbestos. The flashing membrane is assumed for quantification purposes to begin at the edge of the roof and continue three feet into the roof field. - (Refer to Tables 1, 2 & 3 for specific information and Figures 4 & 5 for sample locations).

c. *Flange Gaskets:* Flange gaskets within the mechanical piping systems are assumed to contain asbestos. - (Refer to Tables 2 and 3 for specific information).

Surfacing Material

Surfacing material is friable material that is sprayed on, troweled on, or otherwise applied to surfaces for decorative or other purposes.

No asbestos containing surfacing material was located within Building 3425.

TABLE 1
SUSPECT ACM SAMPLES
FORT BENNING, BUILDING 3425

FIELD ID	DESCRIPTION	LOCATION	ASBESTOS TYPE & %	FIGURE NUMBER
3425-1-1	Spray applied fireproofing	Admin Area, Corridor, G104, applied to structural steel and decking above suspended ceiling	No Asbestos Detected	1A
3425-1-2	Tan floor tile & black mastic	Admin Area, Corridor G104, below carpet	No Asbestos Detected	1A
3425-1-3	Spray applied fireproofing	Admin Area, Room G105, debris on ceiling tiles	No Asbestos Detected	1A
3425-1-4	White mastic	Admin Area, Room G105, on duct insulation above suspended ceiling	No Asbestos Detected	1A
3425-1-5	Tan floor tile & black mastic	Admin Area, Room G105, below carpet	No Asbestos Detected	1A
3425-1-6	White mastic	Admin Area, Room G123, on duct insulation above suspended ceiling	No Asbestos Detected	1A
3425-1-7	2’ X 4’ typical ceiling tile	Admin Area, Room G123	No Asbestos Detected	1A
3425-1-8	Ceiling tile	Admin Area, Room G123, above suspended ceiling, on top of fluorescent light fixtures	No Asbestos Detected	1A
3425-1-9	White mastic	Admin Area, Room G123, on domestic water piping insulation above suspended ceiling	No Asbestos Detected	1A
3425-1-10	12” X 12” tan with brown accents floor tile & black mastic	Admin Area, Room G123	No Asbestos Detected	1A
3425-1-11	Drywall joint compound	Admin Area, Room G123, small partition wall at stage	No Asbestos Detected	1A
3425-1-12	Tan floor tile & black mastic	Admin Area, Room G110, under carpet	No Asbestos Detected	1A

3425-1-13	**Grey sticky caulking material**	**Admin Area, Room G110, between window glass and metal frame on large front window system**	**10% chrysotile**	1A
3425-1-14	**Grey sticky caulking material**	**Admin Area, Room G110, between window glass and metal frame on large front window system**	**10% chrysotile**	1A
3425-1-15	White mastic	Admin Area, Room G109, on domestic water piping insulation above suspended ceiling	No Asbestos Detected	1A
3425-1-16	Duct sealer	Admin Area, Room G109, on bare ductwork above suspended ceiling	No Asbestos Detected	1A
3425-1-17	Base molding & adhesive	Admin Area, Room G117	No Asbestos Detected	1A
3425-1-18	Drywall joint compound	Admin Area, Room G121 walls	No Asbestos Detected	1A
3425-1-19	White mastic	Admin Area, Room G121, on duct insulation above suspended ceiling	No Asbestos Detected	1A
3425-1-20	Spray applied fireproofing	Admin Area, Room G121, applied to structural steel and decking above suspended ceiling	No Asbestos Detected	1A
3425-1-21	12” X 12” tan with brown accents floor tile & black mastic	Admin Area, Room G122	No Asbestos Detected	1A
3425-1-22	White caulking material	Admin Area, Room G117, between metal door frame and masonry wall	No Asbestos Detected	1A
3425-M-23	White mastic	Admin Area, Room G125, on duct insulation near air handler	No Asbestos Detected	1A
3425-M-24	White mastic	Admin Area, Room G125, on abandoned HVAC piping insulation	No Asbestos Detected	1A
3425-M-25	White mastic	Admin Area, Room G125, on domestic water piping insulation	No Asbestos Detected	1A

3425-M-26	Duct sealer	Admin Area, Room G125, on exposed metal ductwork	No Asbestos Detected	1A
3425-M-27	Red caulking material	Admin Area, Room G125, at wall penetrations	No Asbestos Detected	1A
3425-M-28	Stick pin adhesive	Admin Area, Room G124, on sheet metal louver cover at exterior wall	No Asbestos Detected	1A
3425-M-29	Black sticky tape insulation	Admin Area, Room G124, on HVAC piping over rubber insulation	No Asbestos Detected	1A
3425-M-30	White mastic	Admin Area, Room G124, on domestic hot water storage tank insulation	No Asbestos Detected	1A
3425-M-31	Cement insulation	Admin Area, Room G124, on domestic hot water storage tank at access ports	No Asbestos Detected	1A
3425-M-32	White mastic	Admin Area, Room G124, on domestic water piping insulation	No Asbestos Detected	1A
3425-1-33	12” X 12” tan with brown streaks floor tile & black mastic	Dining Facility, Room F103	No Asbestos Detected	1B
3425-1-34	12” X 12” tan with brown mottling floor tile with yellow & black mastic	Dining Facility, Room F103	No Asbestos Detected	1B
3425-1-35	Grey rubbery caulking material	Dining Facility, Room F103, between window glass and metal frame	No Asbestos Detected	1B
3425-1-36	12” X 12” light brown with brown & grey mottling floor tile & black mastic	Dining Facility, Room F104	No Asbestos Detected	1B
3425-1-37	2’ X 4’ ceiling tile	Dining Facility, Room F104	No Asbestos Detected	1B
3425-1-38	Spray applied fireproofing	Dining Facility, Room F104, applied to structural steel and decking above suspended ceiling	No Asbestos Detected	1B

3425-1-39	White mastic	Dining Facility, Room F104, on duct insulation above suspended ceiling	No Asbestos Detected	1B
3425-1-40	**Grey sticky caulking material**	**Dining Facility, Room F104, between window glass and metal frame on large window system**	**10% chrysotile**	1B
3425-1-41	2’ X 4’ older looking ceiling tile	Dining Facility, Room F136	No Asbestos Detected	1B
3425-1-42	2’ X 4’ ceiling tile	Dining Facility, Room F132	No Asbestos Detected	1B
3425-1-43	White mastic	Dining Facility, Room F132, on duct insulation above suspended ceiling	No Asbestos Detected	1B
3425-1-44	Base molding & adhesive	Dining Facility, Room F132	No Asbestos Detected	1B
3425-1-45	12” X 12” light brown with brown & grey mottling floor tile & black mastic	Dining Facility, Room F132	No Asbestos Detected	1B
3425-1-46	**Grey sticky caulking material**	**Dining Facility, Room F132, between window glass and metal frame on large window**	**10% chrysotile**	1B
3425-1-47	2’ X 4’ older looking ceiling tile	Dining Facility, Room F132	No Asbestos Detected	1B
3425-1-48	Plaster ceiling	Dining Facility, Room F101, older ceiling above newer suspended ceiling	No Asbestos Detected	1D
3425-1-49	White mastic	Dining Facility, Room F101, on domestic water piping in plumbing chase wall	No Asbestos Detected	1D
3425-1-50	White caulking material	Dining Facility, Room F101, around plumbing fixtures at wall	No Asbestos Detected	1D
3425-2-51	12” X 12” pink floor tile & yellow mastic	Cadre Area, Room G206	No Asbestos Detected	2F
3425-2-52	12” X 12” white with black and brown accents floor tile & mastic	Cadre Area, Room G205	No Asbestos Detected	2F
3425-2-53	Drywall joint compound	Cadre Area, Room G209 wall	No Asbestos Detected	2F
3425-2-54	2’ X 2’ recessed ceiling tile	Cadre Area, Room G211	No Asbestos Detected	2F

3425-2-55	White mastic	Cadre Area, Room G211, on duct insulation above suspended ceiling	No Asbestos Detected	2F
3425-2-56	Drywall joint compound	Cadre Area, Room G216 wall	No Asbestos Detected	2F
3425-2-57	12” X 12” pink floor tile & yellow mastic	Cadre Area, Room G226	No Asbestos Detected	2F
3425-2-58	12” X 12” white with black and brown accents floor tile & mastic	Cadre Area, Room G224	No Asbestos Detected	2F
3425-2-59	Drywall joint compound	Cadre Area, Room G226 wall	No Asbestos Detected	2F
3425-3-60	2’ X 2’ recessed ceiling tile	Cadre Area, Room G332	No Asbestos Detected	3F
3425-E-61	Tan gummy caulking material	Cadre Area, Walkway 3-1, between plaster ceiling and masonry wall	No Asbestos Detected	3F
3425-E-62	Tan gummy caulking material	Cadre Area, Walkway 3-1, between plaster ceiling and masonry wall	No Asbestos Detected	3F
3425-E-63	White mastic	Cadre Area, Walkway 3-1, on duct insulation above plaster ceiling	No Asbestos Detected	3F
3425-E-64	Brown rubbery caulking material	Cadre Area, Walkway 3-1, in brick wall expansion joints	No Asbestos Detected	3F
3425-E-65	Brown rubbery caulking material	Cadre Area, Walkway 2-1, between metal window frame and brick wall	No Asbestos Detected	2F
3425-E-66	Non-skid floor coating	Cadre Area, Walkway 2-1	No Asbestos Detected	2F
3425-E-67	Non-skid floor coating	Cadre Area, Walkway 2-1	No Asbestos Detected	2F
3425-M-68	White mastic	Dining Facility, Room 120, on low pressure steam piping insulation	No Asbestos Detected	1B
3425-M-69	White mastic	Dining Facility, Room 120, on domestic water piping insulation	No Asbestos Detected	1B
3425-M-70	Cement and white mastic	Dining Facility, Room 120, on domestic hot water storage tank	No Asbestos Detected	1B
3425-M-71	Cement and white mastic	Dining Facility, Room 120, on domestic hot water storage tank	No Asbestos Detected	1B

3425-M-72	Cement and white mastic	Dining Facility, Room 120, on domestic hot water storage tank	No Asbestos Detected	1B
3425-M-73	White mastic	Dining Facility, Room 120, on dual temperature water piping insulation	No Asbestos Detected	1B
3425-M-74	White mastic	Dining Facility, Room 120, on chill water piping insulation	No Asbestos Detected	1B
3425-M-75	White mastic	Dining Facility, Room 120, on domestic water piping insulation	No Asbestos Detected	1B
3425-M-76	Spray applied fireproofing	Dining Facility, Room 120, on structural steel and decking	No Asbestos Detected	1B
3425-M-77	White mastic	Dining Facility, Room 120, on domestic water piping insulation	No Asbestos Detected	1B
3425-1-78	Construction adhesive	Dining Facility, Room F121, used to attach plastic wainscot to wall	No Asbestos Detected	1B
3425-1-79	2’ X 4’ older ceiling tile	Dining Facility, Room F125	No Asbestos Detected	1B
3425-1-80	12” X 12” floor tile & mastic	Dining Facility, Room F127	No Asbestos Detected	1B
3425-1-81	Spray applied fireproofing	Dining Facility, Room F118, on structural steel and decking above suspended ceiling	No Asbestos Detected	1B
3425-1-82	12” X 12” dark brown with orange, black and white accents floor tile & mastic	Dining Facility, Room F113	No Asbestos Detected	1B
3425-1-83	12” X 12” brown mottled floor tile & mastic	Dining Facility, Room F113 patch	No Asbestos Detected	1B
3425-1-84	12” X 12” white floor tile & mastic	Dining Facility, Room F113 patch	No Asbestos Detected	1B
3425-1-85	12” X 12” light brown floor tile & mastic	Dining Facility, Room F113 patch	No Asbestos Detected	1B
3425-1-86	Construction adhesive	Dining Facility, Room F116, used to attach plastic wainscot to wall	No Asbestos Detected	1B

3425-1-87	Caulking material	Dining Facility, Room F116, at top of plastic wainscot	No Asbestos Detected	1B
3425-1-88	Caulking material	Dining Facility, Room F108, at top of plastic wainscot	No Asbestos Detected	1B
3425-1-89	White mastic	Dining Facility, Room F116, on duct insulation above suspended ceiling	No Asbestos Detected	1B
3425-1-90	White mastic	Dining Facility, Room F118, on exposed domestic water piping insulation by stainless steel box on wall	No Asbestos Detected	1B
3425-1-91	White caulking material	Dining Facility, Room F112, on plumbing fixtures on wall	No Asbestos Detected	1B
3425-1-92	White mastic	“A” Company, First Floor, Room A105, on domestic water piping insulation	No Asbestos Detected	1C
3425-1-93	White mastic	“A” Company, First Floor, Room A105, on domestic hot water storage tank insulation	No Asbestos Detected	1C
3425-1-94	White mastic	“A” Company, First Floor, Room A102, on domestic water piping insulation above suspended ceiling	No Asbestos Detected	1C
3425-1-95	White mastic	“A” Company, First Floor, Room A102, on duct insulation above suspended ceiling	No Asbestos Detected	1C
3425-1-96	Drywall joint compound	“A” Company, First Floor, Room A102 plumbing chase wall	No Asbestos Detected	1C
3425-1-97	White mastic	“A” Company, First Floor, Room A116, on duct insulation at air handler	No Asbestos Detected	1C
3425-1-98	Stick pin adhesive	“A” Company, First Floor, Room A116, holds insulation on ductwork	No Asbestos Detected	1C

3425-1-99	Black sticky tape insulation	"A" Company, First Floor, Room A116, on HVAC piping valves near air handler	No Asbestos Detected	1C
3425-1-100	2' X 4' ceiling tile	"A" Company, First Floor, Room A111	No Asbestos Detected	1C
3425-1-101	White mastic	"A" Company, First Floor, Room A111, on HVAC piping insulation above suspended ceiling	No Asbestos Detected	1C
3425-1-102	White mastic	"A" Company, First Floor, Room A111, on roof drain insulation above suspended ceiling	No Asbestos Detected	1C
3425-1-103	12" X 12" tab and grey mottled floor tile & mastic	"A" Company, First Floor, Room A114	No Asbestos Detected	1A
3425-1-104	Drywall joint compound	"A" Company, First Floor, Room A114 wall	No Asbestos Detected	1A
3425-1-105	Spray applied fireproofing	"A" Company, First Floor, Room A114, on structural steel and decking above suspended ceiling	No Asbestos Detected	1A
3425-1-106	**Grey sticky caulking material**	**"A" Company, First Floor, Room A114, between window glass and metal frame**	**10% chrysotile**	**1A**
3425-1-107	12" X 12" tan 7 grey mottled floor tile & mastic	"A" Company, First Floor, Room A120	No Asbestos Detected	1C
3425-1-108	White mastic	"A" Company, First Floor, Room A120, on 12" OD pipe insulation above suspended ceiling	No Asbestos Detected	1C
3425-1-109	White mastic	"A" Company, First Floor, Room A106, on domestic hot water storage tank insulation	No Asbestos Detected	1C
3425-1-110	White mastic	"A" Company, First Floor, Room A106, on domestic water piping insulation	No Asbestos Detected	1C

3425-1-111	White caulking material	"A" Company, First Floor, Room A107, between metal door frame and masonry wall	No Asbestos Detected	1C
3425-2-112	Black sticky tape insulation	"A" Company, Second Floor, Room A212, on HVAC piping valves near air handler	No Asbestos Detected	2A
3425-2-113	White mastic	"A" Company, Second Floor, Room A213 on duct insulation	No Asbestos Detected	2A
3425-2-114	Duct sealer	"A" Company, Second Floor, Room A213, on exposed ductwork	No Asbestos Detected	2A
3425-2-115	12" X 12" dark tan mottled floor tile & mastic	"A" Company, Second Floor, Room A217, patch	No Asbestos Detected	2A
3425-2-116	White mastic	"A" Company, Second Floor, Room A217, on duct insulation above suspended ceiling	No Asbestos Detected	2A
3425-M-117	White mastic	"A" Company, Second Floor, Room A224, on roof drain piping insulation	No Asbestos Detected	2A
3425-R-118	Pitch pan filler	"A" Company 2nd floor mechanical room roof, at roof penetration	No Asbestos Detected	4C
3425-R-119	Built-up roofing membrane	"A" Company 2nd floor mechanical room roof, main roof field	No Asbestos Detected	4C
3425-R-120	Roof insulation	"A" Company 2nd floor mechanical room roof, below roofing membrane	No Asbestos Detected	4C
3425-R-121	Multi-layer flashing	"A" Company 2nd floor mechanical room roof, at parapet wall	No Asbestos Detected	4C
3425-R-122	Flashing cement	"A" Company 2nd floor mechanical room roof, on seams in flashing membrane	No Asbestos Detected	4C
3425-E-123	Brown rubbery caulking material	"A" Company 2nd floor exterior, outside Room A216, in brick wall expansion joint	No Asbestos Detected	2A

3425-3-124	Duct sealer	"A" Company, third Floor, Room A224, Room A311, on exposed metal duct	No Asbestos Detected	3A
3425-3-125	Base molding & adhesive	"A" Company, third Floor, Room A224, Room A308	No Asbestos Detected	3A
3425-3-126	12" X 12" tan & grey mottled floor tile & mastic	"A" Company, third Floor, Room A224, Room A326	No Asbestos Detected	3A
3425-3-127	White mastic	"A" Company, third Floor, Room A224, Room A318, on roof drain piping insulation above suspended ceiling	No Asbestos Detected	3A
3425-R-128	Built-up roofing membrane	"A" Company roof, main roof field	No Asbestos Detected	4C
3425-R-129	Roof insulation	"A" Company roof, under roof membrane	No Asbestos Detected	4C
3425-R-130	Multi-layer flashing	"A" Company roof, at parapet wall	No Asbestos Detected	4C
3425-R-131	Flashing cement	"A" Company roof, at parapet wall, patch	No Asbestos Detected	4C
3425-R-132	Pitch pan filler	Cadre Area roof, at roof penetration	No Asbestos Detected	4A
3425-R-133	Flashing cement	"A" Company roof, 5 gallon can on roof	No Asbestos Detected	4C
3425-R-134	Built-up roofing membrane	Cadre Area roof, main roof field	No Asbestos Detected	4A
3425-R-135	Multi-layer flashing	Cadre Area roof, at roof curb at roof opening	No Asbestos Detected	4A
3425-R-136	Built-up roofing membrane	"E" Company roof, main roof field	No Asbestos Detected	4G
3425-R-137	Multi-layer flashing	"E" Company roof, at parapet wall	No Asbestos Detected	4G
3425-R-138	Flashing cement	"E" Company roof, at access hatch roof curb	No Asbestos Detected	4G
3425-R-139	**Built-up roofing membrane**	**Dining Facility Roof, newer roof over boiler room, flashing area at edge or roof at gravel stop**	**5% chrysotile**	**4B**
3425-R-140	Built-up roofing membrane	Dining Facility Roof, newer roof over boiler room, main roof field	No Asbestos Detected	4B

3425-R-141	Flashing cement	Dining Facility Roof, newer roof over boiler room, at roof curb for vent	No Asbestos Detected	4B
3425-R-142	Flashing cement	Dining Facility Roof, at flashing at entry door to Room C204	No Asbestos Detected	4B
3425-R-143	Pitch pan filler	Dining Facility Roof, at roof penetration	No Asbestos Detected	4B
3425-R-144	Flashing cement	Dining Facility Roof, roof patch at newer condensing unit curb	No Asbestos Detected	4B
3425-R-145	Pitch pan filler	Dining Facility Roof, at legs for air handling unit	No Asbestos Detected	4B
3425-R-146	Multi-layer flashing	Dining Facility Roof, at parapet wall at roof opening	No Asbestos Detected	4B
3425-R-147	Built-up roofing membrane	Dining Facility Roof, main roof field	No Asbestos Detected	4B
3425-R-148	Multi-layer flashing	Dining Facility Roof, at low separating wall	No Asbestos Detected	4B
3425-R-149	Flashing cement	Dining Facility Roof, patch at corner of roof curb	No Asbestos Detected	4B
3425-R-150	Built-up roofing membrane	Administrative area roof, main roof field	No Asbestos Detected	4A
3425-R-151	Multi-layer flashing	Administrative area roof, at building wall at Cadre Area	No Asbestos Detected	4A
3425-R-152	Grey rubbery caulking material	Administrative area roof, at top of metal flashing	No Asbestos Detected	4A
3425-E-153	Brown rubbery caulking material	Exterior, at top of parapet wall cap and brick wall column	No Asbestos Detected	4A
3425-E-154	Pink/white caulking material	Exterior, in seams in pre-cast concrete wall	No Asbestos Detected	4A
3425-E-155	Tan rubbery caulking material	Exterior, between metal mechanical room louvers and brick wall	No Asbestos Detected	4A
3425-E-156	Tan/grey caulking material	Administrative area roof, at top of metal flashing	No Asbestos Detected	4A
3425-E-157	Brown rubbery caulking material	Exterior, between metal window frame and brick wall	No Asbestos Detected	4A
3425-1-158	12” X 12” light blue floor tile & mastic	“C” Company, First Floor, Room C116	No Asbestos Detected	1B

3425-1-159	Plaster ceiling	“C” Company, First Floor, Room C116 art edge of room	No Asbestos Detected	1B
3425-1-160	Spray applied fireproofing	“C” Company, First Floor, Room C116, on structural steel and decking above suspended ceiling	No Asbestos Detected	1B
3425-1-161	White mastic	“C” Company, First Floor, Room C116, on duct insulation above suspended ceiling	No Asbestos Detected	1B
3425-1-162	White mastic	“C” Company, First Floor, Room C116, on HVAC hot water piping insulation above suspended ceiling	No Asbestos Detected	1B
3425-M-163	White mastic	“C” Company, First Floor, Room C117, on domestic hot water piping insulation	No Asbestos Detected	1B
3425-M-164	White mastic	“C” Company, First Floor, Room C117, on domestic cold water piping insulation	No Asbestos Detected	1B
3425-M-165	Red caulking material	“C” Company, First Floor, Room C117, at wall penetrations	No Asbestos Detected	1B
3425-M-166	Spray applied fireproofing	“C” Company, First Floor, Room C117, on structural steel and decking	No Asbestos Detected	1B
3425-M-167	Duct sealer	“C” Company, First Floor, Room C117, on bare metal duct	No Asbestos Detected	1B
3425-E-168	Brown rubbery caulking material	“C” Company, First Floor, exterior, outside Room C114, between metal louver and brick wall	No Asbestos Detected	1B
3425-E-169	Caulking material	“C” Company, First Floor, exterior, outside Room C114, between metal door frame and brick wall	No Asbestos Detected	1B

3425-R-170	Built-up roofing membrane	“C” Company roof, main roof field	No Asbestos Detected	4E
3425-R-171	Built-up roofing membrane	“C” Company roof, main roof field at roof drain flashing area	No Asbestos Detected	4E
3425-R-172	Built-up roofing membrane	“C” Company roof, flashing area 8” from parapet wall	No Asbestos Detected	4E
3425-R-173	Brown rubbery caulking material	“C” Company roof, at top of metal flashing at parapet wall	No Asbestos Detected	4E
3425-R-174	White mastic	Dining Facility roof, on duct insulation at rooftop air handling units	No Asbestos Detected	4B
3425-R-175	Flashing cement	Dining Facility roof, patching on duct insulation at rooftop air handling units	No Asbestos Detected	4B
3425-R-176	White mastic	Dining Facility roof, on duct insulation at rooftop air handling units	No Asbestos Detected	4B
3425-R-177	Flashing cement	Dining Facility roof, patching on duct insulation at rooftop air handling units	No Asbestos Detected	4B
3425-R-178	Built-up roofing membrane	“D” Company roof, flashing area 8” from parapet wall	No Asbestos Detected	4F
3425-R-179	Multi-layer flashing	“D” Company roof, at parapet wall	No Asbestos Detected	4F
3425-R-180	Built-up roofing membrane	“D” Company roof, main roof field, patched area	No Asbestos Detected	4F
3425-R-181	Flashing cement	“D” Company roof, patches at pitch pans at roof penetrations	No Asbestos Detected	4F
3425-R-182	Built-up roofing membrane	“D” Company roof, main roof field, at flashing area 12” from roof drain	No Asbestos Detected	4F
3425-R-183	Flashing cement	“D” Company roof, on corners of roof curb	No Asbestos Detected	4F
3425-R-184	Flashing cement	“B” Company roof, on access hatch roof curb	No Asbestos Detected	4D
3425-R-185	Pitch pan filler	“B” Company roof, at roof penetration	No Asbestos Detected	4D
3425-R-186	Flashing cement	“B” Company roof, on corners of fan roof curb	No Asbestos Detected	4D

3425-R-187	Flashing cement	“B” Company roof, patch near drain at parapet wall	No Asbestos Detected	4D
3425-R-188	Tan rubbery caulking material	“B” Company roof, between sections of concrete parapet wall caps	No Asbestos Detected	4D
3425-R-189	Brown rubbery caulking material	“B” Company roof, at top of metal flashing at wall	No Asbestos Detected	4D
3425-R-190	Black hard patch caulking material	“B” Company roof, at top of metal flashing and on parapet wall caps	No Asbestos Detected	4D
3425-R-191	Tan rubbery caulking material	“B” Company roof, between sections of concrete parapet wall caps	No Asbestos Detected	4D
3425-R-192	White mastic	“B” company, first floor, Room B105, on domestic water piping insulation	No Asbestos Detected	1D
3425-1-193	White mastic	“B” company, first floor, Room B105, on domestic hot water storage tank insulation	No Asbestos Detected	1D
3425-1-194	Drywall joint compound	“B” company, first floor, Room B102 plumbing chase wall	No Asbestos Detected	1D
3425-E-195	Brown rubbery caulking material	“B” company, first floor, exterior outside Room B107, between metal door frame and masonry wall	No Asbestos Detected	1D
3425-1-196	White mastic	“B” company, first floor, Room B123, on roof drain piping insulation above suspended ceiling	No Asbestos Detected	1D
3425-1-197	White mastic	“B” company, first floor, Room B123, on duct insulation above suspended ceiling	No Asbestos Detected	1D
3425-1-198	White mastic	“B” company, first floor, Room B123, on domestic water piping insulation above suspended ceiling	No Asbestos Detected	1D
3425-E-199	Brown rubbery caulking material	“B” company, first floor, exterior outside Room B122, in brick wall expansion joint	No Asbestos Detected	1D

3425-1-200	12” X 12” tan & grey mottled floor tile & mastic	“B” company, first floor, Room B114, upper layer	No Asbestos Detected	1D
3425-1-201	Dark blue floor tile & mastic	“B” company, first floor, Room B114, lower layer	No Asbestos Detected	1D
3425-1-202	Mail slot pillow covering	“B” company, first floor, Room B113	No Asbestos Detected	1D
3425-1-203	Mail slot pillow stuffing	“B” company, first floor, Room B113	No Asbestos Detected	1D
3425-1-204	White mastic	“B” company, first floor, Room B118, on abandoned HVAC piping insulation above air handling unit	No Asbestos Detected	1D
3425-1-205	White mastic	“B” company, first floor, Room B118, on duct insulation at air handling unit	No Asbestos Detected	1D
3425-1-206	Stick pin adhesive	“B” company, first floor, Room on ductwork, holds insulation to duct	No Asbestos Detected	1D
3425-1-207	**Grey sticky caulking material**	**“B” company, first floor, Room B120 between window glass and metal frame**	**10% chrysotile**	**1B**
3425-1-208	12” X 12” white & grey mottled floor tile & mastic	“B” company, first floor, Room B120	No Asbestos Detected	1B
3425-1-209	Base molding & adhesive	“B” company, first floor, Room B120	No Asbestos Detected	1B
3425-1-210	Spray applied fireproofing	“B” company, first floor, Room B120, on structural steel and decking above suspended ceiling	No Asbestos Detected	1B
3425-2-211	Sticky tape insulation	“B” company, second floor, Room B204, on HVAC piping at valves	No Asbestos Detected	2B
3425-2-212	12” X 12” white & grey mottled floor tile & mastic	“B” company, second floor, Room B205	No Asbestos Detected	2B
3425-2-213	12” X 12” dark blue floor tile & mastic	“B” company, second floor, Room B205	No Asbestos Detected	2B
3425-2-214	White caulking material	“B” company, second floor, Room B213, at corners of block walls	No Asbestos Detected	2B

3425-2-215	White mastic	“B” company, second floor, Room B216, on duct insulation above suspended ceiling	No Asbestos Detected	2B
3425-3-216	White mastic	“B” company, third floor, Room B327, on domestic water piping insulation inside chase wall	No Asbestos Detected	3B
3425-3-217	12” X 12” light brown mottled floor tile & mastic	“B” company, third floor, Room B305	No Asbestos Detected	3B
3425-3-218	12” X 12” white & grey mottled floor tile & mastic	“B” company, third floor, Room B305	No Asbestos Detected	3B
3425-3-219	12” X 12” red floor tile & mastic	“B” company, third floor, Room B305	No Asbestos Detected	3B
3425-3-220	Duct sealer	“B” company, third floor, Room B303, on metal duct	No Asbestos Detected	3B
3425-3-221	12” X 12” green & white self stick floor tile & mastic	“B” company, third floor, Room B324	No Asbestos Detected	3B
3425-1-222	White mastic	“C” company, first floor, Room C106, on domestic hot water storage tank insulation	No Asbestos Detected	1E
3425-1-223	White mastic	“C” company, first floor, Room C106, on domestic water piping insulation	No Asbestos Detected	1E
3425-1-224	12” X 12” light blue floor tile & mastic	“C” company, first floor, Room C123	No Asbestos Detected	1E
3425-1-225	12” X 12” tan & grey mottled floor tile & mastic	“C” company, first floor, Room C124	No Asbestos Detected	1E
3425-2-226	White caulking material	“C” company, second floor, Room C223, in corners of block walls	No Asbestos Detected	2C
3425-3-227	12” X 1`2” black floor tile & mastic	“C” company, third floor, Room C306	No Asbestos Detected	3C
3425-3-228	12” X 12” tan & brown floor tile & mastic	“C” company, third floor, Room C306	No Asbestos Detected	3C
3425-3-229	12” X 12” green & white floor tile & mastic	“C” company, third floor, Room C319	No Asbestos Detected	3C

3425-3-230	White mastic	"C" company, third floor, Room C319, on roof drain piping insulation above suspended ceiling	No Asbestos Detected	3C
3425-E-231	Brown rubbery caulking material	"C" company, third floor, exterior outside Room C304, between metal louver and brick wall	No Asbestos Detected	3C
3425-E-232	Tan rubbery caulking material	"C" company, third floor, exterior by stairwell, between plaster ceiling and brick wall	No Asbestos Detected	3C
3425-1-233	White mastic	"D" Company, first floor, Room D111 on duct insulation above suspended ceiling	No Asbestos Detected	1F
3425-1-234	Drywall joint compound	"D" Company, first floor, Room D114 partition wall	No Asbestos Detected	1B
3425-1-235	**Grey sticky caulking material**	**"D" Company, first floor, Room D114, between window glass and metal frame**	**10% chrysotile**	**1B**
3425-1-236	12" X 12" tan & grey mottled floor tile & mastic	"D" Company, first floor, Room D114A	No Asbestos Detected	1B
3425-1-237	12" X 12" light brown & brown mottled floor tile & mastic	"D" Company, first floor, Room D119	No Asbestos Detected	1F
3425-2-238	White mastic	"D" Company, second floor, Room D223, on duct insulation at air handler	No Asbestos Detected	2D
3425-3-239	Duct sealer	"D" Company, third floor, Room D319, on metal duct	No Asbestos Detected	3D
3425-E-240	Brown rubbery caulking material	"D" Company, first floor, exterior in stairwell, in seams in brick wall	No Asbestos Detected	1F
3425-E-241	Pink/tan rubbery caulking material	"D" Company, first floor, exterior, between sections of pre-cast concrete walls	No Asbestos Detected	1F
3425-1-242	White mastic	"D" Company, first floor, Room D106, on domestic hot water storage tank insulation	No Asbestos Detected	1F

3425-1-243	White mastic	“D” Company, first floor, Room D106, on domestic water piping insulation	No Asbestos Detected	1F
3425-1-244	Drywall joint compound	“D” Company, first floor, Room D102, on plumbing chase wall	No Asbestos Detected	1F
3425-E-245	Brown rubbery caulking material	“D” Company, first floor, exterior, in brick wall expansion joint	No Asbestos Detected	1F
3425-2-246	12” X 12” tan & grey floor tile & mastic	“E” Company, second floor, Room E218	No Asbestos Detected	2E
3425-2-247	12” X 12” white & grey floor tile & mastic	“E” Company, second floor, Room E218	No Asbestos Detected	2E
3425-E-248	White rubbery caulking material	“E” Company, first floor, exterior outside Room E118, between plaster ceiling and brick wall	No Asbestos Detected	1G

Samples testing positive for asbestos indicated in **BOLD** type

NAD = No Asbestos Detected

TABLE 2
ACM QUANTITY SUMMARY
FORT BENNING, BUILDING 3425

Homogeneous Area	UNITS	Functional Space									
		INTERIOR	EXTERIOR	MECHANICAL ROOMS	ROOF						TOTALS
Gray Caulk	L.F.	1210									1210
Roof Flashing Membrane	S.F.				200						200
Flange Gaskets	Ea.			100							100

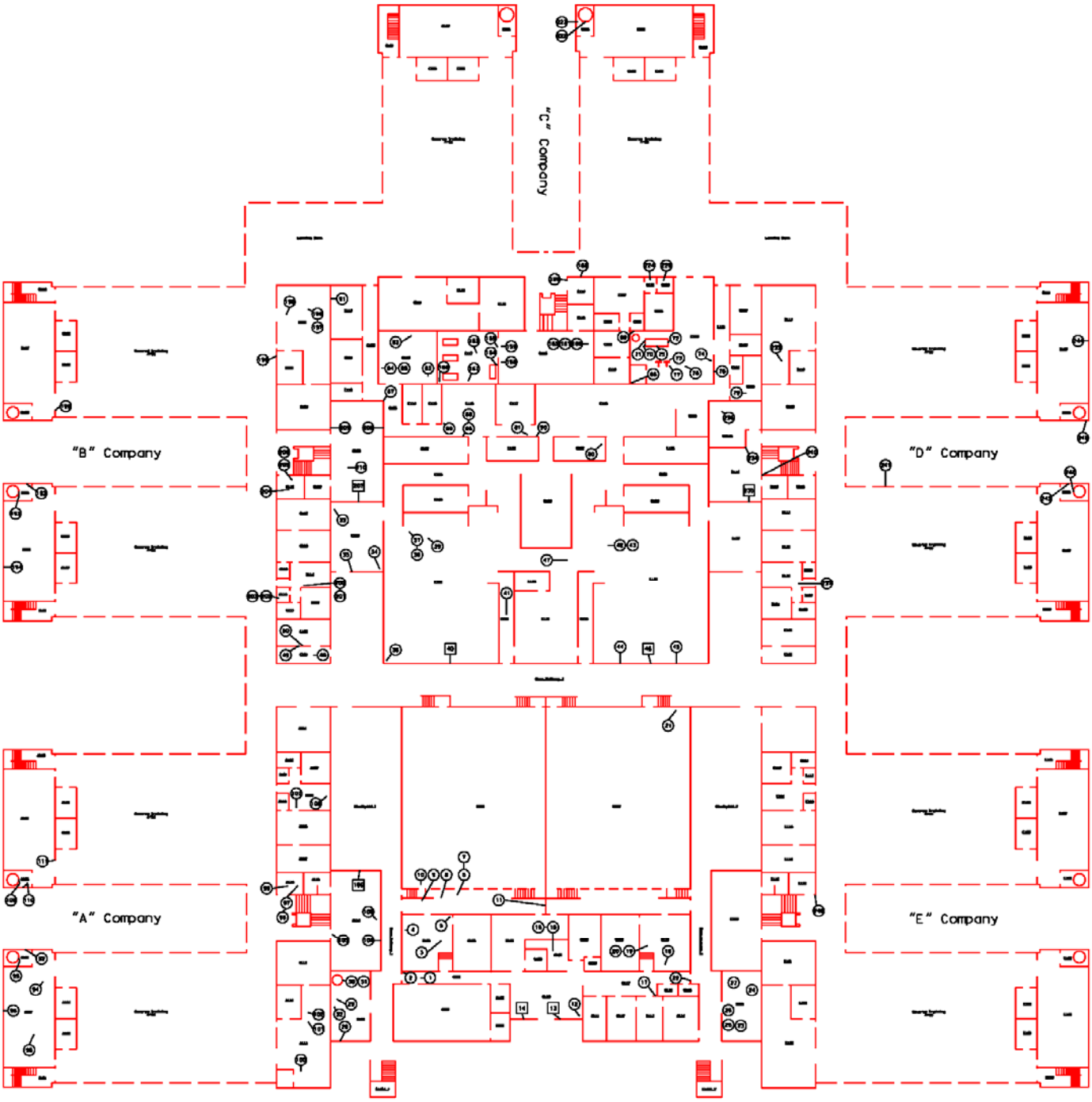
S.F. = Square Foot, L.F. = Linear Foot, C.F. = Cubic Foot

TABLE 3
MATERIAL CHARACTERIZATION AND ASSESSMENT
FORT BENNING, BUILDING 3425

MATERIAL		CHARACTERISTICS			ASSESSMENT	
Type	**Description**	**Asbestos Yes/No/Assumed**	**Quantity**	**Friable / Non-friable**	**Condition**	**Disturbance Potential**
Miscellaneous	Gray Caulking	Yes	1210 L.F.	Non-friable	Good	Low
Miscellaneous	Roof Flashing Membrane	Yes	200 S.F.	Non-friable	Good	Low
Miscellaneous	Flange Gaskets	Assumed	100 Ea.	Non-friable	Good	Low

S.F. = Square Foot, L.F. = Linear Foot, C.F. = Cubic Foot, Ea. = Each

Figure 1



1st Floor
Building 3425

Figure 1A

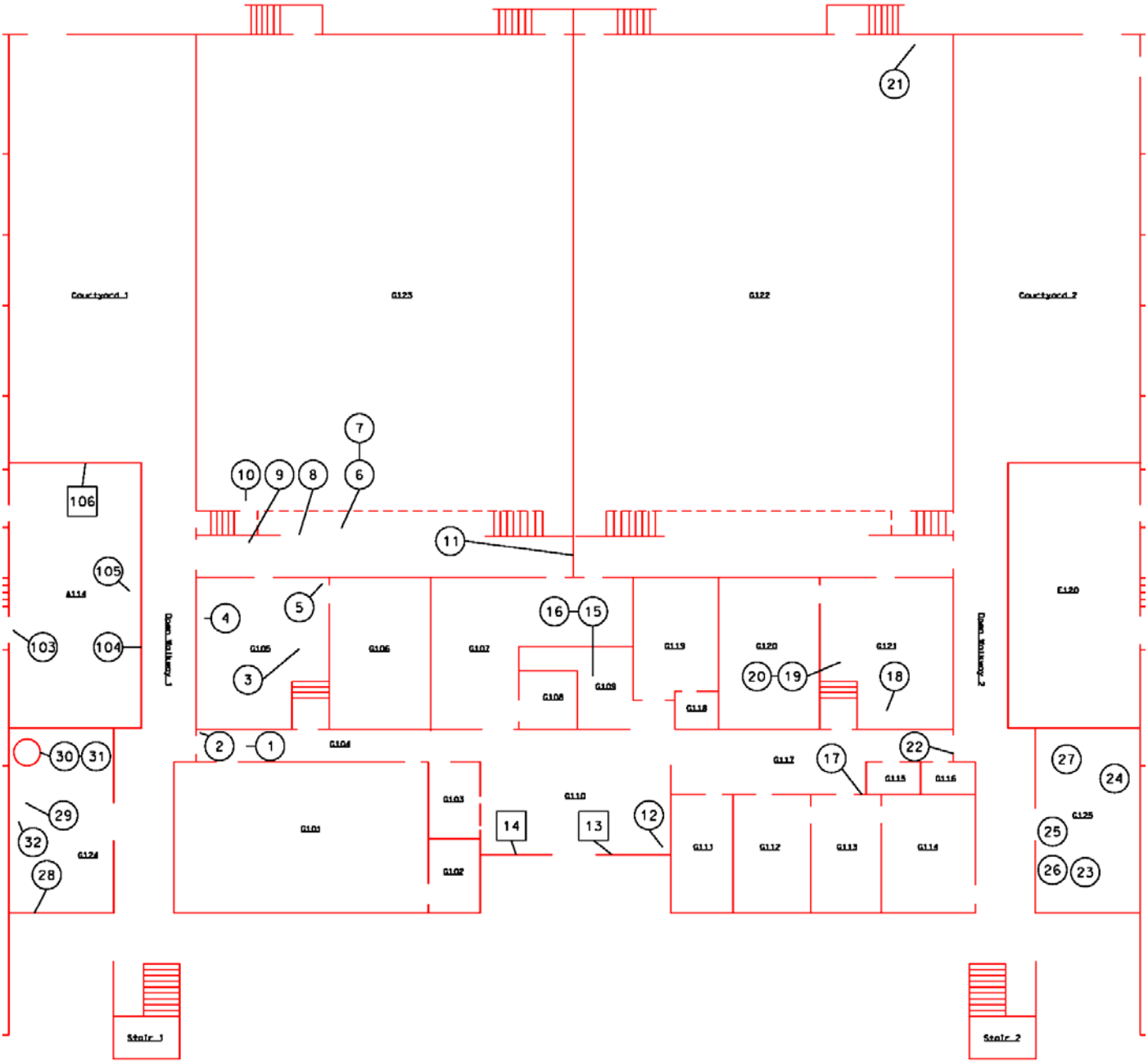

Courtyard 1
G123
G122
Courtyard 2
A114
E120
G105
G106
G107
G108
G109
G119
G120
G121
G118
G104
G101
G103
G102
G110
G117
G115
G116
G111
G112
G113
G114
G125
G124
Stair 1
Stair 2
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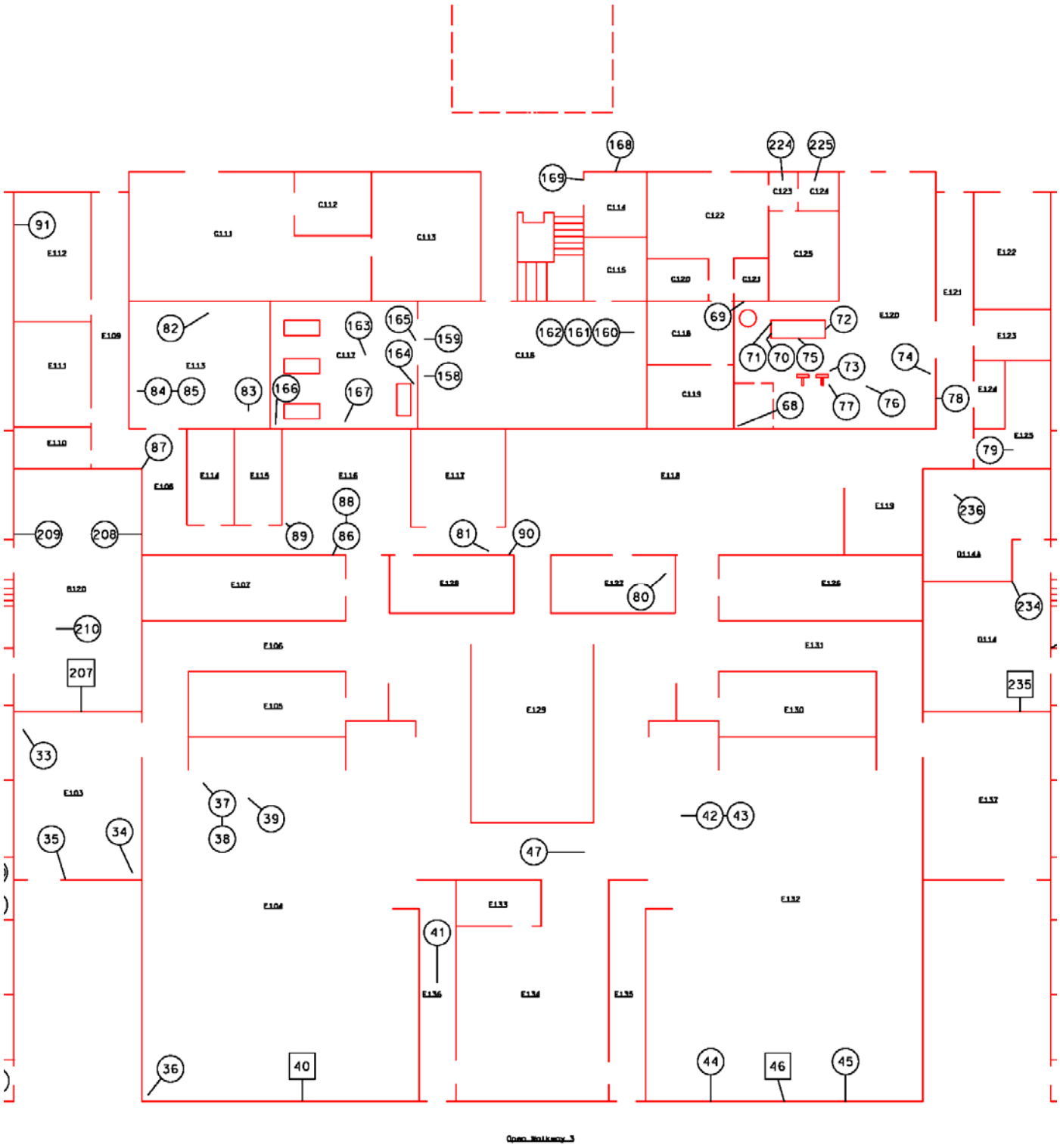
Figure 1B


168
224
225
169
91
82
163
165
159
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158
162
161
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68
77
76
78
84
85
83
166
167
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88
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86
81
90
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236
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208
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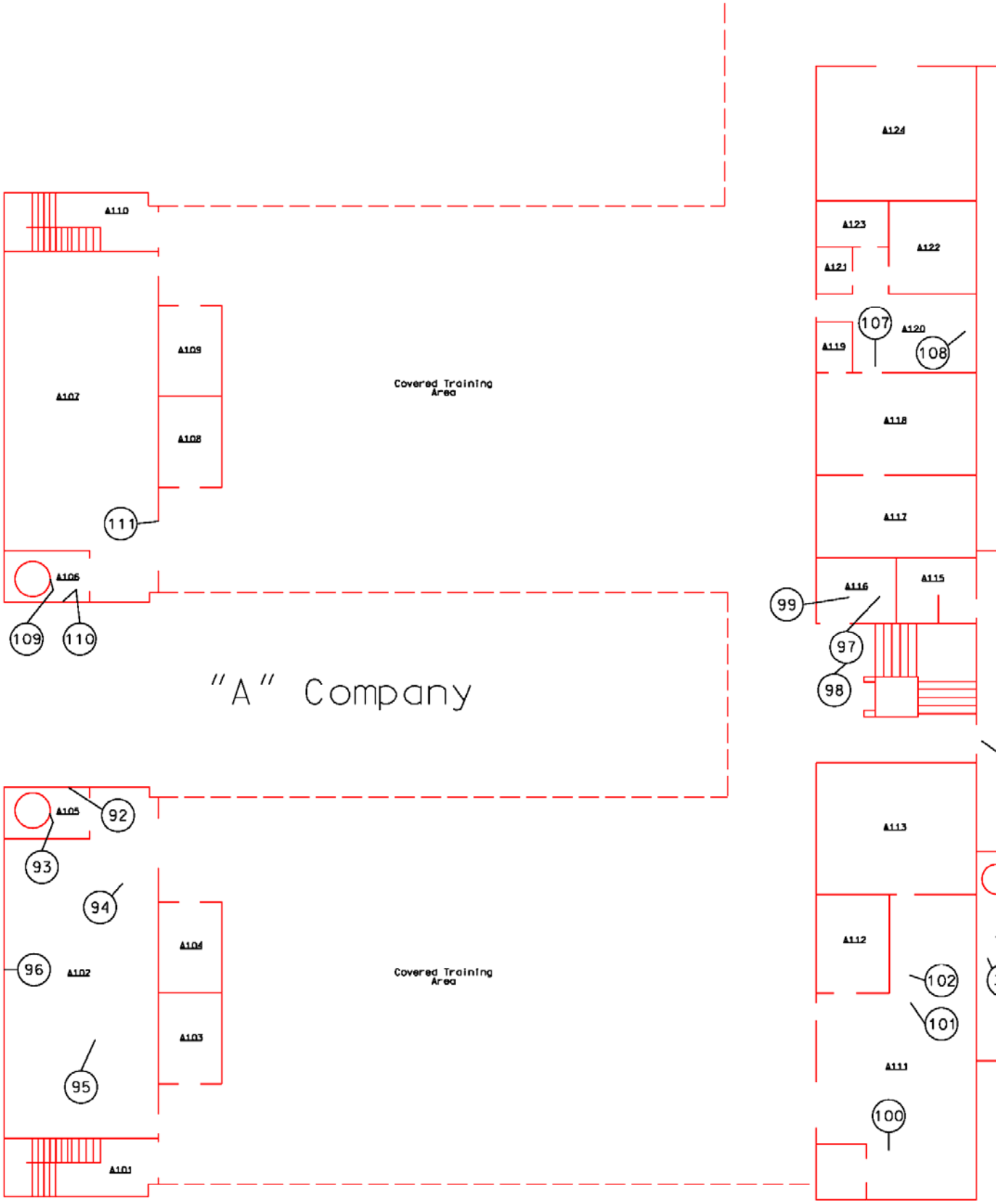
Figure 1C


A124
A123
A122
A121
A120
A119
A118
A117
A116
A115
A114
A113
A112
A111
A110
A109
A108
A107
A106
A105
A104
A103
A102
A101
Covered Training Area
Covered Training Area
"A" Company
92
93
94
95
96
97
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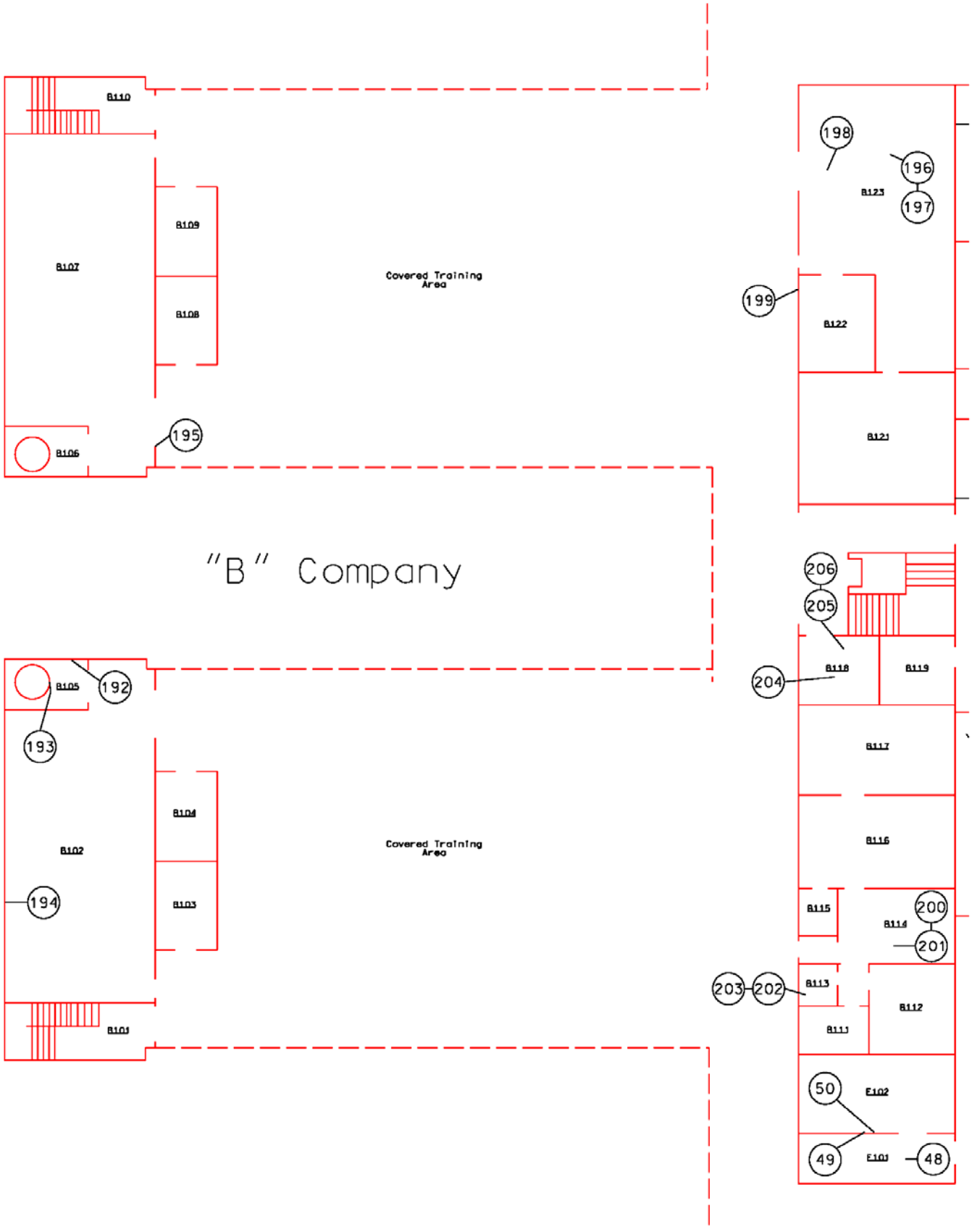
99
100
101
102
107
108
109
110
111

Figure 1D


B110
B109
B107
B108
Covered Training Area
B106
195
"B" Company
198
196
197
B123
199
B122
B121
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205
204
B118
B119
B117
B116
B115
200
B114
201
203
202
B113
B112
B111
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E102
49
E101
48
B105
192
193
B104
B102
Covered Training Area
194
B103
B101

Figure 1E

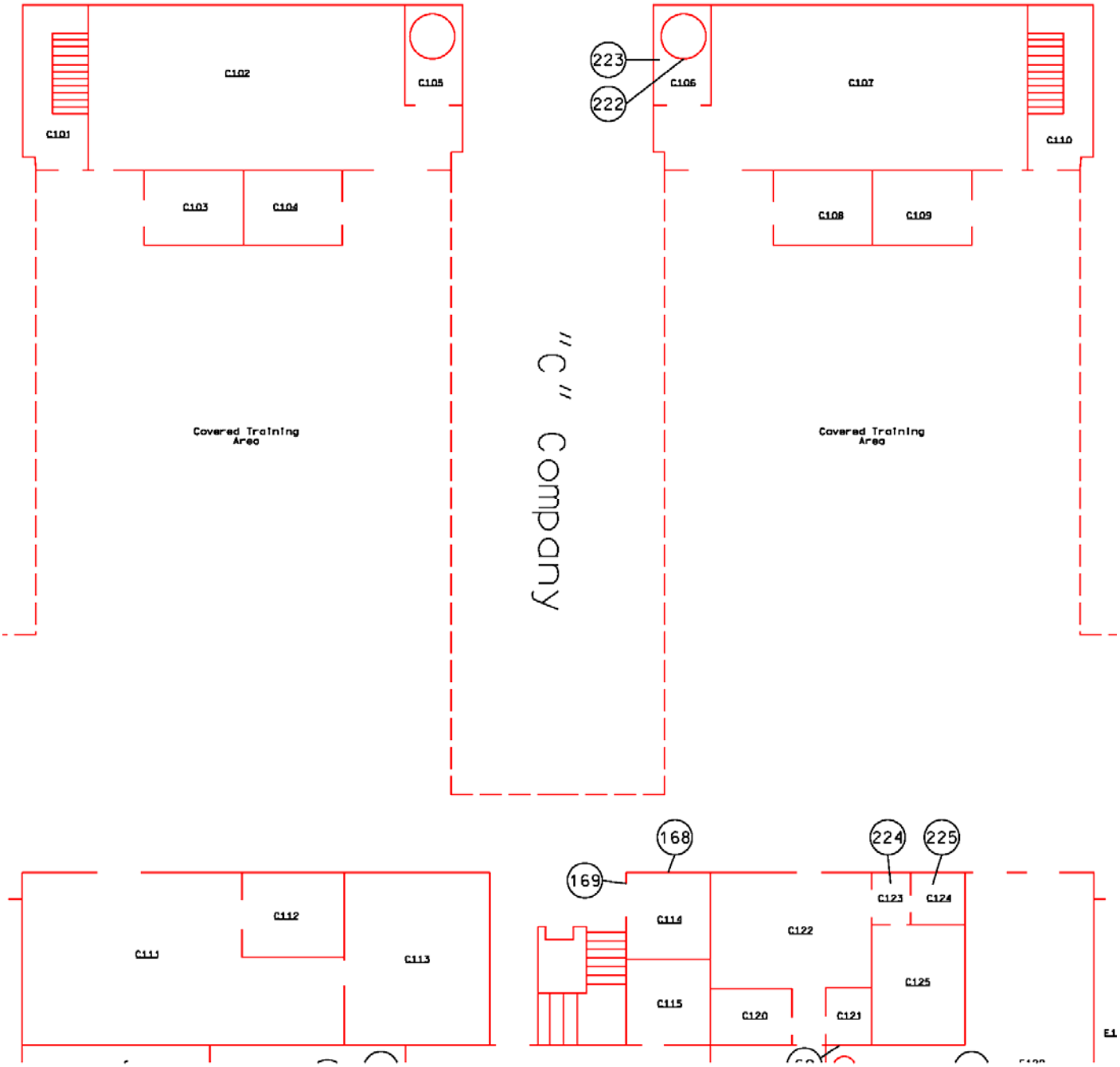

C102
C105
C101
C103
C104
Covered Training Area
223
222
C106
C107
C110
C108
C109
Covered Training Area
"C" company
168
169
224
225
C123
C124
C114
C122
C112
C111
C113
C125
C115
C120
C121
E1

Figure 1F

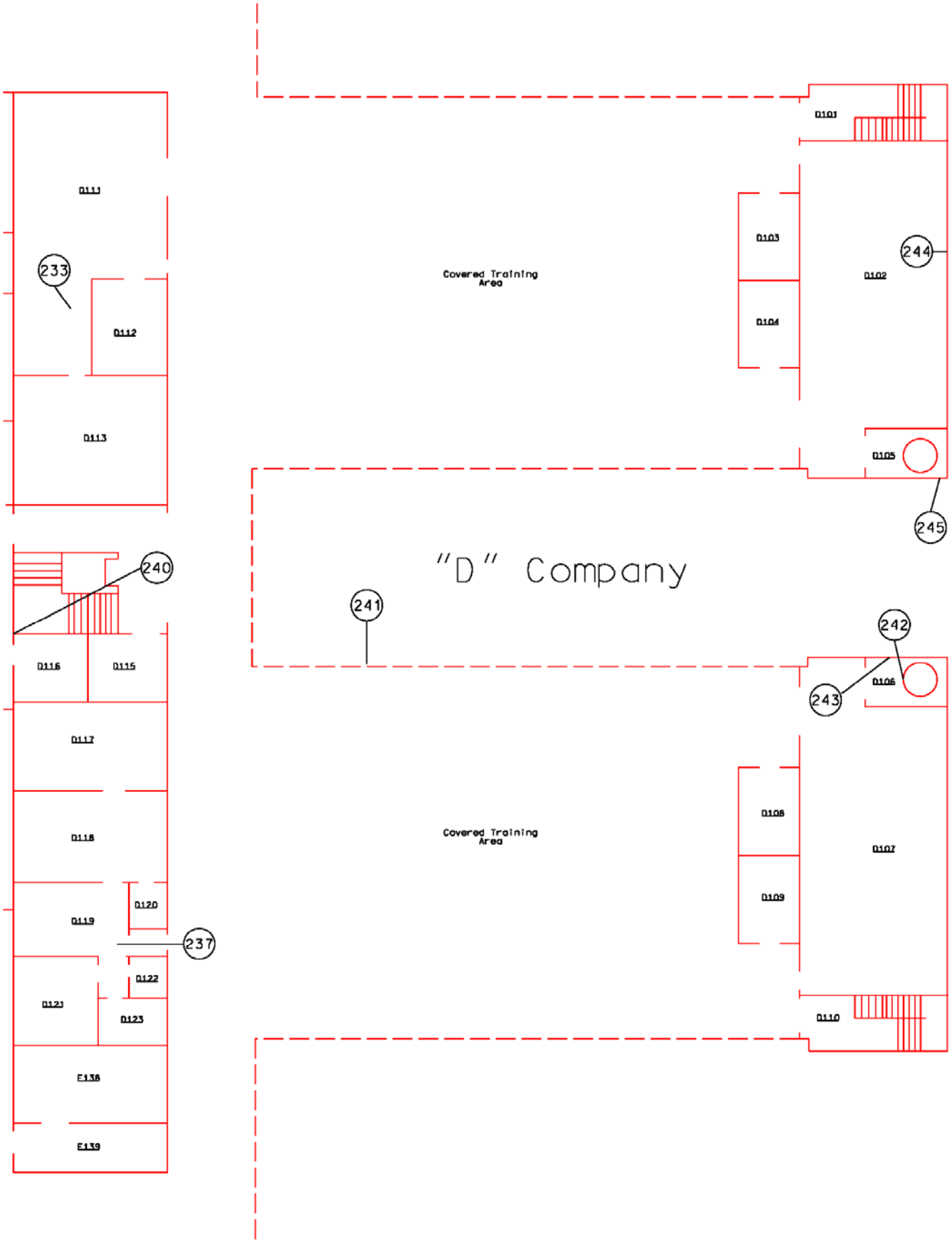

D101
D111
D103
244
233
Covered Training Area
D102
D112
D104
D113
D105
245
"D" Company
240
241
242
D116
D115
243
D106
D117
D108
D118
Covered Training Area
D107
D120
D119
237
D122
D121
D123
D110
E138
E139

Figure 1G

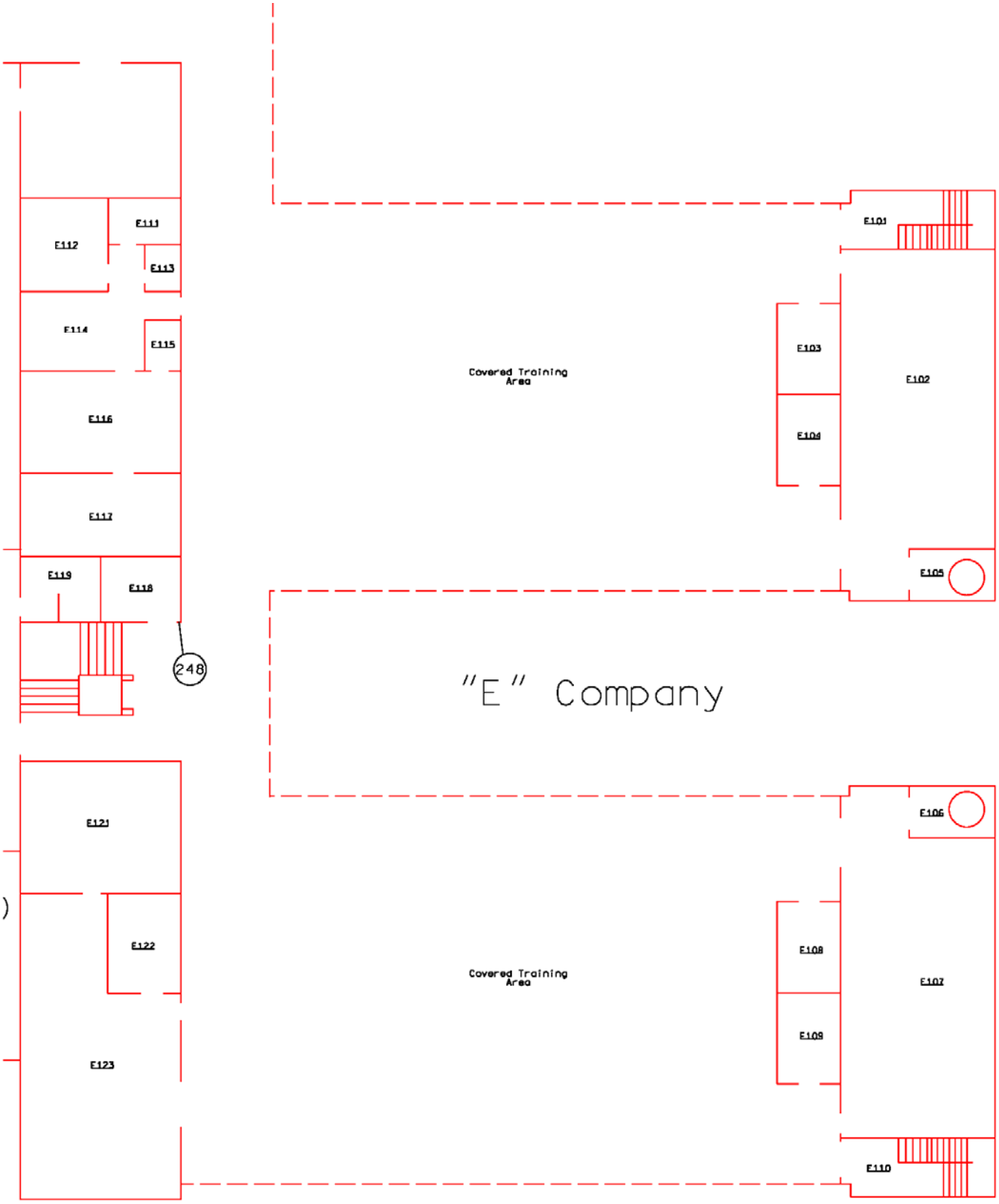
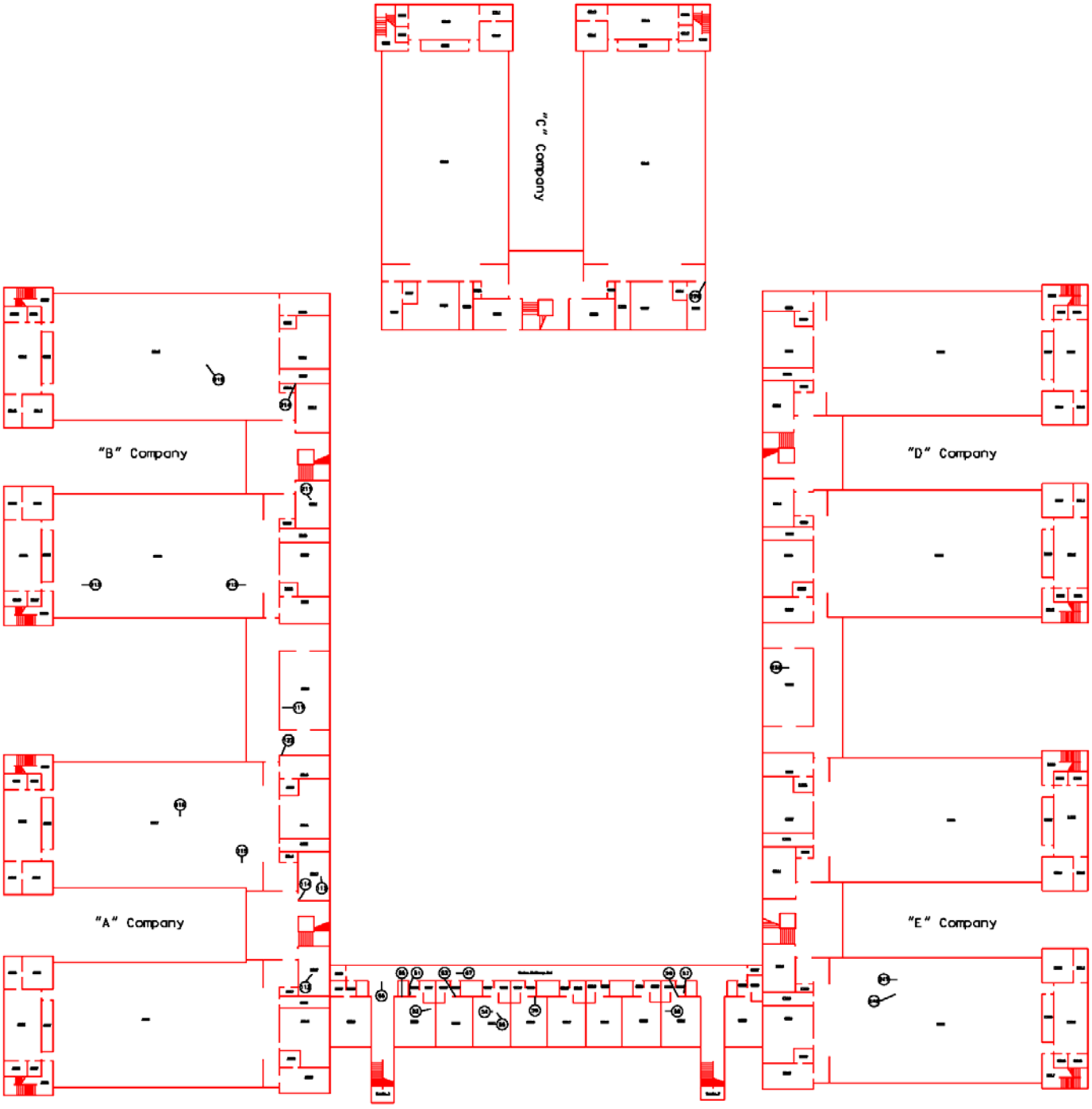
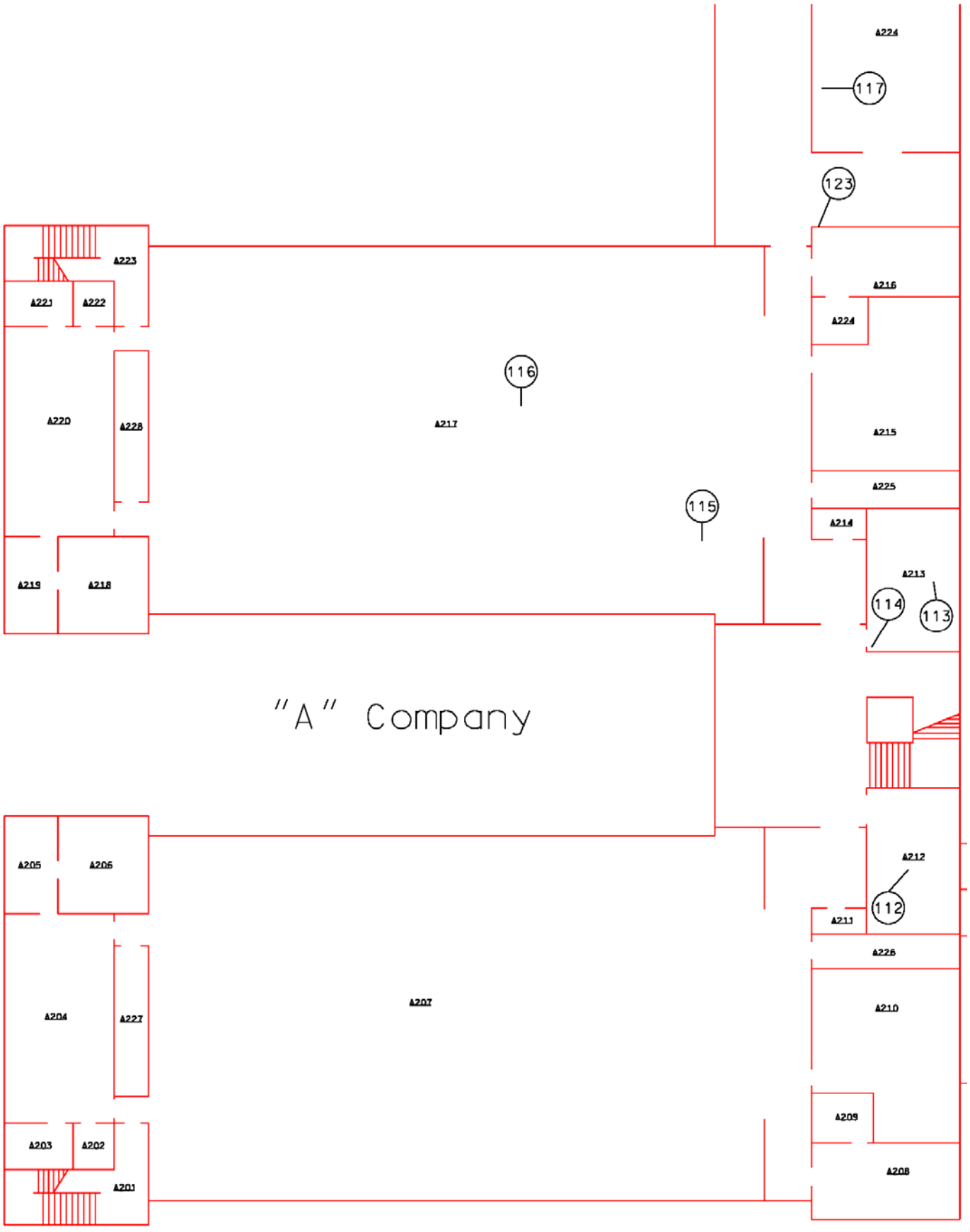

E111
E112
E113
E114
E115
E116
E117
E118
E119
248
E121
E122
E123
Covered Training Area
"E" Company
E101
E102
E103
E104
E105
E106
E107
E108
E109
E110
Covered Training Area

Figure 2



2nd Floor
Building 3425

Figure 2A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114
113
A219
A218
"A" Company
A205
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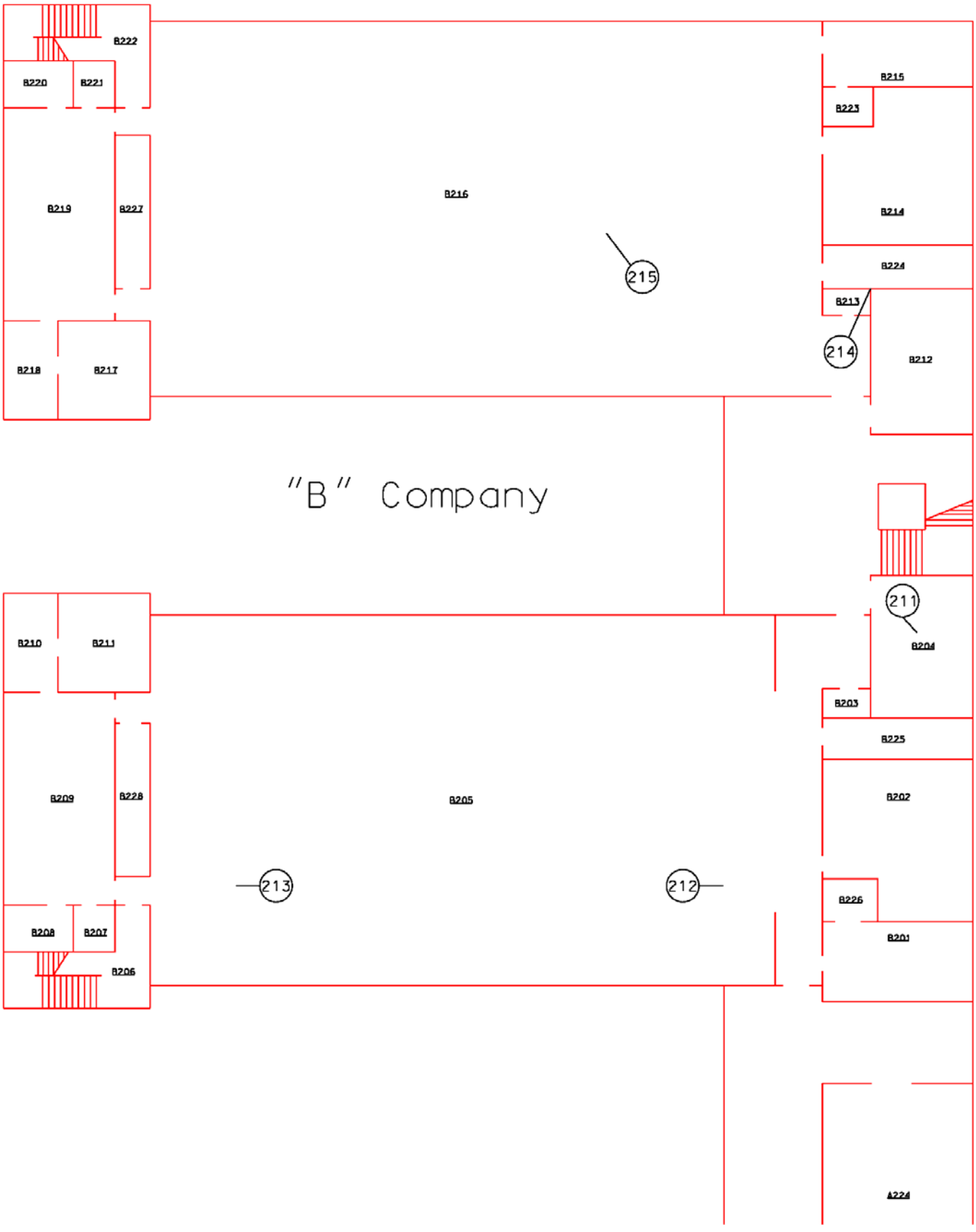
A209
A203
A202
A208
A201

Figure 2B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B227
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B224
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B212
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B218
B217
"B" Company
211
B210
B211
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212
B226
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B207
B201
B206
A224

Figure 2C

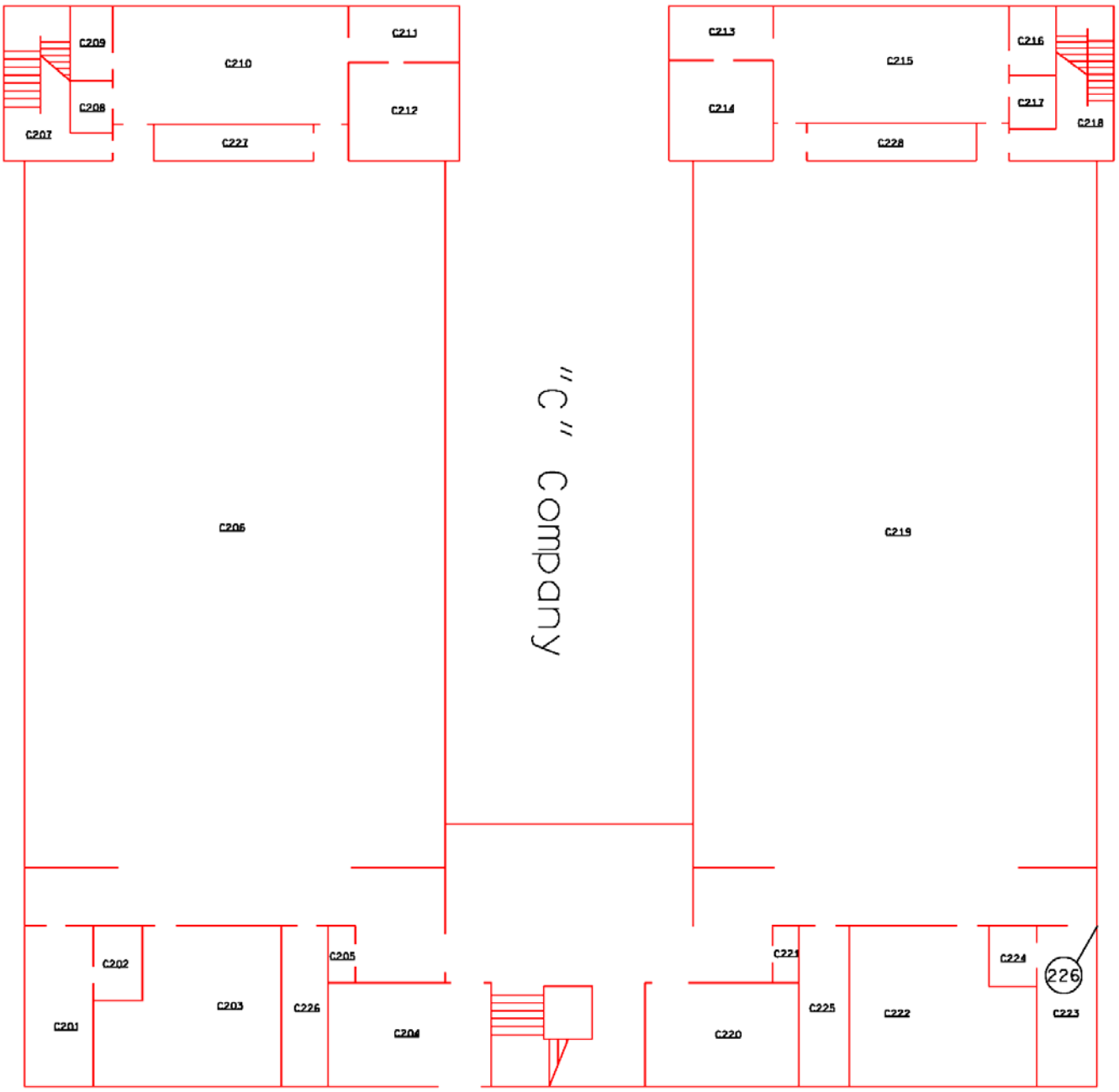
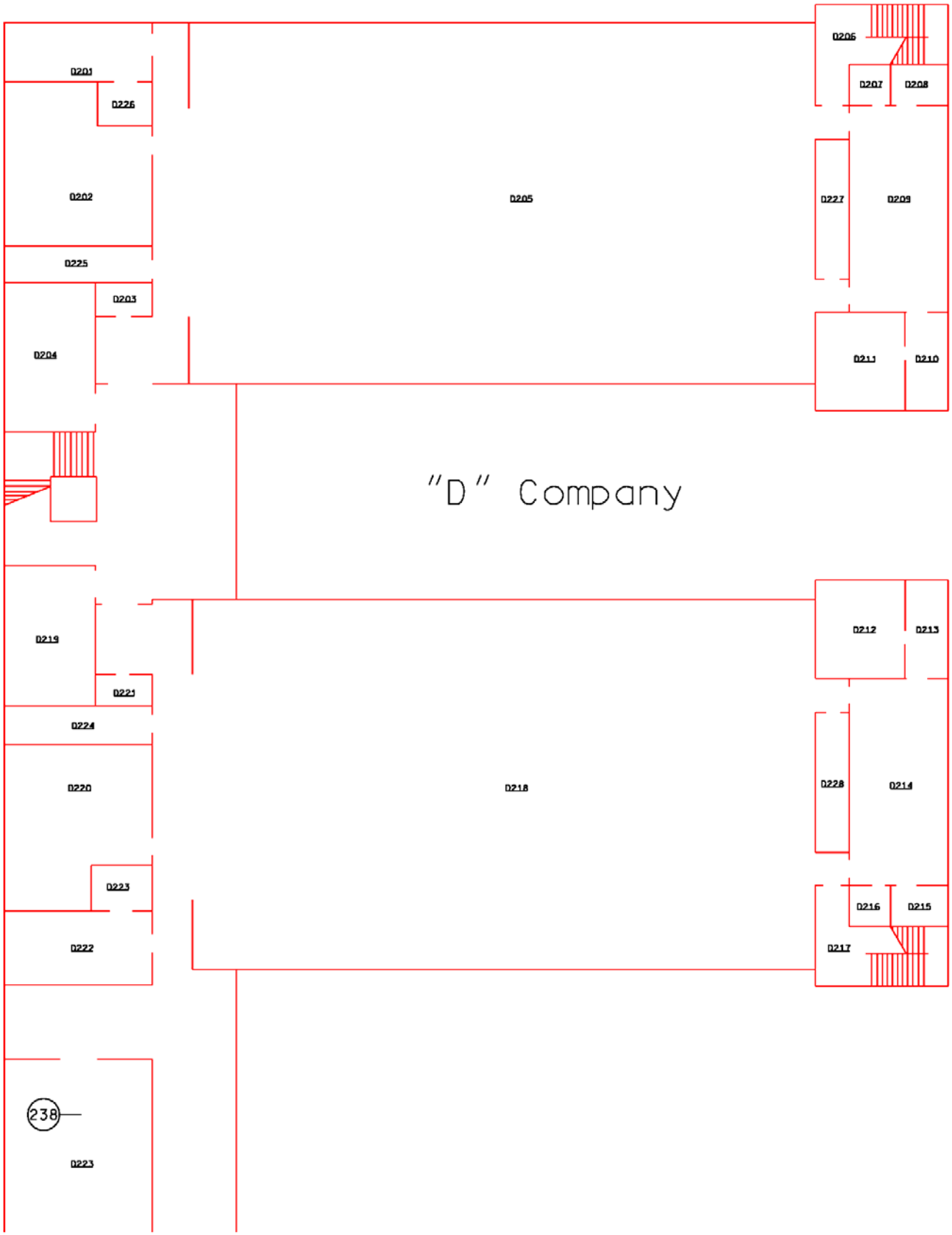

C209
C210
C211
C208
C212
C207
C227
C213
C215
C216
C214
C217
C218
C228
"C" Company
C206
C219
C202
C205
C221
C224
226
C201
C203
C226
C204
C220
C225
C222
C223

Figure 2D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D225
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D204
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"D" Company
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D221
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D212
D213
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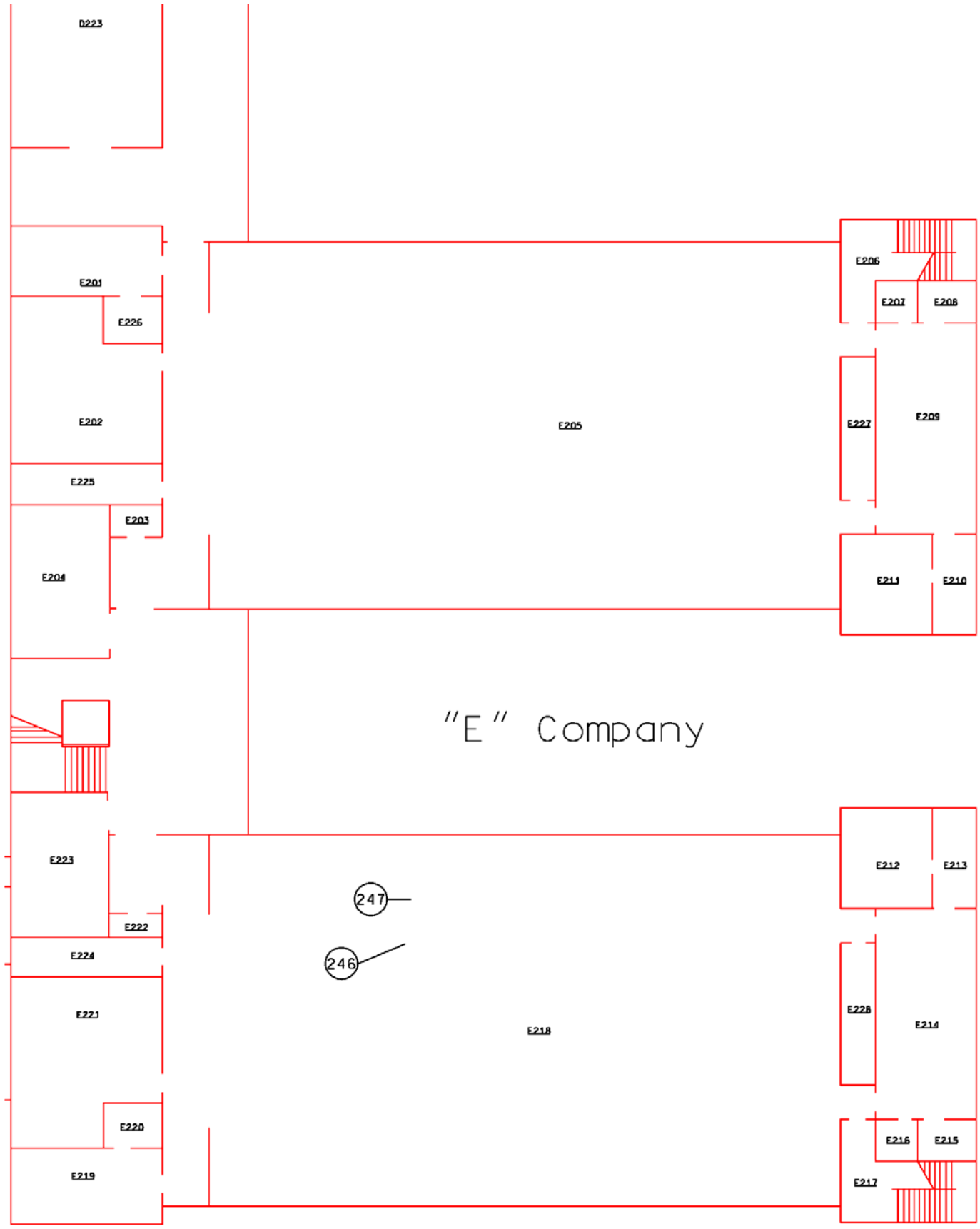
D214
D223
D216
D215
D222
D217
238
D223

Figure 2E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E201
E226
E202
E225
E203
E204
E205
E206
E207
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E227
E209
E211
E210
"E" Company
E223
E222
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E219
247
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E212
E213
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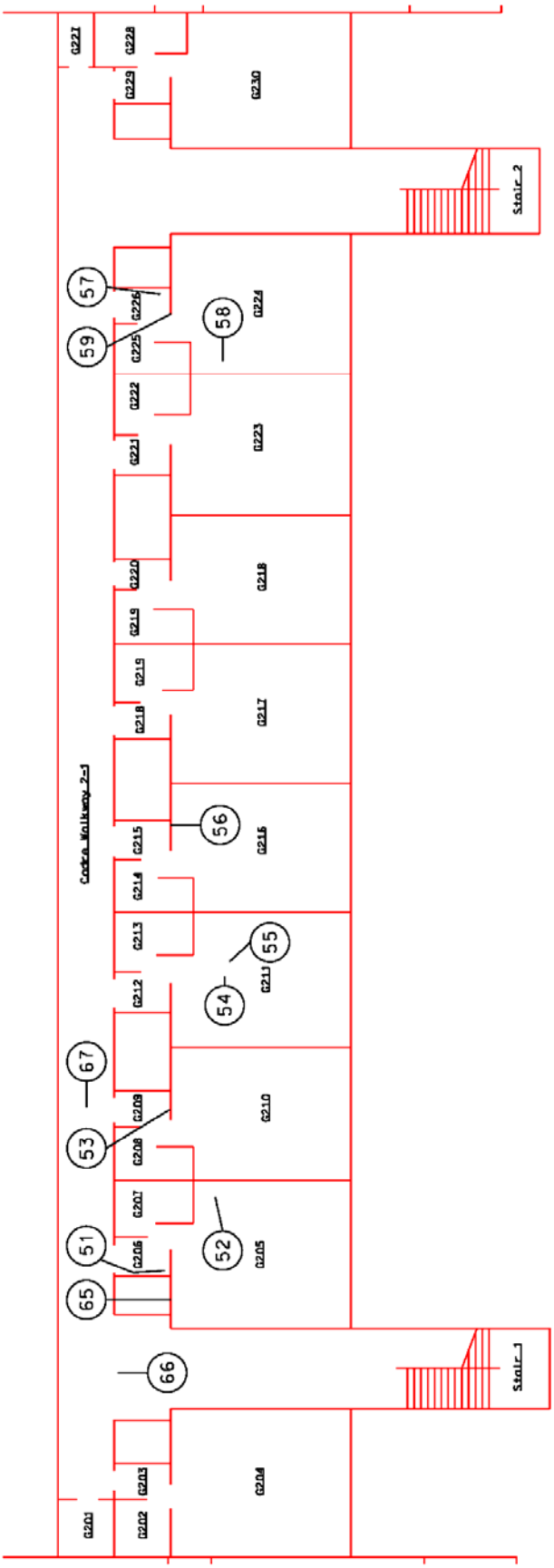
E214
E216
E215
E217

Figure 2F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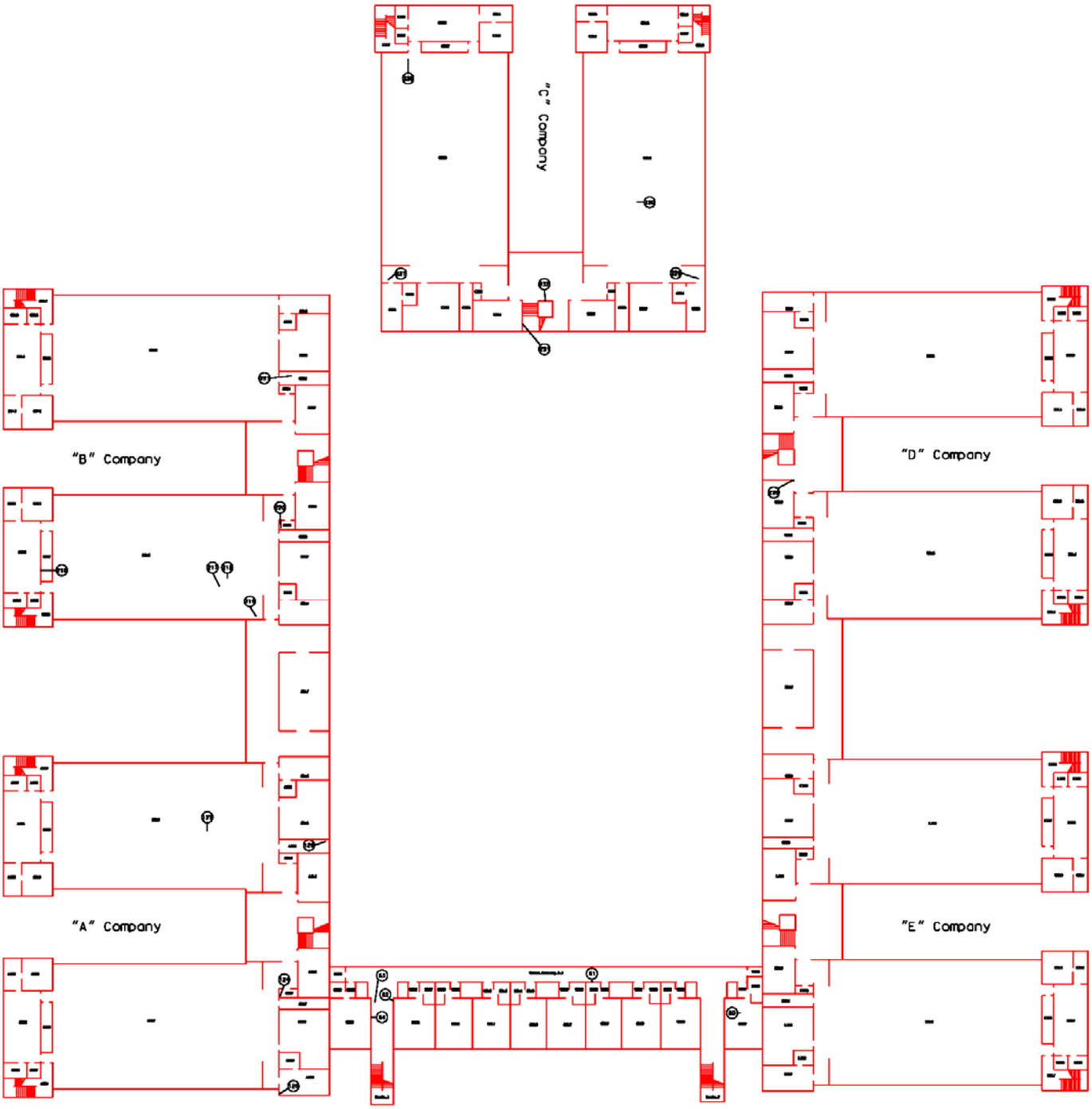
G228
G229
G230
Stair_2
57
59
G226
G225
58
G224
G222
G223
G221
G220
G218
G219
G219
G218
G217
Cadre_Walkway_2-1
56
G215
G216
G214
G213
55
G211
54
G212
67
G209
G210
53
G208
G207
51
G206
52
G205
65
66
Stair_1
G203
G204
G201
G202

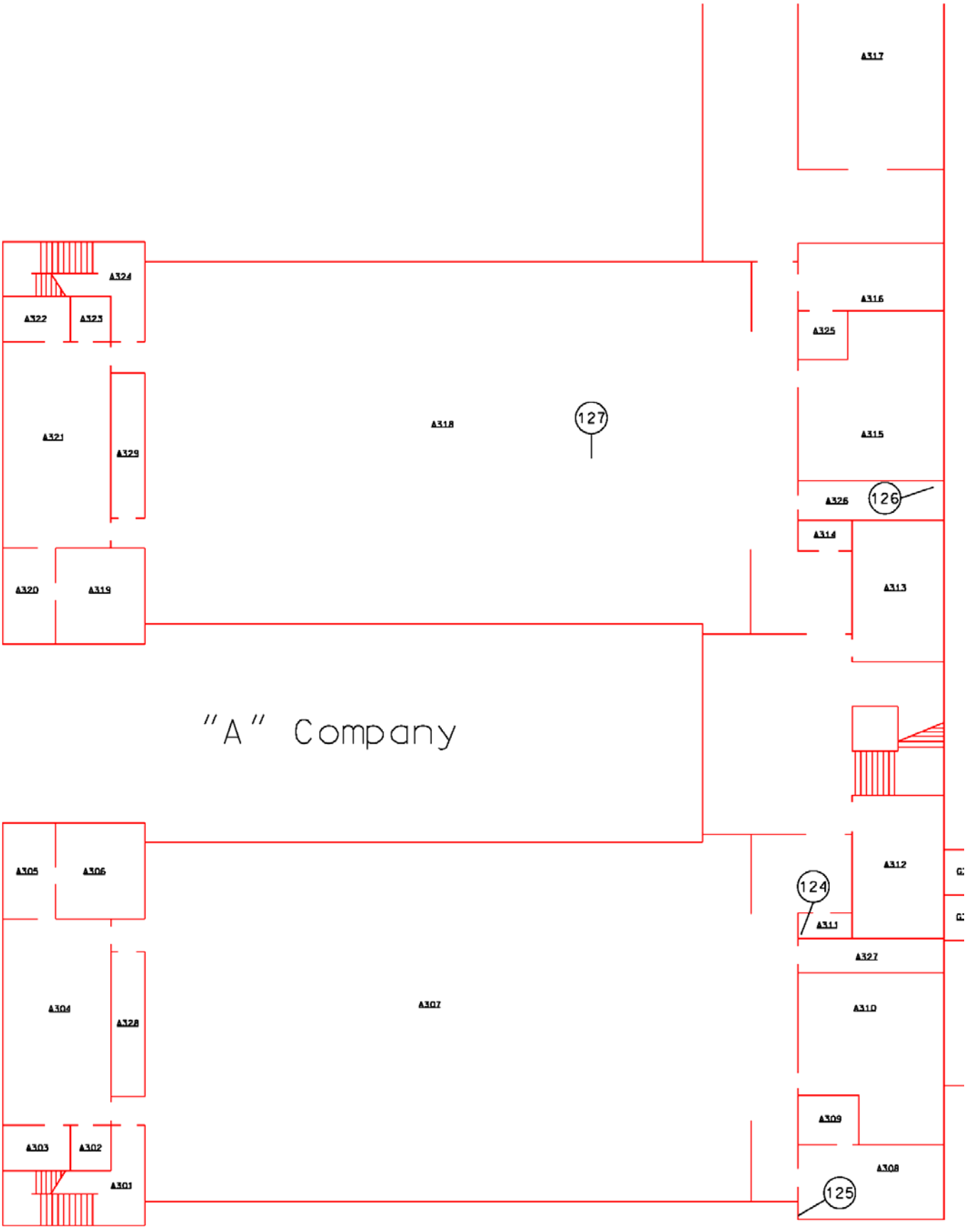
Figure 3



3rd Floor

Building 3425

Figure 3A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A313
"A" Company
A305
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A311
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A304
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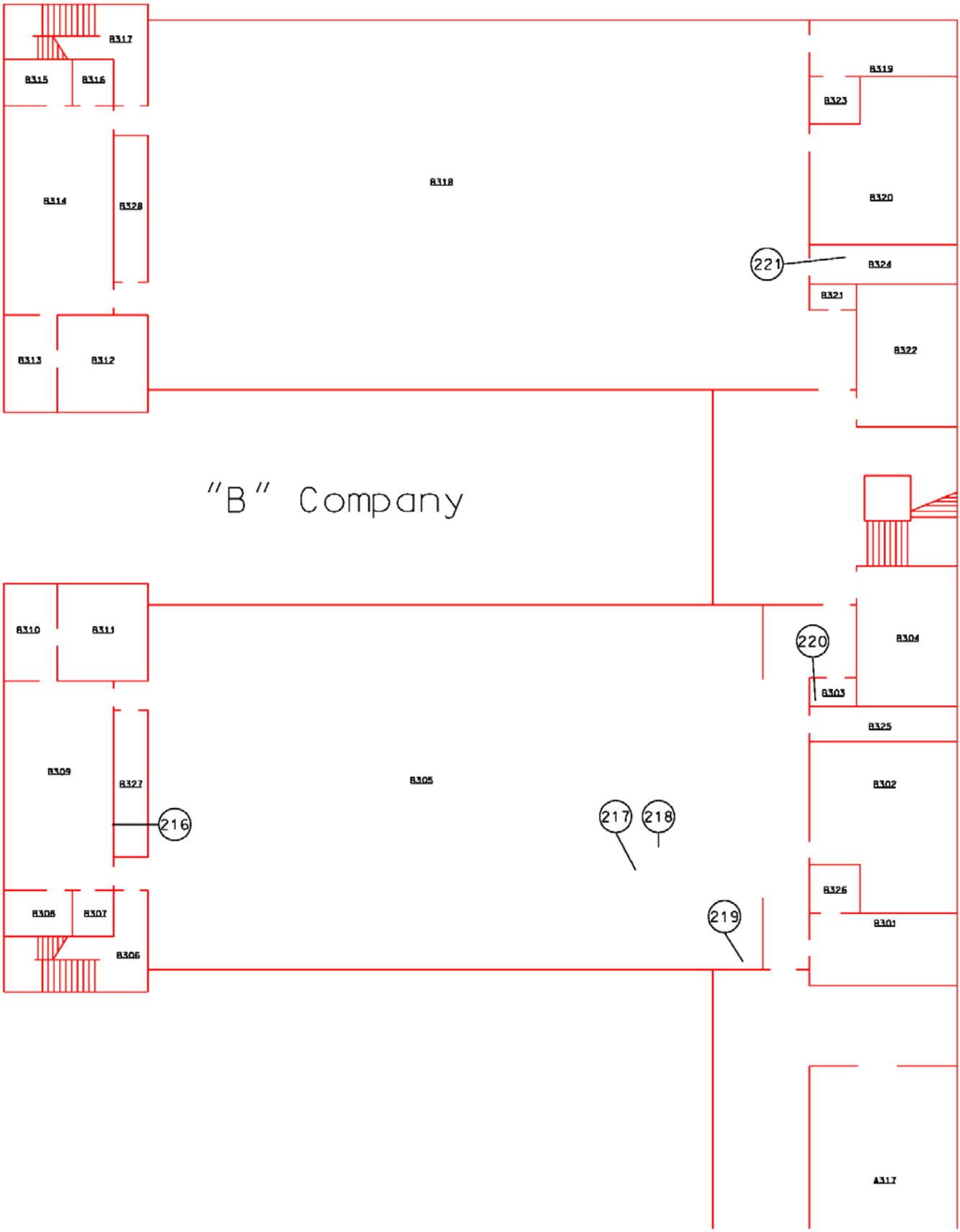
A309
A303
A302
A308
A301
125

Figure 3B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"B" Company
B310
B311
B309
B327
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B308
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B305
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B304
B303
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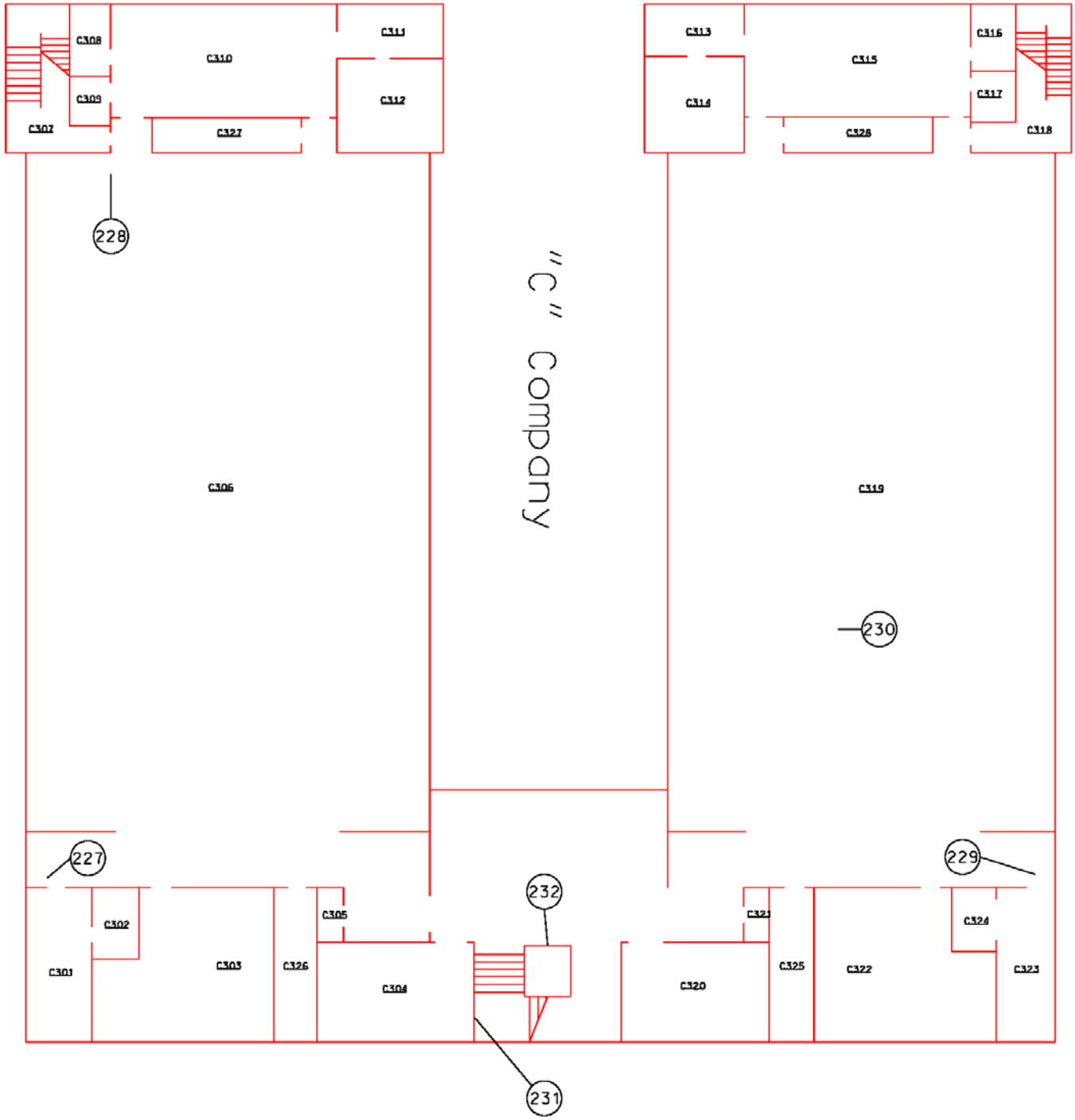
B302
B326
B301
A317

Figure 3C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C312
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C327
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C315
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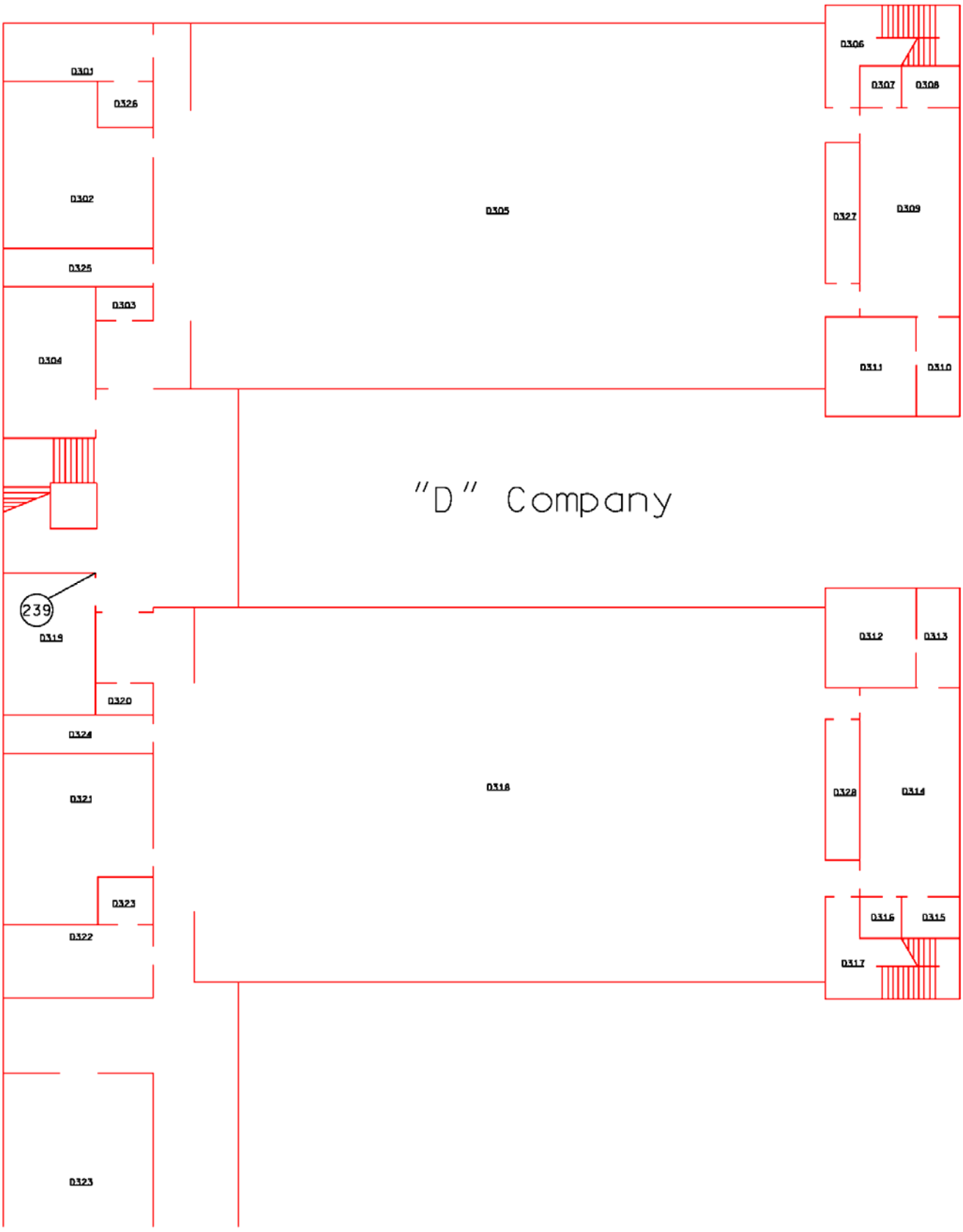
C314
C317
C328
C318
"C" company
C306
C319
230
227
229
232
C302
C305
C321
C324
C301
C303
C326
C304
C320
C325
C322
C323
231

Figure 3D


"D" Company
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0325
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0304
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0310
239
0319
0320
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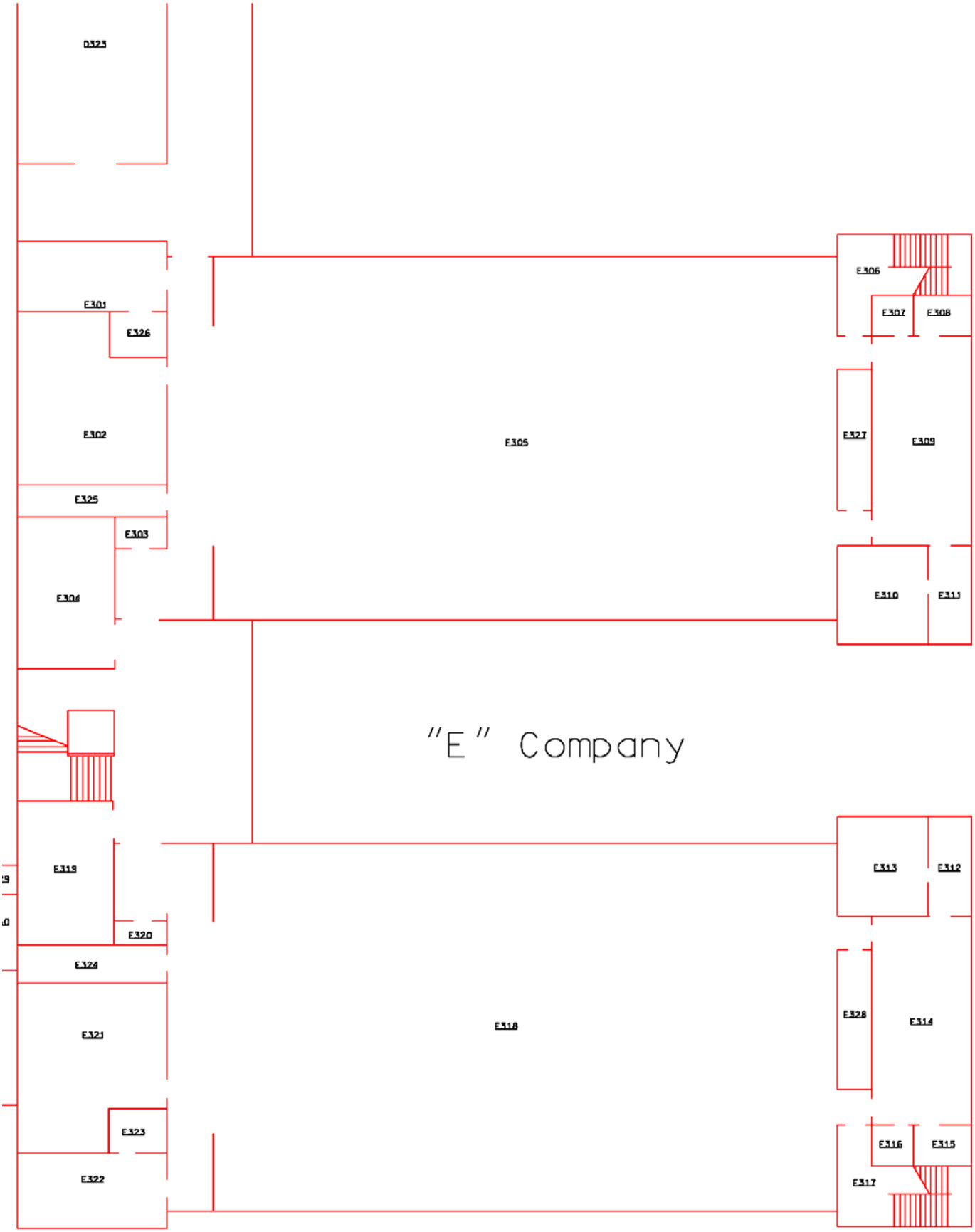
0317

Figure 3E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E301
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E302
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E303
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E307
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E309
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"E" Company
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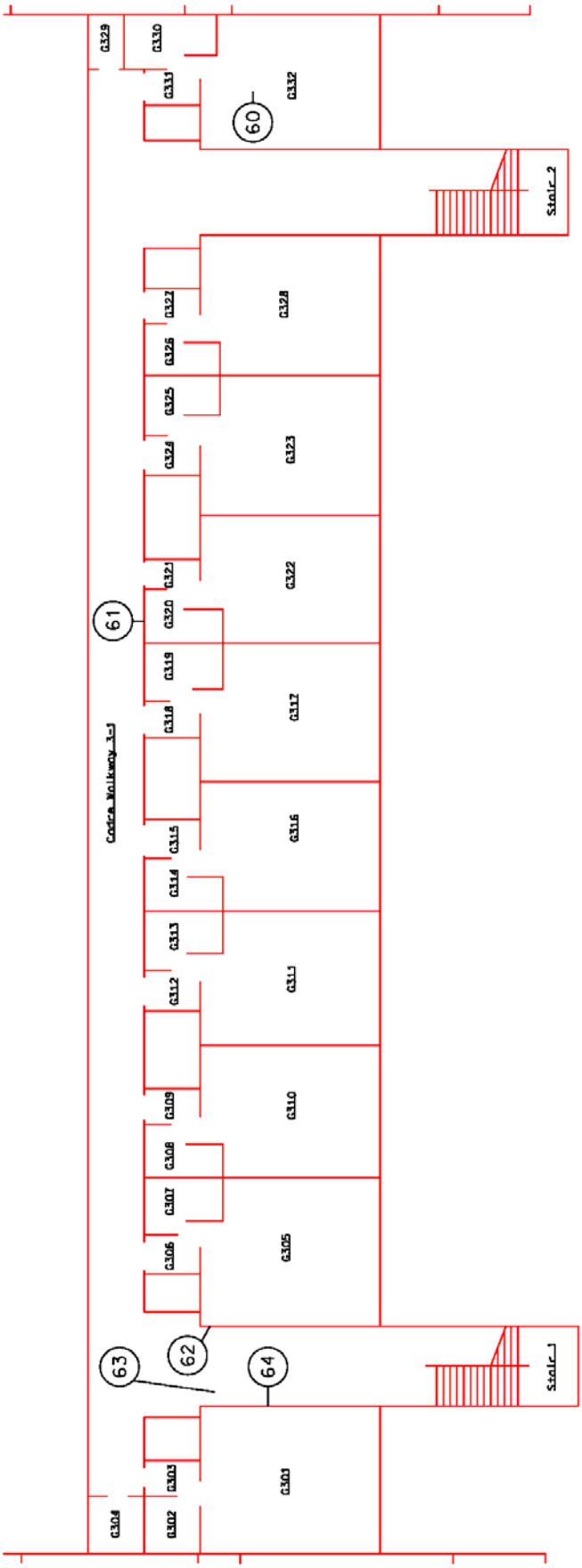
E315
E317

Figure 3F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Stair_2
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G323
G321
G322
61
G320
G319
G318
G317
Cadre_Walkway_3-1
G315
G316
G314
G313
G312
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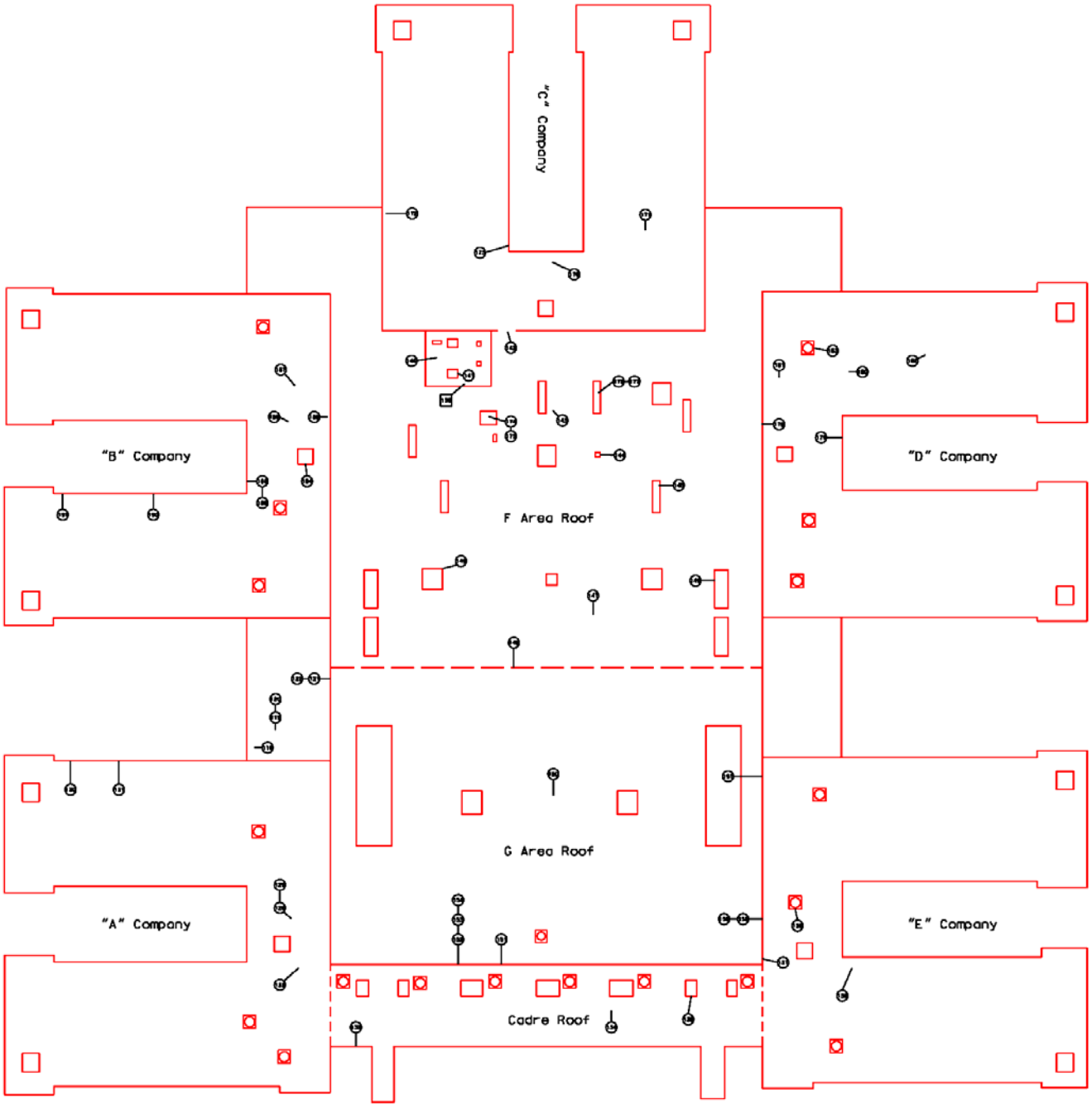
G306
G305
63
62
64
Stair_1
G303
G301
G304
G302

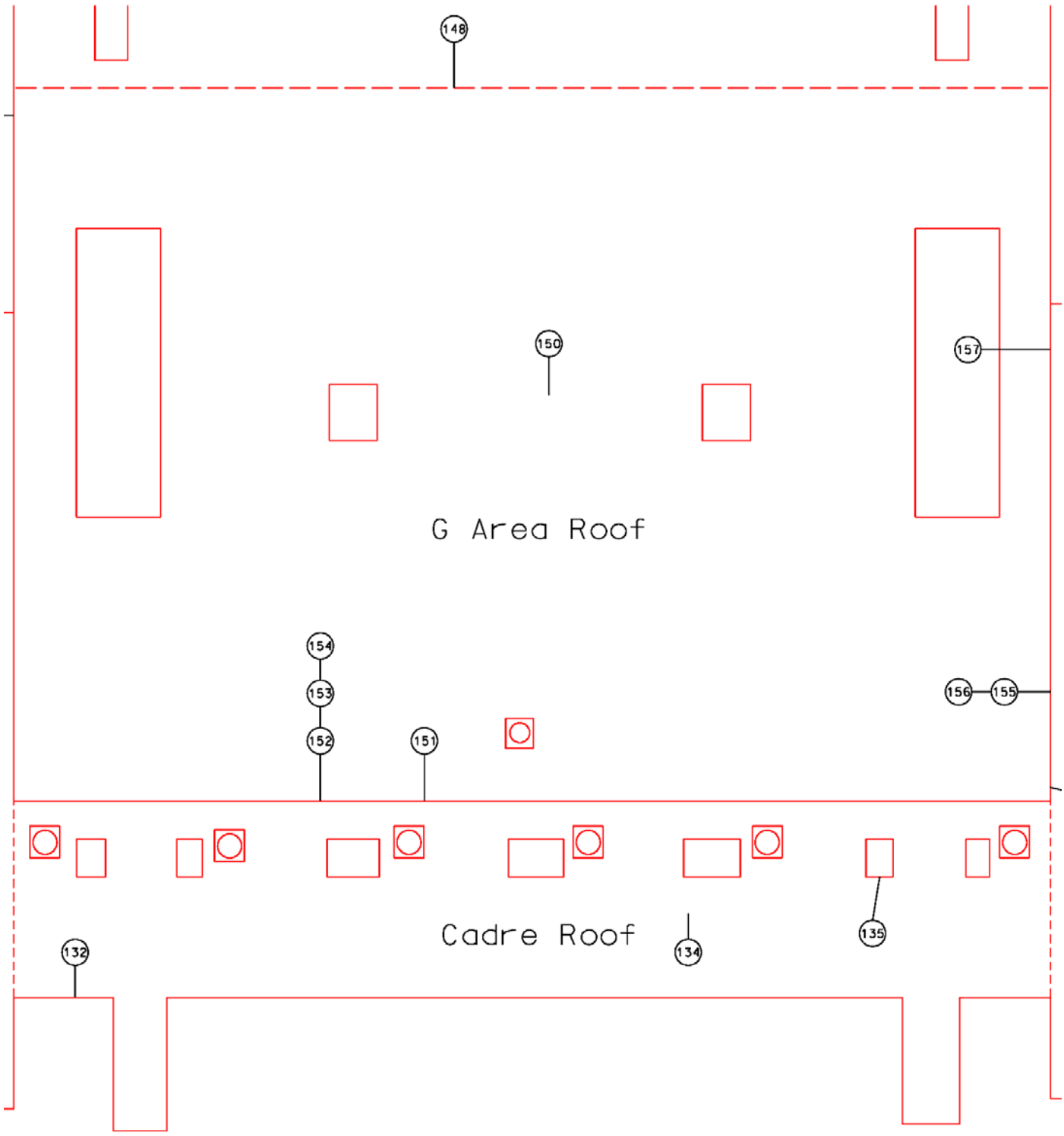
Figure 4



ROOFS

Building 3425

Figure 4A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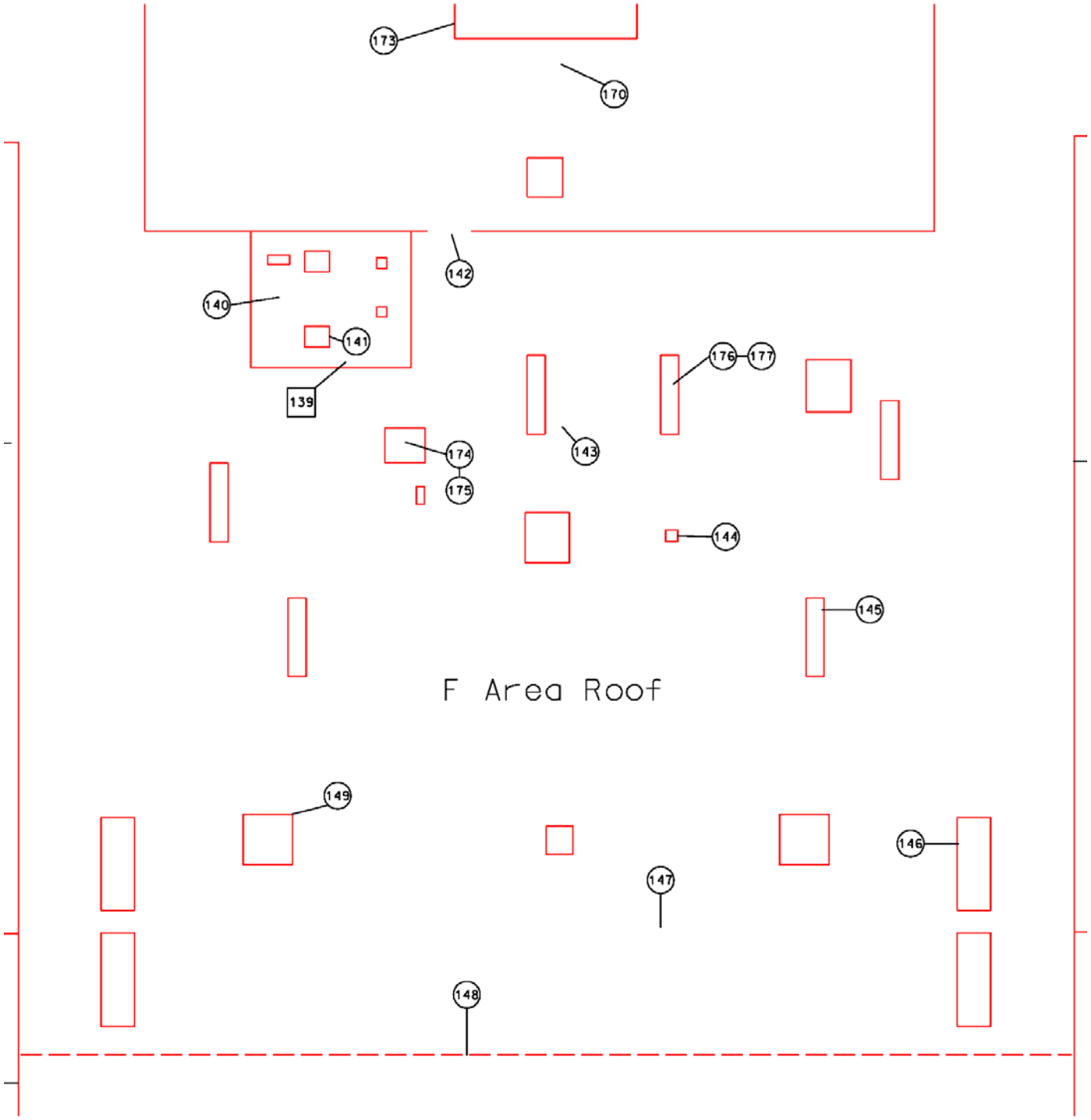
150
157
G Area Roof
154
153
152
151
156
155
Cadre Roof
132
134
135

Figure 4B


173
170
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139
176
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174
175
143
144
145
F Area Roof
149
146
147
148

Figure 4C

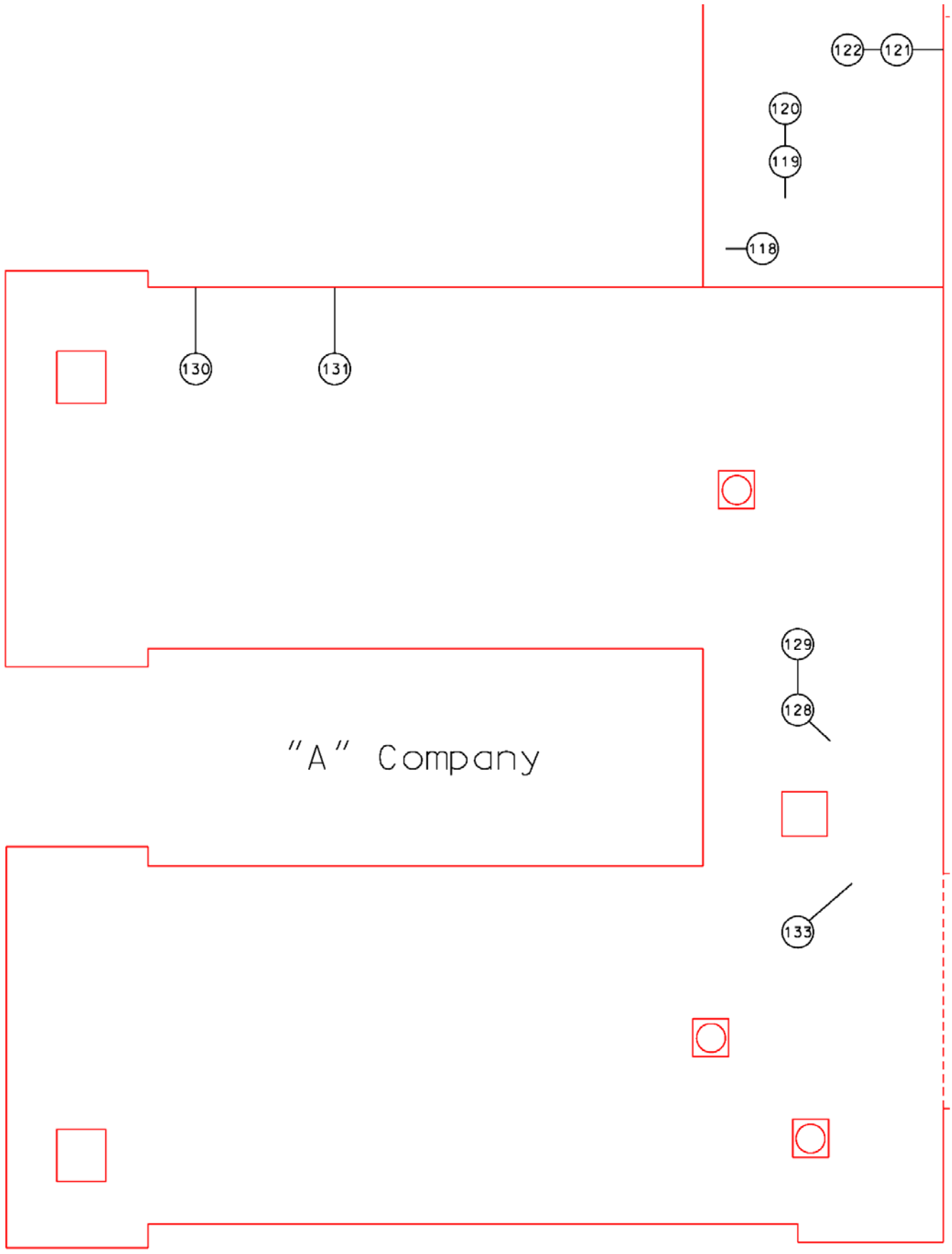


Figure 4D

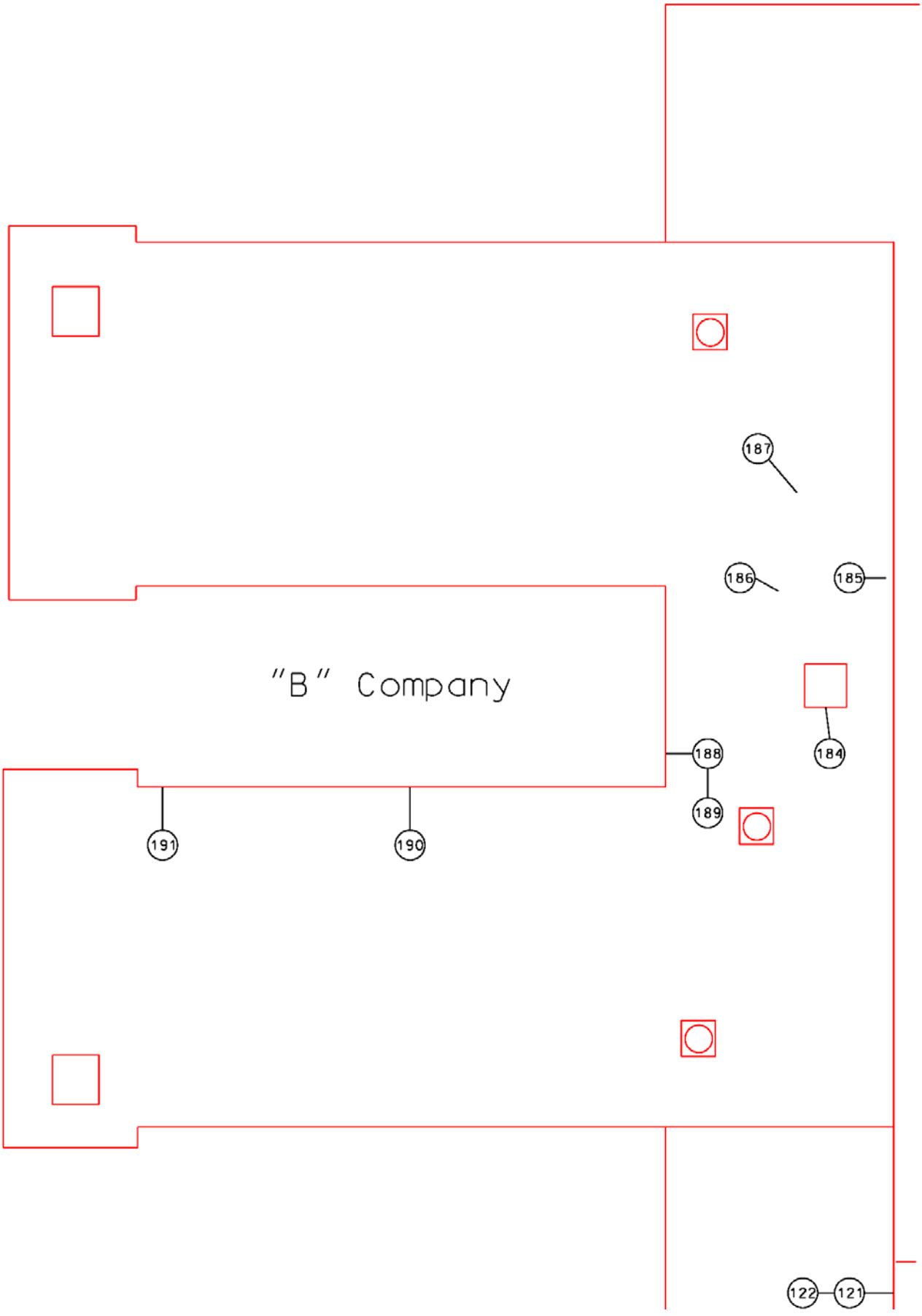


Figure 4E

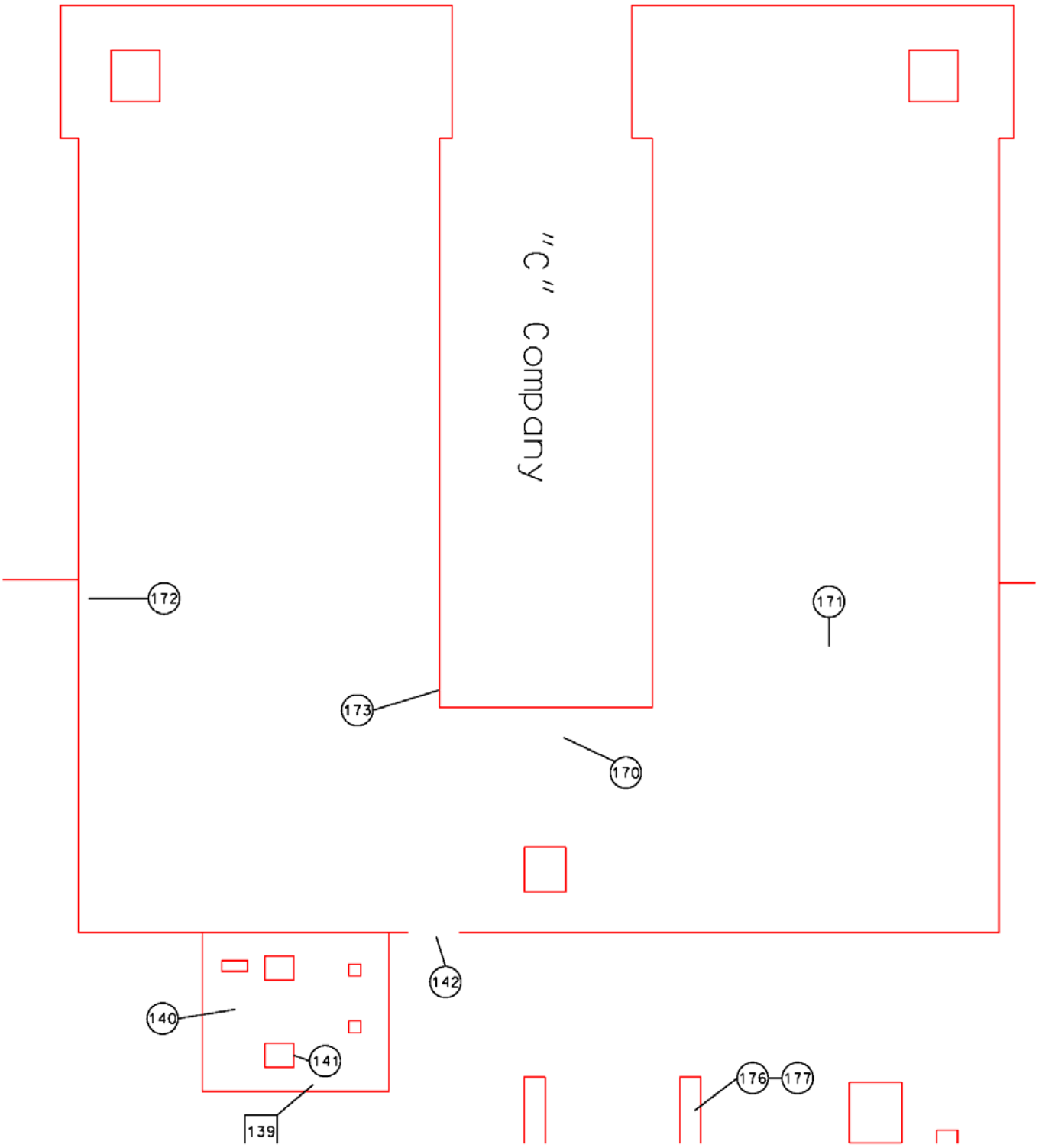


Figure 4F

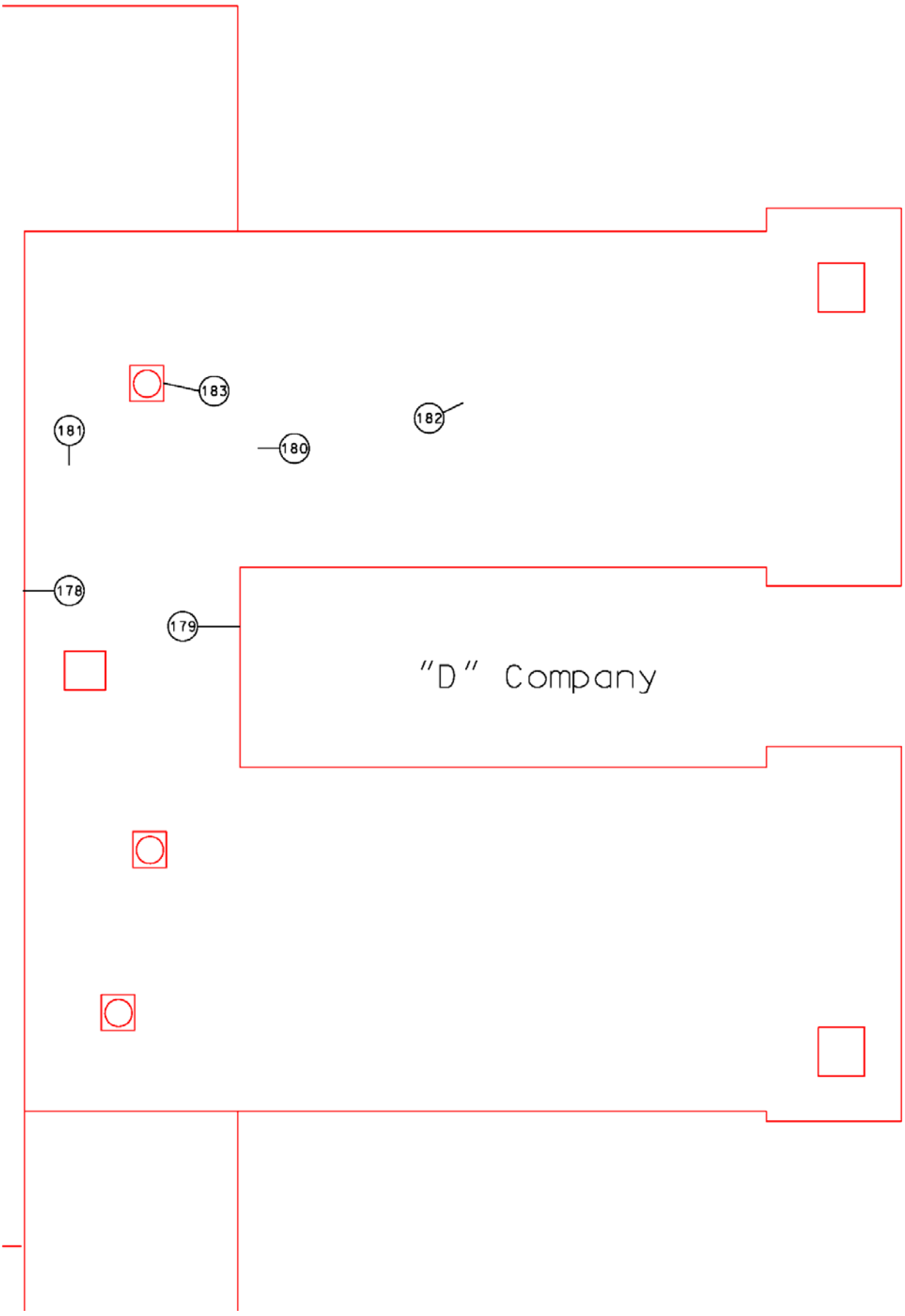
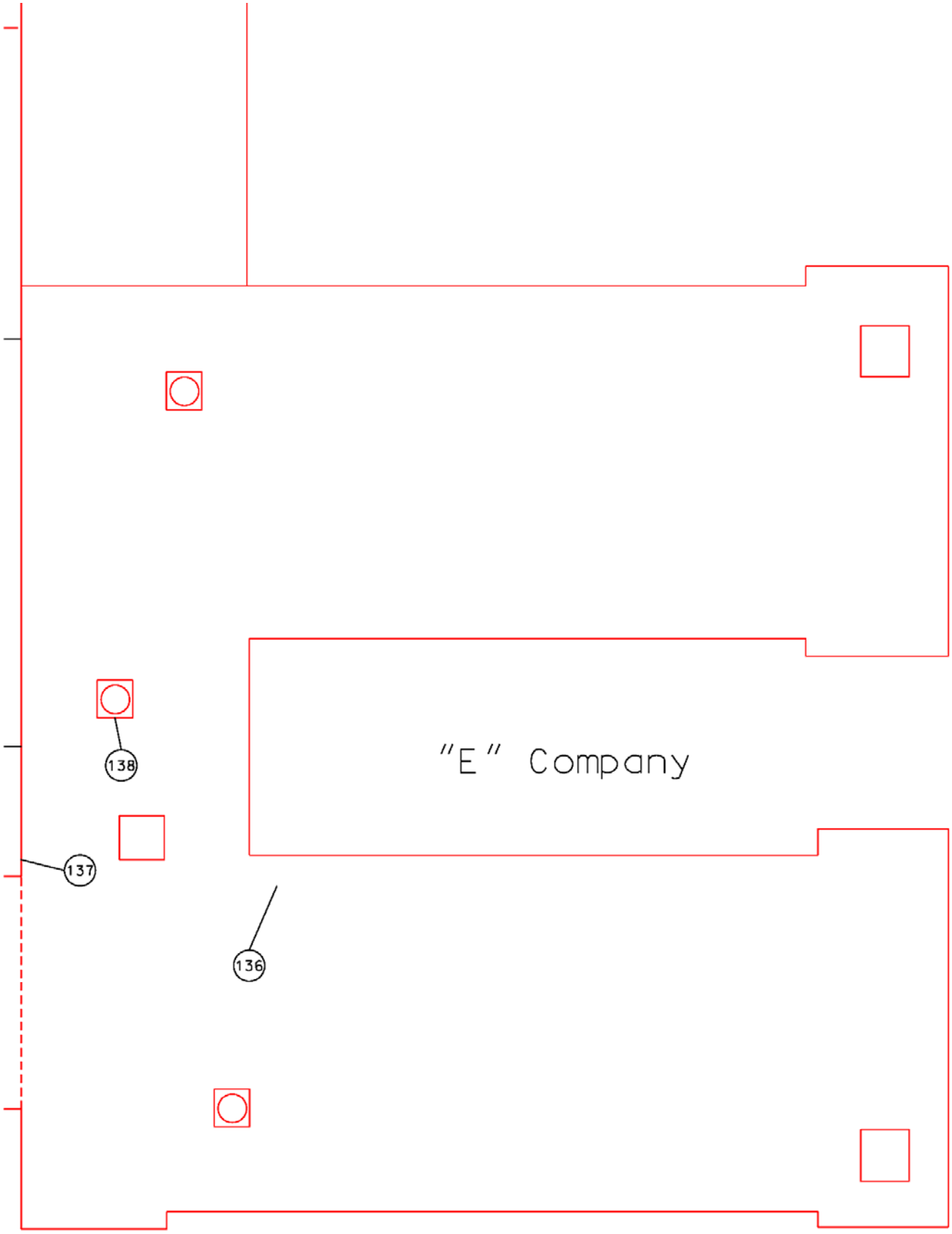


Figure 4G



Appendix A

Analytical Report, Carolina Environmental, Inc.

CAROLINA ENVIRONMENTAL, INC.
107 New Edition Court, Cary, NC 27511
Phone: (919) 481-1413 Fax: (919) 481-1442

LABORATORY REPORT
ASBESTOS BULK ANALYSIS

Client: **US Army Corps of Engineers - Savannah District - EMU9**
200 North Cobb Parkway, Bldg. 400 Ste. 404
Marietta, GA 30062

Project: Ft. Benning Building 3425; 10303

CEI Lab Code: A10-4048
Received: 05-14-10
Analyzed: 05-15-10
Reported: 05-15-10
Analyst: Ashley Miller

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
3425-1-1	A1022839	FIREPROOFING				ND
	Homogeneous,	Grey, Fibrous, Loosely Bound				
		BIND	10 %	FBGL	90 %	
				CELL	<1 %	
3425-1-2	A1022840A	FLOOR TILE				ND
	Homogeneous,	Beige, Non-fibrous, Bound				
		VINYL	100 %	CELL	<1 %	
	A1022840B	MASTIC				ND
	Homogeneous,	Black, Fibrous, Bound				
		MAST	95 %	CELL	5 %	
3425-1-3	A1022841	FIREPROOFING				ND
	Homogeneous,	Grey, Fibrous, Loosely Bound				
		BIND	10 %	FBGL	90 %	
				CELL	<1 %	
3425-1-4	A1022842	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-1-5	A1022843A	FLOOR TILE				ND
	Homogeneous,	Beige, Non-fibrous, Bound				
		VINYL	100 %	CELL	<1 %	

CAROLINA ENVIRONMENTAL, INC.
107 New Edition Court, Cary, NC 27511
Phone: 919-481-1413 Fax: 919-481-1442

Project: Ft. Benning Building 3425; 10303

Lab Code: A10-4048

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION					% ASBESTOS
	A1022843B	MASTIC					ND
	Homogeneous,	Black, Fibrous, Bound					
			MAST	95 %	CELL	5 %	
3425-1-6	A1022844	MASTIC					ND
	Homogeneous,	White, Fibrous, Bound					
			MAST	100 %	FBGL	<1 %	
					CELL	<1 %	
					WOLL	<1 %	
3425-1-7	A1022845	CEILING TILE					ND
	Heterogeneous,	White, Tan, Fibrous, Loosely Bound					
			PERL	20 %	CELL	60 %	
			PAINT	5 %	FBGL	15 %	
3425-1-8	A1022846	CEILING TILE					ND
	Heterogeneous,	White, Tan, Fibrous, Loosely Bound					
			PERL	20 %	CELL	60 %	
			PAINT	5 %	FBGL	15 %	
3425-1-9	A1022847	MASTIC					ND
	Homogeneous,	White, Fibrous, Bound					
			MAST	100 %	FBGL	<1 %	
					CELL	<1 %	
3425-1-10	A1022848A	FLOOR TILE					ND
	Homogeneous,	Beige, Non-fibrous, Bound					
			VINYL	100 %	CELL	<1 %	
	A1022848B	MASTIC					ND
	Homogeneous,	Black, Fibrous, Bound					
			MAST	95 %	CELL	5 %	

CAROLINA ENVIRONMENTAL, INC.
107 New Edition Court, Cary, NC 27511
Phone: 919-481-1413 Fax: 919-481-1442

Project: Ft. Benning Building 3425; 10303

Lab Code: A10-4048

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION					% ASBESTOS
3425-1-11	A1022849	DRYWALL JOINT COMPOUND					ND
	Heterogeneous,	White, Fibrous, Bound					
		PLAS	90 %	CELL	5 %		
		PAINT	5 %	FBGL	<1 %		
3425-1-12	A1022850A	MASTIC					ND
	Homogeneous,	Yellow, Non-fibrous, Bound					
		MAST	100 %	CELL	<1 %		
	A1022850B	FLOOR TILE					ND
	Homogeneous,	Beige, Non-fibrous, Bound					
		VINYL	100 %	CELL	<1 %		
	A1022850C	MASTIC					ND
	Homogeneous,	Black, Fibrous, Bound					
		MAST	95 %	CELL	5 %		
3425-1-13	A1022851	CAULKING					CHRY 10%
	Heterogeneous,	Grey, Fibrous, Bound					
		CHRY 10%	CAULK	90 %	CELL	<1 %	
3425-1-14	A1022852	CAULKING					CHRY 10%
	Heterogeneous,	Grey, Fibrous, Bound					
		CHRY 10%	CAULK	90 %	CELL	<1 %	
3425-1-15	A1022853	MASTIC					ND
	Homogeneous,	White, Fibrous, Bound					
		MAST	100 %	FBGL	<1 %		
				CELL	<1 %		

CAROLINA ENVIRONMENTAL, INC.
107 New Edition Court, Cary, NC 27511
Phone: 919-481-1413 Fax: 919-481-1442

Project: Ft. Benning Building 3425; 10303

Lab Code: A10-4048

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
3425-1-16	A1022854	DUCT SEALER				ND
	Homogeneous,	Grey, Non-fibrous, Bound				
		BIND	100 %	CELL	<1 %	
3425-1-17	A1022855A	BASE MOLDING				ND
	Homogeneous,	Tan, Non-fibrous, Bound				
		RUBR	100 %	CELL	<1 %	
	A1022855B	MASTIC				ND
	Homogeneous,	Yellow, Non-fibrous, Bound				
		MAST	100 %	CELL	<1 %	
3425-1-18	A1022856	DRYWALL JOINT COMPOUND				ND
	Heterogeneous,	White, Fibrous, Bound				
		PLAS	90 %	CELL	5 %	
		PAINT	5 %	FBGL	<1 %	
3425-1-19	A1022857	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-1-20	A1022858	FIREPROOFING				ND
	Homogeneous,	Grey, Fibrous, Loosely Bound				
		BIND	10 %	FBGL	90 %	
				CELL	<1 %	
3425-1-21	A1022859A	FLOOR TILE				ND
	Homogeneous,	Beige, Non-fibrous, Bound				
		VINYL	100 %	CELL	<1 %	

CAROLINA ENVIRONMENTAL, INC.
107 New Edition Court, Cary, NC 27511
Phone: 919-481-1413 Fax: 919-481-1442

Project: Ft. Benning Building 3425; 10303

Lab Code: A10-4048

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
	A1022859B	MASTIC				ND
	Homogeneous,	Black, Fibrous, Bound				
		MAST	95 %	CELL	5 %	
3425-1-22	A1022860	CAULKING				ND
	Homogeneous,	White, Non-fibrous, Bound				
		CAULK	100 %	CELL	<1 %	
3425-M-23	A1022861	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-M-24	A1022862	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-M-25	A1022863	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-M-26	A1022864	DUCT SEALER				ND
	Homogeneous,	Grey, Non-fibrous, Bound				
		BIND	100 %	CELL	<1 %	
3425-M-27	A1022865	CAULKING				ND
	Homogeneous,	Red, Fibrous, Bound				
		CAULK	95 %	CELL	<1 %	
				FBGL	5 %	

CAROLINA ENVIRONMENTAL, INC.
107 New Edition Court, Cary, NC 27511
Phone: 919-481-1413 Fax: 919-481-1442

Project: Ft. Benning Building 3425; 10303

Lab Code: A10-4048

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
3425-M-28	A1022866	STICK PIN ADHESIVE				ND
	Homogeneous,	Grey, Non-fibrous, Bound				
		MAST	100 %	CELL	<1 %	
3425-M-29	A1022867	BLACK TAPE INSULATION				ND
	Homogeneous,	Black, Non-fibrous, Bound				
		BIND	100 %	CELL	<1 %	
3425-M-30	A1022868	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-M-31	A1022869	CEMENT INSULATION				ND
	Homogeneous,	Grey, Fibrous, Loosely Bound				
		BIND	80 %	FBGL	20 %	
				CELL	<1 %	
3425-M-32	A1022870	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-1-33	A1022871A	FLOOR TILE				ND
	Homogeneous,	Beige, Non-fibrous, Bound				
		VINYL	100 %	CELL	<1 %	
	A1022871B	MASTIC				ND
	Homogeneous,	Black, Fibrous, Bound				
		MAST	95 %	CELL	5 %	

CAROLINA ENVIRONMENTAL, INC.
107 New Edition Court, Cary, NC 27511
Phone: 919-481-1413 Fax: 919-481-1442

Project: Ft. Benning Building 3425; 10303

Lab Code: A10-4048

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION					% ASBESTOS
3425-1-34	A1022872A	FLOOR TILE					ND
	Homogeneous,	Beige, Non-fibrous, Bound					
		VINYL	100 %	CELL	<1 %		
	A1022872B	MASTIC					ND
	Homogeneous,	Black, Fibrous, Bound					
		MAST	95 %	CELL	5 %		
3425-1-35	A1022873	CAULKING					ND
	Homogeneous,	Grey, Non-fibrous, Bound					
		CAULK	95 %	CELL	<1 %		
		PAINT	5 %				
3425-1-36	A1022874A	FLOOR TILE					ND
	Homogeneous,	Beige, Non-fibrous, Bound					
		VINYL	100 %	CELL	<1 %		
	A1022874B	MASTIC					ND
	Homogeneous,	Black, Fibrous, Bound					
		MAST	95 %	CELL	5 %		
3425-1-37	A1022875	CEILING TILE					ND
	Heterogeneous,	White, Tan, Fibrous, Loosely Bound					
		PERL	20 %	CELL	60 %		
		PAINT	5 %	FBGL	15 %		
3425-1-38	A1022876	FIREPROOFING					ND
	Homogeneous,	Grey, Fibrous, Loosely Bound					
		BIND	10 %	FBGL	90 %		
				CELL	<1 %		

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3425-1-39	A1022877	MASTIC	ND
	Homogeneous,	White, Fibrous, Bound	
		MAST 100 % FBGL <1 %	
		CELL <1 %	
		WOLL <1 %	
3425-1-40	A1022878	CAULKING	CHRY 10%
	Heterogeneous,	Grey, Fibrous, Bound	
		CHRY 10% CAULK 85 % CELL <1 %	
		PAINT 5 %	
3425-1-41	A1022879	CEILING TILE	ND
	Heterogeneous,	White, Grey, Fibrous, Loosely Bound	
		BIND 10 % FBGL 80 %	
		PAINT 5 % CELL 5 %	
3425-1-42	A1022880	CEILING TILE	ND
	Heterogeneous,	White, Tan, Fibrous, Loosely Bound	
		PERL 20 % CELL 60 %	
		PAINT 5 % FBGL 15 %	
3425-1-43	A1022881	MASTIC	ND
	Homogeneous,	White, Fibrous, Bound	
		MAST 100 % FBGL <1 %	
		CELL <1 %	
		WOLL <1 %	
3425-1-44	A1022882A	BASE MOLDING	ND
	Homogeneous,	Brown, Non-fibrous, Bound	
		RUBR 100 % CELL <1 %	
	A1022882B	MASTIC	ND
	Homogeneous,	Yellow, Non-fibrous, Bound	
		MAST 100 % CELL <1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3425-1-45	A1022883A	FLOOR TILE	ND
	Homogeneous,	Beige, Non-fibrous, Bound	
		VINYL 100 % CELL <1 %	
	A1022883B	MASTIC	ND
	Heterogeneous,	Black, Yellow, Non-fibrous, Bound	
		MAST 95 % CELL 5 %	
3425-1-46	A1022884	CAULKING	CHRY 10%
	Heterogeneous,	Grey, Fibrous, Bound	
		CHRY 10% CAULK 85 % CELL <1 %	
		PAINT 5 %	
3425-1-47	A1022885	CEILING TILE	ND
	Heterogeneous,	White, Grey, Fibrous, Loosely Bound	
		BIND 10 % FBGL 80 %	
		PAINT 5 % CELL 5 %	
3425-1-48	A1022886A	PLASTER SKIM COAT	ND
	Heterogeneous,	White, Non-fibrous, Bound	
		PLAS 95 % CELL <1 %	
		PAINT 5 %	
	A1022886B	PLASTER BASE COAT	ND
	Homogeneous,	Grey, Non-fibrous, Bound	
		PLAS 100 % CELL <1 %	
		FBGL <1 %	
3425-1-49	A1022887	MASTIC	ND
	Homogeneous,	White, Fibrous, Bound	
		MAST 100 % FBGL <1 %	
		CELL <1 %	
		WOLL <1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3425-1-50	A1022888	CAULKING	ND
	Homogeneous,	White, Non-fibrous, Bound	
		CAULK 100 % CELL <1 %	
3425-2-51	A1022889A	FLOOR TILE	ND
	Homogeneous,	Brown, Non-fibrous, Bound	
		VINYL 100 % CELL <1 %	
	A1022889B	MASTIC	ND
	Heterogeneous,	Yellow, Non-fibrous, Bound	
		MAST 100 % CELL <1 %	
3425-2-52	A1022890A	FLOOR TILE	ND
	Homogeneous,	Grey, Non-fibrous, Bound	
		VINYL 100 % CELL <1 %	
	A1022890B	MASTIC	ND
	Heterogeneous,	Yellow, Non-fibrous, Bound	
		MAST 100 % CELL <1 %	
3425-2-53	A1022891	DRYWALL JOINT COMPOUND	ND
	Heterogeneous,	White, Fibrous, Bound	
		PLAS 90 % CELL 5 %	
		PAINT 5 % FBGL <1 %	
3425-2-54	A1022892	CEILING TILE	ND
	Heterogeneous,	White, Tan, Fibrous, Loosely Bound	
		PERL 20 % CELL 60 %	
		PAINT 5 % FBGL 15 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
3425-2-55	A1022893	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-2-56	A1022894	DRYWALL JOINT COMPOUND				ND
	Heterogeneous,	White, Fibrous, Bound				
		PLAS	90 %	CELL	5 %	
		PAINT	5 %	FBGL	<1 %	
3425-2-57	A1022895A	FLOOR TILE				ND
	Homogeneous,	Brown, Non-fibrous, Bound				
		VINYL	100 %	CELL	<1 %	
	A1022895B	MASTIC				ND
	Heterogeneous,	Yellow, Non-fibrous, Bound				
		MAST	100 %	CELL	<1 %	
3425-2-58	A1022896A	FLOOR TILE				ND
	Homogeneous,	Grey, Non-fibrous, Bound				
		VINYL	100 %	CELL	<1 %	
	A1022896B	MASTIC				ND
	Heterogeneous,	Yellow, Non-fibrous, Bound				
		MAST	100 %	CELL	<1 %	
3425-2-59	A1022897	DRYWALL JOINT COMPOUND				ND
	Heterogeneous,	White, Fibrous, Bound				
		PLAS	90 %	CELL	5 %	
		PAINT	5 %	FBGL	<1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3425-3-60	A1022898	CEILING TILE Heterogeneous, White, Tan, Fibrous, Loosely Bound PERL 20 % CELL 60 % PAINT 5 % FBGL 15 %	ND
3425-E-61	A1022899	CAULKING Heterogeneous, Off-white, Non-fibrous, Bound CAULK 100 % CELL <1 % PAINT <1 %	ND
3425-E-62	A1022900	CAULKING Heterogeneous, Off-white, Non-fibrous, Bound CAULK 100 % CELL <1 % PAINT <1 %	ND
3425-E-63	A1022901	MASTIC Homogeneous, White, Fibrous, Bound MAST 100 % FBGL <1 % CELL <1 % WOLL <1 %	ND
3425-E-64	A1022902	CAULKING Heterogeneous, Black, Non-fibrous, Bound CAULK 100 % CELL <1 % PAINT <1 %	ND
3425-E-65	A1022903	CAULKING Heterogeneous, Black, Non-fibrous, Bound CAULK 100 % CELL <1 % PAINT <1 %	ND
3425-E-66	A1022904	FLOOR COATING Heterogeneous, Grey, Non-fibrous, Tightly Bound BIND 95 % CELL <1 % PAINT 5 %	ND

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
3425-E-67	A1022905	FLOOR COATING				ND
	Heterogeneous,	Grey, Non-fibrous, Tightly Bound				
		BIND	95 %	CELL	<1 %	
		PAINT	5 %			
3425-M-68	A1022906	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-M-69	A1022907	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-M-70	A1022908	CEMENT/MASTIC				ND
	Heterogeneous,	White, Grey, Fibrous, Bound				
		MAST	85 %	FBGL	10 %	
				CELL	5 %	
3425-M-71	A1022909	CEMENT/MASTIC				ND
	Heterogeneous,	White, Grey, Fibrous, Bound				
		MAST	85 %	FBGL	10 %	
				CELL	5 %	
3425-M-72	A1022910	CEMENT/MASTIC				ND
	Heterogeneous,	White, Grey, Fibrous, Bound				
		MAST	85 %	FBGL	<1 %	
				CELL	15 %	
3425-M-73	A1022911	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
3425-M-74	A1022912	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-M-75	A1022913	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-M-76	A1022914	FIREPROOFING				ND
	Homogeneous,	Grey, Fibrous, Loosely Bound				
		BIND	10 %	FBGL	90 %	
				CELL	<1 %	
3425-M-77	A1022915	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-1-78	A1022916	ADHESIVE				ND
	Homogeneous,	Tan, Non-fibrous, Bound				
		MAST	100 %	CELL	<1 %	
				WOLL	<1 %	
3425-1-79	A1022917	CEILING TILE				ND
	Heterogeneous,	White, Grey, Fibrous, Loosely Bound				
		BIND	10 %	FBGL	80 %	
		PAINT	5 %	CELL	5 %	
3425-1-80	A1022918A	FLOOR TILE				ND
	Homogeneous,	Grey, Non-fibrous, Bound				
		VINYL	100 %	CELL	<1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
	A1022918B	MASTIC	ND
	Homogeneous,	Black, Fibrous, Bound	
		MAST 95 % CELL 5 %	
3425-1-81	A1022919	FIREPROOFING	ND
	Homogeneous,	Grey, Fibrous, Loosely Bound	
		BIND 10 % FBGL 90 %	
		CELL <1 %	
3425-1-82	A1022920A	FLOOR TILE	ND
	Homogeneous,	Grey, Non-fibrous, Bound	
		VINYL 100 % CELL <1 %	
	A1022920B	MASTIC	ND
	Homogeneous,	Black, Fibrous, Bound	
		MAST 95 % CELL 5 %	
3425-1-83	A1022921	FLOOR TILE	ND
	Homogeneous,	Grey, Non-fibrous, Bound	
		VINYL 100 % CELL <1 %	
No mastic.			
3425-1-84	A1022922A	FLOOR TILE	ND
	Homogeneous,	White, Non-fibrous, Bound	
		VINYL 100 % CELL <1 %	
	A1022922B	MASTIC	ND
	Homogeneous,	Yellow, Non-fibrous, Bound	
		MAST 100 % CELL <1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
3425-1-85	A1022923A	FLOOR TILE				ND
	Homogeneous,	Beige, Non-fibrous, Bound				
		VINYL	100 %	CELL	<1 %	
	A1022923B	MASTIC				ND
	Homogeneous,	Black, Non-fibrous, Bound				
		MAST	100 %	CELL	<1 %	
3425-1-86	A1022924	ADHESIVE				ND
	Homogeneous,	Tan, Non-fibrous, Bound				
		MAST	100 %	CELL	<1 %	
				WOLL	<1 %	
3425-1-87	A1022925	CAULKING				ND
	Heterogeneous,	Tan, Non-fibrous, Bound				
		CAULK	100 %	CELL	<1 %	
		PAINT	<1 %			
3425-1-88	A1022926	CAULKING				ND
	Heterogeneous,	Tan, Non-fibrous, Bound				
		CAULK	100 %	CELL	<1 %	
		PAINT	<1 %			
3425-1-89	A1022927	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-1-90	A1022928	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
3425-1-91	A1022929	CAULKING				ND
	Heterogeneous,	White, Non-fibrous, Bound				
		CAULK	100 %	CELL	<1 %	
		PAINT	<1 %			
3425-1-92	A1022930	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-1-93	A1022931	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-1-94	A1022932	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-1-95	A1022933	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-1-96	A1022934	DRYWALL JOINT COMPOUND				ND
	Heterogeneous,	White, Fibrous, Bound				
		PLAS	90 %	CELL	5 %	
		PAINT	5 %	FBGL	<1 %	
3425-1-97	A1022935	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
3425-1-98	A1022936	STICK PIN ADHESIVE				ND
	Homogeneous,	Grey, Non-fibrous, Bound				
		MAST	100 %	CELL	<1 %	
3425-1-99	A1022937	BLACK TAPE INSULATION				ND
	Homogeneous,	Black, Non-fibrous, Bound				
		BIND	100 %	CELL	<1 %	
3425-1-100	A1022938	CEILING TILE				ND
	Heterogeneous,	White, Tan, Fibrous, Loosely Bound				
		PERL	20 %	CELL	60 %	
		PAINT	5 %	FBGL	15 %	
3425-1-101	A1022939	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-1-102	A1022940	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-1-103	A1022941A	FLOOR TILE				ND
	Homogeneous,	Beige, Non-fibrous, Bound				
		VINYL	100 %	CELL	<1 %	
	A1022941B	MASTIC				ND
	Homogeneous,	Black, Fibrous, Bound				
		MAST	95 %	CELL	5 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3425-1-104	A1022942	DRYWALL/JOINT COMPOUND	ND
	Heterogeneous,	White, Fibrous, Bound	
		GYPSUM 90 % CELL 5 %	
		PLAS 5 % FBGL <1 %	
		PAINT <1 %	
3425-1-105	A1022943	FIREPROOFING	ND
	Homogeneous,	Grey, Fibrous, Loosely Bound	
		BIND 10 % FBGL 90 %	
		CELL <1 %	
3425-1-106	A1022945	CAULKING	CHRY 10%
	Heterogeneous,	Grey, Fibrous, Bound	
		CHRY 10% CAULK 90 % CELL <1 %	
3425-1-107	A1022945A	FLOOR TILE	ND
	Homogeneous,	Beige, Non-fibrous, Bound	
		VINYL 100 % CELL <1 %	
	A1022945B	MASTIC	ND
	Homogeneous,	Black, Fibrous, Bound	
		MAST 95 % CELL 5 %	
3425-1-108	A1022946	MASTIC	ND
	Homogeneous,	White, Fibrous, Bound	
		MAST 100 % FBGL <1 %	
		CELL <1 %	
		WOLL <1 %	
3425-1-109	A1022947	MASTIC	ND
	Homogeneous,	White, Fibrous, Bound	
		MAST 100 % FBGL <1 %	
		CELL <1 %	
		WOLL <1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
3425-1-110	A1022948	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-1-111	A1022949	CAULKING				ND
	Heterogeneous,	White, Non-fibrous, Bound				
		CAULK	100 %	CELL	<1 %	
		PAINT	<1 %			
3425-2-112	A1022950	STICKY TAPE INSULATION				ND
	Homogeneous,	Black, Non-fibrous, Bound				
		BIND	100 %	CELL	<1 %	
3425-2-113	A1022951	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-2-114	A1022952	DUCT SEALER				ND
	Homogeneous,	Grey, Non-fibrous, Bound				
		MAST	100 %	CELL	<1 %	
3425-2-115	A1022953A	FLOOR TILE				ND
	Homogeneous,	Beige, Non-fibrous, Bound				
		VINYL	100 %	CELL	<1 %	
	A1022953B	MASTIC				ND
	Homogeneous,	Black, Fibrous, Bound				
		MAST	95 %	CELL	5 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
3425-2-116	A1022954	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-M-117	A1022955	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-R-118	A1022956	PITCH PAN FILLER				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	75 %	CELL	25 %	
3425-R-119	A1022957	BUILT-UP ROOF MEMBRANE				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	75 %	CELL	25 %	
3425-R-120	A1022958	ROOF INSULATION				ND
	Heterogeneous,	Grey, Fibrous, Loosely Bound				
		PERL	15 %	CELL	75 %	
				FBGL	10 %	
3425-R-121	A1022959	MULTI-LAYER FLASHING				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	65 %	CELL	25 %	
		GRAV	10 %	FBGL	<1 %	
3425-R-122	A1022960	FLASHING CEMENT				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	90 %	CELL	10 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
3425-R-123	A1022961	CAULKING				ND
	Homogeneous,	Grey, Non-fibrous, Bound				
		CAULK	100 %	CELL	<1 %	
3425-3-124	A1022962	DUCT SEALER				ND
	Homogeneous,	Grey, Non-fibrous, Bound				
		MAST	100 %	CELL	<1 %	
3425-3-125	A1022963A	BASE MOLDING				ND
	Homogeneous,	Tan, Non-fibrous, Bound				
		RUBR	100 %	CELL	<1 %	
	A1022963B	MASTIC				ND
	Homogeneous,	Yellow, Non-fibrous, Bound				
		MAST	100 %	CELL	<1 %	
3425-3-126	A1022964A	FLOOR TILE				ND
	Homogeneous,	Beige, Non-fibrous, Bound				
		VINYL	100 %	CELL	<1 %	
	A1022964B	ADHESIVE				ND
	Homogeneous,	Black, Non-fibrous, Bound				
		MAST	100 %	CELL	<1 %	
3425-3-127	A1022965	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
3425-R-128	A1022966	BUILT-UP ROOF MEMBRANE				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	75 %	CELL	25 %	
3425-R-129	A1022967	ROOF INSULATION				ND
	Heterogeneous,	Grey, Fibrous, Loosely Bound				
		PERL	15 %	CELL	75 %	
				FBGL	10 %	
3425-R-130	A1022968	MULTI-LAYER FLASHING				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	65 %	CELL	25 %	
		GRAV	10 %	FBGL	<1 %	
3425-R-131	A1022969	FLASHING CEMENT				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	90 %	CELL	10 %	
3425-R-132	A1022970	PITCH PAN FILLER				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	75 %	CELL	25 %	
3425-R-133	A1022971	FLASHING CEMENT				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	90 %	CELL	10 %	
3425-R-134	A1022972	BUILT-UP ROOF MEMBRANE				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	75 %	CELL	25 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3425-R-135	A1022973	MULTI-LAYER FLASHING	ND
	Heterogeneous,	Black, Fibrous, Bound	
		TAR 65 % CELL 25 %	
		GRAV 10 % FBGL <1 %	
3425-R-136	A1022974	BUILT-UP ROOF MEMBRANE	ND
	Heterogeneous,	Black, Fibrous, Bound	
		TAR 75 % CELL 25 %	
3425-R-137	A1022975	MULTI-LAYER FLASHING	ND
	Heterogeneous,	Black, Fibrous, Bound	
		TAR 65 % CELL 25 %	
		GRAV 10 % FBGL <1 %	
3425-R-139	A1022975	BUILT-UP ROOF MEMBRANE	CHRY 5%
	Heterogeneous,	Black, Fibrous, Bound	
		CHRY 5% TAR 70 % CELL 15 %	
		FBGL 10 %	
3425-R-140	A1022978	BUILT-UP ROOF MEMBRANE	ND
	Heterogeneous,	Black, Fibrous, Bound	
		TAR 70 % CELL 15 %	
		GRAV 5 % FBGL 10 %	
3425-R-141	A1022979	FLASHING CEMENT	ND
	Heterogeneous,	Black, Fibrous, Bound	
		TAR 90 % CELL 10 %	
3425-R-142	A1022980	FLASHING CEMENT	ND
	Heterogeneous,	Black, Fibrous, Bound	
		TAR 90 % CELL 10 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
3425-R-143	A1022981	PITCH PAN FILLER				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	75 %	CELL	25 %	
3425-R-144	A1022982	FLASHING CEMENT				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	90 %	CELL	10 %	
3425-R-145	A1022983	PITCH PAN FILLER				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	75 %	CELL	25 %	
3425-R-146	A1022984	MULTI-LAYER FLASHING				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	65 %	CELL	20 %	
		GRAV	10 %	FBGL	5 %	
3425-R-147	A1022985	BUILT-UP ROOF MEMBRANE				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	70 %	CELL	15 %	
		GRAV	5 %	FBGL	10 %	
3425-R-148	A1022986	MULTI-LAYER FLASHING				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	70 %	CELL	15 %	
		GRAV	5 %	FBGL	10 %	
3425-R-149	A1022987	FLASHING CEMENT				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	90 %	CELL	10 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3425-R-150	A1022988	BUILT-UP ROOF MEMBRANE Heterogeneous, Black, Fibrous, Bound TAR 70 % CELL 15 % GRAV 5 % FBGL 10 %	ND
3425-R-151	A1022989	MULTI-LAYER FLASHING Heterogeneous, Black, Fibrous, Bound TAR 70 % CELL 15 % GRAV 5 % FBGL 10 %	ND
3425-R-152	A1022990	CAULKING Homogeneous, Grey, Non-fibrous, Bound CAULK 100 % CELL <1 %	ND
3425-E-153	A1022991	CAULKING Homogeneous, Brown, Non-fibrous, Bound CAULK 100 % CELL <1 %	ND
3425-E-154	A1022992	CAULKING Homogeneous, Brown, Non-fibrous, Bound CAULK 100 % CELL <1 %	ND
3425-E-155	A1022993	CAULKING Homogeneous, Grey, Non-fibrous, Bound CAULK 100 % CELL <1 %	ND
3425-E-156	A1022994	CAULKING Heterogeneous, Grey, Brown, Non-fibrous, Bound CAULK 100 % CELL <1 %	ND

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
3425-E-157	A1022995	CAULKING				ND
	Homogeneous,	Brown, Non-fibrous, Bound				
		CAULK	100 %	CELL	<1 %	
3425-1-158	A1022996A	FLOOR TILE				ND
	Homogeneous,	Blue, Non-fibrous, Bound				
		VINYL	100 %	CELL	<1 %	
	A1022996B	MASTIC				ND
	Homogeneous,	Black, Non-fibrous, Bound				
		MAST	95 %	CELL	5 %	
3425-1-159	A1022997A	PLASTER SKIM COAT				ND
	Heterogeneous,	White, Non-fibrous, Bound				
		PLAS	100 %	CELL	<1 %	
		PAINT	<1 %			
	A1022997B	PLASTER BASE COAT				ND
	Homogeneous,	Grey, Non-fibrous, Bound				
		PLAS	100 %	CELL	<1 %	
				FBGL	<1 %	
3425-1-160	A1022998	FIREPROOFING				ND
	Homogeneous,	White, Fibrous, Bound				
		BIND	10 %	FBGL	85 %	
		PAINT	5 %	CELL	<1 %	
3425-1-161	A1022999	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
3425-1-162	A1023000	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-M-163	A1023001	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-M-164	A1023002	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-M-165	A1023003	CAULKING				ND
	Homogeneous,	Red, Fibrous, Bound				
		CAULK	95 %	FBGL	5 %	
				CELL	<1 %	
3425-M-166	A1023004	FIREPROOFING				ND
	Homogeneous,	White, Fibrous, Bound				
		BIND	80 %	CELL	10 %	
		MICA	10 %	FBGL	<1 %	
3425-M-167	A1023005	DUCT SEALER				ND
	Homogeneous,	Grey, Non-fibrous, Bound				
		BIND	100 %	CELL	<1 %	
3425-E-168	A1023006	CAULKING				ND
	Homogeneous,	Brown, Fibrous, Bound				
		CAULK	100 %	CELL	<1 %	

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3425-E-169	A1023007	CAULKING				ND
	Homogeneous,	Brown, Fibrous, Bound				
		CAULK	100 %	CELL	<1 %	
3425-R-170	A1023008	BUILT-UP ROOF MEMBRANE				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	70 %	CELL	15 %	
		GRAV	5 %	FBGL	10 %	
3425-R-171	A1023009	BUILT-UP ROOF MEMBRANE				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	70 %	CELL	15 %	
		GRAV	5 %	FBGL	10 %	
3425-R-172	A1023010	BUILT-UP ROOF MEMBRANE				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	70 %	CELL	15 %	
		GRAV	5 %	FBGL	10 %	
3425-R-173	A1023011	CAULKING				ND
	Homogeneous,	Brown, Fibrous, Bound				
		CAULK	100 %	CELL	<1 %	
3425-R-174	A1023012	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-R-175	A1023013	FLASHING CEMENT				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	90 %	CELL	10 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
3425-R-176	A1023014	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-R-177	A1023015	FLASHING CEMENT				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	90 %	CELL	10 %	
3425-R-178	A1023016	BUILT-UP ROOF MEMBRANE				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	70 %	CELL	15 %	
		GRAV	5 %	FBGL	10 %	
3425-R-179	A1023017	MULTI-LAYER FLASHING				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	70 %	CELL	15 %	
		GRAV	5 %	FBGL	10 %	
3425-R-180	A1023018	BUILT-UP ROOF MEMBRANE				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	70 %	CELL	15 %	
		GRAV	5 %	FBGL	10 %	
3425-R-181	A1023019	FLASHING CEMENT				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	90 %	CELL	10 %	
3425-R-182	A1023020	BUILT-UP ROOF MEMBRANE				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	70 %	CELL	15 %	
		GRAV	5 %	FBGL	10 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
3425-R-183	A1023021	FLASHING CEMENT				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	90 %	CELL	10 %	
3425-R-184	A1023022	FLASHING CEMENT				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	90 %	CELL	10 %	
3425-R-185	A1023023	PITCH PAN FILLER				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	75 %	CELL	25 %	
3425-R-186	A1023024	FLASHING CEMENT				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	90 %	CELL	10 %	
3425-R-187	A1023025	FLASHING CEMENT				ND
	Heterogeneous,	Black, Fibrous, Bound				
		TAR	90 %	CELL	10 %	
3425-R-188	A1023026	CAULKING				ND
	Heterogeneous,	Grey, White, Fibrous, Bound				
		CAULK	100 %	CELL	<1 %	
		PAINT	<1 %			
3425-R-189	A1023027	CAULKING				ND
	Heterogeneous,	Grey, Fibrous, Bound				
		CAULK	100 %	CELL	<1 %	
		PAINT	<1 %			

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
3425-R-190	A1023028	CAULKING				ND
	Homogeneous,	Grey, Fibrous, Bound				
		CAULK	100 %	CELL	<1 %	
		PAINT	<1 %			
3425-R-191	A1023029	CAULKING				ND
	Heterogeneous,	Grey, White, Fibrous, Bound				
		CAULK	100 %	CELL	<1 %	
		PAINT	<1 %			
3425-R-192	A1023030	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-1-193	A1023031	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-1-194	A1023032	JOINT COMPOUND				ND
	Heterogeneous,	White, Fibrous, Bound				
		PLAS	100 %	CELL	<1 %	
		PAINT	<1 %			
3425-E-195	A1023033	CAULKING				ND
	Heterogeneous,	Grey, White, Fibrous, Bound				
		CAULK	100 %	CELL	<1 %	
		PAINT	<1 %			
3425-1-196	A1023034	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
3425-1-197	A1023035	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-1-198	A1023036	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-E-199	A1023037	CAULKING				ND
	Homogeneous,	Brown, Non-fibrous, Bound				
		CAULK	100 %	CELL	<1 %	
3425-1-200	A1023038	FLOOR TILE				ND
	Homogeneous,	Off-white, Non-fibrous, Bound				
		VINYL	100 %	CELL	<1 %	
No Mastic.						
3425-1-201	A1023039A	FLOOR TILE				ND
	Homogeneous,	Blue, Non-fibrous, Bound				
		VINYL	100 %	CELL	<1 %	
	A1023039B	MASTIC				ND
	Homogeneous,	Yellow, Non-fibrous, Bound				
		MAST	100 %	CELL	<1 %	
3425-1-202	A1023039B	MAIL SLOT PILLOW COVERING				ND
	Homogeneous,	White, Fibrous, Loosely Bound				
				FBGL	100 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
3425-1-203	A1023040	MAIL SLOT PILLOW STUFFING				ND
	Homogeneous,	Black, Fibrous, Loosely Bound				
		BIND	100 %	FBGL	<1 %	
3425-1-204	A1023042	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-1-205	A1023043	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	FBGL	<1 %	
				CELL	<1 %	
				WOLL	<1 %	
3425-1-206	A1023044	STICK PIN ADHESIVE				ND
	Homogeneous,	White, Fibrous, Bound				
		BIND	95 %	CELL	5 %	
3425-1-207	A1023045	CAULKING				CHRY 10%
	Homogeneous,	Grey, Fibrous, Bound				
		CHRY 10% CAULK	90 %	CELL	<1 %	
3425-1-208	A1023046A	FLOOR TILE				ND
	Homogeneous,	White, Non-fibrous, Bound				
		VINYL	100 %	CELL	<1 %	
	A1023046B	MASTIC				ND
	Homogeneous,	Black, Non-fibrous, Bound				
		MAST	100 %	CELL	<1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3425-1-209	A1023047A	BASE MOLDING	ND
	Homogeneous,	Brown, Non-fibrous, Bound	
		VINYL 100 % CELL <1 %	
	A1023047B	MASTIC	ND
	Homogeneous,	Yellow, Non-fibrous, Bound	
		MAST 100 % CELL <1 %	
3425-1-210	A1023048	FIREPROOFING	ND
	Homogeneous,	Grey, Fibrous, Loosely Bound	
		BIND 10 % FBGL 90 %	
		CELL <1 %	
3425-2-211	A1023049	STICKY TAPE INSULATION	ND
	Homogeneous,	Black, Non-fibrous, Bound	
		BIND 100 % CELL <1 %	
3425-2-212	A1023050A	FLOOR TILE	ND
	Homogeneous,	Beige, Non-fibrous, Bound	
		VINYL 100 % CELL <1 %	
	A1023050B	MASTIC	ND
	Homogeneous,	Black, Non-fibrous, Bound	
		MAST 100 % CELL <1 %	
3425-2-213	A1023051A	FLOOR TILE	ND
	Homogeneous,	Blue, Non-fibrous, Bound	
		VINYL 100 % CELL <1 %	

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	A1023051B	MASTIC				ND
	Homogeneous,	Black, Non-fibrous, Bound				
		MAST	100 %	CELL	<1 %	
3425-2-214	A1023052	CAULKING				ND
	Homogeneous,	White, Fibrous, Bound				
		CAULK	100 %	CELL	<1 %	
				WOLL	<1 %	
3425-2-215	A1023053	CAULKING				ND
	Homogeneous,	White, Fibrous, Bound				
		CAULK	100 %	CELL	<1 %	
				WOLL	<1 %	
3425-3-216	A1023054	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	CELL	<1 %	
				WOLL	<1 %	
3425-3-217	A1023055A	FLOOR TILE				ND
	Homogeneous,	Off-white, Non-fibrous, Bound				
		VINYL	100 %	CELL	<1 %	
	A1023055B	MASTIC				ND
	Homogeneous,	Black, Non-fibrous, Bound				
		MAST	100 %	CELL	<1 %	
3425-3-218	A1023056A	FLOOR TILE				ND
	Homogeneous,	Off-white, Non-fibrous, Bound				
		VINYL	100 %	CELL	<1 %	

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	A1023056B	MASTIC	ND
	Homogeneous,	Black, Non-fibrous, Bound	
		MAST 100 % CELL <1 %	
3425-3-219	A1023057A	FLOOR TILE	ND
	Homogeneous,	Red, Non-fibrous, Bound	
		VINYL 100 % CELL <1 %	
	A1023057B	MASTIC	ND
	Homogeneous,	Black, Non-fibrous, Bound	
		MAST 100 % CELL <1 %	
3425-3-220	A1023058	DUCT SEALER	ND
	Homogeneous,	Grey, Non-fibrous, Bound	
		BIND 100 % CELL <1 %	
3425-3-221	A1023059A	FLOOR TILE	ND
	Homogeneous,	Green, Non-fibrous, Bound	
		VINYL 100 % CELL <1 %	
	A1023059B	MASTIC	ND
	Homogeneous,	Clear, Non-fibrous, Bound	
		MAST 100 % CELL <1 %	
3425-1-222	A1023060	MASTIC	ND
	Homogeneous,	White, Fibrous, Bound	
		MAST 100 % CELL <1 %	
		WOLL <1 %	

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3425-1-223	A1023061	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	CELL	<1 %	
				WOLL	<1 %	
3425-1-224	A1023062A	FLOOR TILE				ND
	Homogeneous,	Green, Non-fibrous, Bound				
		VINYL	100 %	CELL	<1 %	
	A1023062B	MASTIC				ND
	Homogeneous,	Black, Non-fibrous, Bound				
		MAST	100 %	CELL	<1 %	
3425-1-225	A1023063A	FLOOR TILE				ND
	Homogeneous,	Beige, Non-fibrous, Bound				
		VINYL	100 %	CELL	<1 %	
	A1023063B	MASTIC				ND
	Homogeneous,	Black, Non-fibrous, Bound				
		MAST	100 %	CELL	<1 %	
3425-2-226	A1023064	CAULKING				ND
	Homogeneous,	White, Fibrous, Bound				
		CAULK	100 %	CELL	<1 %	
				WOLL	<1 %	
3425-3-227	A1023065A	FLOOR TILE				ND
	Homogeneous,	Black, Non-fibrous, Bound				
		VINYL	100 %	CELL	<1 %	

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107 New Edition Court, Cary, NC 27511
Phone: 919-481-1413 Fax: 919-481-1442

Project: Ft. Benning Building 3425; 10303

Lab Code: A10-4048

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
	A1023065B	MASTIC	ND
	Homogeneous,	Black, Non-fibrous, Bound	
		MAST 100 % CELL <1 %	
3425-3-228	A1023066A	FLOOR TILE	ND
	Homogeneous,	Off-white, Non-fibrous, Bound	
		VINYL 100 % CELL <1 %	
	A1023066B	MASTIC	ND
	Homogeneous,	Black, Non-fibrous, Bound	
		MAST 100 % CELL <1 %	
3425-3-229	A1023067A	FLOOR TILE	ND
	Homogeneous,	Green, Non-fibrous, Bound	
		VINYL 100 % CELL <1 %	
	A1023067B	MASTIC	ND
	Homogeneous,	Black, Non-fibrous, Bound	
		MAST 100 % CELL <1 %	
3425-3-230	A1023068	MASTIC	ND
	Homogeneous,	White, Fibrous, Bound	
		MAST 100 % CELL <1 %	
		WOLL <1 %	
3425-E-231	A1023069	CAULKING	ND
	Homogeneous,	Brown, Fibrous, Bound	
		CAULK 100 % CELL <1 %	

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Lab Code: A10-4048

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3425-E-232	A1023070 Homogeneous,	CAULKING Off-white, Fibrous, Bound CAULK 100 % CELL <1 %	ND
3425-1-233	A1023071 Homogeneous,	MASTIC White, Fibrous, Bound MAST 100 % CELL <1 % WOLL <1 %	ND
3425-1-234	A1023072 Heterogeneous,	JOINT COMPOUND White, Non-fibrous, Bound PLAS 100 % CELL <1 % PAINT <1 %	ND
3425-1-235	A1023073 Homogeneous,	CAULKING Grey, Fibrous, Bound CHRY 10% CAULK 90 % CELL <1 %	CHRY 10%
3425-1-236	A1023074A Homogeneous,	FLOOR TILE Off-white, Non-fibrous, Bound VINYL 100 % CELL <1 %	ND
	A1023074B Homogeneous,	MASTIC Black, Non-fibrous, Bound MAST 100 % CELL <1 %	ND
3425-1-237	A1023075A Homogeneous,	FLOOR TILE Off-white, Non-fibrous, Bound VINYL 100 % CELL <1 %	ND

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Lab Code: A10-4048

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
	A1023075B	MASTIC				ND
	Homogeneous,	Yellow, Non-fibrous, Bound				
		MAST	100 %	CELL	<1 %	
3425-2-238	A1023076	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	CELL	<1 %	
				WOLL	<1 %	
3425-3-239	A1023077	DUCT SEALER				ND
	Homogeneous,	Grey, Non-fibrous, Bound				
		BIND	100 %	CELL	<1 %	
3425-E-240	A1023078	CAULKING				ND
	Homogeneous,	Brown, Fibrous, Bound				
		CAULK	100 %	CELL	<1 %	
3425-E-241	A1023079	CAULKING				ND
	Homogeneous,	Tan, Fibrous, Bound				
		CAULK	100 %	CELL	<1 %	
3425-1-242	A1023080	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	CELL	<1 %	
				WOLL	<1 %	
3425-1-243	A1023081	MASTIC				ND
	Homogeneous,	White, Fibrous, Bound				
		MAST	100 %	CELL	<1 %	
				WOLL	<1 %	

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3425-1-244	A1023082	JOINT COMPOUND	ND
	Heterogeneous,	White, Non-fibrous, Bound	
		PLAS 100 % CELL <1 %	
		PAINT <1 %	
3425-E-245	A1023083	CAULKING	ND
	Homogeneous,	Grey, Non-fibrous, Bound	
		CAULK 100 % CELL <1 %	
3425-2-246	A1023084A	FLOOR TILE	ND
	Homogeneous,	Off-white, Non-fibrous, Bound	
		VINYL 100 % CELL <1 %	
	A1023084B	MASTIC	ND
	Homogeneous,	Black, Non-fibrous, Bound	
		MAST 100 % CELL <1 %	
3425-2-247	A1023085A	FLOOR TILE	ND
	Homogeneous,	White, Non-fibrous, Bound	
		VINYL 100 % CELL <1 %	
	A1023085B	MASTIC	ND
	Homogeneous,	Black, Non-fibrous, Bound	
		MAST 100 % CELL <1 %	
3425-E-248	A1023086	CAULKING	ND
	Homogeneous,	Grey, Non-fibrous, Bound	
		CAULK 100 % CELL <1 %	

The following definitions apply to the abbreviations used in the ASBESTOS BULK ANALYSIS REPORT:

CHRY = Chrysotile	CELL = Cellulose	DEBR = Debris
AMOS = Amosite	FBGL = Fibrous Glass	BIND = Binder
CROC = Crocidolite	CACO = Calcium Carbonate	SILI = Silicates
TREM = Tremolite	SYNT = Synthetics	GRAV = Gravel
ANTH = Anthophyllite	WOLL = Wollastonite	MAST = Mastic
ACTN = Actinolite	CERWL = Ceramic Wool	PLAS = Plaster
N D = None Detected	NTREM = Non-Asbestiform Tremolite	PERL = Perlite
NANTH = Non-Asbestiform Anthophyllite	FBGY = Fibrous Gypsum	RUBR =Rubber
		VER =Vermiculite

CLIENT: US Army Corps of Engineers - Savannah District - EMU9

PROJECT: Ft. Benning Building 3425; 10303

CEI LAB CODE: A10-4048

Stereoscopic microscopy and polarized light microscopy coupled with dispersion staining is the analytical technique used for sample identification. The percentage of each component is visually estimated by volume. These results pertain only to the samples analyzed. The samples were analyzed as submitted by the client and may not be representative of the larger material in question. Unless notified in writing to return samples, Carolina Environmental, Inc. will discard all bulk samples after 30 days.

Many vinyl floor tiles have been manufactured using greater than 1% asbestos. Often the asbestos was milled to a fiber size below the detection limit of polarized light microscopy. Therefore, a "None Detected" (ND) reading on vinyl floor tile does not necessarily exclude the presence of asbestos. Transmission electron microscopy provides a more conclusive form of analysis for vinyl floor tiles.

It is certified by the signature below that Carolina Environmental, Inc. is accredited by the National Voluntary Accreditation Program (NVLAP) for the analysis of asbestos in bulk materials. The accredited test method is EPA / 600 / M4-82 / 020 for the analysis of asbestos in building materials. Procedures described in EPA / 600 / R-93 / 116 have been incorporated where applicable. The detection limit for the method is 0.1% (trace amount). Carolina Environmental, Inc.'s NVLAP accreditation number is #101768-0. This report is not to be used to claim product endorsement by NVLAP or any agency of the U. S. Government. This report and its contents are only valid when reproduced in full. Dust and soil analyses for asbestos using PLM are not covered under NVLAP accreditation.

ANALYST Ashley Miller

REVIEWED BY

Tianbao Bai, Ph.D.
Laboratory Director

End of Report

Appendix B

Sample Chain of Custody Forms

A/O 4048 (248)
A/022839, A/023086

ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS

Project:	**Ft. Benning Building 3425**	Job No.:	**10303**
Sampler:	Tim Jones	Analysis:	PLM

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
5/3/2010	3425-1-1	64143	Fireproofing
5/3/2010	3425-1-2	64144	Floor tile & mastic
5/3/2010	3425-1-3	64145	Fireproofing
5/3/2010	3425-1-4	64146	White mastic
5/3/2010	3425-1-5	64147	Floor tile & mastic
5/3/2010	3425-1-6	64148	White mastic
5/3/2010	3425-1-7	64149	Ceiling tile
5/3/2010	3425-1-8	64150	Ceiling tile
5/3/2010	3425-1-9	64151	White mastic
5/3/2010	3425-1-10	64152	Floor tile & mastic
5/3/2010	3425-1-11	64153	Drywall joint compound
5/3/2010	3425-1-12	64154	Floor tile & mastic
5/3/2010	3425-1-13	64155	Caulking material
5/3/2010	3425-1-14	64156	Caulking material
5/3/2010	3425-1-15	64157	White mastic
5/3/2010	3425-1-16	64158	Duct sealer
5/3/2010	3425-1-17	64159	Base molding & adhesive
5/3/2010	3425-1-18	64160	Drywall joint compound
5/3/2010	3425-1-19	64161	White mastic
5/3/2010	3425-1-20	64162	Fireproofing
5/3/2010	3425-1-21	64163	Floor tile & mastic
5/3/2010	3425-1-22	64164	Caulking material

Relinquished By	Date	Time	Received By	Date	Time
Tim Jones	5-13-10	1400	Kim Pell	05/14/10	9:40am

A10-4048

ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS

Project:	**Ft. Benning Building 3425**	Job No.:	**10303**
Sampler:	Tim Jones	Analysis:	PLM

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
5/3/2010	3425-M-23	64165	White mastic
5/3/2010	3425-M-24	64166	White mastic
5/3/2010	3425-M-25	64167	White mastic
5/3/2010	3425-M-26	64168	Duct sealer
5/3/2010	3425-M-27	64169	Caulking material
5/3/2010	3425-M-28	64170	Stick pin adhesive
5/3/2010	3425-M-29	64171	Black tape insulation
5/3/2010	3425-M-30	64172	White mastic
5/3/2010	3425-M-31	64173	Cement insulation
5/3/2010	3425-M-32	64174	White mastic
5/4/2010	3425-1-33	64175	Floor tile & mastic
5/4/2010	3425-1-34	64176	Floor tile & mastic
5/4/2010	3425-1-35	64177	Caulking material
5/4/2010	3425-1-36	64178	Floor tile & mastic
5/4/2010	3425-1-37	64179	Ceiling tile
5/4/2010	3425-1-38	64180	Fireproofing
5/4/2010	3425-1-39	64181	White mastic
5/4/2010	3425-1-40	64182	Caulking material
5/4/2010	3425-1-41	64183	Ceiling tile
5/4/2010	3425-1-42	64184	Ceiling tile
5/4/2010	3425-1-43	64185	White mastic
5/4/2010	3425-1-44	64186	Base molding & adhesive

Relinquished By	Date	Time	Received By	Date	Time
Tim Jones	5-13-10	1400			

A16.4048

ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS

Project:	**Ft. Benning Building 3425**	Job No.:	**10303**
Sampler:	Tim Jones	Analysis:	PLM

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
5/4/2010	3425-1-45	64187	Floor tile & mastic
5/4/2010	3425-1-46	64188	Caulking material
5/4/2010	3425-1-47	64189	Ceiling tile
5/4/2010	3425-1-48	64190	Plaster ceiling
5/4/2010	3425-1-49	64191	White mastic
5/4/2010	3425-1-50	64192	Caulking material
5/4/2010	3425-2-51	64193	Floor tile & mastic
5/4/2010	3425-2-52	64194	Floor tile & mastic
5/4/2010	3425-2-53	64195	Drywall joint compound
5/4/2010	3425-2-54	64196	Ceiling tile
5/4/2010	3425-2-55	64197	White mastic
5/4/2010	3425-2-56	64198	Drywall joint compound
5/4/2010	3425-2-57	64199	Floor tile & mastic
5/4/2010	3425-2-58	64200	Floor tile & mastic
5/4/2010	3425-2-59	64201	Drywall joint compound
5/4/2010	3425-3-60	64202	Ceiling tile
5/4/2010	3425-E-61	64203	Caulking material
5/4/2010	3425-E-62	64204	Caulking material
5/4/2010	3425-E-63	64205	White mastic
5/4/2010	3425-E-64	64206	Caulking material
5/4/2010	3425-E-65	64207	Caulking material
5/4/2010	3425-E-66	64208	Non-skid floor coating

Relinquished By	Date	Time	Received By	Date	Time
Tim Jones	5-13-10	1400			

A10-4048

ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS

Project:	**Ft. Benning Building 3425**	Job No.:	**10303**
Sampler:	Tim Jones	Analysis:	PLM

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
5/4/2010	3425-E-67	64209	Non-skid floor coating
5/4/2010	3425-M-68	64210	White mastic
5/4/2010	3425-M-69	64211	White mastic
5/4/2010	3425-M-70	64212	Cement and white mastic
5/4/2010	3425-M-71	64213	Cement and white mastic
5/4/2010	3425-M-72	64214	Cement and white mastic
5/4/2010	3425-M-73	64215	White mastic
5/4/2010	3425-M-74	64216	White mastic
5/4/2010	3425-M-75	64217	White mastic
5/4/2010	3425-M-76	64218	Fireproofing
5/4/2010	3425-M-77	64219	White mastic
5/4/2010	3425-1-78	64220	Construction adhesive
5/4/2010	3425-1-79	64221	Ceiling tile
5/4/2010	3425-1-80	64222	Floor tile & mastic
5/4/2010	3425-1-81	64223	Fireproofing
5/4/2010	3425-1-82	64224	Floor tile & mastic
5/4/2010	3425-1-83	64225	Floor tile & mastic
5/4/2010	3425-1-84	64226	Floor tile & mastic
5/4/2010	3425-1-85	64227	Floor tile & mastic
5/4/2010	3425-1-86	64228	Construction adhesive
5/4/2010	3425-1-87	64229	Caulking material
5/4/2010	3425-1-88	64230	Caulking material

Relinquished By	Date	Time	Received By	Date	Time
Tim Jones	5-13-10	1400			

A10-4048

ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS

Project:	**Ft. Benning Building 3425**	Job No.:	**10303**
Sampler:	Tim Jones	Analysis:	PLM

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
5/4/2010	3425-1-89	64231	White mastic
5/4/2010	3425-1-90	64232	White mastic
5/4/2010	3425-1-91	64233	Caulking material
5/5/2010	3425-1-92	64234	White mastic
5/5/2010	3425-1-93	64235	White mastic
5/5/2010	3425-1-94	64236	White mastic
5/5/2010	3425-1-95	64237	White mastic
5/5/2010	3425-1-96	64238	Drywall joint compound
5/5/2010	3425-1-97	64239	White mastic
5/5/2010	3425-1-98	64240	Stick pin adhesive
5/5/2010	3425-1-99	64241	Sticky tape insulation
5/5/2010	3425-1-100	64242	Ceiling tile
5/5/2010	3425-1-101	64243	White mastic
5/5/2010	3425-1-102	64244	White mastic
5/5/2010	3425-1-103	64245	Floor tile & mastic
5/5/2010	3425-1-104	64246	Drywall joint compound
5/5/2010	3425-1-105	64247	Fireproofing
5/5/2010	3425-1-106	64248	Caulking material
5/5/2010	3425-1-107	64249	Floor tile & mastic
5/5/2010	3425-1-108	64250	White mastic
5/5/2010	3425-1-109	64251	White mastic
5/5/2010	3425-1-110	64252	White mastic

Relinquished By	Date	Time	Received By	Date	Time
Tim Jones	5-13-10	1400			

A10-4048

ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS

Project:	**Ft. Benning Building 3425**	Job No.:	**10303**
Sampler:	Tim Jones	Analysis:	PLM

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
5/5/2010	3425-1-111	64253	Caulking material
5/5/2010	3425-2-112	64254	Sticky tape insulation
5/5/2010	3425-2-113	64255	White mastic
5/5/2010	3425-2-114	64256	Duct sealer
5/5/2010	3425-2-115	64257	Floor tile & mastic
5/5/2010	3425-2-116	64258	White mastic
5/5/2010	3425-M-117	64259	White mastic
5/5/2010	3425-R-118	64260	Pitch pan filler
5/5/2010	3425-R-119	64261	Built-up roofing membrane
5/5/2010	3425-R-120	64262	Roof insulation
5/5/2010	3425-R-121	64263	Multi-layer flashing
5/5/2010	3425-R-122	64264	Flashing cement
5/5/2010	3425-E-123	64265	Caulking material
5/5/2010	3425-3-124	64266	Duct sealer
5/5/2010	3425-3-125	64267	Base molding & adhesive
5/5/2010	3425-3-126	64268	Floor tile & mastic
5/5/2010	3425-3-127	64269	White mastic
5/5/2010	3425-R-128	64270	Built-up roofing membrane
5/5/2010	3425-R-129	64271	Roof insulation
5/5/2010	3425-R-130	64272	Multi-layer flashing
5/5/2010	3425-R-131	64273	Flashing cement
5/5/2010	3425-R-132	64274	Pitch pan filler

Relinquished By	Date	Time	Received By	Date	Time
Tim Jones	5-13-10	1400			

A10-4048

ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS

Project:	**Ft. Benning Building 3425**	Job No.:	**10303**
Sampler:	Tim Jones	Analysis:	PLM

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
5/5/2010	3425-R-133	64275	Flashing cement
5/5/2010	3425-R-134	64276	Built-up roofing membrane
5/5/2010	3425-R-135	64277	Multi-layer flashing
5/5/2010	3425-R-136	64278	Built-up roofing membrane
5/6/2010	3425-R-137	64279	Multi-layer flashing
5/6/2010	3425-R-138	64280	Flashing cement
5/6/2010	3425-R-139	64281	Built-up roofing membrane
5/6/2010	3425-R-140	64282	Built-up roofing membrane
5/6/2010	3425-R-141	64283	Flashing cement
5/6/2010	3425-R-142	64284	Flashing cement
5/6/2010	3425-R-143	64285	Pitch pan filler
5/6/2010	3425-R-144	64286	Flashing cement
5/6/2010	3425-R-145	64287	Pitch pan filler
5/6/2010	3425-R-146	64288	Multi-layer flashing
5/6/2010	3425-R-147	64289	Built-up roofing membrane
5/6/2010	3425-R-148	64290	Multi-layer flashing
5/6/2010	3425-R-149	64291	Flashing cement
5/6/2010	3425-R-150	64292	Built-up roofing membrane
5/6/2010	3425-R-151	64293	Multi-layer flashing
5/6/2010	3425-R-152	64294	Caulking material
5/6/2010	3425-E-153	64295	Caulking material
5/6/2010	3425-E-154	64296	Caulking material

Relinquished By	Date	Time	Received By	Date	Time
Tim Jones	5-13-10	1400			

A10-4048

ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS

Project:	**Ft. Benning Building 3425**	Job No.:	**10303**
Sampler:	Tim Jones	Analysis:	PLM

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
5/6/2010	3425-E-155	64297	Caulking material
5/6/2010	3425-E-156	64298	Caulking material
5/6/2010	3425-E-157	64299	Caulking material
5/6/2010	3425-1-158	64300	Floor tile & mastic
5/6/2010	3425-1-159	64301	Plaster ceiling
5/6/2010	3425-1-160	64302	Fireproofing
5/6/2010	3425-1-161	64303	White mastic
5/6/2010	3425-1-162	64304	White mastic
5/6/2010	3425-M-163	64305	White mastic
5/6/2010	3425-M-164	64306	White mastic
5/6/2010	3425-M-165	64307	Caulking material
5/6/2010	3425-M-166	64308	Fireproofing
5/6/2010	3425-M-167	64309	Duct sealer
5/6/2010	3425-E-168	64310	Caulking material
5/6/2010	3425-E-169	64311	Caulking material
5/6/2010	3425-R-170	64312	Built-up roofing membrane
5/6/2010	3425-R-171	64313	Built-up roofing membrane
5/6/2010	3425-R-172	64314	Built-up roofing membrane
5/6/2010	3425-R-173	64315	Caulking material
5/6/2010	3425-R-174	64316	White mastic
5/6/2010	3425-R-175	64317	Flashing cement
5/6/2010	3425-R-176	64318	White mastic

Relinquished By	Date	Time	Received By	Date	Time
Tim Jones	5-13-10	1400			

A10-4048

ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS

Project:	**Ft. Benning Building 3425**	Job No.:	**10303**
Sampler:	Tim Jones	Analysis:	PLM

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
5/6/2010	3425-R-177	64319	Flashing cement
5/6/2010	3425-R-178	64320	Built-up roofing membrane
5/6/2010	3425-R-179	64321	Multi-layer flashing
5/6/2010	3425-R-180	64322	Built-up roofing membrane
5/6/2010	3425-R-181	64323	Flashing cement
5/6/2010	3425-R-182	64324	Built-up roofing membrane
5/6/2010	3425-R-183	64325	Flashing cement
5/7/2010	3425-R-184	64326	Flashing cement
5/7/2010	3425-R-185	64327	Pitch pan filler
5/7/2010	3425-R-186	64328	Flashing cement
5/7/2010	3425-R-187	64329	Flashing cement
5/7/2010	3425-R-188	64330	Caulking material
5/7/2010	3425-R-189	64331	Caulking material
5/7/2010	3425-R-190	64332	Caulking material
5/7/2010	3425-R-191	64333	Caulking material
5/7/2010	3425-R-192	64334	White mastic
5/7/2010	3425-1-193	64335	White mastic
5/7/2010	3425-1-194	64336	Drywall joint compound
5/7/2010	3425-E-195	64337	Caulking material
5/7/2010	3425-1-196	64338	White mastic
5/7/2010	3425-1-197	64339	White mastic
5/7/2010	3425-1-198	64340	White mastic

Relinquished By	Date	Time	Received By	Date	Time
Tim Jones	5-13-10	1400			

A10-4048

ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS

Project:	**Ft. Benning Building 3425**	Job No.:	**10303**
Sampler:	Tim Jones	Analysis:	PLM

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
5/7/2010	3425-E-199	64341	Caulking material
5/7/2010	3425-1-200	64342	Floor tile & mastic
5/7/2010	3425-1-201	64343	Floor tile & mastic
5/7/2010	3425-1-202	64344	Mail slot pillow covering
5/7/2010	3425-1-203	64345	Mail slot pillow stuffing
5/7/2010	3425-1-204	64346	White mastic
5/7/2010	3425-1-205	64347	White mastic
5/7/2010	3425-1-206	64348	Stick pin adhesive
5/7/2010	3425-1-207	64349	Caulking material
5/7/2010	3425-1-208	64350	Floor tile & mastic
5/7/2010	3425-1-209	64351	Base molding & adhesive
5/7/2010	3425-1-210	64352	Fireproofing
5/7/2010	3425-2-211	64353	Sticky tape insulation
5/7/2010	3425-2-212	64354	Floor tile & mastic
5/7/2010	3425-2-213	64355	Floor tile & mastic
5/7/2010	3425-2-214	64356	Caulking material
5/7/2010	3425-2-215	64357	Caulking material
5/7/2010	3425-3-216	64358	White mastic
5/7/2010	3425-3-217	64359	Floor tile & mastic
5/7/2010	3425-3-218	64360	Floor tile & mastic
5/7/2010	3425-3-219	64361	Floor tile & mastic
5/7/2010	3425-3-220	64362	Duct sealer

Relinquished By	Date	Time	Received By	Date	Time
Tim Jones	5-13-10	1400			

A10-4048

ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS

Project:	**Ft. Benning Building 3425**	Job No.:	**10303**
Sampler:	Tim Jones	Analysis:	PLM

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
5/7/2010	3425-3-221	64363	Floor tile & mastic
5/7/2010	3425-1-222	64364	White mastic
5/7/2010	3425-1-223	64365	White mastic
5/7/2010	3425-1-224	64366	Floor tile & mastic
5/7/2010	3425-1-225	64367	Floor tile & mastic
5/7/2010	3425-2-226	64368	Caulking material
5/7/2010	3425-3-227	64369	Floor tile & mastic
5/7/2010	3425-3-228	64370	Floor tile & mastic
5/7/2010	3425-3-229	64371	Floor tile & mastic
5/7/2010	3425-3-230	64372	White mastic
5/7/2010	3425-E-231	64373	Caulking material
5/7/2010	3425-E-232	64374	Caulking material
5/11/2010	3425-1-233	64375	White mastic
5/11/2010	3425-1-234	64376	Drywall joint compound
5/11/2010	3425-1-235	64377	Caulking material
5/11/2010	3425-1-236	64378	Floor tile & mastic
5/11/2010	3425-1-237	64379	Floor tile & mastic
5/11/2010	3425-2-238	64380	White mastic
5/11/2010	3425-3-239	64381	Duct sealer
5/11/2010	3425-E-240	64382	Caulking material
5/11/2010	3425-E-241	64383	Caulking material
5/11/2010	3425-1-242	64384	White mastic

Relinquished By	Date	Time	Received By	Date	Time
Tim Jones	5-13-10	1400			

A10-4048

ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS

Project:	**Ft. Benning Building 3425**	Job No.:	**10303**
Sampler:	Tim Jones	Analysis:	PLM

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
5/11/2010	3425-1-243	64385	White mastic
5/11/2010	3425-1-244	64386	Drywall joint compound
5/11/2010	3425-E-245	64387	Caulking material
5/11/2010	3425-2-246	64388	Floor tile & mastic
5/11/2010	3425-2-247	64389	Floor tile & mastic
5/11/2010	3425-E-248	64390	Caulking material

Relinquished By	Date	Time	Received By	Date	Time
Tim Jones	5-13-10	1400			

Appendix C

Certifications and Accreditations

The Environmental Institute

Tim Jones

Has completed coursework and satisfactorily passed

an examination that meets all criteria required for

EPA / AHERA (TSCA Title II) Approved Accreditation

and NESHAP Regulations Training

Asbestos in Buildings: Inspection and Assessment

February 10-12, 1997
Course Date

2360
Certificate Number

February 12, 1997
Examination Date

February 11, 1998
Expiration Date

William H. Spain - Course Director

Rachel G. McCain - Exam Administrator

TEI - 1300 Williams Drive, Suite E - Marietta, Georgia 30066 - (770) 427-3600

The Environmental Institute

Tim Jones

Social Security Number - XXX-XX-8826
USACE - 200 N. Cobb Parkway, Suite 404 - Marietta, Georgia 30062

Has completed coursework and satisfactorily passed an examination that meets all criteria required for EPA/AHERA/ASHARA (TSCA Title II) Approved Reaccreditation and NESHAP Regulations Training

Asbestos in Buildings: Inspector Refresher

September 24, 2009
Course Date

11600
Certificate Number

September 24, 2009
Examination Date

September 23, 2010
Expiration Date

David W. Hogue - Principle Instructor / Training Manager

Rachel G. McCain - Exam Administrator

(Approved by the ABIH Certification Maintenance Committee for 1/2 CM point)
(American Indoor Air Quality Council Re-certification Credit Registration #09011202)
(Florida Provider Registration Number 0001342 - Course #0002805)
TEI - 1841 West Oak Parkway, Suite F - Marietta, Georgia 30062 - (770) 427-3600 - www.tei-atl.com

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 101768-0

Carolina Environmental, Inc.

Cary, NC

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

BULK ASBESTOS FIBER ANALYSIS

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2009-04-01 through 2010-03-31

Effective dates

DEPARTMENT OF COMMERCE * UNITED STATES OF AMERICA *

Sally S. Bruce

For the National Institute of Standards and Technology

NVLAP-01C (REV. 2009-01-28)

Appendix F

Photographs of Buildings 3405 and 3425

1

Building 3405
View of main entrance

2

Building 3405
View of main façade

3

Building 3405
View of barracks wings from the east

4

Building 3405
Detail view of barracks wings from the east

Note fitness equipment to be demolished and replaced.

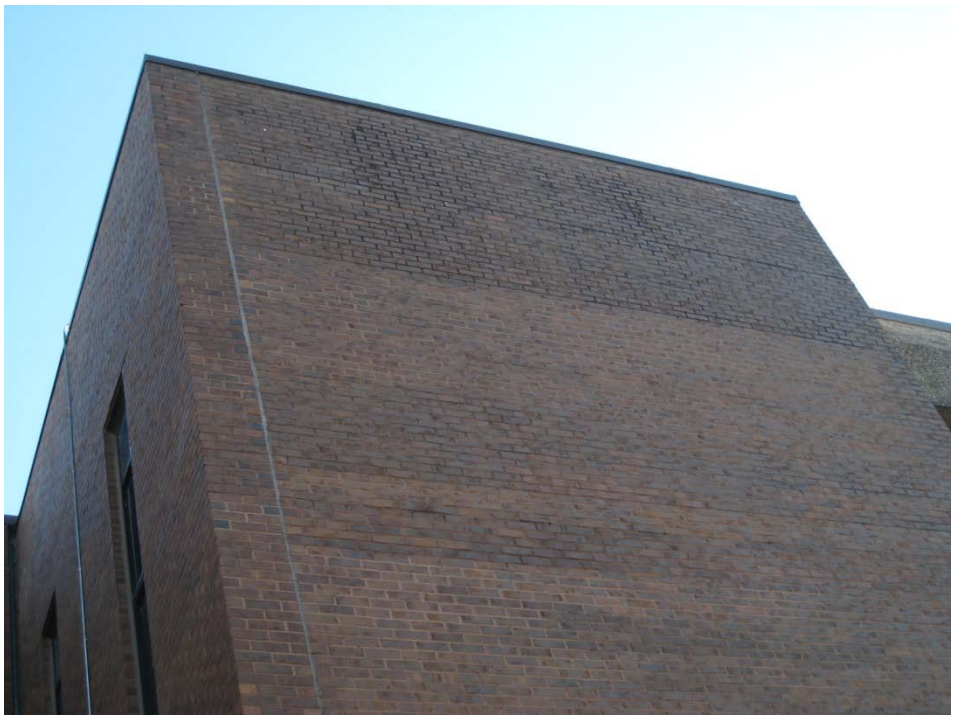
5

Building 3405
View of barracks wings and loading dock from the south.

6

Building 3405
View of barracks wing.

Detail view of brick and expansion joints.



7

Building 3405
View of barracks wings.

Detail view of brick and efflorescence.

8

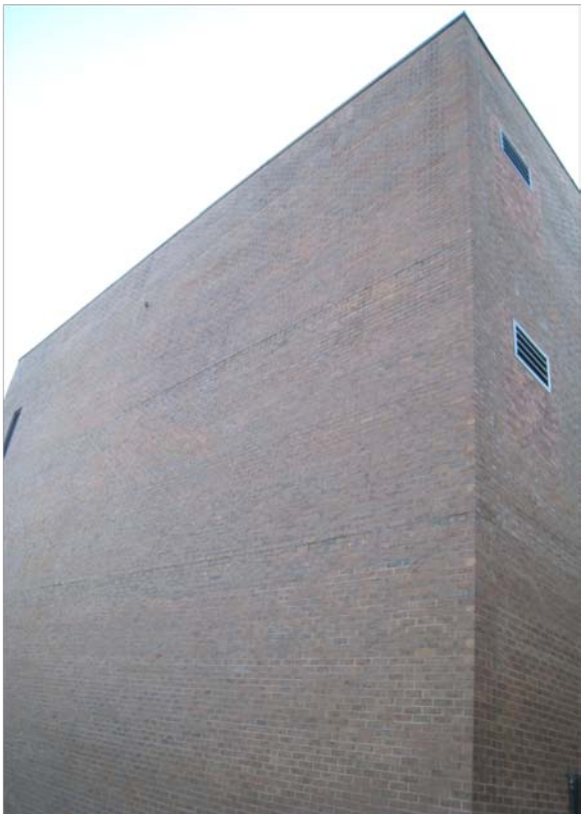
Building 3405
View of barracks wings.

Detail view of brick at floor line.

9

Building 3405
View of barracks wings.

Overall view of brick condition at floor line.



10

Building 3425
View of barracks wing at first floor.

11

Building 3425
View of breezeway between classrooms and DFAC.

12

Building 3425
View of barracks wing at breezeway.

13

Building 3425
View of looking south from DFAC roof.

14

Building 3425
View looking north of metal roof over courtyard.

15

Building 3425
View looking north from Classroom roof.

16

Building 3425
View looking south of uncovered courtyard from Classroom roof.

SPECIFIC INSTRUCTIONS
FOR
REPAIR TRAINEE BARRACKS BLDGS. 3405 & 3425
FORT BENNING, GEORGIA
FY**10,** LI **69147/69747/69752**

SECTION A-10 –DRAWINGS
PREPARED BY: L. Sitter DATE: **revised 13 May 10**

10.1 GENERAL. The instructions given herein supplement and modify the requirements given in Chapter A-10 of the Savannah District Design Manual for Military Construction. Except where modified, all pertinent instructions found in Chapter A-10 of the Design Manual shall be complied with for this project. These instructions are written and numbered so as to "parallel" the text of Chapter A-10. The AE Design Manual can be obtained at http://en.sas.usace.army.mil/enWeb/ go to Engineering Criteria, then go to Savannah District Design Manual for Military Construction by Volume or Individual Chapter.

10.2 APPLICABLE PUBLICATIONS. No changes

10.3 COMPUTER AIDED DESIGN AND DRAFTING (CADD). No changes

10.4 SUBMITTAL REQUIREMENTS. No changes

10.5 FINAL (100%) DESIGN SUBMITTAL REQUIREMENTS. No changes

10.6 CORRECTED FINAL DESIGN SUBMITTAL REQUIREMENTS. No changes

10.7 MATERIALS. No changes

10.8 DRAWING PREPARATION. No changes

10.9 DRAWING FORMATS. No changes

10.10 DRAWING REVISIONS. No changes

10.11 SPECIFIC INSTRUCTIONS. Civil site drawing CADD files shall use the seed files available from the Savannah District Engineering Criteria web site - http://en.sas.usace.army.mil/enWeb/ .

On the civil site plans, label all existing structures with a building number, even when they are scheduled for demolition. All streets shall be labeled with the street name. All site plans are to be displayed with North to the top of the sheet. No rotation is acceptable. All site drawings will have exactly the same match lines. All drawing elements shall reside on appropriately named levels, in accordance with the 4.0 A/E/C/ CADD standard. All polygons shall be cleaned and free

of duplicate vertexes and self-intersections. Pertinent survey information must be present on the existing topography; datum, date, survey method, and surveyor name.
The **site layout plan** needs to clearly identify the construction limits of the project. The resulting CADD file will be a singular file depicting the **project site layout** with a closed polygon depicting the construction limits. The construction limits polygon will reside on an individual layer named **C-PROP-CONS** per the 4.0 A/E/C CADD standard AIA format with the Level/Layer Description of **Construction limits/controls, staging area.** Depiction by symbology alone is not acceptable. The coordinate system of this file will be State Plane - NAD83 – US Survey Feet. Vertical Datum will be NAVD88.

For RFP's, one layer (polygonal shape files) is required of the Construction limits. The construction limits should include all areas of expected disturbance – grading, clearing, erosion control, utilities, etc.

For full construction design, submittal of the following layers is necessary for NEPA review (144R).
1) Clearing limits in polygon form.
2) Construction limits/sediment and erosion control in polygon form.
3) Building footprints as polygons.
4) Road and parking edges as polygons
5) For linear constructions, i.e., fences, pipelines, and the like, a polygon enclosing the right of way, a polygon showing the clearing limits, and a polyline designating the centerline of the linear construction.

The border sheet should be completed at the CATEGORY CODE area with these numbers **721-81-12** .

All **drawing files names** begin with a project code (3 characters). The project code for the:

- **TBUP Bldg's 3405 & 3425** begins with these characters -
  NAF-----.file extension
- **CIVIL** (work outside the 5 foot) begins with these characters -
  NAE-----.file extension

The file naming should be in accordance with the 4.0 A/E/C/ CADD standard at the web site https://cadbim.usace.army.mil/CAD. All file names will begin with the three digits provided by the bullets above.

A CD with the drawing files included in the review must be submitted at **each** review submittal. All CD's submitted for review must be labeled the review phase (30%, 60%, 90%, etc.) and the complete project name. Also this reference number (CADD #) should be placed on the CD submittals (this can be hand written) **Ben0655 .**

The border sheet, index and coversheet dgn files can be found at http://en.sas.usace.army.mil/enWeb/ under ENGINEERING CRITERIA. These are the files that must be used for this project. The plot size of this sheet at full size english is **22X34**. If there are any reasons why the AE cannot use this size, please contact me immediately upon receipt to discuss why. For instance, if this project is site adapt to another project that is F size or a renovation of an existing project, we can discuss acceptance upon receipt of this document.

All files will be prepared with or completely compatible with MicroStation latest version. **Bound DGN files are unacceptable! Delivered DGN files must be unbound!**

EXHIBITS. No changes

Please call Lori Sitter if you have any CADD questions (912)652-5211.
Please call Scott Gobin at (912)652-5386 or Will Martin at (912)652-5543 for any questions in regards to the creation of GIS Shape files and requirements

APPENDIX H
Exterior Signage

Not Used

Recommended Trees for Fort Benning

Street Trees

Red Maple	Acer rubrum
White Ash	Fraxinus americana
Green Ash	Fraxinus pennsylvanica
White Oak	Quercus alba
Scarlet Oak	Quercus coccinea
Overcup Oak	Quercus lyrata
Swamp Chestnut Oak	Quercus michauxii
Nuttall Oak	Quercus nuttallii
Willow Oak	Quercus phellos
Chestnut Oak	Quercus prinus
Shumard Oak	Quercus shumardii
Bald Cypress	Taxodium distichum
Winged Elm	Ulmus alata

Flowering Trees

Red Maple	Acer rubrum
Serviceberry	Amelanchier canadensis
Red Buckeye	Aesculus pavia
Eastern Redbud	Cercis canadensis
Fringe Tree	Chionanthus virginicus
Flowering Dogwood	Cornus florida
Hawthorn	Crataegus spp.
Silverbell	Halesia diptera
Crape Myrtle	Lagerstroemia indica
Yellow-Poplar	Liriodendron tulipifera
Southern Magnolia	Magnolia grandiflora
* Crabapples	Malus spp.
* Snowbell	Styrax americanus

Trees Under Power Lines

Serviceberry	Amelanchier arborea
American Hornbeam	Carpinus caroliniana
Eastern Redbud	Cercis canadensis
Fringe Tree	Chionanthus virginicus
Flowering Dogwood	Cornus florida
Hawthorn	Crataegus spp.
Titi	Cyrilla racemiflora
Crape Myrtle	Lagerstroemia indica
* Crabapple	Malus spp.
Eastern Hophornbeam	Ostrya virginians
* Snowbell	Styrax americanus
Rusty Blackhaw	Viburnam rufidulum

Trees for Fall Color

Florida Maple	Acer barbatum
Red Maple	Acer rubrum
Hickory	Carya spp.
Flowering Dogwood	Cornus florida
Crape Myrtle	Lagerstroemia indica
Blackgum	Nyssa sylvatica
White Oak	Quercus alba
Scarlet Oak	Quercus coccinea
Willow Oak	Quercus phellos
Sassafras	Sassafras albidum
Bald Cypress	Taxodium distichum

* not recommended for street trees

Large Trees

Florida Maple	Acer barbatum
Red Maple	Acer rubrum
River Birch	Betula nigra
Hickory	Carya spp.
Common Persimmon	Diospyrus virginiana
American Beech	Fagus grandiflora
White Ash	Fraxinus pennsylvanica
Green Ash	Fraxinus americana
American Holly	Ilex opaca
Black Walnut	Juglans nigra
Redcedar	Juniperus virginiana
Yellow-Poplar	Liriodendron tulipifera
Cucumber magnolia	Magnolia acuminata
Southern Magnolia	Magnolia grandiflora
Big Leaf Magnolia	Magnolia macrophylla
Blackgum	Nyssa sylvatica
Longleaf Pine	Pinus palustris
Sawtooth Oak	Quercus acutissima
White Oak	Quercus alba
Scarlet Oak	Quercus coccinea
Southern Red Oak	Quercus falcata
Overcup Oak	Quercus lyrata
Swamp Chestnut Oak	Quercus michauxii
Nuttal Oak	Quercus nuttallii
Willow Oak	Quercus phellos
Chestnut Oak	Quercus prinus
Northern Red Oak	Quercus rubrum
Shumard Oak	Quercus shumardii
Post Oak	Quercus stellata
Black Oak	Quercus velutina
Bald Cypress	Taxodium distichum
American Basswood	Tillia americana
Winged Elm	Ulmus alata

DESIGN / BUILD

TRAINEE COMPLEX UPGRADE

FORT BENNING, GEORGIA

APPENDIX - J

FY
SOLICITATION NO. PN 69147

US Army Corps
of Engineers

Savannah District

US ARMY CORPS
OF ENGINEERS
SAVANNAH

SYMBOL	DESCRIPTION	DATE	BY

DATE: 30 APR 2010
SOLICITATION NO.: PN 69147
CONTRACT NO.:
CATEGORY CODE: 722-10-03
PLOT DATE: 2-17-2010

DESIGNED BY:
DWN BY:
CKD BY:
SUBMITTED BY:
FILE NAME:
SIZE:
PLOT SCALE:

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

CROMWELL
ARCHITECTS ENGINEERS
101 SOUTH SPRING ST.
LITTLE ROCK, AR. 72201

TRAINING BATTALION UPGRADE
FORT BENNING, GEORGIA

COVER SHEET

PLATE
REFERENCE
NUMBER
G-101
SHEET OF

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

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

US Army Corps of Engineers

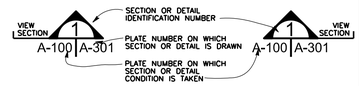
Savannah District

VOLUME NO. 1

INDEX OF DRAWINGS

SHEET NO.	PLATE NO.	DGN FILE	TITLE
001	G-001	NMXG-001.dgn	COVER SHEET
002	G-002	NMXG-002.dgn	INDEX OF DRAWINGS, ABBREVIATIONS, AND SYMBOLS
003	G-003	NMXG-003.dgn	LOCATION PLAN
004	VF101	NMYVF101.dgn	SITE SURVEY - BUILDING 3405
005	VF102	NMYVF102.dgn	SITE SURVEY - BUILDING 3405
006	VF103	NMYVF103.dgn	SITE SURVEY - BUILDING 3425
007	VF104	NMYVF104.dgn	SITE SURVEY - BUILDING 3425
008	CS101	NMYCS101.dgn	SITE LAYOUT PLAN - BUILDING 3405
009	CS102	NMYCS102.dgn	SITE LAYOUT PLAN - BUILDING 3405
010	CS103	NMYCS103.dgn	SITE LAYOUT PLAN - BUILDING 3425
011	CS104	NMYCS104.dgn	SITE LAYOUT PLAN - BUILDING 3425

SECTION SYMBOLS

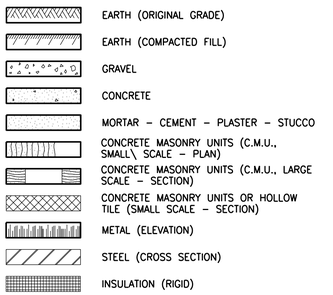


KEY FOR SECTION

KEY FOR ENLARGED PLAN/DETAIL

KEY FOR ELEVATION

MATERIAL INDICATIONS



STANDARD ABBREVIATIONS

A.C.	AIR CONDITIONED
A.D.	AREA DRAIN
A.H.U.	AIR HANDLING UNIT
ALT.	ALTERNATE
ALUM.	ALUMINUM
AMP., A.	AMPERES
A.O.	ACCESS OPENING
APPROX.	APPROXIMATELY
ARCH.	ARCHITECTURAL
A.T.	ASPHALT TILE
A.T.C.	ACOUSTIC TILE CEILING
BAL.	BALANCE
BD.	BOARD
BLDG.	BUILDING
BLK.	BLANK
BM.	BEAM
BOT.	BOTTOM
BRG.	BEARING
B.T.U.H.	BRITISH THERMO UNIT/HOUR
CAB.	CABINET
CAP.	CAPACITY
C/B	CIRCUIT BREAKER
C.D.	CEILING DIFFUSER
CEM.	CEMENT
CER.	CERAMIC
C.F.M.	CUBIC FEET/MINUTE
CKT.	CIRCUIT
℄	CENTER LINE
CEIL.	CEILING
CL.	CLOSET
C.M.U.	CONCRETE MASONRY UNIT
C.O.	CLEAN OUT
COL.	COLUMN
CONC.	CONCRETE
COND.	CONDENSATE
CONN.	CONNECTION
CONST.	CONSTRUCTION
CONT.	CONTINUOUS
CONTR. JT.	CONTRACTION JOINT
C.S.C.	COLOR SYMBOL CODE
C.T.	CERAMIC TILE
C.T.B.	CERAMIC TILE BASE
C. TO C.	CENTER TO CENTER
DET.	DETAIL
DIA.	DIAMETER
DIFF.	DIFFUSER
DIM.	DIMENSION
DISC.	DISCONNECT
D.J.	DUMMY JOINT
DN.	DOWN
DR.	DRAIN
D.S.	DOWN SPOUT
DWG.(S)	DRAWING(S)
EA.	EACH
ELEC.	ELECTRIC
EQUIP.	EQUIPMENT
E.W.C.	ELECTRIC WATER COOLER
EXH.	EXHAUST
EXP. JT.	EXPANSION JOINT
EXT.	EXTERIOR
EXIST.	EXISTING
F.A.	FIRE ALARM
F.C.	FLEXIBLE CONNECTION
F.D.	FLOOR DRAIN
F.E.C.	FIRE EXTINGUISHER CABINET
FIN.	FINISH
FL.	FLOOR
FT.	FOOT, FEET
FTG.	FOOTING
GA.	GAGE
GAL.	GALLON
GALV.	GALVANIZED
G.F.E.	GOVERNMENT FURNISHED EQUIPMENT
GL.	GLASS
GND.	GROUND
GOV'T	GOVERNMENT
G.P.H.	GALLONS/HOUR
G.P.M.	GALLONS/MINUTE
GR.	GRILLE
G.W.B.	GYPSUM WALL BOARD
H.	HIGH
H.B.	HOSE BIBB
H.C.	HOLLOW CORE
HT.	HEIGHT
H.M.	HOLLOW METAL
H.P.	HORSE POWER
HR.	HOUR
HTG.	HEATING
HTR.	HEATER
H.&V.	HEATING AND VENTILATING
HW.	HARDWARE
HYD.	HYDRANT
I.D.	INSIDE DIAMETER
I.E.	INVERT ELEVATION
IN.	INCHES
INCAND.	INCANDESCENT
INSUL.	INSULATION
INT.	INTERIOR
J.B.	JUNCTION BOX
JCT.	JUNCTION
JT.	JOINT
KVA	KILOVOLT AMPERE
LB.,#	POUND
LG.	LONG
L.P.	LIGHTING PANEL
LTG.	LIGHTING
M.	MOTOR
MAINT.	MAINTENANCE
MAX.	MAXIMUM
M.D.P.	MAIN DISTRIBUTION PANEL
MECH.	MECHANICAL
MTL.	METAL
MIN.	MINIMUM
MISC.	MISCELLANEOUS
M.O.	MASONRY OPENING
M.T.	METAL THRESHOLD
MTD.	MOUNTED
MTG.	MOUNTING
M.V.	MECHANICAL VENTILATION
M.G.T.	MATT GLAZE TILE
N.A.	NOT APPLICABLE
N.I.C.	NOT IN CONTRACT
NO.	NUMBER
O.A.	OUTDOOR AIR
OL.	OVERLOAD
OPNG.	OPENING
OPP.	OPPOSITE
O.S.D.	OPEN SIGHT DRAIN
P.	PAPER
PART.	PARTITION
PER.	PERIMETER
P. PL.	PLATE
PLBG.	PLUMBING
PLYW'D	PLYWOOD
PNL.	PANEL
PRESS.	PRESSURE
PSF	POUNDS/SQUARE FOOT
PSI	POUNDS/SQUARE INCH
PSIG	POUNDS/SQUARE INCH GAGE
PT.	POINT
PTD.	PAINTED
QTR.	QUARTER
QUAN.	QUANTITY
R.	RISER
R.A.	RETURN AIR
RAD.	RADIUS
RD.	ROUND
REG.	REGISTER
REINF.	REINFORCING
REQ.	REQUIRED
RET.	RETURN
R.G.	RETURN GRILLE
RM.	ROOM
R.P.M.	REVOLUTION/MINUTE
S.	SUPPLY
S.A.	SUPPLY AIR
SCH.	SCHEDULE
SECT.	SECTION
SERV.	SERVICE
SHT.	SHEET
S.J.	SLIP JOINT
SPEC.	SPECIFICATIONS
SQ. FT.	SQUARE FEET
ST.	STEEL
STOR.	STORAGE
STRUC.	STRUCTURAL
SUSP.	SUSPENDED
SW.	SWITCH
T.	TOILET
TEL.	TELEPHONE
TEMP.	TEMPERATURE
THK.	THICKNESS
THD.	THRESHOLD
TOIL.	TOILET
TYP.	TYPICAL
V.	VOLT
V.A.T.	VINYL ASBESTOS TILE
VENT.	VENTILATION
VERT.	VERTICAL
VTR	VENT THRU ROOF
W.	WATT
W/	WITH
WC	WAINSCOATING
WD.	WOOD
W.D.	WINDOW DIMENSION
WF	WIDE FLANGE
W.G.	WATER GAGE
WP.	WEATHERPROOF
WTR.	WATER
W.W.F.	WELDED WIRE FABRIC

US ARMY CORPS OF ENGINEERS SAVANNAH

BY	DATE	DESCRIPTION

DESIGNED BY:
DRWN BY:
CKD BY:
SUBMITTED BY:
DATE: 30 APR 2010
SQ. NOTATION NO: PN 69147
CONTRACT NO.:
CATEGORY CODE: 722-10-03
FILE NAME: 8686-002XXX.DGN
PLOT DATE: 2-17-2010
SIZE:
PLOT SCALE:

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

CROMWELL
ARCHITECTS ENGINEERS
101 SOUTH SPRING ST.
LITTLE ROCK, AR. 72201

TRAINING BATTALION UPGRADE
FORT BENNING, GEORGIA

INDEX OF DRAWINGS, ABBREVIATIONS & SYMBOLS

PLATE REFERENCE NUMBER
G-002
SHEET OF

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

PROJECT LOCATION
BUILDINGS 3405 & 3425

HAUL ROUTE

GATE

NEW DFAC UNDER CONSTRUCTION

1 G-003C-003 LOCATION MAP - FORT BENNING - SAND HILL AREA
1" = 500'-0"
0' 100' 250' 500' 1000' 1500'

US ARMY CORPS OF ENGINEERS
SAVANNAH

BY	DATE	DESCRIPTION	SYMBOL

DESIGNED BY:
DWN BY:
CKD BY:
SUBMITTED BY:
DATE: MAR 2010
SOLICITATION NO.: PN 69147
CONTRACT NO.:
CATEGORY CODE: 722-10-03
FILE NAME:
SIZE:
PLOT SCALE:
PLOT DATE: 2-17-2010

U. S. ARMY ENGINEER DISTRICT
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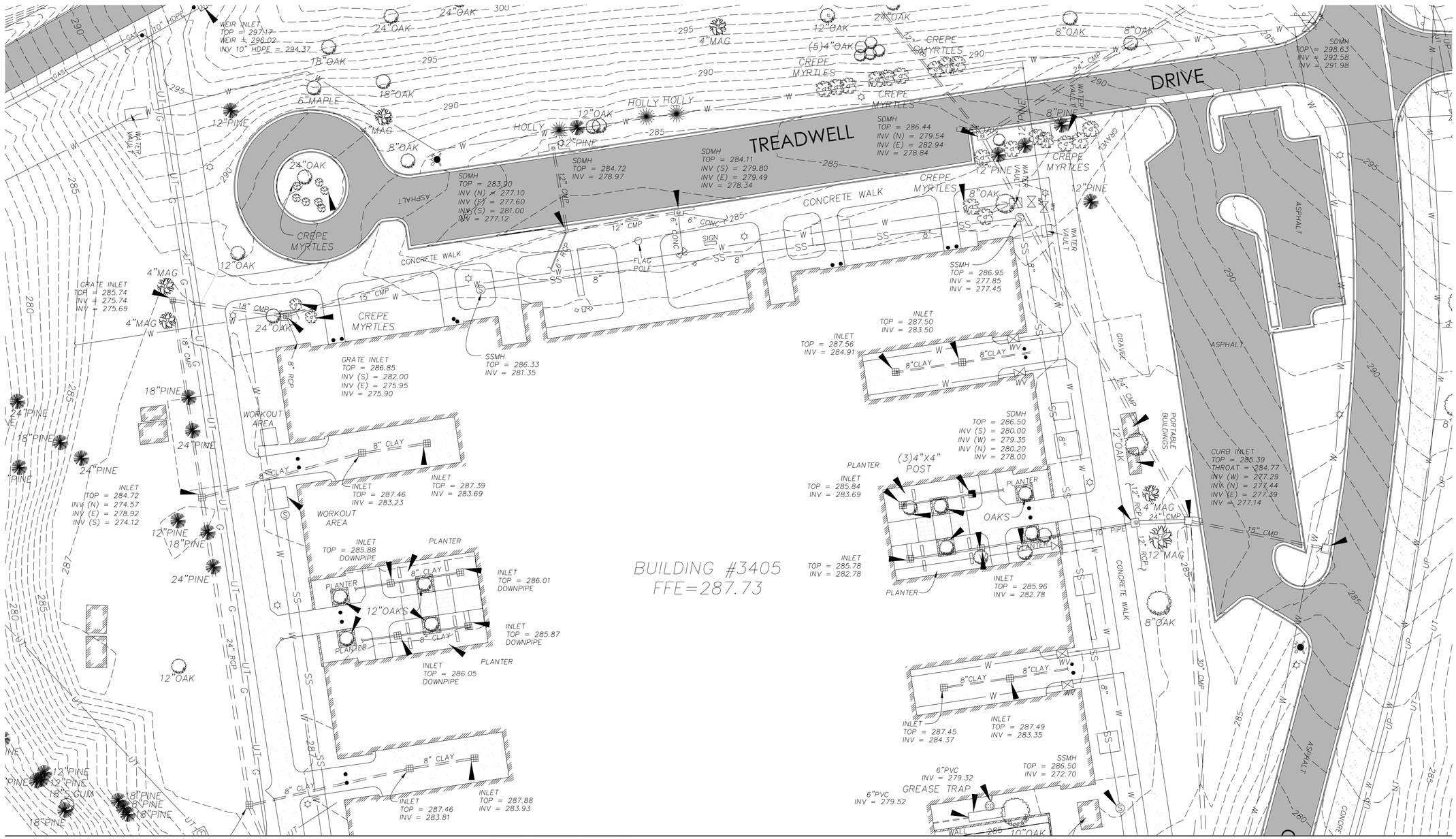
LITTLE ROCK, AR. 72201

TRAINING BATTALION UPGRADE
FORT BENNING, GEORGIA

LOCATION MAP

PLATE REFERENCE NUMBER
G-003
SHEET 3 OF

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



SITE SURVEY - BUILDING 3405

NORTH

SCALE: 1" = 30'

0' 15' 30' 60' 90'

US ARMY CORPS OF ENGINEERS SAVANNAH

BY	DATE	DESCRIPTION	SYMBOL

DESIGNED BY:
DRWN BY:
CKD BY:
SUBMITTED BY:
DATE: APR 2010
SOLICITATION NO: PN 69147
CONTRACT NO.:
CATEGORY CODE: 722-10-03
FILE NAME:
SIZE:
PLOT SCALE:
PLOT DATE: 2-17-2010

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

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101 SOUTH SPRING ST.
LITTLE ROCK, AR. 72201

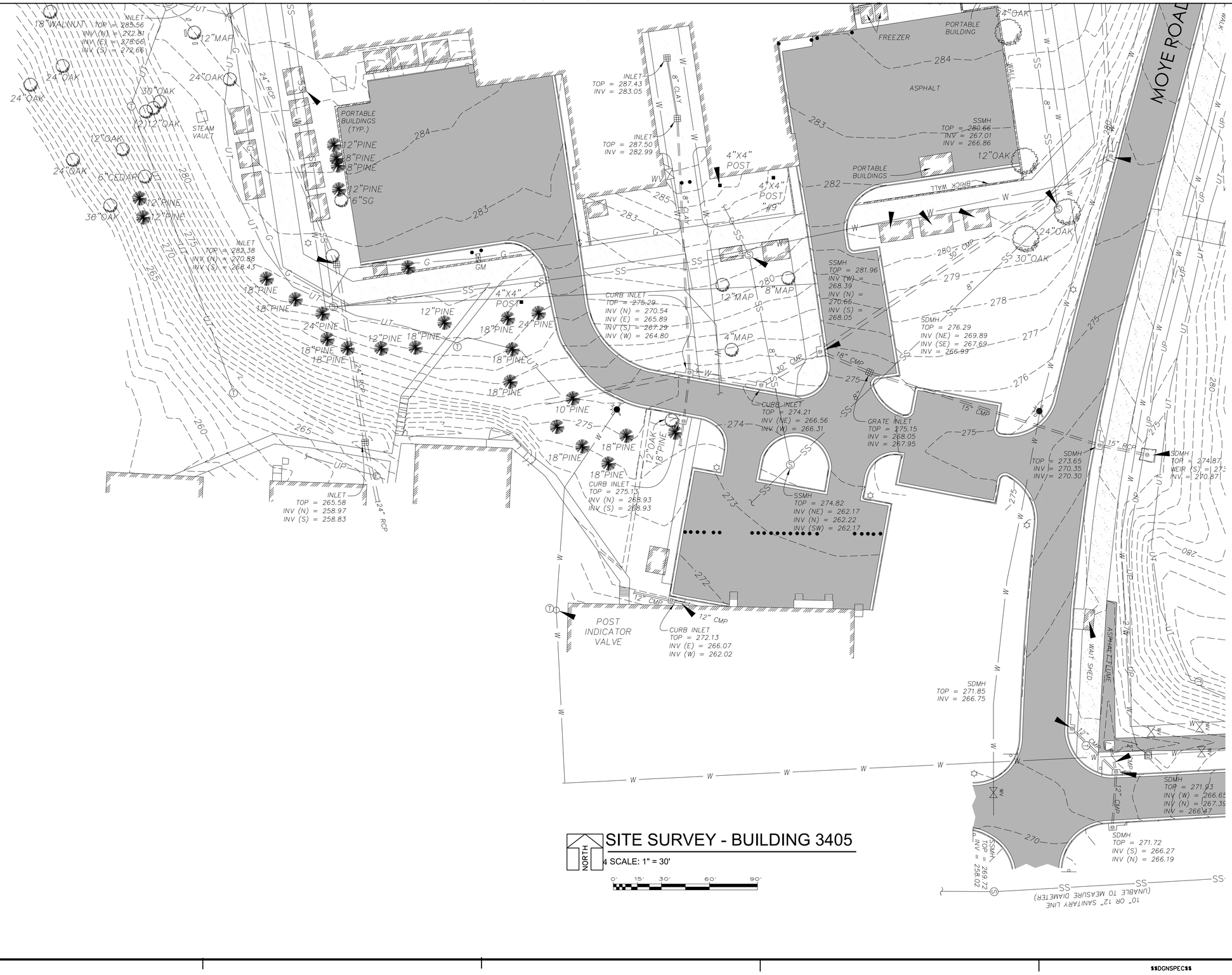
TRAINING BATTALION UPGRADE
FORT BENNING, GEORGIA

SITE SURVEY
BUILDING 3405

PLATE REFERENCE NUMBER
VF101
SHEET OF

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

MATCH LINE SEE SHEET VF101



SITE SURVEY - BUILDING 3405

SCALE: 1" = 30'

US ARMY CORPS OF ENGINEERS SAVANNAH

BY	DATE	DESCRIPTION	SYMBOL

DATE: APR 2010
SOLICITATION NO.: PN 69147
CONTRACT NO.:
CATEGORY CODE: 722-10-03
PLOT DATE: 2-17-2010

DESIGNED BY:
DWN BY:
CKD BY:
SUBMITTED BY:
FILE NAME:
SIZE:
PLOT SCALE:

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

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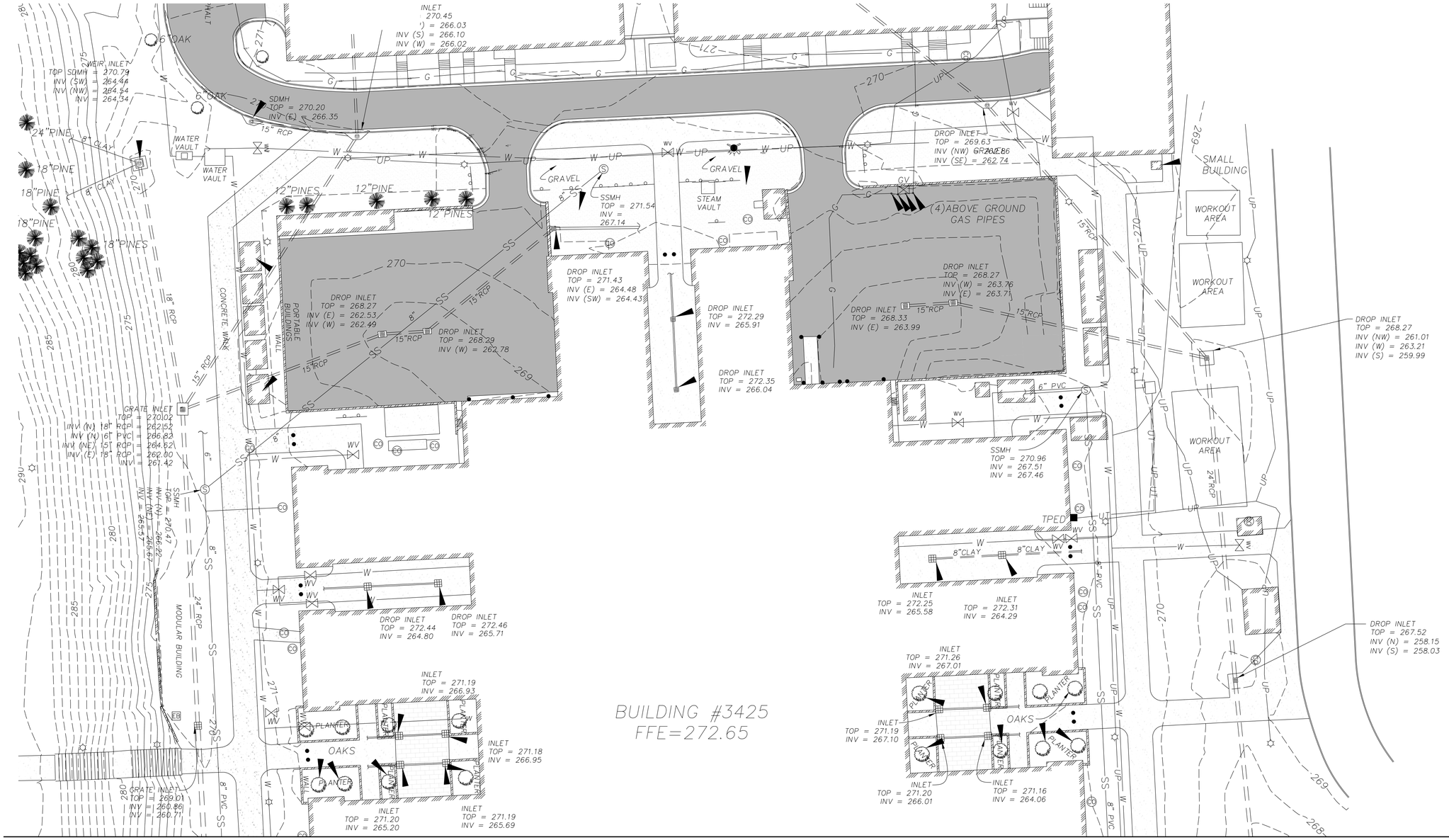
101 SOUTH SPRING ST.
LITTLE ROCK, AR. 72201

TRAINING BATTALION UPGRADE
FORT BENNING, GEORGIA

SITE SURVEY
BUILDING 3405

PLATE REFERENCE NUMBER
VF102
SHEET OF

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



MATCH LINE-SEE SHEET VF104

SITE SURVEY - BUILDING 3425

NORTH

4 SCALE: 1" = 30'

0' 15' 30' 60' 90'

US ARMY CORPS OF ENGINEERS SAVANNAH

BY	DATE	DESCRIPTION	SYMBOL

DATE: 30 APR 2010
SOLICITATION NO: PN 69147
CONTRACT NO.:
CATEGORY CODE: 722-10-03
PLOT DATE: 2-17-2010

DESIGNED BY:
DWN BY: CKD BY:
SUBMITTED BY:
FILE NAME:
SIZE: PLOT SCALE:

U. S. ARMY ENGINEER DISTRICT
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SAVANNAH DISTRICT

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LITTLE ROCK, AR. 72201

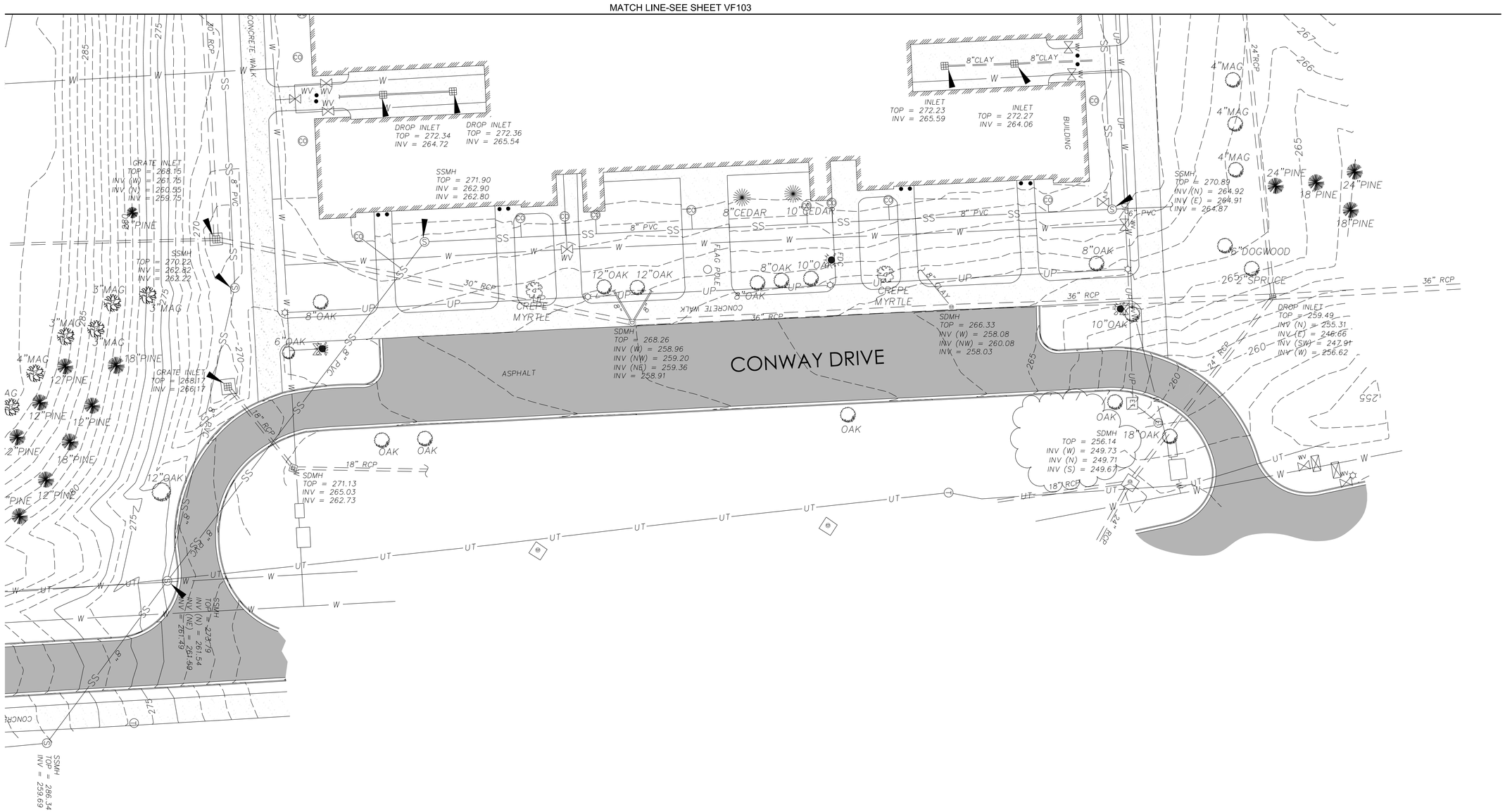
TRAINING BATTALION UPGRADE
FORT BENNING, GEORGIA

SITE SURVEY
BUILDING 3425

PLATE REFERENCE NUMBER
VF103
SHEET OF

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

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



SITE SURVEY - BUILDING 3425

NORTH

4 SCALE: 1" = 30'

0' 15' 30' 60' 90'

US ARMY CORPS OF ENGINEERS SAVANNAH

SYMBOL	DESCRIPTION	DATE	BY

DESIGNED BY:
DWN BY:
CKD BY:
SUBMITTED BY:
FILE NAME:
SIZE:
PLOT SCALE:
DATE: 30 APR 2010
SOLICITATION NO.: PN 69147
CONTRACT NO.:
CATEGORY CODE: 722-10-03
PLOT DATE: 2-17-2010

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

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ARCHITECTS ENGINEERS
101 SOUTH SPRING ST.
LITTLE ROCK, AR. 72201

TRAINING BATTALION UPGRADE
FORT BENNING, GEORGIA

SITE SURVEY
BUILDING 3425

PLATE REFERENCE NUMBER
VF104
SHEET OF

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

LEGEND

EXISTING MINOR GRADE CONTOUR (1' CONTOUR)	269
EXISTING MAJOR GRADE CONTOUR (5' CONTOUR)	300
FINISHED MINOR GRADE CONTOUR (1' CONTOUR)	284
FINISHED MAJOR GRADE CONTOUR (5' CONTOUR)	285
NEW WEIR INLET	
NEW CATCH BASIN (C.B.)	
NEW MANHOLE (M.H.)	
NEW STORM DRAIN	
NEW MOUNTABLE CURB & GUTTER	
LIMITS OF CONSTRUCTION	

GENERAL NOTES

1. OBTAIN NPDES PERMIT FOR THE ENTIRE SITE. OBTAIN UTILITY TIE-IN APPROVALS.
2. STORM WATER: NO DETENTION REQUIRED FOR THE SITE.
3. DOMESTIC WATER DISTRIBUTION: PROVIDE NO MORE THAN 2 DOMESTIC WATER SERVICE LINES TO EACH BUILDING. LOCATION AND DEMAND TO BE DETERMINED BY DESIGNER. DISCONNECT ALL EXISTING DOMESTIC WATER SERVICE LINES. PROVIDE METER AND BACKFLOW PREVENTER ON EACH LINE. INSTALL ALL DOMESTIC WATER PER COLUMBUS WATER WORKS (CWW) SPECIFICATIONS.
4. FIRE WATER DISTRIBUTION: PROVIDE FIRE WATER LINE TO THE BUILDING. LOCATION AND DEMAND TO BE DETERMINED BY DESIGNER. PROVIDE BACK FLOW PREVENTER ON FIRE LINE. INSTALL FIRE LINE PER CWW SPECIFICATIONS.
5. PRIMARY ELECTRICAL SERVICE: COORDINATE WITH FLINT ELECTRIC THE DESIGN OF TRANSFORMER IF NECESSARY. COORDINATE NUMBER AND SIZE OF CONDUIT STUBS AND DEMAND WITH CONTRACTING OFFICER REPRESENTATIVE.
6. SITE/SECURITY LIGHTING: COORDINATE DESIGN, DEMOLITION, AND/OR RELOCATION WITH FLINT ELECTRIC.
7. COMMUNICATIONS: PROVIDE NEW DUCT BANK FROM BUILDING TO COMMUNICATION POINT OF CONNECTION NOTED ON PLAN.
8. SITE ATFP ELEMENTS: PROVIDE PHYSICAL BARRIERS AS INDICATED.
9. ENSURE A FIRE HYDRANT IS LOCATED WITHIN 150' OF BUILDING FIRE DEPARTMENT CONNECTION. PROVIDE FIRE HYDRANT IF NECESSARY.

US ARMY CORPS OF ENGINEERS SAVANNAH

SYMBOL	DESCRIPTION	DATE	BY

DESIGNED BY:		DATE: 15 APR 2010	
DWN BY:	CKD BY:	SOLICITATION NO.: PN 69147	
SUBMITTED BY:		CONTRACT NO.:	
FILE NAME:		CATEGORY CODE: 722-10-03	
SIZE:	PLOT SCALE:	PLOT DATE: 2-17-2010	

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

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ARCHITECTS ENGINEERS
101 SOUTH SPRING ST.
LITTLE ROCK, AR. 72201

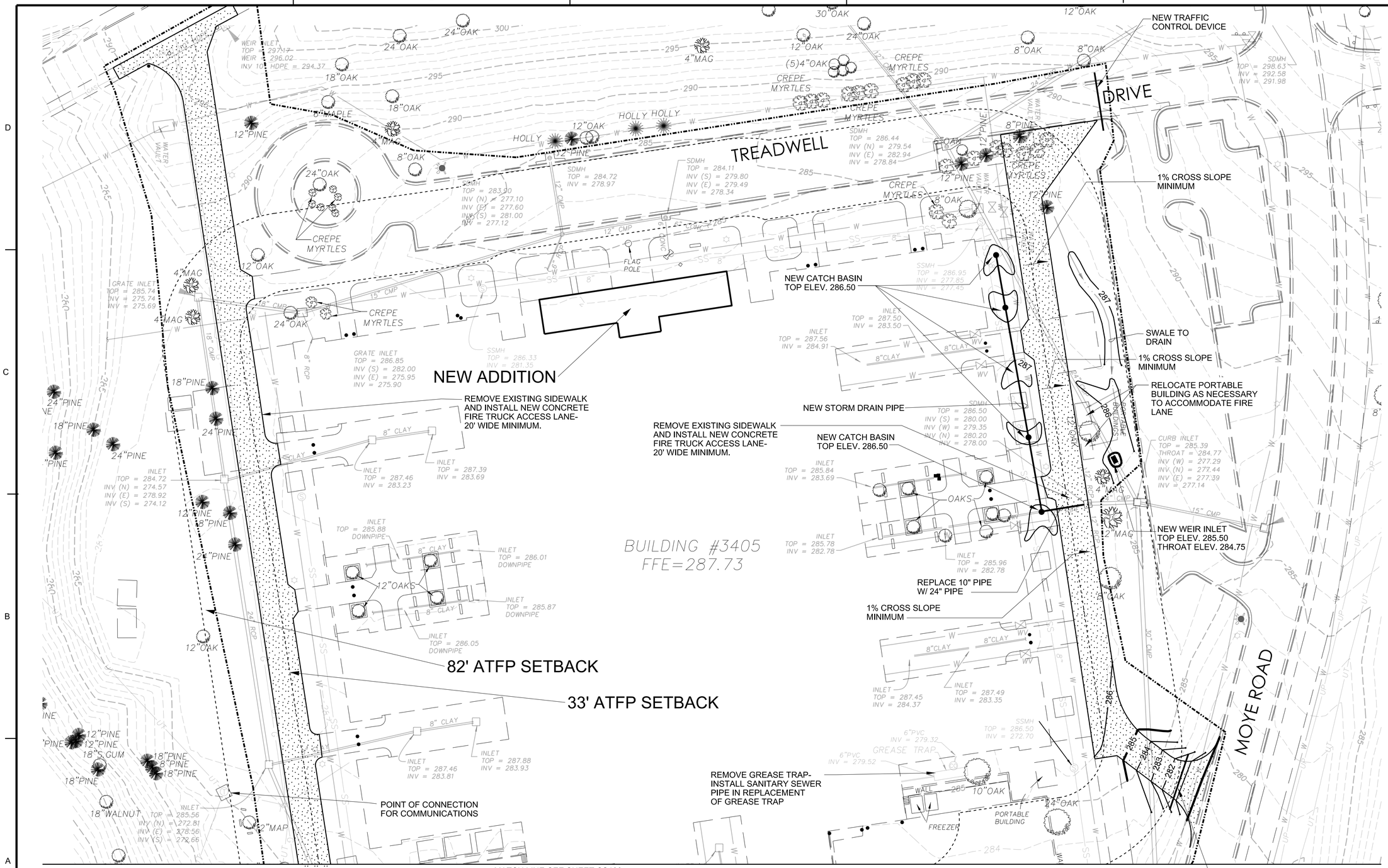
TRAINING BATTALION UPGRADE
FORT BENNING, GEORGIA

SITE LEGENDS & NOTES
BUILDING 3405

PLATE REFERENCE NUMBER
CS001
SHEET OF

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

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



NOTE: FOR LEGEND AND NOTES PERTAINING TO THIS SHEET SEE CS001.

SITE LAYOUT - BUILDING 3405

NORTH

4 SCALE: 1" = 30'

0' 15' 30' 60' 90'

US ARMY CORPS OF ENGINEERS SAVANNAH

SYMBOL	DESCRIPTION	DATE	BY

DESIGNED BY: | DATE: 30 APR 2010
DWN BY: | CKD BY: | SOLICITATION NO.: PN 69147
SUBMITTED BY: | CONTRACT NO.:
FILE NAME: | CATEGORY CODE: 722-10-03
SIZE: | PLOT SCALE: | PLOT DATE: 2-17-2010

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

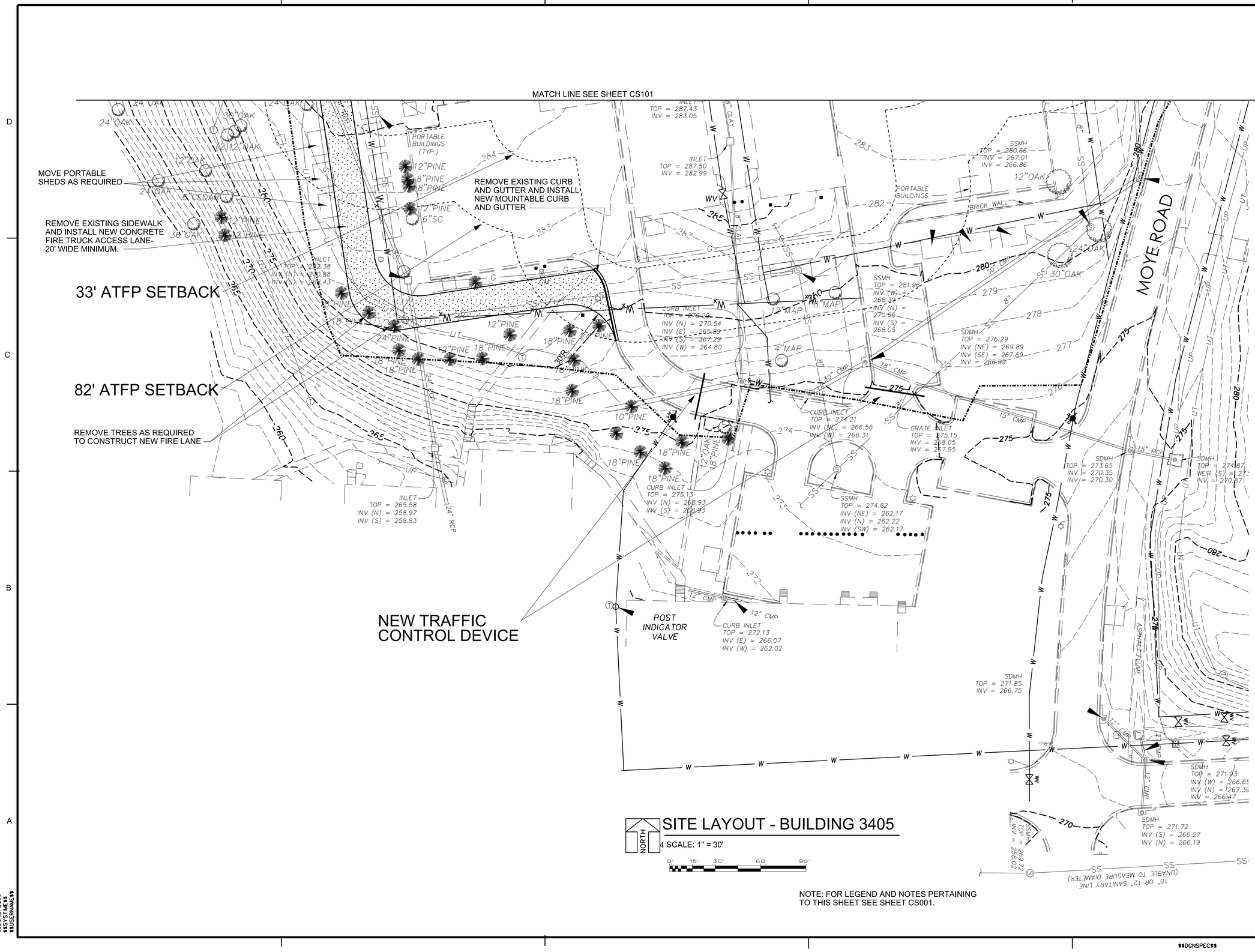
CROMWELL
ARCHITECTS ENGINEERS
101 SOUTH SPRING ST.
LITTLE ROCK, AR. 72201

TRAINING BATTALION UPGRADE
FORT BENNING, GEORGIA

SITE LAYOUT
BUILDING 3405

PLATE REFERENCE NUMBER
CS101
SHEET OF

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



NOTE: FOR LEGEND AND NOTES PERTAINING TO THIS SHEET SEE SHEET CS001.

US ARMY CORPS OF ENGINEERS SAVANNAH

SYMBOL	DESCRIPTION	DATE	BY

DATE: APR 2010
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CONTRACT NO.:
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DESIGNED BY:
DWN BY:
CKD BY:
SUBMITTED BY:
FILE NAME:
SIZE:
PLOT SCALE:

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

CROMWELL
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101 SOUTH SPRING ST.
LITTLE ROCK, AR. 72201

TRAINING BATTALION UPGRADE
FORT BENNING, GEORGIA

SITE LAYOUT BUILDING 3405

PLATE REFERENCE NUMBER
CS102
SHEET OF

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

REPLACE WATER VAULT WITH HS-20 RATED WATER VAULT

REPLACE CURB & GUTTER W/ MOUNTABLE CURB & GUTTER

REPLACE CURB & GUTTER W/ MOUNTABLE CURB & GUTTER

REMOVE EXISTING SCREEN WALL

NEW SCREEN WALL

ADJUST WATER METER AS REQUIRED TO ACCOMMODATE FIRE LINE

REMOVE GREASE TRAP FROM THIS AREA AND REPLACE WITH SANITARY SEWER PIPE

REMOVE EXISTING SIDEWALK AND INSTALL NEW CONCRETE FIRE TRUCK ACCESS LANE- 20' WIDE MINIMUM.

REMOVE EXISTING SIDEWALK AND INSTALL NEW CONCRETE FIRE TRUCK ACCESS LANE- 20' WIDE MINIMUM.

BUILDING #3425
FFE=272.65

SMALL BUILDING

PORTABLE BUILDINGS

MATCH LINE-SEE SHEET CS104

SITE LAYOUT - BUILDING 3425

NORTH

SCALE: 1" = 30'

0' 15' 30' 60' 90'

NOTE: FOR LEGEND AND NOTES PERTAINING TO THIS SHEET SEE SHEET CS001.

US ARMY CORPS OF ENGINEERS SAVANNAH

BY	DATE	DESCRIPTION	SYMBOL

DATE: 15 APR 2010
SOLICITATION NO: PN 69147
CONTRACT NO.:
CATEGORY CODE: 722-10-03
PLOT DATE: 2-17-2010

DESIGNED BY:
DWN BY: CKD BY:
SUBMITTED BY:
FILE NAME:
SIZE: PLOT SCALE:

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

CROMWELL
ARCHITECTS ENGINEERS
101 SOUTH SPRING ST.
LITTLE ROCK, AR. 72201

TRAINING BATTALION UPGRADE
FORT BENNING, GEORGIA

SITE LAYOUT
BUILDING 3425

PLATE REFERENCE NUMBER
CS103
SHEET OF

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

MATCH LINE-SEE SHEET CS103

REMOVE EXISTING SIDEWALK AND INSTALL NEW CONCRETE FIRE TRUCK ACCESS LANE- 20' WIDE MINIMUM.

REMOVE EXISTING SIDEWALK AND INSTALL NEW CONCRETE FIRE TRUCK ACCESS LANE- 20' WIDE MINIMUM.

NEW ADDITION

REMOVE TREES

CONWAY DRIVE

REPLACE CURB & GUTTER W/ MOUNTABLE CURB & GUTTER

RELOCATE GRATE INLET TO ACCOMMODATE FIRE LANE

POINT OF CONNECTION FOR COMMUNICATIONS

REPLACE CURB & GUTTER W/ MOUNTABLE CURB & GUTTER

SITE LAYOUT - BUILDING 3425

NORTH

SCALE: 1" = 30'

0' 15' 30' 60' 90'

NOTE: FOR LEGEND AND NOTES PERTAINING TO THIS SHEET SEE SHEET CS001.

US ARMY CORPS OF ENGINEERS SAVANNAH

BY	DATE	DESCRIPTION	SYMBOL

DATE: 30 APR 2010
SOLICITATION NO.: PN 69147
CONTRACT NO.:
CATEGORY CODE: 722-10-03
PLOT DATE: 2-17-2010

DESIGNED BY:
DWN BY: CKD BY:
SUBMITTED BY:
FILE NAME:
SIZE: PLOT SCALE:

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

CROMWELL ARCHITECTS ENGINEERS
101 SOUTH SPRING ST.
LITTLE ROCK, AR. 72201

TRAINING BATTALION UPGRADE
FORT BENNING, GEORGIA

SITE LAYOUT
BUILDING 3425

PLATE REFERENCE NUMBER
CS104
SHEET OF

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

APPENDIX K
Fuel Cost Information

The following utility rates for this installation are provided for design

Electrical:
Demand Charge - $0.0632 per kilowatt

Natural Gas:
Commodity Charge Rate - $ 0.6978 per thousand cubic feet

Water:
Commodity Charge Rate - $2.8732 per thousand gallons

Sewer:
Commodity Charge Rate - $5.2003 per thousand gallons

APPENDIX L

LEED Project Credit Guidance (MAY 10)

This spreadsheet indicates Army required credits, Army preferred credits, project-specific ranking of individual point preferences, assumptions guidance for individual credits, and references to related language in the RFP for individual credits.

LEED Credit Paragraph	**LEED Project Credit Guidance**	**Army Guidance:** Required - Preferred - Avoid	**Project Preference Ranking**: (1=most preferred, blank=no preference, X=preference not applicable to this credit, Rqd=required)	
PAR	**FEATURE**			**REMARKS**
SUSTAINABLE SITES				
SSPR1	Construction Activity Pollution Prevention (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
SS1	Site Selection		X	See paragraph LEED CREDITS COORDINATION.

SS2	Development Density & Community Connectivity - OPTION 1 DENSITY		X	See paragraph LEED CREDITS COORDINATION.
	Development Density & Community Connectivity - OPTION 2 CONNECTIVITY		X	See paragraph LEED CREDITS COORDINATION.
SS3	Brownfield Redevelopment		X	See paragraph LEED CREDITS COORDINATION.
SS4.1	Alternative Transportation: Public Transportation Access		X	See paragraph LEED CREDITS COORDINATION.
SS4.2	Alternative Transportation: Bicycle Storage & Changing Rooms	Pref		Assume that non-transient building occupants are NOT housed on Post unless indicated otherwise.
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 1			Requires provision of vehicles, which cannot be purchased with construction funds. Assume Government will not provide vehicles unless indicated otherwise. Assume that 50% of GOV fleet is NOT alternative fuel vehicles unless indicated otherwise.
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 2	Pref		
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 3			Requires provision of vehicle refueling stations. Installation must support type of fuel and commit to maintaining/supporting refueling stations.
SS4.4	Alternative Transportation: Parking Capacity	Pref		

SS5.1	Site Development: Protect or Restore Habitat			
SS5.2	Site Development: Maximize Open Space	Pref		Assume AGMBC option for aggregated open space at another location on the installation is not available to the project unless indicated otherwise.
SS6.1	Stormwater Design: Quantity Control	Pref		See paragraph STORMWATER MANAGEMENT.
SS6.2	Stormwater Design: Quality Control	Pref		See paragraph STORMWATER MANAGEMENT.
SS7.1	Heat Island Effect: Non-Roof			
SS7.2	Heat Island Effect: Roof	Pref		Coordinate with nearby airfield requirements, which may preclude this credit.
SS8	Light Pollution Reduction	Pref		
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	Rqd		See paragraph COMMISSIONING. The Commissioning Authority may be provided through the Design-Build Contractor only if in accordance with USGBC Credit Interpretation Ruling (CIR) dated 9/15/06. Commissioning Authority activities begin during design phase and continue well beyond beneficial occupancy. Assume Government will not provide CxA post-occupancy activities unless indicated otherwise.
EA4	Enhanced Refrigerant Management			
EA5	Measurement & Verification			Assume Government will not provide post-occupancy activities unless indicated otherwise.
EA6	Green Power		X	See paragraph LEED CREDITS COORDINATION.

MATERIALS AND RESOURCES				
MRPR1	Storage & Collection of Recyclables (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met. Coordinate with Installation during design development on collection service and receptacles.
MR1	Building Reuse			
MR2.1	Construction Waste Management: Divert 50% From Disposal	Pref		See paragraph CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT.
MR2.2	Construction Waste Management: Divert 75% From Disposal	Pref		
MR3	Materials Reuse			
MR4.1	Recycled Content: 10% (post-consumer + 1/2 pre-consumer)	Pref		See paragraph RECYCLED CONTENT.
MR4.2	Recycled Content: 20% (post-consumer + 1/2 pre-consumer)	Pref		
MR5.1	Regional Materials:10% Extracted, Processed & Manufactured Regionally			
MR5.2	Regional Materials:20% Extracted, Processed & Manufactured Regionally			

MR6	Rapidly Renewable Materials	Pref		See paragraph BIOBASED AND ENVIRONMENTALLY PREFERABLE MATERIALS and paragraph FEDERAL BIOBASED PRODUCTS PREFERRED PROCUREMENT PROGRAM.
MR7	Certified Wood	Pref		See paragraph BIOBASED AND ENVIRONMENTALLY PREFERABLE MATERIALS.
INDOOR ENVIRONMENTAL QUALITY				
EQPR1	Minimum IAQ Performance (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
EQPR2	Environmental Tobacco Smoke (ETS) Control (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met. Assume all buildings are smoke free unless indicated otherwise (family housing, barracks and other lodging are facility types where smoking may be permitted in some cases).
EQ1	Outdoor Air Delivery Monitoring			
EQ2	Increased Ventilation			
EQ3.1	Construction IAQ Management Plan: During Construction	Pref		See paragraph CONSTRUCTION IAQ MANAGEMENT.
EQ3.2	Construction IAQ Management Plan: Before Occupancy	Pref		See paragraph CONSTRUCTION IAQ MANAGEMENT.
EQ4.1	Low Emitting Materials: Adhesives & Sealants	Pref		See paragraph LOW-EMITTING MATERIALS.
EQ4.2	Low Emitting Materials: Paints & Coatings	Pref		See paragraph LOW-EMITTING MATERIALS.
EQ4.3	Low Emitting Materials: Carpet/Flooring Systems	Pref		See paragraph LOW-EMITTING MATERIALS.

EQ4.4	Low Emitting Materials: Composite Wood & Agrifiber Products	Pref		See paragraph LOW-EMITTING MATERIALS.
EQ5	Indoor Chemical & Pollutant Source Control	Pref		System requiring weekly cleaning to earn this credit is not a permitted option unless indicated otherwise.
EQ6.1	Controllability of Systems: Lighting			
EQ6.2	Controllability of Systems: Thermal Comfort			
EQ7.1	Thermal Comfort: Design	Rqd		See paragraph HEATING, VENTILATING AND AIR CONDITIONING.
EQ7.2	Thermal Comfort: Verification			Project must earn credit EQ7.1 to be eligible for this credit. Assume Government will not provide post-occupancy activities unless indicated otherwise.
EQ8.1	Daylight & Views: Daylight 75% of Spaces	Pref		See paragraph DAYLIGHTING.
EQ8.2	Daylight & Views: Views for 90% of Spaces	Pref		
INNOVATION & DESIGN PROCESS				
IDc1.1	Innovation in Design			See paragraph INNOVATION AND DESIGN CREDITS. Assume Government will not provide any activities associated with ID credits.
IDc1.2	Innovation in Design			
IDc1.3	Innovation in Design			
IDc1.4	Innovation in Design			
IDc2	LEED Accredited Professional	Rqd	Rqd	LEED AP during design and construction is required.
REGIONAL PRIORITY CREDITS (Version 3 only)				See paragraph LEED CREDITS COORDINATION.

APPENDIX M
LEED Owner's Project Requirements

Not Used

APPENDIX N
LEED Requirements for Multiple Contractor Combined Projects

Not Used

LEED-NC

LEED-NC Version 2.2 Registered Project Checklist

Ft Benning Trainee Complex Upgrade Building 3405
Columbus, Georgia

Yes	?	No			
6			**Sustainable Sites**		**14** Points
Y			Prereq 1	**Construction Activity Pollution Prevention**	Required
1			Credit 1	**Site Selection**	1
			Credit 2	**Development Density & Community Connectivity**	1
			Credit 3	**Brownfield Redevelopment**	1
			Credit 4.1	**Alternative Transportation**, Public Transportation Access	1
1			Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
1			Credit 4.3	**Alternative Transportation**, Low-Emitting and Fuel-Efficient Vehicles	1
1			Credit 4.4	**Alternative Transportation**, Parking Capacity	1
			Credit 5.1	**Site Development,** Protect or Restore Habitat	1
1			Credit 5.2	**Site Development,** Maximize Open Space	1
			Credit 6.1	**Stormwater Design,** Quantity Control	1
			Credit 6.2	**Stormwater Design,** Quality Control	1
			Credit 7.1	**Heat Island Effect,** Non-Roof	1
			Credit 7.2	**Heat Island Effect,** Roof	1
1			Credit 8	**Light Pollution Reduction**	1

Yes	?	No			
4			**Water Efficiency**		**5** Points
1			Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
1			Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
			Credit 2	**Innovative Wastewater Technologies**	1
1			Credit 3.1	**Water Use Reduction**, 20% Reduction	1
1			Credit 3.2	**Water Use Reduction**, 30% Reduction	1

Yes	?	No			
7			**Energy & Atmosphere**		**17** Points
Y			Prereq 1	**Fundamental Commissioning of the Building Energy Systems**	Required
Y			Prereq 2	**Minimum Energy Performance**	Required
Y			Prereq 3	**Fundamental Refrigerant Management**	Required
6			Credit 1	**Optimize Energy Performance**	1 to 10
			Credit 2	**On-Site Renewable Energy**	1 to 3
			Credit 3	**Enhanced Commissioning**	1
1			Credit 4	**Enhanced Refrigerant Management**	1
			Credit 5	**Measurement & Verification**	1
			Credit 6	**Green Power**	1

continued…

Yes	?	No			
5			**Materials & Resources**		**13** Points
Y			Prereq 1	**Storage & Collection of Recyclables**	Required
1			Credit 1.1	**Building Reuse**, Maintain 75% of Existing Walls, Floors & Roof	1
			Credit 1.2	**Building Reuse**, Maintain 100% of Existing Walls, Floors & Roof	1
			Credit 1.3	**Building Reuse**, Maintain 50% of Interior Non-Structural Elements	1
1			Credit 2.1	**Construction Waste Management**, Divert 50% from Disposal	1
			Credit 2.2	**Construction Waste Management**, Divert 75% from Disposal	1
			Credit 3.1	**Materials Reuse**, 5%	1
			Credit 3.2	**Materials Reuse**,10%	1
1			Credit 4.1	**Recycled Content**, 10% (post-consumer + ½ pre-consumer)	1
1			Credit 4.2	**Recycled Content**, 20% (post-consumer + ½ pre-consumer)	1
1			Credit 5.1	**Regional Materials**, 10% Extracted, Processed & Manufactured Regio	1
			Credit 5.2	**Regional Materials**, 20% Extracted, Processed & Manufactured Regio	1
			Credit 6	**Rapidly Renewable Materials**	1
			Credit 7	**Certified Wood**	1

Yes	?	No			
9			**Indoor Environmental Quality**		**15** Points
Y			Prereq 1	**Minimum IAQ Performance**	Required
Y			Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	Required
1			Credit 1	**Outdoor Air Delivery Monitoring**	1
1			Credit 2	**Increased Ventilation**	1
1			Credit 3.1	**Construction IAQ Management Plan**, During Construction	1
1			Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1
1			Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
1			Credit 4.2	**Low-Emitting Materials**, Paints & Coatings	1
1			Credit 4.3	**Low-Emitting Materials**, Carpet Systems	1
1			Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products	1
			Credit 5	**Indoor Chemical & Pollutant Source Control**	1
			Credit 6.1	**Controllability of Systems**, Lighting	1
			Credit 6.2	**Controllability of Systems**, Thermal Comfort	1
1			Credit 7.1	**Thermal Comfort**, Design	1
			Credit 7.2	**Thermal Comfort**, Verification	1
			Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1
			Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1

Yes	?	No			
2			**Innovation & Design Process**		**5** Points
1			Credit 1.1	**Innovation in Design**: Reduce Water Consumption by 40%	1
			Credit 1.2	**Innovation in Design**: Provide Specific Title	1
			Credit 1.3	**Innovation in Design**: Provide Specific Title	1
			Credit 1.4	**Innovation in Design**: Provide Specific Title	1
1			Credit 2	**LEED® Accredited Professional**	1

Yes	?	No		
33			**Project Totals (pre-certification estimates)**	**69** Points

Certified 26-32 points **Silver** 33-38 points **Gold** 39-51 points **Platinum** 52-69 points

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 IBCT - 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 1.1 – 31 MAY 2009
AREA COMPUTATIONS

Computation of Areas: Compute the "gross area" and "net area" of facilities (excluding family housing) in accordance with the following subparagraphs:

(1) Enclosed Spaces: The "gross area" is the sum of all floor spaces with an average clear height ≥6'-11" (as measured to the underside of the structural system) and having perimeter walls which are ≥4'-11". The area is calculated by measuring to the exterior dimensions of surfaces and walls.

(2) Half-Scope Spaces: Areas of the following spaces shall count as one-half scope when calculating "gross area":

- Balconies
- Porches
- Covered exterior loading platforms or facilities
- Covered but not enclosed passageways and walks
- Open stairways (both covered and uncovered)
- Covered ramps
- Interior corridors (Unaccompanied Enlisted Personnel Housing Only)

(3) Excluded Spaces: The following spaces shall be excluded from the "gross area" calculation:

- Crawl spaces
- Uncovered exterior loading platforms or facilities
- Exterior insulation applied to existing buildings
- Open courtyards
- Open paved terraces
- Uncovered ramps
- Uncovered stoops
- Utility tunnels and raceways
- Roof overhangs and soffits measuring less than 3'-0" from the exterior face of the building to the fascia

(4) Net Floor Area: Where required, "net area" is calculated by measuring the inside clear dimensions from the finish surfaces of walls. If required, overall "assignable net area" is determined by subtracting the following spaces from the "gross area":

- Basements not suited as office, special mechanical, or storage space
- Elevator shafts and machinery space
- Exterior walls
- Interior partitions
- Mechanical equipment and water supply equipment space
- Permanent corridors and hallways
- Stairs and stair towers
- Janitor closets
- Electrical equipment space
- Electronic/communications equipment space

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	FIO - FOR INFORMATION ONLY	GA - GOVERNMENT APPROVED	DA - DESIGNER OF RECORD APPROVAL	CR - CONFORMANCE REVIEW	DA / CR	DA / GA	DO - DISTRICT OFFICE	AO - AREA OFFICE	RO - RESIDENT OFFICE	PO - PROJECT OFFICE	DR - DESIGNER OF RECORD	AE - ARCHITECT / ENGINEER
00 72 00	52.236-13	Accident Prevention Plan	X														X				X				
00 73 00	1.11	Dev. From Accept. Design. No Deviation from Contract					X											X			X			X	
00 73 00	1.11	Dev. From Accepted Design - Deviates from Contract					X												X		X			X	
00 73 00	1.17	Supplemental Price Breakdown	X											X							X				
00 73 00	1.18	SSHO Qualifications	X												X						X				
01 10 00	5.2.3.1	(if concrete pavement) Joint Layout Plan with design drawings					X										X								
01 10 00	5.5.2	Building Envelope Sealing Performance Testing						X						X							X				
01 10 10	***	Tests as Req by Codes - DOR Develops Test Program						X						X							X			X	
01 10 00	5.8.3	BAS Review Information		X														X		X	X			X	
01 10 00	5.8.3	BAS Performance Verification Test						X						X							X			X	
01 10 00	5.8.4	Testing Adjusting and Balancing						X						X							X			X	
01 10 00	5.8.5	Commissioning						X						X							X			X	
01 10 00	6.15	Environmental As Required for Site Specific					X										X				X			X	
01 10 00	6.16	Permits as required for Site specific					X										X				X			X	
01 10 00	5.10.2	Fire Protection Tests						X	X					X							X			X	
01 32 01.00 10	3.4.1	Preliminary Project Schedule	X												X						X				
01 32 01.00 10	3.4.2	Initial Project Schedule	X												X						X				
01 32 01.00 10	3.4.3	Design Package Schedule	X												X						X				
01 32 01.00 10	3.6.1	Periodic schedule updates from the Contractor	X												X						X				
01 32 01.00 10	3.7	Time Extension Request (Schedule)	X												X						X				
01 33 00	1.8	Submittal Register - DOR Input Required	X												X						X			X	
01 33 00	1.8	Submittal Register Updates (Design Packages, etc.)	X												X						X			X	
01 33 00	1.3.1	Substitution of Manuf or Model Named in Proposal		X	X													X			X			X	
01 33 16	1.2	Identify Designer(s) of Record	X												X						X				
01 33 16	1.1.2 / 3.2.4	Fast Track Design Package(s)					X										X			X	X				
01 33 16	1.2	Identification of all Designers of Record	X														X				X				
01 33 16	3.2.1	Site and Utility Des Package, incl. Substantiation					X										X			X	X				
01 33 16	3.2.2/3.5	Interim Des Subm Package(s), incl. Substantiation					X										X			X	X				
01 33 16	3.5.1	Drawings					X										X			X	X				
01 33 16	3.5.2.2	Sitework Design Analyses					X										X			X	X				
01 33 16	3.5.2.3	Structural Design Analyses					X										X			X	X				
01 33 16	3.5.2.4	Security Design Analyses					X										X			X	X				
01 33 16	3.5.2.5	Architectural Design Analyses					X										X			X	X				
01 33 16	3.5.2.6	Mechanical Design Analyses					X										X			X	X				
01 33 16	3.5.2.7	Life Safety Design Analyses					X										X			X	X				
01 33 16	3.5.2.8	Plumbing Design Analyses					X										X			X	X				
01 33 16	3.5.2.9	Elevator Design Analyses (as Applicable)					X										X			X	X				
01 33 16	3.5.2.10	Electrical Design Analyses					X										X			X	X				
01 33 16	3.5.2.11	Telecommunications Design Analyses					X										X			X	X				
01 33 16	3.5.2.12	Cathodic Protection Design Analyses					X										X			X	X				
01 33 16	3.5.3	Geotechnical Investigations and Reports					X										X			X	X				
01 33 16	3.5.4	LEED Submittals					X										X			X	X				
01 33 16	3.5.5	Energy Conservation Documentation					X										X			X	X				
01 33 16	3.5.6	Specifications					X										X			X	X				
01 33 16	3.5.7	Building Rendering					X										X			X	X				
01 33 16	3.2.4/3.7	Final Des Submittal Package(s), incl. Substantiation					X										X			X	X				
01 33 16	3.7.5	DD Form 1354 (Transfer of Real Property)											X				X				X				
01 33 16	3.2.5/3.8	Design Complete Submittal Package(s)					X										X			X	X				
01 33 16	3.3.3	Design and Code Review Checklists					X										X			X	X				
01 33 16	A-2.0	SID - Interim and Final (as applicable)			X	X	X								X						X				
01 33 16	B-2.0	FFE (as Applicable)					X								X						X				
01 45 04.00 10	3.2	Design and Construction QC Plan	X														X				X				
01 57 20.00.10	1.2	Environmental Protection Plan	X														X				X				
01 78 02.00 10	1.2.1	Final as-Built Drawings											X		X										
01 78 02.00 10	1.2.3.11	Non-Hazardous Solid Waste Diversion Reports							X					X								X			
01 78 02.00 10	1.2.7	Provide final as-built CADD and BIM Model files											X		X							X			
01 78 02.00 10	1.2.9	Provide scans of all other docs in Adobe.pdf format											X		X							X			
01 78 02.00 10	1.3.1	Equip-in-Place list of all installed equip and cost											X		X							X			
01 78 02.00 10	1.3.2	Data on equip not addressed in O&M manuals											X		X							X			
01 78 02.00 10	1.3.3	Final as-built specs - electronic files											X		X							X			
01 78 02.00 10	1.4.2.1	Warranty management plan - FAR 52.246-21											X		X							X			
01 78 02.00 10	1.4.2.1	Certificates of Warranty for extended warranty items											X		X							X			
01 78 02.00 10	1.4.2.1	Contractor's POCs for implementing warranty process											X		X							X			
01 78 02.00 10	1.4.2.1	List of each warranted equip, item, feature or system											X		X							X			
01 78 02.00 10	1.5	See also Section 01 10 00 par. 5.8.4 and 5.8.5											X		X							X			
01 78 02.00 10	1.6.1.2	Equipment O&M Manuals - 1 electronic / 2 hard copies											X		X							X			
01 78 02.00 10	1.7	Field Training DVD Videos										X		X								X			
01 78 02.00 10	1.8	Pricing of CF/CI and GF/CI Property											X	X								X			
01 78 02.00 10	1.11	List of Completed Cleanup Items											X				X					X			

RMS INPUT FORM 4288A

Export to RMS in CSV(MS-DOS) (*.csv) Format

Note: Reviewing Office Optional

US Army Corps of Engineers

ENGINEERING AND CONSTRUCTION BULLETIN

No. 2007- 22 **Issuing Office: CECW-CE** **Issued: 16 November, 2007**

Subject: Army Installation Information Infrastructure Architecture (I3A) Guide

Applicability: Directive

1. The Army Installation Information Infrastructure Architecture (I3A) Policy guide establishes an Army-wide information technology architectural design standard. The guide assists the designer in the integration of the telecommunications and information systems and is mandated for all MILCON projects.

2. The I3A guide has been removed from the Huntsville website due to the current security restrictions. The U.S Army Information Systems Engineering Command – Ft. Detrick Engineering Directorate (USAISEC-FDED) has established an email address for the Corps Districts and contractors to request and obtain a copy of the I3A guide. The email address is: DetrickISECI3AGuide@conus.Army.mil.

3. The Corps contracting offices and all contractors are required to handle sensitive information according to the Procurement Instruction Letter (PIL) 2007-06, 19 July 2007, "Distribution of Contract Materials that Are Sensitive." The PIL provides policy and guidance in determining, distributing and handling of sensitive information during procurement process. The PIL is available at: https://hqintra1.hq.ds.usace.army.mil/Cepr/pil/PIL-2007-06.pdf. The point of contact for the PIL is Famane Brown, 202-761-1504.

4. HQUSACE Engineering and Construction point of contact for this bulletin is Bob Billmyre, 202-761-4228 or Andy Wu, 202-761-7767. The USAISEC-FDED point of contact is Frederick M. Skroban, 301-619-6487.

//S//
JAMES C. DALTON, P.E.
Chief, Engineering and Construction
Directorate of Civil works

FORT BENNING
FIRE AND EMERGENCY SERVICES

BUILDING 214 BARRON AVENUE
FORT BENNING, GEORGIA 31905

17 November 2008

MEMORANDUM FOR RECORD

FROM: Fort Benning F&ES
Fire Chief's Office
Arthur E. Simmons

SUBJECT: Carbon Monoxide Detectors

To Whom It May Concern,

In accordance with AR 420-1 Chapter 25-32, Section 2, and National Fire Protection Association (NFPA) 720 carbon monoxide detectors shall be installed per manufacture recommendations, in all structures on Fort Benning and all annex locations, which are serviced by natural gas, petroleum or other combustible fuel sources. Detectors shall be replaced per manufacturer's recommendations.

1. Any existing structure serviced by natural gas, petroleum, or other combustible fuel sources shall have carbon monoxide detectors installed throughout the structure. A minimum of an AC plug in type carbon monoxide detector will be required.
2. Any new/refurbished (51% or greater of the total cost of the structure) shall have carbon monoxide detection system installed throughout the structure with at least two independent and reliable power supplies and meet all requirements of NFPA 720.

If there any questions contact the fire prevention office at benn.dps.fireprevention@conus.army.mil.

Arthur E. Simmons
Fire Chief
Fort Benning F&ES

USACE-NPDES Construction on FT. Benning GA: Revised 24Feb 2010
Drafted By: Joe Ranson USACE Env. QA FT. Benning Area Office

Timber Harvest Activities Associated with Construction Projects-

- The contractor must furnish the COE with GIS shape files of the construction limits. These limits will be used to delineate the timber limits/project limits for the site.
- In addition to the required shape file the contractor must provide a pdf. Map of the project site indicating the locations of all sensitive areas within 200' of the project limits to include all state waters, wetlands, cultural resources, RCW's ,etc.
- The shape files and map shall be submitted to the COE, P.E., ENV QA., and ENV ENG, who will then submit the provided information to the Master planning office for submission of the 144-R for timber harvest.
- At this time the contractor is required to survey and mark the limits of construction as well as any stream buffers that exist on the site. All Timbering limits must be marked with a minimum of two colors of flagging.
- Once the 144-R is approved a meeting at the site will be coordinated through the COE P.E., to include the contractor's Project Manager, and Land Management Branch (LMB) personnel to confirm the limits marked at the site are accurate. Once confirmed the contractor is to submit an e-mail confirmation that the limits are correct. The LMB will then initiate the timber harvest at the site.(The Erosion Sedimentation Pollutant Control Plan must be approved by FT. Benning EMD in order for LMB to initiate Timber Harvest at any project site).
- Once 5 acres have been harvested coordination with the COE Construction Division and COE Forestry can occur to allow the contractor to begin working at the site at that point if necessary (providing all required submittals are approved and all required preparatory meetings have been completed).

If Soil Boring:

- The contractor must furnish the COE with GIS shape files illustrating the construction limits and the approximate bore pit locations.
- In addition to the required shape file the contractor must provide a pdf. Map of the project site indicating the locations of the bore pits as well as all sensitive areas within 200' of the project limits to include all state waters, wetlands, cultural resources, RCW's, Relict Trillium sites,etc.
- The shape files and map shall be submitted to the COE, P.E., ENV QA., and or ENV ENG, who will then submit the provided information to the Master planning office for submission of the 144-R for timber harvest.

Notes to consider regarding Soil Borings:
Soil Borings Activities, if project area for soil borings is to be less than one acre:

- Soil boring activities involve a process where soil could be displaced during rain events if not properly managed.
- Stay away 25' or more from any waterways that could be affected, particularly if the waterway is considered a "state waters". This includes clearing trees within 25' of any "state waters". This is considered encroachment of the 25' buffer. Any encroachment caused by removing tress with the 25' stream buffer of a "state Water" **will result in a violation of the CWA**, and the site will not be able to be used for

construction for 3 years.

- Minimize soil disturbance at all times. Ensure protection of the exposed soil is accomplished by use of best management practices (BMPs) such as berms or silt fences at all time to minimize soil/sediment run-off that could reach water ways or be washed during rain events.
- All disturbed areas must be stabilized with some type of vegetation.
- Crossing of small streams authorized only if performed perpendicular to the stream and **with a proper temporary crossing BMPs (Sr)**
- Ensure that wastewaters from drilling operations are not discharged into storm drains or waterways, as constituents are considered pollutants under the CWA.

Notes: Future construction activities at this location will be regulated under NPDES Permit GAR 100001 and/or GAR 100003.
Contractor should take advantage of a site visit to identify any potential areas where "state waters" may be present and submit to design professional for consideration during his/her required site visit to the site.

If More Than 1 Acre:

- Construction project will require NPDES Permit GAR 100001/2/3 coverage to meet NPDES / BRAC EIS / GTA requirements.
- ESPCP must be stamped, signed, and sealed with the Level II certification # on every sheet by a certified Level II Design Professional.
- ESPCP with both completed GASWCC (must be the revised checklist effective as of Jan09), FT. Benning Checklists, and original pen ink document of the NOI must be submitted to EMD NPDES Construction Program Manager for final review, approval through the FB-144 R Process.(COE Projects coordinate this submittal through the Master Planning Office)
- The design professional will be required to identify all states waters within the project area, and establish and protect the 25' buffer on both sides of the state waters.
- All new ROW for utilities must be shown in the design plans
- Once Reviewed and Approved by NPDES Program Manager and 144-R is approved the ESPCP, NOI, and Fee Payment Form are to be submitted to GA EPD. There are three offices that are required to receive this information which are noted on the NOI.

If More than 50 Acres:

- A letter requesting authorization to disturb more than 50 acres at one time is required to be prepared and submitted to FT. Benning EMD for review and approval. Once reviewed and approved the letter is signed by Craig Taylor and mailed to GA EPD via certified mail. A 35 Day review process is required by GA EPD and begins from the date the letter is received at the GA EPD office.
- 4 Additional BMP's must be added to the ESPCP as required by the NPDES Permit. These 4 BMP's, a map of the site, and some background information/justification must be included in the 50 acre letter. (This letter is to be coordinated through the COE ENV Q.A., ENV ENG, and the P.E.)
- Note Projects filed under GAR 100002 i.e. Infrastructure/Linear projects are exempt from the 50 Acre Letter requirement.

- Large sites are encouraged to be phased under multiple NOI's. Each Phase must be separated by drainage basin so that the BMP's from any one Phase are not dependent on BMP's from another Phase in order to achieve stabilization.

If Affecting State Waters:

- 25' stream buffer requirements will apply.100'Buffer for the Chattahoochee River
- Design professional must conduct a site visit to identify and ensure protection of all state waters based on the construction design and clearly identify in the ESPCP all state waters and any impacts or work to be performed that will encroach into state waters or 25' stream buffers.
- If the state waters are to be affected by land disturbance and/or tree removal that will encroach within the 25' buffer, the design professional will be required to prepare and submit a stream buffer variance.
- The variance will be required before proceeding with activities within the 25' buffer.
- No tree removal within 25' of any "state waters" without a stream buffer variance. 404 Permit approval is required before the SBV Application can be approved by GA EPD.
- New utility ROW may require cover under NPDES Permit, depending on location and land disturbances' as well as stream buffer variances - if crossing any "state waters".

If a Stream Buffer Variance is Required:

- Send two copies of the Stream Buffer Variance application and approved ESPCP Drawings to Joe Ranson or Steve Myers.
- COE POC will review and coordinate a review with Felix Seda.
- Once reviewed a marked up SBV application and or comments will be forwarded to contractors POC, for the SBV application, for corrections.
- Once all corrections have been made contractor must provide 5 complete copies of the SBV application to the COE POC. 2-Copies for COE, 1-Copy EMD, 1-Copy for Contractor, 1-Copy for GA EPD (Jean Shepherd).
- Once received COE will submit the complete SBV to EMD for approval and signature by Craig Taylor DPW Director. Once signed SBV will be returned to COE POC Who will coordinate with EMD and the contractor for submission to GA EPD.
- SBV Applications require a 90-120 day review by GA EPD including a 30 day public notice period.
- Once the SBV is reviewed and the 30 public notice period is completed GA EPD will issue an official approval letter authorizing the work as specified in the SBV application. No work can occur in the stream buffer until this letter has been received.

If Draining within 1 linear mile upstream of and within the same watershed of a stream segment listed as impaired for sediment on the 303d/305 list:

- ESPCP Must comply with part III .C of the GAR 100001
- The contractor must select 4 additional BMP's from the list provided on pgs 12-13 of the GAR 100001.

- ESPCP Must comply with any site specific requirements as outlined in the TMDL plan if one has been prepared and incorporate any requirements from the TMDL plan into the ESPCP. This can be verified at www.gaepd.org.

COE ESPCP Review Process- Design Build-

- ESPCP Preparation Meeting- the COE Area office has created a review meeting in which Joe Ranson COE ENV. QA, and Steve Myers ENV Eng., Joey Thames EMD plan Reviewer, and the Design professional review all the requirements for the preparation of the ESPCP. The meeting consists of a review of previously approved ESPCP plans, Q & A regarding checklist and permit requirements, as well as review of all FT. Benning ESPCP requirements.
- After the review meeting the Design professional then submits the completed ESPCP (1 set Full size plan sheets for initial review), NOI, Fee Payment Form, and completed copies of the GSWCC ESPCP Checklist (Must be new checklist effective Jan09) and the FT. Benning ESPCP Checklist, to Joe Ranson ENV. QA or Steve Myers ENV. Eng. At the Sand Hill Range Office:
  ATTN: Joe Ranson or Steve Myers
  U.S. Army Corps of Engineers
  Range Resident Office
  11th Airborne Div. Rd., Bldg. P3955
  Fort Benning GA, 31905
- Once received Joe Ranson, or Steve Myers will review the ESPCP, NOI, and Checklists and provide comments back to the Design professional for corrections to meet approval requirements.
- Once all comments are resolved the Design Professional submits a minimum of two full size ESPCP sets, Both ESPCP Checklists, NOI (pen and ink signed and initialed), Fee payment form, and a **photo copy** of the Fee payment check (do not send the actual check). Once received the COE will submit the ESPCP etc. to Master Planning for submission to EMD for review and approval via the 144-R process. (the ESPCP drawings will not be returned) GIS Shape files of the site limits and state waters/stream buffer limits will be required for submission of the 144-R to EMD for review and approval
- Once the ESPCP is approved by EMD two additional copies of the approved ESPCP must be submitted to the COE for control Copies: one to Joe Ranson and or Steve Myers and One copy for the Project Engineer.
- Once approved EMD will notify COE Rep. that the NOI is ready to be picked up at which time the NOI will be mailed to the Primary Permittee for submission to GA EPD along with the ESPCP, Fee Payment Form and Check.
- The NOI, Fee payment form, check, and ESPCP drawings should be mailed following the FT. Benning Submission instructions on the NOI via certified mail. Copies of All return receipts must be sent to COE for submission to EMD before LDA starts at the site.

If Impacting Wetlands:

- All 404 Permit applications must be coordinated through Gary Hollon Soil Conservationist with the FT. Benning Natural Resources Branch. Phone (706) 544-7070

- No work can commence in any portion of wetlands at a site until all 404 permit applications are completed and signed.

POL Storage-

- If storing over 1,320 Gal of POL at the site a SPCC Plan is required to be prepared/signed by a certified Design Professional and approved by Mr. Felix Seda EMD.
- Drip pans should be utilized under construction equipment and basic spill clean up BMP's should be readily available on site as indicated in the ESPCP and or the EPP.
- The contractor should identify a location on the ESPCP where POL will be stored as well as a location where any waste materials from spill clean up will be stored.
- Any waste material must be properly collected, stored, and disposed of in accordance with local, state, and federal guidelines. Copies of all trip tickets and hazardous waste manifests must be submitted to the P.E. for all waste material hauled off post. The manifest and trip tickets are then submitted to EMD.

Civil Design Submittals to EMD/DPW:

- Civil Design packages are to be submitted to the base EMD via the 144-R process for each stage of Design i.e. 35%, 65%, 95%, 100%, RTA, and or Corrected Final as applicable
- Civil Design packages must be submitted through the COE and must be accompanied by GIS Shape files illustrating the site limits as well as any building footprints as applicable.

Construction Contractor Environmental Requirements for Construction Projects on FT. Benning:

- Contractor must submit an Environmental Protection Plan (EPP) prior to start of construction. The EPP is to be a living document and requires approval from FB EMD NEPA Program Manager Mr. John Brown.
- Construction contractor must not begin work until after the 14 day waiting period following the submission of the NOI to GA EPD. The Original Signed NOI is to be submitted to EMD for signature by DPW Director as Owner. Once the NOI signed the Primary Permittee or Contracting Officer will be notified by EMD that the NOI is ready to be mailed. Once mailed construction can begin on the 15th day after the date the NOI, ESPCP, and Fee Payment is **Postmarked**. A copy of the certified mail tickets are to be submitted to EMD NPDES Program Manager as well as a copy of the return receipts for all three addresses indicated on the NOI as well as for the fee payment.
- All Perimeter erosion control devices are to be installed prior to commencing clearing and grubbing. This means Silt Fences, Construction Exit, and sediment storage devices as shown on the Initial Phase ESPCP.
- The ESPCP is to be updated as needed and a current copy available at the site at all times.

- Any revision to the ESPCP that requires a change to a BMP with a hydraulic component is required to be certified by the design professional as well as submitted to EMD for review and approval via the 144-R process.
- Any ESPCP Revision requiring additional Land disturbance will require the revision to the ESPCP and NOI to be reviewed and approved by EMD with a revised ESPCP, NOI, and the payment of LDA Fees to GA EPD.
- Any ESPCP Revisions that require a project change and or require work outside of the approved project limits for land disturbing activities require the submission of a FB 144-R prior to initiating the work on the ground.
- Contractor then should begin excavation of all required sediment basins before performing mass grading. All Sediment Basins are to be completed to include retrofits, outfalls etc. prior to mass grading of the site.
- Inspections- Contractor is required to perform Daily, Weekly, Monthly, and Rain Event Inspections as required and outlined in the GAR 100001/2/3. The contractor is required to maintain all records on site as well as a copy of the ESPCP at all times
- Rain Event inspections- Copies of Rain Event reports are to be submitted to the NPDES Program Manager as well as copies of all water sample reports. Within 48Hours after a rain event a follow up report is to be submitted to EMD by the Primary Permittee stating the status of the completion of corrective actions at the site no later than 7 days from the rain event.
- Self-Notification- The contractor is required to report any violations of the permit as well as corrective actions taken or estimated date of completion to the NPDES Construction Program Manager for inclusion into the monthly Self-Notification letter to GA EPD.
- Certified Inspector- All Persons/contractors performing LDA are required to have a certified inspector on site at all times while LDA's are occurring.
- Sub-Contractor Awareness Training-Any person or entity involved in performing land disturbing activities at the site and operating in a subcontractor capacity for such permittee shall meet the requirements of the subcontractor awareness seminar.
- If storing POL in excess of over 1320 Gal on site a SPCC Plan is required to be prepared and submitted to EMD for approval prior to storing petroleum products on site
- All POL Storage requires secondary containment measures and areas of storage and equipment fueling must be inspected Daily to ensure that all spills are identified cleaned up properly, and reported as required.
- Batch Plants & Rock Crushers also require individual NPDES Industrial Permits- Please coordinate these occurrences with EMD via the FB-144R Process.

Notice of Termination-N.O.T.-

- "Final Stabilization" Means that all soil disturbing activities at the site have been completed, and that for unpaved areas and areas not covered by permanent structures, 100% of the soil surface is uniformly covered in permanent vegetation with a density of 70% or greater, or equivalent permanent stabilization measures (such as the use of Rip Rap, gabions, permanent mulches or geo-textiles) have

been used. Permanent vegetation shall consist of: planted tress, shrubs, perennial vines; a crop of perennial vegetation appropriate for the time of year and region; or a crop of Annual vegetation and a seeding of target crop perennials appropriate for the region. Final stabilization applies to each phase of construction.

- Grassing types must be in compliance with the FT. Benning Grassing schedule document. Serecia Lespedeza and weeping Love grass are not authorized for use on FT. Benning.

FT. Benning Seeding Specifications Summary:

The following is a strict list of plantings that are to be used in the cantonment areas for permanent grassing:

- Common Bermuda- (Hulled or unhulled)

For Temporary Grassing:

- Browntop Millet
- Rye Grass
-

The following is a strict list of plantings that are to be used on Ranges
For Permanent grassing:

- Mixture No. 1 - Common Bermuda, Pensacola Bahia, and Rye
- Mixture No. 2 – Common Bermuda, Pensacola Bahia, Browntop Millet, and Alamo Switch Grass

For Temporary Grassing:

- Browntop Millet
- Rye Grass

Weeping Love grass and *Lespedeza are not allowed to be planted on FT. Benning*

FAQ'S and web sites

What is the Green Book? and where can I get a copy?
http://gaswcc.georgia.gov/00/article/0,2086,28110777_28115483_29165205,00.html

Where can I obtain Guidance on Training requirements for individuals involved in Land Disturbing activities?
http://gaswcc.georgia.gov/vgn/images/portal/cit_1210/21/0/38605840RulesChangeHB463%20_2_.pdf

Additional info at:
http://gaswcc.georgia.gov/00/channel_modifieddate/0,2096,28110777_29155166,00.html

What are State Waters and How are they Identified?
http://s150378756.onlinehome.us/level2/2-3-state-waters.pdf

How do I complete the GSWCC Checklist that is required for the ESPCP?
http://gaswcc.georgia.gov/vgn/images/portal/cit_1210/9/33/850800232009%20Guidance%20Document%20-%20Common%20Development.pdf

Additional Checklist Guidance available at:
http://gaswcc.georgia.gov/00/article/0,2086,28110777_29139948_40392118,00.html

Where can I get a copy of the required checklist?
http://gaswcc.georgia.gov/vgn/images/portal/cit_1210/9/34/850808812009%20Plan%20Review%20Checklist%20-20Infrastructure%20Projects%20(Revised%20Nov%202008).pdf
Where Can I get a copy of the Field Guide for determining state waters?

Where Can I find the Guidelines for Stream Bank Restoration?
http://gaswcc.georgia.gov/vgn/images/portal/cit_1210/60/20/31110081Guidelines_Streambank_Restoration.pdf

OCGA 12-7-1 Erosion and Sediment Control Act- Can Be Found at:
http://gaswcc.georgia.gov/vgn/images/portal/cit_1210/18/53/56818622ocga12-7-1.pdf

What is the GAR 100001 and Where can I get a copy? NPDES Construction Permit GAR 100001 is for stand alone projects over 1 acre and can be found at:
http://gaswcc.georgia.gov/vgn/images/portal/cit_1210/50/11/30683271FINAL_StormWater_NPDES_Permit_StandAlone_GAR100001_Y2008.pdf

Stream Buffer Variance Guidelines-GA Rule 391-3-7 is Available at:
http://rules.sos.state.ga.us/cgi-bin/page.cgi?g=GEORGIA_DEPARTMENT_OF_NATURAL_RESOURCES/ENVIRONMENTAL_PROTECTION/EROSION_AND_SEDIMENTATION_CONTROL/index.html&d=1

ENV- POC Contact List:

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U.S. Army Corps of Engineers
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E-mail: joseph.a.ranson@usace.army.mil

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Conservation Branch:

404 Permit Applications and Mitigation

Gary Hollon, Soil Conservationist
Conservation Branch, DPW
706-544-7077

Acronym List:

BMP- Construction Best Management Practices
COE- Corps of Engineers
CWA- Clean Water Act
DPW- Department of Public Works
EMD- Environmental Management Division
ENV- Environmental
ESPCP- Erosion Sedimentation Pollutant Control Plan
GA EPD- Georgia Environmental Protection Division
GSWCC- Georgia Soil and Water Conservation Commission
ISCP- Instillation Spill Contingency Plan
LDA- Land Disturbing Activity
LMB- Land Management Branch
NEPA- National Environmental Policy Act
N.O.I. - Notice of Intent
N.O.T. - Notice of Termination
NPDES- National Pollutant Discharge Elimination System
P.E. - Project Engineer
Q.A. - Quality Assurance Representative
RCW- Red Cockaded Woodpecker
SBV- Stream Buffer Variance
SPCC- Spill Prevention, Control and Countermeasures
TMDL- Total Maximum Daily Load
144-R- Fort Benning Form #144-R Record of Environmental Consideration

SWCD:_____

Project Name:_____ Address:_____

City/County:_____ Date on Plans:_____

Plan Page #	Included Y/N	TO BE SHOWN ON ES&PC PLAN
		1. The applicable Erosion, Sedimentation and Pollution Control Plan Checklist established by the Commission as of January 1 of the year in which the land-disturbing activity was permitted. (The completed Checklist must be submitted with the ES&PC Plan or the Plan will not be reviewed)
		2. Level II certification number issued by the Commission, signature and seal of the certified design professional (Signature, seal and Level II number must be on each sheet pertaining to ES&PC plan or the Plan will not be reviewed)
		3. The name and phone number of the 24-hour local contact responsible for erosion, sedimentation and pollution controls
		4. Provide the name, address and phone number of primary permittee
		5. Note total and disturbed acreage of the project or phase under construction
		6. Provide land lot and district numbers for site location. Describe critical areas and any additional measures that will be utilized for these areas.
		7. Provide vicinity map showing site's relation to surrounding areas. Include designation of specific phase, if necessary
		8. Graphic scale and north arrow.
		9. Existing and proposed contour lines with contour lines drawn at an interval in accordance with the following

Map Scale	Ground Slope	Contour Intervals, ft.
1 inch = 100ft or larger scale	Flat 0 - 2% Rolling 2 - 8% Steep 8% +	0.5 or 1 1 or 2 2,5 or 10

		10. Boundary line survey.
		11. Delineation and acreage of contributing drainage basins on the project site
		12. Delineation of on-site wetlands and all state waters located on and within 200 feet of the project site
		13. Delineation of the applicable 25-foot or 50-foot undisturbed buffers adjacent to state waters and any additional buffers required by the Local Issuing Authority. Clearly note and delineate all areas of impact
		14. Delineate all sampling locations, perennial and intermittent streams and other water bodies into which storm water is discharged.
		15. Storm-drain pipe and weir velocities with appropriate outlet protection to accommodate discharges without erosion Identify/Delineate all storm water discharge points.
		16. Soil series for the project site and their delineation.
		17. Identify the project receiving waters and describe all adjacent areas including streams, lakes, residential areas, wetlands, etc. which may be affected.
		18. Any construction activity which discharges storm water into an Impaired Stream Segment, or within 1 linear mile upstream of and within the same watershed as, any portion of an Biota Impaired Stream Segment must comply with Part III. C. of the Permit. Include the completed Appendix 1 listing all the BMPs that will be used for those areas of the site which discharge to the Impaired Stream Segment.
		19. If a TMDL Implementation Plan for sediment has been finalized for the Impaired Stream Segment (identified in item 18 above) at least six months prior to submittal of NOI, the ES&PC Plan must address any site-specific conditions or requirements included in the TMDL Implementation Plan.
		20. Provide hydrology study and maps of drainage basins for both the pre- and post-developed conditions
		21. Initial date of the Plan and the dates of any revisions made to the Plan including the entity who requested the revisions
		22. The limits of disturbance for each phase of construction.
		23. Limit of disturbance shall be no greater than 50 acres at any one time without prior written authorization from the EPD District Office. If EPD approves the request to disturb 50 acres or more at any one time, the plan must include at least 4 of the BMPs listed in Appendix 1 of this checklist. (A copy of the written approval by EPD must be attached to the plan for the plan to be reviewed.)
		24. Provide a minimum of 67 cubic yards of sediment storage per acre drained using a temporary sediment basin, retrofitted detention pond, and/or excavated inlet sediment traps for each common drainage location. Sediment storage volume must be in place prior to and during all land disturbance activities until final stabilization of the site has been achieved. A written rationale explaining the decision to use equivalent controls when a sediment basin is not attainable must be included in the plan for each common drainage location in which a sediment basin is not provided. Worksheets from the Manual must be included for structural BMPs and all calculations used by the design professional to obtain the required sediment storage when using equivalent controls.
		25. Use of alternative BMPs whose performance has been documented to be equivalent to or superior to conventional BMPs

as certified by a Design Professional (unless disapproved by EPD or the Georgia Soil and Water Conservation Commission). Please refer to the Alternative BMP Guidance Document found at www.gaswcc.org.

26. Best Management Practices to minimize off-site vehicle tracking of sediments and the generation of dust
27. BMPs for concrete washdown of tools, concrete mixer chutes, hoppers and the rear of the vehicles. Washout of the drun at the construction site is prohibited.
28. Provide BMPs for the remediation of all petroleum spills and leaks.
29. Location of Best Management Practices that are consistent with and no less stringent than the Manual for Erosion and Sediment Control in Georgia. Use uniform coding symbols from the Manual, Chapter 6, with legend
30. Description of the nature of construction activity.
31. A description of appropriate controls and measures that will be implemented at the construction site including: (1) initia sediment storage requirements and perimeter control BMPs, (2) intermediate grading and drainage BMPs, and (3) fina BMPs.
32. Description and chart or timeline of the intended sequence of major activities which disturb soils for the major portions of the site (i.e., initial perimeter and sediment storage BMPs, clearing and grubbing activities, excavation activities, utility activities, temporary and final stabilization).
33. Description of the practices that will be used to reduce the pollutants in storm water discharges
34. Description of the measures that will be installed during the construction process to control pollutants in storm water tha will occur after construction operations have been completed.
35. Design professional's certification statement and signature that the site was visited prior to development of the ES&PC Plan as stated on page 14 of the permit.
36. Design professional's certification statement and signature that the permittee's ES&PC Plan provides for an appropriate and comprehensive system of BMPs and sampling to meet permit requirements as stated on page 14 of the permit
37. Certification statement and signature of the permittee or the duly authorized representative as stated in section V.G.2.d. of the state general permit.
38. An estimate of the runoff coefficient or peak discharge flow of the site prior to and after construction activities are completed.
39. Indication that non-exempt activities shall not be conducted within the 25 or 50-foot undisturbed stream buffers as measured from the point of wrested vegetation without first acquiring the necessary variances and permits
40. Indication that the design professional who prepared the ES&PC Plan is to inspect the installation of the initial sediment storage requirements and perimeter control BMPs within 7 days after installation
41. Indication that amendments/revisions to the ES&PC Plan which have a significant effect on BMPs with a hydraulic component must be certified by the design professional.
42. Indication that waste materials shall not be discharged to waters of the State, except as authorized by a Section 404 permit.
43. Documentation that the ES&PC Plan is in compliance with waste disposal, sanitary sewer, or septic tank regulations during and after construction activities have been completed.
44. Provide complete requirements of inspections and record keeping by the primary permittee.
45. Provide complete requirements of sampling frequency and reporting of sampling results
46. Provide complete details for retention of records as per Part IV.F. of the permit
47. Description of analytical methods to be used to collect and analyze the samples from each location
48. Appendix B rationale for outfall sampling points where applicable.
49. Cleary note statement in bold letters- "The escape of sediment from the site shall be prevented by the installation of erosion and sediment control measures and practices prior to, or concurrent with, land disturbing activities."
50. Cleary note maintenance statement in bold letters - "Erosion control measures will be maintained at all times. If full implementation of the approved plan does not provide for effective erosion control, additional erosion and sediment control measures shall be implemented to control or treat the sediment source."
51. Clearly note the statement in bold letters - "Any disturbed area left exposed for a period greater than 14 days shall be stabilized with mulch or temporary seeding."
52. Provide detailed drawings for all structural practices. Specifications must, at a minimum, meet the guidelines set forth in the Manual for Erosion and Sediment Control in Georgia.
53. Provide vegetative plan, noting all temporary and permanent vegetative practices. Include species, planting dates and seeding, fertilizer, lime and mulching rates. Vegetative plan shall be site specific for appropriate time of year that seeding will take place and for the appropriate geographic region of Georgia

Army Regulation 190–11

Military Police

Physical Security of Arms, Ammunition, and Explosives

Distribution Restriction Statement.
This publication contains technical or operational information that is for official Government use only. Distribution is limited to U.S. Government agencies. Requests from outside the U.S. Government for release of this publication under the Freedom of Information Act or the FMS Program must be made to the Office of The Provost Marshal General, ATTN: DAPM–MPD–PS, 2800 Army Pentagon, Washington, DC 20310–2800

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Headquarters
Department of the Army
Washington, DC
15 November 2006

UNCLASSIFIED

SUMMARY of CHANGE

AR 190–11
Physical Security of Arms, Ammunition, and Explosives

This major revision, dated 15 November 2006--

- Changes the proponent to The Provost Marshal General (title page and para 1-4).
- Assigns responsibility to the Commanding General, U.S. Army Installation Management Command and garrison commanders for securing arms, ammunition, and explosives (para 1-4).
- Assigns responsibilities and provides procedures for the security of arms during initial entry training (para 1-4).
- Assigns responsibility to the Commanding General, U.S. Army Training and Doctrine Command to enforce procedures for security of weapons and ammunition assigned to initial entry training Soldiers (para 1-4).
- Assigns responsibilities and provides guidance on the submission of physical security waivers and exceptions to the standards of this regulation (para 2-4).
- Provides guidelines for the security of ammunition and explosives deployed to the field for training or operational purposes (para 2-5).
- Authorizes commanders to delegate responsibilities for conducting background checks of personnel who have access to Army arms, ammunition, and explosives to directors/managers who are responsible for the supervision of the personnel and the arms, ammunition, and explosives (para 2-11).
- Assigns responsibilities to persons issued or in possession of arms (para 4-1).
- Revises table 4-1.
- Authorizes the use of portable armories (para 4-2).
- Provides revised guidance on the use of modified and locally fabricated arms racks (para 4-2).
- Provides additional guidance on the use of consolidated arms rooms (para 4-4).
- Requires armed guards to be posted on Categories I and II arms, ammunition, and explosives facilities upon failure of the intrusion detection system (para 5-2).
- Changes frequency of security guard checks at Category I and II facilities from once every 2 hours to once every 24 hours (para 5-2).

- Deletes requirement for security guard checks at facilities with an operational intrusion detection system (para 5-2).

- Provides minimum requirements for safeguarding and maintaining unit stocks of ammunition and explosives (para 5-2).

- Authorizes the storage of live ammunition in weapons magazines provided the magazines are color-keyed (para 5-8).

- Provides procedures for the movement of arms, ammunition, and explosives by unit or organization transportation (para 7-10).

- Provides new facility criteria for storage of Category I ammunition and explosives (para G-3).

- Provides existing facility criteria for storage of Category I ammunition and explosives (para G-4).

- Provides authorization to use portable explosive magazine (para G-5).

- Authorizes the use of the GOLAN-10 container for storage of explosives for military working dogs (para G-6).

- Deletes requirements for the security of arms, ammunition, and explosives at contractor-owned, contractor-operated facilities (app H).

- Prescribes physical security standards for sensitive conventional ammunition and explosives during production, manufacturing, renovation, and demilitarization operations at Government facilities (app H).

- Deletes appendix I that prescribed specific additional transportation security measures for use in shipments to and from activities affected by or under terrorist threat conditions.

Headquarters
Department of the Army
Washington, DC
15 November 2006

*Army Regulation 190–11

Effective 15 December 2006

Military Police

Physical Security of Arms, Ammunition, and Explosives

By Order of the Secretary of the Army:

PETER J. SCHOOMAKER
General, United States Army
Chief of Staff

Official:

JOYCE E. MORROW
Administrative Assistant to the Secretary of the Army

History. This publication is a major revision.

Summary. This regulation covers the physical security of arms, ammunition, and explosives, to include the security of arms, ammunition, and explosives deployed to the field for training or operational purposes; the security of arms during initial entry training; the use of modified and locally fabricated arms racks; and the security policy of ammunition and explosives during production.

Applicability. This regulation applies to the Active Army, the Army National Guard/Army National Guard of the United States, and the U.S. Army Reserve, unless otherwise stated. During mobilization, procedures in this publication can be modified to support policy changes as necessary.

Proponent and exception authority. The proponent of this regulation is The Provost Marshal General. The proponent has the authority to approve exceptions or waivers to this regulation that are consistent with controlling law and regulations. The proponent may delegate this approval authority, in writing, to a division chief within the proponent agency or its direct reporting unit or field operating agency, in the grade of colonel or the civilian equivalent. Activities may request a waiver to this regulation by providing justification that includes a full analysis of the expected benefits and must include formal review by the activity's senior legal officer. All waiver requests will be endorsed by the commander or senior leader of the requesting activity and forwarded through their higher headquarters to the policy proponent. Refer to AR 25–30 for specific guidance.

Army management control process. This regulation contains management control provisions, but does not identify key management controls that must be evaluated.

Supplementation. Supplementation of this regulation and establishment of command and local forms are prohibited without prior approval from The Provost Marshal General (DAPM–MPD–PS), 2800 Army Pentagon, Washington, DC 20310–2800.

Suggested improvements. Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to The Provost Marshal General (DAPM–MPD–PS), 2800 Army Pentagon, Washington, DC 20310–2800.

Distribution. Distribution of this publication is available in electronic media only and is intended for command levels A, B, C, D, and E for the Active Army, the Army National Guard/Army National Guard of the United States, and the U.S. Army Reserve.

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Glossary

Chapter 1
Introduction

Section I
Information

1–1. Purpose
This regulation prescribes standards and criteria for the physical security of sensitive conventional arms, ammunition, and explosives (AA&E), including nonnuclear missiles and rockets, as set forth in appendix B, in the custody of any Department of the Army (DA) component. This regulation also prescribes policy, procedures, and standards, and assigns responsibilities for the effective implementation and application of physical security of AA&E. Consistent with operational and safety requirements and this regulation, physical security requirements for production and manufacturing operations at Government facilities will be in accordance with appendix H.

1–2. References
Required and related publications and prescribed and referenced forms are listed in appendix A.

1–3. Explanation of abbreviations and terms
Abbreviations and special terms used in this regulation are explained in the glossary.

Section II
Responsibilities
This regulation does not relieve responsible or accountable officers of their responsibility to account for property. Persons issued or holding AA&E are responsible for properly securing such property while it is charged or entrusted to their care.

1–4. The Provost Marshal General
The Provost Marshal General (PMG) will—

a. Have overall Army Staff responsibility for physical security (PS) of sensitive conventional AA&E.

b. Establish overall policy for the PS aspects of the program.

c. Function as the Army Staff focal point for PS matters.

d. Establish minimum PS standards, criteria, and procedures for protecting AA&E.

1–5. Commanding Generals, Army Commands, Army Service Component Commands, and Direct Reporting Units
Commanding Generals, Army Commands (ACOMs), Army Service Component Commands (ASCCs), and Direct Reporting Units (DRUs) will—

a. Support the AA&E PS program according to prescribed responsibilities in AR 190–13 and this regulation.

b. Apply enough human resources and funds to AA&E PS programs at all levels.

c. Provide oversight of the mission AA&E program.

d. Provide assistance to mission commanders in correcting deficiencies by advocating for mission resources and funding.

e. Coordinate the submission of PS waivers and exceptions from mission commander to the appropriate Headquarters, Department of the Army (HQDA) staff proponent.

f. Provide credentials to mission PS inspectors.

1–6. Commanding General, U.S. Army Training and Doctrine Command
The CG, U.S. Army Training and Doctrine Command (TRADOC) will—

a. Enforce procedures for security of weapons and ammunition assigned to initial entry training (IET) Soldiers.

b. Ensure that IET commanders coordinate with garrison commanders to ensure police response to an alarm or call for assistance.

c. Ensure IET commanders conduct risk analysis and vulnerability assessments. As a minimum, IET commanders will—

(1) Conduct a risk analysis and vulnerability assessment before weapons are issued to Soldiers.

(2) Ensure the risks posed by insider personnel, criminals, or terrorists are acceptable and that reasonable measures are in place to mitigate identified vulnerabilities.

(3) Ensure the risk analysis and vulnerability assessments are reviewed and validated at the beginning of each training cycle.

(4) Ensure a new risk analysis and vulnerability assessment is accomplished annually or when the HQDA or TRADOC commanders assessed or postulated threat changes.

(5) Ensure copies of risk analysis and vulnerability assessments are maintained on file until a new risk analysis and vulnerability assessment is accomplished.

1–7. Commanding General, U.S. Army Materiel Command

The CG, U.S. Army Materiel Command (AMC) will—

a. Prescribe policies, procedures, and standards to physically secure AA&E manufacturing and production facilities and those AA&E under research, development, or being tested and evaluated under DA jurisdiction.

b. Coordinate through tri–Service the use of decision logic formulas (DLFs) (table B–1) and determine the appropriate risk categories for AA&E items. Security requirements for conventional ammunition and explosives during production and manufacturing operations at Government–owned, contractor–operated facilities are prescribed by the Joint Ordnance Commanders Group (DOD 5160.65–M, chap 12).

1–8. Commanding General, U.S. Army Criminal Investigation Command

The CG, U.S. Army Criminal Investigation Command (USACIDC) will—

a. Conduct preliminary investigation into losses of all Category I and II AA&E items, regardless of dollar value, to determine if a crime was committed.

b. Conduct preliminary investigation into losses of Category III and IV items meeting the quantities listed in appendix E, regardless of dollar value, to determine if a crime was committed.

c. Conduct investigations of actual or attempted break–ins or armed robberies of AA&E storage facilities.

d. Provide copies of USACIDC serious/sensitive incident reports which may be prepared pertaining to a, b, and c, above, to HQDA, PMG (DAPM–MPD–PS), 2800 Army Pentagon, Washington, DC 20310–2800.

e. Conduct a complete investigation and provide HQDA PMG (DAPM–MPD–PS), upon request, copies of such investigation reports if a crime was committed.

f. Coordinate with the proper law enforcement activity (LEA), provost marshal (PM), Director, Emergency Services (DES), or security office to ensure assignment of a PS specialist to the investigation, if needed.

g. Assist HQDA PMG (DAPM–MPD–PS) and the commander concerned in evaluating existing security measures and recommending corrective action to improve security of such items using the results of completed investigations.

1–9. Chief of Engineers

The Chief of Engineers (COE) will ensure that construction plans for new or modified AA&E storage facilities meet the minimum standards prescribed by this regulation.

1–10. Commanding General, U.S. Army Installation Management Command

Commanding General (CG), U.S. Army Installation Management Command (IMCOM) will—

a. Support the AA&E PS program according to prescribed responsibilities in AR 190–13 and this regulation.

b. Apply enough human resources and funds to AA&E PS programs at all levels.

c. Provide oversight and support of AA&E program consistent with this regulation using IMCOM region offices.

d. Establish an AA&E program for providing oversight and support to IMCOM installations at the IMCOM region office by—

(1) Providing oversight of garrison AA&E program.

(2) Providing assistance and assessments on the installations for the garrison commander.

(3) Providing assistance to the garrison commander in correcting deficiencies by advocating for Base Operating System resources and funding and coordinating with the ACOM, ASCC, and DRU commanders for mission resources and funding.

(4) Coordinating the submission of PS waivers and exceptions from the garrison commander through headquarters, IMCOM to the appropriate HQDA staff proponent.

(5) Providing credentials to installations for PS inspectors.

1–11. Garrison commanders, Chief, Army National Guard/Chief, Army National Guard of the United States

Garrison commanders, Chief, Army National Guard (ARNG)/Chief, Army National Guard of the United States will—

a. Support the AA&E PS program according to prescribed responsibilities in AR 190–13 and this regulation.

b. Apply enough human resources and funds to AA&E PS programs at all levels.

1–12. Commanders and custodians of arms, ammunitions, and explosives

Commanders and custodians of AA&E will—

a. Comply with this regulation.

b. Ensure necessary measures are taken to safeguard AA&E at all times. This includes providing specific instructions in writing on individual responsibility for AA&E during operational and field training conditions, care and maintenance, competitive marksmanship meets, and storage on, or when mounted on, vehicles and aircraft. Appendix I provides a guide that may be used to quickly check for compliance with physical security requirements.

c. Ensure timely submission of Serious Incident Reports, per AR 190–40.

d. Report all losses (actual or suspected) or recoveries within 2 hours of initial detection to the proper law enforcement agencies.

e. Conduct prompt investigation of losses after a decision of the USACIDC that criminal acts were not involved.

f. Fix responsibility when negligence is determined and take proper corrective action to prevent further loss.

g. Publicize AA&E security and loss prevention through command information and unit training programs.

h. Plan, program, budget, and allocate resources for the implementation of required policies outlined in this regulation.

i. Ensure that AA&E storage facilities are checked, inventoried, and inspected as required by this regulation.

j. Appoint, in writing, a commissioned officer, warrant officer, or noncommissioned officer as the unit PS/arms room officer to ensure that PS requirements pertaining to the accountability and security of AA&E are met or exceeded.

k. Maintain an updated notification roster. The roster will list the names and telephone numbers of personnel to be notified in the event of an alarm system malfunction or breach of security.

l. Ensure the security of any nonsensitive AA&E that that does not meet the criteria in this regulation for sensitive items by—

(1) Safeguarding from pilferage, theft, and wrongful destruction. Although this regulation does not prescribe security criteria for these items, AR 190–13 assigns commanders the responsibility to ensure reasonable security measures are taken to safeguard property and facilities that may be vulnerable to criminal acts or other disruptive activities.

(2) Ensuring that the security measures taken provide enough security based on an assessment of the threat and vulnerability of the items concerned. Such security measures can include use of fences, lighting, lock and key control, security patrols, and any other measures deemed suitable by the commander responsible for the security of the items involved.

1–13. Garrison commanders, Reserve Component commanders, and Reserve Officers' Training Corps unit commanders

Garrison commanders, Reserve Component (RC) commanders, and Reserve Officers' Training Corps (ROTC) unit commanders will—

a. Coordinate PS plans with local LEAs, DES, supporting military intelligence (MI) and USACIDC elements.

b. Set up a liaison at the local level with the agencies per chapter 3 of this regulation.

c. Ensure that agreements governing consolidated AA&E storage facilities and the storage of AA&E property of Federal, State, contractor agencies, and foreign government agencies contain definite assignment in writing of responsibility for the items stored.

d. Ensure construction programming documents involving AA&E facilities have been coordinated with the responsible PM or security officer.

1–14. Commanders or directors of activities and units on Active Army installations or sub–installations

Commanders or directors of activities, and units on Active Army installations or sub–installations will—

a. Coordinate PS plans for standard operating procedures (SOP) once a year with the installation PM, DES, or security office.

b. Ensure their security procedures are current and in keeping with the command and HQDA PS directives.

c. Include provisions in security procedures for applying PS measures for storage areas in keeping with the host commander's assessment.

1–15. Commanders or directors of tenant activities (located both on and off the installation)

Commanders or directors of tenant activities (located both on and off the installation) will—

a. Identify their security requirements to the host installation.

b. Ensure funding provisions are considered in proper budget programs.

1–16. Installation planning boards

Installation planning boards will—

a. Include a PS representative from the LEA, PM, DES, or security office as a voting member on all actions.

b. Ensure that the provisions of this regulation are considered and made a matter of record during the planning process by the representatives.

Chapter 2
Policy

2–1. General

a. Physical security systems should incorporate technology and equipment available within the Federal Government and the private sector to provide cost–effective protection, automated accountability, and inventory control. Physical security equipment management policy is established in AR 190–13, chapter 4. Security criteria will be included in initial plans for research and development, as well as all new or modified construction projects.

b. To minimize the cost of PS inventory control, and to reduce theft vulnerability, the quantities of AA&E and the number of storage facilities for AA&E should be reduced. Storage should be consolidated to the maximum extent consistent with operational, safety, and training requirements.

(1) The AA&E should be removed from designated storage areas as briefly as possible. The quantity to be removed should be as small as possible to support specific missions or projects. Storage areas should be as small as possible and be consistent with safety standards, security, and mission requirements.

(2) Further reduction of costs for protection and inventory control can be effected by grouping the consolidation of AA&E into smaller storage areas by assigned risk category and providing the degree of PS protection needed for that category. Priority attention will be given to demilitarization or disposal of obsolete and unserviceable AA&E to avoid unnecessary storage, security, and inventory–related costs.

(3) The provisions of this regulation are intended to provide adequate storage security for AA&E at most DA activities. There may be a few unusual activities, such as large depots or remote storage areas without existing electrical service, where not all criteria in this regulation can be directly applied in a cost–effective manner. At these unusual or unique facilities, local conditions must be carefully evaluated, and the security system must be tailored to the local conditions.

2–2. Construction of facilities

a. The provisions of this regulation are mandatory for construction of new permanent storage structures at land–based installations that store sensitive AA&E. Modification to existing facilities will be accomplished in accordance with the criteria set forth in this regulation.

b. The tearing down and rebuilding of facilities will not be undertaken unless the concerned command and IMCOM has determined that existing security measures cannot be supplemented to provide the required degree of protection. When nonstandard structures or facilities provide equivalent or better protection, modifications will not be undertaken. Exceptions to this policy will be granted under paragraph 2–4.

c. Upgrading of existing storage structures must be consistent with approved plans for future development and new construction plans. The type, planned use, modification costs, and remaining economic life of storage structures must be considered. Additionally, in determining upgrade requirements, ammunition and explosives will be consolidated by risk category to the maximum extent consistent with operational, safety, and training requirements. Compensatory security measures will be established for AA&E storage structures that do not meet minimum construction standards. Definitive drawings and specifications for new construction, upgrade, or modification of AA&E storage structures will be coordinated with the engineer office, safety office, and LEA, PM, DES, or security police office to ensure safety and PS requirements are met.

d. Qualified engineer personnel will verify the structure composition of AA&E storage facilities (for example, walls, ceilings, roofs, floors, and doors). Statements will be prepared on DA Form 4604 (Security Construction Statement). Statements will indicate the highest construction category met for storage of AA&E (for example, Category I, II, III, or IV AA&E items) and date of applicable regulation (see para 2–4 for procedures when structural deficiencies exist). The DA Form 4604 will be affixed to the interior wall of each AA&E storage facility. A blanket statement on DA Form 4604 may be issued at an installation for all facilities, such as ammunition magazines, constructed according to the same specifications. Under these circumstances, a copy of the DA Form 4604 need not be affixed to the interior wall of each individual storage structure, but must specifically identify the facilities by number and location and be readily available for inspection. Security construction statements will be reviewed during PS surveys and inspections. The statements will be revalidated by engineer personnel every 5 years.

e. Physical security personnel will monitor construction of new facilities and renovation of existing facilities. Engineer personnel will coordinate new construction and renovation projects with the local PM or security officer. In addition to meeting construction standards, storage of AA&E will meet PS criteria, such as Intrusion Detection System (IDS), locks and hasps, lighting, and security patrols, as necessary, for the particular category of AA&E involved.

2–3. Intrusion Detection System priority lists

a. Priority of installation of the IDS is as follows:

(1) Facilities storing Category I items, when protection is inadequate. Those having the largest quantity will receive initial attention.

(2) Facilities storing Category II items.

(3) Facilities storing Category III items.

(4) Facilities storing Category IV items.

b. Deviations from these priorities will be permitted only when IMCOM has determined that a local threat dictates these deviations.

2–4. Security Criteria Deviation Program

a. Purpose. The purpose of the AA&E security criteria deviation program is to—

(1) Ensure that prescribed security requirements are properly observed and implemented at all AA&E facilities.

(2) Provide a management tool to monitor corrective actions.

(3) Ensure that deviations from established security requirements are systematically and uniformly identified and approved at the proper level of command. Waivers and exceptions are deviations from specific security requirements prescribed in this regulation.

b. Waivers. A waiver may be approved for temporary relief from a specific requirement prescribed in this regulation pending actions to conform to the requirement.

(1) A waiver may be approved for a period not to exceed 12 months and extended only after a review of the circumstances that necessitate the extension.

(2) Compensatory security measures are required in the interim. Compensatory security measures approved by the AA&E facility commander/director will remain in effect pending formal review and final approval by the approving authority.

(3) Deficiencies correctable within 60 days do not require a waiver; however, ensure compensatory security measures are taken during the interval. In such cases, the compensatory measure must be in writing, approved by the AA&E facility commander/director and the next higher commander in the chain of command.

c. Exception. An exception may be approved for permanent relief from a specific requirement prescribed in this regulation.

(1) Approve exceptions only when correction of the deviation is adjudged to be not feasible or cost–effective and only after a most careful and critical evaluation of the facts in the case.

(2) Notify the approving authority through command channels when the exception is no longer needed.

(3) Review all exceptions during PS inspections or when a major change in site configuration or mission offers the opportunity for corrective action to terminate the exception.

(4) The AA&E facility commander/director, to whom the exception was granted, will conduct the review. Forward all reviews through command channels to the approving authority granting the exception.

(5) Compensatory security measures are required in the interim. Compensatory security measures approved by the AA&E facility commander/director will remain in effect pending formal review and final approval by the approving authority.

d. Exceptions and waivers. Exceptions and waivers will not be used to reduce or eliminate minimum security requirements in this regulation. Evaluate each waiver or exception on a case–by–case basis.

e. Compensatory measures.

(1) Institute compensatory measures for each deficiency.

(2) One compensatory measure may suffice for more than 1 deficiency.

(3) Security measures will compensate for the specific vulnerability created by a deficiency when a minimum security requirement in this regulation cannot be met. A security requirement directed by this regulation cannot serve as a compensatory measure for a deficiency.

(4) Compensatory measures may include additional security forces, procedures, and/or PS devices such as additional locks, alarms, lighting, and delay devices. Design the criteria for accepting compensatory measures to specifically enhance the security posture in light of the deficient situation.

(5) Compensatory measures that consist primarily of instructions to the security force to increase their alertness do not provide a comparable level of security.

(6) The AA&E sites lacking an installed IDS, will conduct a thorough assessment to determine compensatory measures most reasonable to ensure near–real time assessment of an attempted facility intrusion. The assessment will include a full explanation of the factors considered in formulating the compensatory measures.

f. Arms, ammunition, and explosives security considerations.

(1) The AA&E facility commander/director will ensure that prescribed compensatory measures are implemented as required.

(2) Security forces will be advised of all standing deviations and compensatory measures in assigned duty areas.

(3) Prescribed compensatory measures for individual deficiencies must not, when considered in total, unrealistically task the security forces.

g. Approval procedures. Requests for waivers and exceptions are initiated by the AA&E facility commander/director and forwarded through appropriate command channels to HQDA, PMG (DAPM–OPS), 2800 Army Pentagon, Washington, DC 20310–2800.

h. Waiver and exception requests. All waiver and exception requests will include the following:

(1) *Subject of request.* An example includes, Request for Waiver at Dugway Proving Grounds – Intrusion Detection System.

(2) *Reasons for request.* State the problems and/or deficiencies that constitute requirements below those cited in this regulation (cite references and state requirements).

(3) *Reasons for noncompliance.* Explain why the unit, facility, or installation cannot comply with the requirements of this regulation. For waivers, show what actions have been taken planned or scheduled to correct the deficiencies.

(4) *Detailed information.* Provide detailed information on current compensatory measures.

(5) *List of all waivers and exceptions currently in effect for the site.* Explain why these deviations, collectively, will not establish an overall site vulnerability greater than the stated compensatory measures.

(6) *Coordination.* Show coordinated efforts with the affected staff agencies (PM/security officer, supporting judge advocate of the installation or activity, and supporting engineers).

(7) *Commander's evaluation of the requests.* Commanders (in the chain of command) will review and endorse each waiver or exception request. The IMCOM region commanders may delegate the review and endorsement to a civilian division chief assigned to that headquarters and responsible for PS matters in the region. The Commanding General, IMCOM may delegate the review and endorsement to a civilian division chief assigned to that headquarters and responsible for PS matters. The ACOM, ASCC, and DRU commanders may delegate this authority to a division chief within the organization in the grade of colonel or the civilian equivalent. Each chain of command's endorsement will include comments assessing the adequacy of compensatory measures, taking into consideration the required criteria for waivers and exceptions.

i. Exceptions previously granted. Exceptions previously granted under the criteria of the previous AR 190–11 remain valid under the provisions of this regulation. Such exceptions need not be resubmitted for approval. However, such exceptions will be reviewed as indicated above.

2–5. Security of arms, ammunition, and explosives during training and aboard ships

All AA&E deployed in the field for training or operational purposes will be secured at all times. Field level munitions storage area (FLMSA) will be designated by the commander and used to temporarily hold unit level munitions in a field environment to meet training requirements (for example, ammunition holding area, ammunition transfer point, or field ammunition resupply point). After firing, the FLMSA will be used to reconcile the munitions prior to turn–in to the installation ammunition supply point (ASP). The following guidelines apply:

a. Access to the FLMSA will be strictly controlled. The 2–person rule will apply to Category I missiles and rockets at these locations.

b. Perimeter barriers, either temporary or permanent, must be in place to preclude unauthorized entry into the storage area.

c. Storage areas will be posted as a restricted area.

d. Armed guards will be posted at the FLMSA to control entry, to protect the AA&E, and in the event Category I missiles and rockets are stored there, to enforce the 2–person rule. The guards will be equipped with a primary and alternate means of communications. At a minimum, armed guards will be checked every 4 hours by an individual appointed by the commander.

e. Positive measures (for example, security lighting or additional guards so that visibility between guards is maintained, and so on) will be implemented during hours of darkness or reduced visibility.

f. Accountability procedures will be established at the FLMSA to record expenditures. Inventory results will be reconciled daily until return to the installation ASP.

g. Category I missiles and rockets stored in open areas are vulnerable to theft. The commander responsible for the FLMSA should consider placing these Category I missiles and rockets in either an approved container (military van (MILVAN), SEAVAN (see glossary), or container express (CONNEX)), or in a totally enclosed storage building. The following additional PS measures apply if the container or building is used:

(1) Doors will be secured with 2 general field service padlocks (see glossary, under locks).

(2) Access to, or possession of, both keys to the building by 1 person is prohibited.

(3) A key control system will be established so that no 1 person will be allowed to have access to keys to installed A and B locks.

h. Commanders of units that routinely deploy for field training and live firing should consider having the supporting engineer activity construct a storage building to be used at the FLMSA. This building need not meet the minimum construction standards for Category I storage buildings in this regulation (earth covered), but should provide a degree

of security necessary to enforce 2–person access and provide shelter from the weather. The approval authority for construction standards will be IMCOM. A Type 2 outdoor magazine may also be used as a temporary storage structure.

2–6. Inspections and audits

Security measures including theft or loss reporting and inventory and accountability procedures for AA&E will be examined during inspections and audits. The status of existing waivers and exceptions will be examined for compliance and continuing necessity.

a. The garrison commander will ensure that PS inspections are conducted in accordance with AR 190–13 for AA&E governed by this regulation. Additionally, conduct PS inspections as follows:

(1) For new AA&E storage facilities, and before and immediately after occupancy.

(2) On significant change in facility structure.

(3) After a forced entry or attempted forced entry with or without theft.

(4) When units have received an unsatisfactory rating on PS inspection, reinspection will be within 6 months. A copy of an unsatisfactory PS inspection concerning RC and ROTC units will be furnished the installation commander providing logistical report. The follow–up report will include written comments to show what elements have received copies.

b. Physical security inspections of AA&E deployed in the field for training and operations will be conducted to ensure these items are properly protected.

c. Results of PS inspections will be briefed to the commander responsible for the security of the facility or area inspected.

d. Inventory, accountability, issue, and turn–in procedures will be included in PS inspections to ensure the procedures support the PS program. Supply operations below the wholesale level area applied in AR 710–2, chapter 2. Physical inventory controls at the wholesale level are established by AR 740–26, chapter 2.

e. Persons authorized by the commander to exchange custody of an arms storage facility will conduct a physical count of the weapons and ammunition stored therein during the custody exchange per requirements in AR 710–2.

2–7. Prohibition

a. Gun clubs and activities under the responsibility of the Director of Marksmanship are not authorized to possess or store Category I or Category II AA&E.

b. The ARNG and the U.S. Army Reserve (USAR) are not permitted to permanently store operational quantities of Category I AA&E.

(1) The ARNG and USAR are authorized to temporarily store training quantities of Category I AA&E at ASP for training of ARNG and USAR units provided the ASP meets all requirements for Category I storage in chapter 5.

(2) Additionally, ARNG and USAR units are authorized temporary custody (not to exceed 14 days) of Category I AA&E for training on military installations. Storage requirements in paragraph 2–5, above, and transportation requirements in paragraph 7–10, below, will be strictly adhered to.

c. The ROTC/Junior ROTC units are not authorized to possess or store Category I AA&E. With the exception of Norwich University, Virginia Military Institute, Texas A&M, the Citadel, and North Georgia College, ROTC units are not authorized to permanently possess or store Category II AA&E.

(1) The ROTC units may retain temporary (overnight/weekend) custody of AA&E for training purposes. This temporary custody will not exceed 72 hours. Chapter 4 PS measures will be adhered to.

(2) The ROTC units may use Category II weapons for familiarization training and field training exercises or marksmanship, on or off a military reservation. Active Army and RC units and installations are encouraged to provide support to ROTC units when requested.

2–8. Requisition

The HQDA (DALO–SMP–S) will establish procedures for item managers to ensure necessary requisition verification of AA&E items. Commanders will include instructions to ensure AA&E requisitions are authorized by designated personnel and released only to properly identified authorized personnel. The procedures will include positive steps for rejecting excess and unauthorized requisitions (see AR 710–2 for policy on requisitioning).

2–9. Investigations

A thorough investigation will be made of lost, stolen, or missing AA&E to determine the circumstances surrounding the loss or theft and to fix responsibility as necessary. Inventory and accountability losses will be investigated thoroughly. Before any loss can be attributed to any inventory or accountability discrepancy, it must be determined through investigation that the loss was not the result of theft or wrongful appropriation per AR 735–5.

a. Guidance on actions to be taken. Active Army and RC commanders, or their designated representatives, having direct responsibility for AA&E lost, stolen, or missing or the receiving unit or agency will—

(1) Notify the supporting military LEA or security office as soon as the incident is discovered. The notice will be as complete as possible, but will not be delayed because of incomplete data. The USAR will notify the military law

enforcement activity responsible for the geographical area. In the continental United States (CONUS), this notice will include the proper Federal Bureau of Investigation (FBI) field office having area jurisdiction. Civil authorities in overseas areas will be notified according to local policy.

(2) Conduct a preliminary investigation when sensitive AA&E are reported lost by the USACIDC to determine criminality before beginning any administrative action (see para 1–11).

(3) Start administrative action per AR 735–5 if the USACIDC investigation determines a crime was not committed. The report of survey or equal procedures will not be used as a disciplinary or punitive measure. The use of this administrative procedure will not prevent recourse to disciplinary measures when proper.

(4) Determine accountability for recovered property per AR 735–5. A person may be held responsible and be required to pay for a loss. If so, he or she will not be allowed to claim title or obtain ownership of the item if it is recovered.

(5) Consider relative investigative findings in violation of this or other applicable regulations. Take proper punitive action if events warrant.

(6) Request, through the proper channels, that an AR 15–6 investigation be initiated for loss/theft of AA&E identified in appendix E. Ensure financial liability investigations are conducted in accordance with AR 735–5.

b. Property overages. Property overages will be handled in the same way as stated in *a*, above.

c. The investigation. Facts must be presented by the requesting person. The installation, depot, or community commander may then direct that an investigation be initiated. The officer appointed to conduct the investigation will follow procedures per AR 15–6 and this regulation.

d. In–transit losses. Consignees of AA&E shipments will report in–transit losses to the supporting LEA, PM, DES, or security office.

e. Inventory adjustments. Inventory losses or overages may be determined as administrative, computer, or other type accountability errors and not actual losses. This determination will be made only after investigative action has established the cause of the discrepancy. (In no case may a weapon, ammunition, or explosive loss or overage be attributed to inventory error unless the responsible agency, unit, or activity conducts an investigation that, beyond a doubt, excludes the possibility of theft or loss.) When such a decision has been made, DA Form 3056 (Report of Missing/Recovered Firearms, Ammunition and Explosives) will be submitted. The form will explain—

(1) The rationale for such a decision.

(2) The type of inventory adjustment action taken.

(3) The name, grade, and duty position of the approval authority.

f. Transportation losses. Transportation officers, or their designated representatives, will inform the supporting LEA, PM, DES, or security office when claims or other data reflect the loss of AA&E from shipment or storage. This report will include household goods and losses of privately–owned weapons.

g. Criminal investigation reports. The CG, USACIDC will provide HQDA (DAPM–MPD–PS), upon request, copies of completed criminal investigation reports. The reports will describe the loss or theft of AA&E. Reports prepared by the FBI will be included as attachments.

2–10. Training

a. Commanders responsible for AA&E will establish a training program for those personnel responsible for the accountability of these items. The training program will be designed to—

(1) Provide training in inventory and accountability procedures as outlined in applicable 700–series Army regulations.

(2) Fit the requirements of different groups of personnel responsible for accountability.

(3) Indoctrinate personnel in the principles, criteria, and procedures for accountability and inventory, including disciplinary actions against individuals responsible for violating security requirements as prescribed in this regulation.

b. Commanders will initiate an aggressive training program to ensure all unit personnel are aware of their responsibilities for the security and accountability of AA&E. A training program will also be established to ensure requirements of AR 190–56, chapter 4 are met and to ensure continued proficiency of the guard force. As a minimum, this training will include—

(1) Care and use of weapons, to include qualification firing with assigned weapons within the past 12 months.

(2) Legal authority, responsibility, and jurisdiction of guards on duty, to include apprehension, search and seizure, and use of force.

(3) Physical fitness training.

(4) Guard orders, to include communications and duress procedures.

(5) Duties in the event of emergencies, such as alerts, fire, explosion, civil disturbance, intrusion, attempted seizure, or terrorist incident.

(6) Current criminal threat to AA&E.

(7) Crime prevention.

(8) Common forms of sabotage and espionage, to include current threat situation.

(9) Location of hazardous and vulnerable equipment and materiel, to include high security risk AA&E requiring special attention or more frequent security checks.

(10) Location of fire protection equipment, decontamination stations, electrical circuit breakers and main cut–off switches, and first–aid facilities.

(11) Operation and monitoring of IDS.

(12) Additional training subjects as listed in AR 190–13, paragraph 2–5.

c. Commanders will take continuing action through annual update refresher briefings to ensure that all personnel are aware of their responsibilities for the control and safeguarding of AA&E.

2–11. Personnel

a. Commanders/directors will be selective in assigning personnel to duties involving control of all categories of AA&E. Only personnel who are mature and stable and have shown a willingness and capability to perform assigned tasks in a dependable manner will be assigned to duties, which involve responsibility for the control, accountability, and shipment of all categories of AA&E. The commander may delegate this responsibility to directors/managers who are responsible for the supervision of the personnel and the AA&E. As part of this selection process, personnel assigned duties involved in the control, accountability, and shipment of AA&E will be screened and evaluated using DA Form 7281 (Command Oriented Arms, Ammunition, and Explosives (AA&E) Security Screening and Evaluation Records). Completed forms will be retained on file within the command until the individual departs or is relieved of his or her AA&E–oriented duties. In addition, the senior mission commander and/or IMCOM will implement procedures to ensure the following:

(1) Personnel assigned custody, maintenance, disposal, or security responsibilities for AA&E on military installations in the United States and its territories, or U.S. citizens assigned to such duties overseas, will be subject to 1 of the following investigations and periodic reinvestigations as set forth in DOD 5200.2–R:

(a) Military personnel— National agency check, local agency check, credit check.

(b) DOD civilian personnel— National agency check with written inquiries and credit.

(c) Contractor personnel (including subcontractors)— National agency check, local agency check, credit check.

(2) Prior to assumption of such duties (and at least annually thereafter), personnel responsible for the accountability of AA&E will be made aware of the importance of accurate receipt, dispatch, and inventory records. Adherence to the requirement for scheduled inventories will be stressed, as well as procedures for processing inventory adjustment gains and losses.

(3) Personnel operating a vehicle or providing security to a vehicle transporting Category I and II AA&E (including contractor personnel transporting such items on military installations in the United States and its territories or U.S. citizens assigned to such duties overseas in direct support of installation requirements) will be subject to an investigation as provided above, except as follows:

(a) Officers of U.S. flag carriers will be licensed in accordance with United States Coast Guard requirements.

(b) Designated commercial carrier employees providing protective security service for the transportation of items classified secret must possess a Government–issued secret clearance, as provided for in DOD 5220.22–M (reference (l)), and carrier–issued identification.

(c) Foreign national personnel providing services in overseas locations will be investigated in accordance with the policy and procedures governing locally hired employees under Status of Forces Agreements, export licenses or laws of the host government. The DOD components assume responsibility for permitting access to DOD systems, information, material, and areas when an investigation conducted by the host country does not meet the investigative standards in DOD 5200.2–R.

(d) Within CONUS, commercial carrier employees transporting Category I through Category IV AA&E will be subject to an investigation and/or Government security clearance as prescribed in DOD 4500.9–R, chapter 205.

b. Commanders/directors will determine the reliability and trustworthiness of the following personnel before they are assigned duties involving control of AA&E. The commander may delegate this responsibility to directors/managers who are responsible for the supervision of the personnel and the AA&E—

(1) Personnel authorized unaccompanied access to arms and Category I and II ammunition and explosives storage facilities.

(2) Personnel authorized to receive, store, or issue arms and Category I and II ammunition and explosives at such storage facilities.

(3) Personnel authorized to issue or control keys to AA&E storage facilities in (1) and (2), above.

(4) When personnel report for temporary duty at another station and work directly with AA&E, they are required to provide a copy of the DA Form 7281 from their primary station. In the event that temporary duty personnel are from another military department, they will present evidence of reliability and trustworthiness.

c. Commanders/directors/managers who are responsible for the supervision of the personnel and the AA&E will prohibit access to personnel specified in paragraphs *a* and *b*, above, when doubt exists as to their reliability or trustworthiness. All personnel will be required to undergo a command–oriented security screening or an equivalent foreign country check before access is authorized. The security screening check will be designed to provide the

commander reasonable assurance that personnel with character traits that raise significant doubt as to their honesty or stability are not afforded access. At a minimum, the command–oriented security screening will include—

(1) A personal interview of the individual conducted by his or her immediate commander or supervisor.

(2) A request for medical file check of active duty military personnel.

(3) A personnel records check.

(4) A records check of the PM, DES, or security office.

(5) A records check of local civilian law enforcement agencies in the area of the person's residence if permitted by State or local laws.

d. Commanders/directors/managers who are responsible for the supervision of the personnel and the AA&E will deny access to the above personnel when doubt exists as to their reliability or trustworthiness. The following disqualifying factors will be considered:

(1) Record of alcohol abuse.

(2) Record of unauthorized use, sale, or possession of drugs and narcotics.

(3) Record of mental instability or disorders.

(4) Record of judicial or nonjudicial punishment.

(5) Pattern of behavior or actions which are reasonably indicative of a contemptuous attitude toward the law.

(6) Personnel with qualifying conviction under the Lautenberg Amendment (Staff Judge Advocate coordination required).

(7) Any other character trait, a record of conduct, or adverse information, which, in the commander's/director's/manager's judgment, would be prejudicial to reliability or trustworthiness.

e. Continuing evaluation of all personnel is essential to the success of the AA&E security screening policy. All personnel involved in AA&E will be fully cognizant of their responsibilities to observe and report promptly to the commander any incident or condition which might result in temporary or permanent disqualification of such personnel. Security screening checks in *c*, above, will be repeated every 3 years.

Chapter 3
Physical Security Planning

3–1. General

In assessing local requirements for protection, the following factors should be considered:

a. All AA&E storage rooms, facilities, or areas to include AA&E manufacturing, rebuilding, or demilitarizing facilities will be designated as mission essential vulnerable areas. The garrison commander will assume responsibility for coordinating PS efforts of all tenants having AA&E storage rooms, facilities, or areas, regardless of the components represented, as outlined in the support agreements and the host activity security plan. Applicable provisions will be included in, or be an appendix to, the support agreement. A formal agreement will contain definite assignment of PS responsibility for the items stored. The agreement should address—

(1) Physical safeguards to be used.

(2) Frequency of, and responsibility for, physical inventories or reconciliations.

(3) Procedures for authorization and identification of individuals to receipt for, and physically take custody of, Army property.

b. Threat assessment based on information furnished by local intelligence, criminal investigative, or law enforcement agencies.

c. Types of AA&E, other sensitive assets, property maintained, and mission of the facility.

d. Location, size, and vulnerability of storage facilities.

e. Vulnerability of AA&E to theft and loss.

f. Geographic location within the installation and relative to surrounding population centers.

g. Availability and responsiveness of security forces.

h. Availability or existence of security enhancing systems, including—

(1) Perimeter barriers.

(2) Security lighting.

(3) Communication systems.

(4) Key and lock controls.

(5) Stringent construction criteria for storage areas and armories.

(6) Personnel and vehicular entry control.

(7) Security training programs.

(8) IDS (including closed circuit television (CCTV)).

(9) Military working dogs.

(10) Security guard personnel.

3–2. Coordination

a. In developing a security plan, coordination and close liaison should be effected between the military commander and—

(1) Adjacent installations or units.

(2) Federal agencies.

(3) State and local agencies.

(4) Similar host country agencies.

b. To the extent permissible, such interaction should allow for an exchange of intelligence information on security measures being employed, contingency plans, and any other information to enhance local security.

c. On an installation, the host activity will assume responsibility for coordinating PS efforts of all tenants, regardless of the DOD components represented, as outlined in the support agreements and the host activity security plan. Applicable provisions will be included in, or be an appendix to, the support agreement.

(1) Bilateral storage agreements will be used when—

(a) The AA&E are stored on the installations or facilities of other U.S. or foreign government agencies or other DOD services.

(b) Consolidated storage facilities are used to store AA&E belonging to more than 1 unit or organization.

(2) A formal agreement, signed by both commanders, will contain definite assignment of PS responsibility for the items stored. The agreement will address—

(a) Maximum quantities to be stored.

(b) Physical safeguards to be used.

(c) Frequency of, and the responsibility for, physical inventories or reconciliations.

(d) Reporting of losses for investigations.

(e) Key control procedures.

(f) Unit that has overall responsibility for the storage facility.

(g) Procedures for authorization and identification of individuals to receipt for physically taking custody of AA&E.

(h) Risk categories of items to be stored.

d. The formal agreement concerning PS requirements for AA&E can be implemented by an appendix to a host/tenant activity support agreement or by a letter of instruction.

e. The purpose of such coordination is protection in–depth. Authority, jurisdiction, and responsibility must be set forth in a manner that ensures protection and avoids duplication of effort.

3–3. Contingency plans

In most instances, it will be necessary to increase security for AA&E and other sensitive property, assets, and facilities during periods of natural disasters, natural emergencies, or periods of increased threat from terrorist or criminal elements. Therefore, contingency plans should include provisions for increasing the PS measures and procedures for storage areas based on the local commander's assessment of the situation. These provisions should be designed for early detection of an attempted intrusion, theft, or interruption of normal security conditions.

3–4. Security threats

a. The security plan will provide for the identification of local threats and should make full use of the investigative resources available in the geographic area to anticipate criminal activities that threaten the PS of AA&E assets. At a minimum, a liaison will be established with the following agencies:

(1) Local FBI field office.

(2) Local law enforcement agencies.

(3) Intelligence and investigative agencies of the Uniformed Services.

(4) Bureau of Alcohol, Tobacco, and Firearms (BATF) field office.

(5) Host country agencies where applicable.

b. Installation plans will address actions to counter thefts by employees. These actions include personnel screening (see para 2–11) and the monitoring to minimize opportunities for employee theft and to detect concealed shortages.

c. The USACIDC is designated as the single command for receiving, analyzing, and disseminating data on the criminal threat to the security of the Army. The U.S. Army Intelligence and Security Command (INSCOM) will perform a similar function as related to terrorist, hostile intelligence, demonstrator, and hostile special operation threats.

d. Commanders responsible for storage of AA&E will—

(1) Coordinate with local USACIDC and MI elements to receive current data on any threat to the security of these items.

(2) Conduct periodic visits by USACIDC and MI personnel with commanders or their designated representatives. These visits should provide updated threat analysis data based on observed vulnerabilities.

(3) Assess the local requirements for PS protection.

(4) Incorporate into local security plans or SOPs, procedures for providing the following essential elements of criminal data to the nearest military police (MP) and USACIDC representatives as the data become available:

(a) Any intent to steal AA&E.

(b) Suspicious acts indicating that a storage area is being targeted by criminal elements.

(c) Alleged offers to buy or barter for AA&E.

(d) Losses of AA&E, including alleged inventory or administrative errors, together with the events surrounding individual losses.

3–5. Implementation of physical security planning

Commanders at each installation, unit, or activity will—

a. Issue instructions regarding all phases of security operations pertinent to the installation, unit, or activity. These instructions will be reviewed at least annually for relevance and currency.

b. Develop and implement an effective security awareness program based on current PS plans.

c. Develop effective countermeasures to prevent or reduce the risk posed by potential threats.

(1) Countermeasures should be consistent with the current PS plan and the requirements of Army PS regulations.

(2) Physical security countermeasures consist of measures and procedures designed to reduce risk by—

(a) Providing means of alerting response forces to the presence of intruders as soon as possible.

(b) Providing means of delaying intruders long enough to prevent intruders from completing the purpose of the intrusion.

(3) Physical security measures and procedures are specified in Army regulations and include—

(a) Area patrols.

(b) Continuous surveillance.

(c) Security fences, doors, walls, and locks.

(d) Security vaults.

(e) Security lighting and emergency power supply.

(f) IDS.

(g) CCTV.

(h) Clear zones.

(i) Response forces.

d. Sensitive or critical items or equipment should be stored in inner zones of an installation. This may require inventory, segregation, and restorage, where practical by risk categories.

e. Security protection requirements for AA&E will be based on the highest category item stored in magazines or other structures.

3–6. Intrusion Detection System

The IDS is an essential part of the PS system. The IDS consists of the combination of electronic components, including sensors, control units, transmission lines, and monitoring units integrated to be capable of detecting all types of intrusion into an area protected by the system including the stay–behind threat. An IDS includes both interior and exterior systems. The system will be a DOD standardized system or DA approved commercial system. The following policy applies:

a. Central monitoring station.

(1) A central monitoring station (CMS) will be provided at which alarms will present audible and visual alerts and from which a response force will be dispatched. The response force is not required to be collocated with the CMS.

(2) The CMS will alarm with audible and visual alerts whenever the system detects possible intrusion into the protected area or when the system is turned off, malfunctions, or is placed in maintenance mode.

(3) Some means of communication will be provided between the protected area and the CMS to coordinate status changes. Telephone communication should be considered.

(4) Where IDS is used in civilian communities, arrangements will be made to connect alarms to civil police headquarters, private security companies, or a monitoring service from which immediate response can be directed. A commercial answering service is not authorized. Coordination is required with civil authorities to ensure a response force can be directed immediately.

b. Response force. The response force should respond to an activated alarm as soon as possible, but in no case may arrival at the scene exceed 15 minutes.

c. Alarm circuitry.

(1) Circuitry will be used that requires alarm signals to be cleared either at the CMS or from inside the protected area.

(2) Circuitry will be configured to ensure that alarms that announce intrusion detection have priority over other events announcements such as a power or communication change.

(3) Use of alarm delay switches at RC facilities is prohibited.

(4) On and off, access, maintenance mode, and secure switches not located at the CMS will be located within the protected area.

d. Sensors.

(1) All AA&E storage facilities (other than bulk storage facilities) that require IDS will be protected by at least a heavy–duty, industrial–grade balanced magnetic switch and a volumetric sensor such as a passive infrared sensor.

(2) The sensors will comply with the standards in Unified Facilities Guide Specification (UFGS) 28 20 01.00 10, available at the Whole Building Design Guide Web site http://www.wbdg.org.

(3) Walk–test lights should be disabled.

(4) Boundary sensors, such as vibration sensors, are encouraged.

(5) Dual– and tri–technology sensors, without need for independent alarm condition sensing, are authorized.

(6) Additional levels of protection, when practical, are encouraged (duress signaling components, for example) and will be considered for Category I and II arms storage facilities.

e. Personal identification numbers.

(1) A separate personal identification numbers (PIN) will be issued to each person whose duties require the ability to operate the IDS.

(2) The PINs will not be shared.

(3) The PINs will not be written anywhere except for official record maintained by the facility manager or designee.

(4) The PINs that have been or believed to be compromised will be immediately replaced.

(5) The PINs will be withdrawn immediately when the individual to whom it was issued departs the organization or no longer requires the ability to operate the IDS.

(6) The PINs will be secured to the same degree as afforded to IDS keys and to keys and combinations used to access the protected area.

(7) The PINs and IDS point of contact call rosters will be reviewed semiannually by the facility manager or designee to ensure the information is current and will document this in writing with an informal memorandum retained on file for 1 year.

f. Signs.

(1) Signs will be prominently displayed announcing the presence of IDS.

(2) All IDS signs will be affixed at general eye–level (when possible) on the exterior of each interior wall of the protected area that contains an entrance.

(3) All IDS signs will be affixed on exterior walls of the building only if the exterior wall contains an entrance to the protected area.

(4) Specifications for IDS signs are per appendix F.

g. Power supply.

(1) A protected, independent, backup power supply will be used that provides a minimum of 4 hours of uninterrupted power.

(2) The backup power supply will be maintained at full charge by automatic charging circuits.

h. Event logs. A daily log will be maintained of all alarm events, and at a minimum will include—

(1) The nature of the alarm such as system failure or nuisance alarm.

(2) The date and time the alarm was received.

(3) The location and action taken in response to the alarm.

(4) Any other information that will aid technical analysis.

(5) Logs will be maintained for a minimum of 1 year and will be reviewed periodically to identify, monitor, and correct system reliability problems.

(6) Logs will be generated and maintained at the CMS. Optionally, DA Form 4930 (Alarm/Intrusion Detection Record) may be used.

(7) Serious or recurring problems will be described in writing and expeditiously sent through command channels to HQDA PMG (DAPM–MPD–PS), 2800 Army Pentagon, Washington, DC 20310–2800.

i. Data transmission.

(1) *Electrical line supervision.*

(a) Data transmission lines for the alarm circuits will have line supervision to detect and report evidence of tampering or malfunction.

(b) Visible lines will be inspected weekly.

(2) *Dual data transmission.*

(a) If line supervision is not available, 2 independent means of alarm signal transmission will be used from the protected area to the CMS.

(b) One of the 2 independent means of alarm signal transmission must be either a long–range radio or cellular telephone link.

(c) Two non–dedicated, hardwire telephone links are not acceptable.

(d) The dual transmission equipment must continuously monitor the integrity of both the telephone wire line and the wireless link.

(e) Upon loss of either communication path, the system must immediately notify the CMS via the other communication link.

(f) The dual transmission equipment must be able to seize control of the communication links (line seizure), even if that link is already in use.

j. Tamper protection.

(1) Communications equipment and connections, including cellular equipment, will be mounted in tamper protected enclosures or protected by sensors.

(2) Communications equipment, including cellular wireless where possible, will be located within the protected area.

(3) Systems will be tested quarterly and a log maintained for at least 1 year for recording all tests.

(4) Visible lines will be inspected on a regular basis.

(5) The tamper detection will be continuously monitored whether the system is in a secure or access mode of operation.

(6) All intrusion detection equipment enclosures with removable covers will be equipped with tamper switches. These equipment enclosures are not required to be locked. Keyed–alike locks are authorized if the commander decides to lock the enclosures.

(7) Enclosures that are not routinely opened for maintenance purposes (such as pull boxes) need not have tamper switches installed if they contain no connections or splices and the covers are held in place by tack welding, brazing, or tamper resistant security fasteners.

k. Electrical conduit.

(1) Data transmission lines that are located inside the protected area may be installed in electric metallic tubing that complies with UFGS 26 20 00, paragraph 2.2.4. The electric metallic tubing couplings and connectors will be compression type.

(2) When data transmission lines exit the protected area but are still located interior to the building, they may be enclosed in intermediate metal conduit that complies with UFGS 26 20 00, paragraph 2.2.3.

(3) When transmission lines exit the building, they will be enclosed in rigid metal conduit that complies with UFGS 26 20 00, paragraph 2.2.1.1.

(4) Data transmission lines installed in other configurations of metallic conduit prior to the date of this publication are acceptable and do not have to be replaced to comply with this requirement.

l. Personnel.

(1) Only authorized personnel should be allowed access to unclassified IDS installation wiring diagrams for a specific facility or location. This also applies to information on known, specific vulnerabilities or countermeasures affecting the IDS.

(2) Civilian employees whose duties involve the design, operation, or maintenance of IDS require completion of a favorable national agency check with written inquiries prior to appointment to such noncritical, sensitive positions. Civilian contractor employees must possess a minimum security clearance of confidential, granted in accordance with AR 380–67.

(3) A check of the National Crime Information Center (NCIC) for installers and maintainers of unclassified IDS is a command decision. The decision will be based on the sensitivity of the area to be protected and the need for quality control over personnel having access.

(4) Installers, maintainers, and operators of unclassified IDS will undergo a command–oriented security check. The security check should be made with the area PM or other agencies that might have information bearing on the honesty or stability of the individual. The requirement for command–oriented security checks should be based on local jurisdiction policies, the local threat and sensitivity, and vulnerability of the protected facility.

m. Maintenance.

(1) Monthly operational checks will be conducted to ensure sensor activation and to visually inspect components and conduit for evidence of tampering.

(2) Commercial intrusion detection systems employing sensors equipped with a remote–test feature that activate the same sensing phenomenology as would an actual intruder do not require operational checks by organization personnel.

(3) Each zone component will be checked and tested by alarm maintenance personnel a minimum of every 6 months during routine preventive maintenance.

(4) Maintenance will be provided by personnel who are qualified to install and repair IDS. Maintenance will be performed consistent with operational requirements to ensure continuous operation and reliability of each system.

n. Physical security inspectors. The PS inspectors will—

(1) Review event logs for areas of concern during inspections.

(2) Check the IDS during security inspections to verify proper operating condition. Checks will include inspection of components and conduit for evidence of tampering.

o. System acceptance.

(1) Prior to accepting a newly installed IDS into operation, an inspection will be conducted by qualified technical personnel to ensure the system meets minimum acceptable standards.

(2) A statement of verification will be recorded on DA Form 4604 and maintained in the using unit or organization files.

p. Security classification. An IDS will be considered for security classification if it meets the specific classifying criteria per AR 380–5. An appropriate personnel security clearance will be obtained if the IDS is classified.

q. Intrusion Detection System key security. Keys associated with IDS components will be safeguarded and controlled according to paragraph 3–8, below.

3–7. Security forces

A security patrol, guard patrol, or unit personnel will periodically check facilities and areas used to store sensitive or critical items or equipment as prescribed herein and as dictated by a threat and vulnerability analysis. Checks will be conducted on an irregular basis during non–duty hours to avoid establishment of a pattern. Security checks will be made to ensure unauthorized personnel are not in the area and the structures are intact and have not been breached. During periods of increased vigilance because of a threat situation, security patrols will physically inspect doors and locks on all storage structures in their area of responsibility. Selection of personnel to perform guard duties will be closely monitored by commanders to ensure only properly trained and reliable individuals are assigned duty. Supervisory checks will be conducted to ensure guard duties are being performed properly.

a. Security patrols may be conducted by military personnel; civilian security personnel, including contract personnel; U.S. Marshal Service; or State, local, or campus police.

b. Security forces that are DA controlled, will be provided with adequate means of communication.

c. Security forces personnel (for example, guards, security patrols, security reaction forces) will be armed with appropriate weapons and ammunition. If such personnel are armed, provisions of AR 190–14 apply.

d. Guard procedures will be reviewed at least annually and revised if necessary to provide greater application of security measures and will place special emphasis on guard post locations and guard orientation concerning duties to be performed.

e. Inspections and guard checks will be increased during nights, weekends, and holidays to provide for deterrence of violations and early detection of loss. These checks will be recorded and will consist of an inspection of the building or facility including all doors and windows. Records of these checks will be maintained in an active file for a minimum of 90 days and then destroyed.

f. Law enforcement patrol plans will be coordinated and integrated with the guard plan or other security plans and programs to the maximum extent possible. When facilities are located in civilian communities, a liaison will be established with local civil police agencies to ensure that periodic surveillance is conducted and that a coordination plan for security exists.

3–8. Key and lock controls

a. Only approved locks and locking devices (including hasps and chains) will be used (see glossary definition of locks for a list of DA approved locks and hasps). All questions regarding the identity of approved commercial equivalent locks and locking devices (including hasps and chains) meeting military specifications will be addressed to the Naval Facilities Engineering Service Center (NFESC), Port Hueneme, CA 93043–5000, (805) 982–1212 (DSN 551–1212) and the DOD Lock Program Office at https://portal.navfac.navy.mil/go/locks.

b. Keys will be signed out to authorized personnel, as needed, on a key control register. The DA Form 5513 (Key Control Register and Inventory) will be used to meet the requirements of this regulation. When not in use, the key control register will be kept in a locked container that does not contain or store classified material and to which access is controlled.

c. Keys and combinations to locks for AA&E storage facilities, arms racks, IDS (operational or maintenance), or key containers will not be removed from the installation except to provide for protected storage elsewhere.

d. Keys to locks securing key containers will be afforded physical protection equivalent to that provided by the key container itself. Keys to AA&E storage buildings, rooms, racks, containers, and IDS will be maintained separately from other keys and accessible only to those individuals whose official duties require access to them.

(1) A current roster of these individuals will be kept within the unit, agency, or organization. The roster will be protected from public view.

(2) The roster will be signed by the designated official and contain the names of those individuals authorized to receive keys from the key custodian.

(3) At no time will keys be in the custody of a person not listed on the roster.

e. A key control register will be maintained at the unit level to ensure continuous accountability for keys, ensure positive control of keys, and establish responsibility for the custody of stored AA&E. Key control registers will contain printed name and signature of the individual receiving the key, date and hour of issuance, serial number or other identifying information of the key, printed name and signature of the person issuing the key, date and hour key was returned, and the printed name and signature of the individual receiving the returned key. Completed key control registers will be retained for 1 year.

f. Keys to AA&E storage buildings, rooms, racks, containers, and IDS may be secured together in the same key container. However, keys required for maintenance and repair of IDS, including keys to the control unit door and monitor cabinet, will be kept separate from other operational IDS keys and access permitted only to authorized maintenance personnel. Under no circumstances will IDS or AA&E keys or locks or alternate keys or locks be placed in any security container that contains or stores classified material. The primary and secondary arms room keys may be placed in separately locked metal containers and secured with an approved locking device. The secondary/alternate keys will be stored at the next higher command in a secure location, that is, multiple drawer security container.

g. When arms and ammunition are stored in the same areas, keys to those storage areas may be maintained together, but separately from other keys that do not pertain to AA&E storage. The number of keys will be held to the minimum essential. Keys may not be left unattended or unsecured at any time.

h. When not attended or in use, keys will be secured in a locked key container. Any General Services Administration (GSA) approved security container, or equivalent container or key container of at least 20–gauge steel, is acceptable for storing such keys. An appropriate locking system will be used to lock the key container. The key container will be located in a room where it is kept under surveillance or in a room that can be locked during non–duty hours. Procedures will be established to preclude access of stored keys which require 2–person control.

i. An automated, lockable key container is authorized provided the container meets GSA standards and generates a record of key usage. Ensure the electronic key container is properly programmed permitting only authorized personnel access to duty specific keys. The printed record will contain the name of the individual receiving the key, date and time of issuance, and date and time returned. A printed record will be produced each time a key is removed and returned. In case of a system failure, detailed instructions will be included in the lock and key SOP on how accountability will be maintained and emergency access to the keys stored in the automated container.

j. When combinations, codes, or electronic equipment are used in lieu of keys, the control procedures used for keys will apply to maintain the integrity of the combinations, codes, or electronic equipment.

k. In the event of lost, misplaced, or stolen keys, a commander's inquiry will be conducted immediately. The affected locks or cores to locks will be replaced immediately. Replacement of reserve locks, cores, and keys will be secured to preclude access by unauthorized individuals. The use of a master key system or multiple key systems is prohibited.

l. A key and lock custodian, where duties include assuring proper handling of keys and locks, will be appointed in writing. Only the commander and the key custodian (or alternate, if appointed) will issue and receive keys to and from individuals on the key access roster (*d*, above). Personnel listed on the roster may transfer custody, in writing, among themselves. The key and lock custodian's duties will also include procurement and receipt of keys and locks, and investigation of lost or stolen keys. The key and lock custodian will maintain a record to identify each key and lock and combinations to locks used by the activity, including replacement or reserve keys and locks. The record will show the current location and custody of each key and lock. The key and lock custodian will ensure that individuals who are designated to issue, receive, and account for keys in his/her absence, clearly understand local key control procedures. The key and lock custodian will maintain a key control register at all times to ensure continuous accountability for keys of locks used to secure AA&E. At no time will the primary and alternate key custodian be the same as the primary and alternate armorer or be on the unaccompanied access roster.

m. Padlocks will be locked to the staple or hasp when the area of container is open to preclude theft, loss, or substitution of the lock.

n. Locks and their keys will be inventoried by serial number semiannually. Padlocks and keys which do not have a serial number will be given one. This number will be inscribed on the lock or key as appropriate. The inventory records will be retained in unit files for a minimum of 1 year. A key and lock inventory will contain a record of keys, locks, key serial numbers, lock serial numbers, location, and the number of keys maintained for each lock. This record will be secured in the key depository.

o. When individuals are charged with the responsibility for safeguarding or otherwise having keys immediately available, they will sign for a sealed container of keys. A sealed container is a locked and sealed key container, or a sealed envelope (SF 700 (Security Container Information) per AR 380–5) containing the key or combination to the key container. When the sealed container of keys is transferred from 1 individual to another, the unbroken seal is evidence that the keys have not been disturbed. The seal need not be broken for inventory of keys. However, evidence of tampering with a sealed container will require an inventory of the keys and such other action as may be required by the commander concerned. If the keys are not placed in a sealed container, an inventory of keys will be made by serial number or other identifying information of the key (for example, stamped number on key). The inventory and change

of custody will be recorded on the DA Form 5513 (see para 2–11 for requirements to determine reliability of personnel authorized to issue and control keys to arms and Category I and II ammunition and explosives storage facilities).

p. Combinations to locks on vault doors or GSA approved Class 5 or Class 6 security containers will be changed annually or upon change of custodian, armorer, or other person having knowledge of the combination, or when the combination has been subject to possible compromise. Combinations will also be changed when a container is first put into service. The combination will be recorded using SF 700, sealed in the envelope provided, and stored in a container meeting storage requirements per AR 380–5. No other written record of the combination will be kept. Controls will be established to ensure that the envelopes containing combinations to locks or containers are not made available to unauthorized personnel.

q. Replacement of lock cylinders and broken keys for high security locks may be requested through normal supply channels. Requests will be coordinated through the key control custodian.

r. The use of master or keyed alike locks is prohibited.

Chapter 4
Protection of Arms

4–1. General

This chapter prescribes the criteria and standards for the protection of arms in custody of DA components, arms, including firearms in rod and gun club facilities, will be stored in an arms room, modular vault, or an arms storage building per the requirements of this chapter.

a. When storage in an arms storage room, modular vault, or building impedes training or operational requirements, arms may be stored or installed on the Naval craft, vehicle, or aircraft to which assigned or in other configurations per this regulation and as specified by HQDA PMG (DAPM–MPD–PS). Weapons stored or installed in tanks, vehicles, or aircraft will be protected as part of the overall system in which they are stored or installed.

(1) Commanders will establish appropriate security measures to ensure weapons stored or installed in tanks, vehicles, or aircraft are protected at all times, particularly when tanks, vehicles, or aircraft are unmanned. The following guidance applies:

(a) When not in use, tanks, vehicles, or aircraft containing weapons will be parked inside a secure motor pool or an aircraft park area. Level III security measures in AR 190–51, paragraphs 3–3 and 3–5, apply.

(b) When operational readiness permits, weapons mounted on tanks, vehicles, or aircraft that are accessible and easily removable will be dismounted and secured inside the locked tank, vehicle, aircraft, or other secure location. Weapons that are dismounted and secured inside the locked tank, vehicle, aircraft, and weapons that remain installed on board will be made inoperative by removal of barrels or other essential firing components. Such components will be secured in a locked metal container inside the tank, vehicle, or aircraft, or other secure location. The container will be secured to the tank, vehicle, aircraft, or other secure structure with bolts or chains equipped with secondary padlocks. Spare barrels may be stored inside a locked, totally enclosed armored combat vehicle when the other essential firing components are secured in an arms storage room and the vehicle is parked inside a motor park which provides continuous surveillance by guards and Level III security measures per AR 190–51, paragraphs 3–3 and 3–5.

(c) Weapon systems that are impractical to dismount, due to operational readiness or damage to the weapon system will be made inoperable by the removal of essential component or components. Such components will be secured as in (*b*), above. Electrical power may be considered an essential component on the 20mm and 30mm weapon systems.

(d) When electrical power is the only essential component removed from the weapons systems, ammunition for those weapons systems will not be stored on board the tank, vehicle, or aircraft. Level II security measures per AR 190–51, paragraphs 3–3 and 3–5 apply.

(2) Large weapons (for example, crew served weapons and mortar tubes) that cannot be secured in arms rooms or other arms storage facilities because of inadequate storage space, may be stored in a locked, totally enclosed armored vehicle. In such cases, security requirements in (1), above, apply.

(3) Large weapons that cannot be secured in arms rooms, as stated above, may also be secured in other secure locations, such as a room made secure by compensatory measures. In such cases, protection and surveillance by guard or other personnel will be provided according to the risk category of the weapons involved. Such weapons will be rendered inoperable according to the requirements prescribed in (*b*), above.

(4) During maintenance support operations, weapon components may be stored in a storage facility meeting security requirements according to the risk category of the items involved.

(5) Commanders may authorize storage of small quantities of Category IV arms in a GSA approved Class 5 security container not storing classified documents or materials without IDS, security lighting, and security patrol requirements. Commanders will decide the number to be stored on the basis of mission and operational requirements in conjunction with an assessment of vulnerability and threat conditions. Provisions above apply only to small units (for example, USACIDC detachment) that must store a small quantity of prescribed weapons for operational requirements.

b. Individuals issued or in possession of arms are responsible for security of this property while it is entrusted to their care.

(1) Each weapon issued for training, operations, or any other reasons will be carried on the person of the individual to whom issued at all times or it will be properly safeguarded and secured. Except during emergencies, weapons will not be entrusted to the custody of any other person except those responsible for the security of operational weapons. These persons will comply with issue and turn–in procedures. Local procedures will be established to secure and account for the weapons of personnel medically evacuated during training and operations.

(2) During field exercises and training, pistols and revolvers issued to persons will be secured to the person by either a locally made lanyard or military issued field lanyard (national stock number (NSN) 8465–00–965–1705).

(3) Pistols or revolvers that lack a device to affix the lanyard will be secured by running the lanyard through the pistol/revolver trigger guard during field and training exercises when drawing the pistol/revolver is not contemplated. If drawing the pistol/revolver is contemplated, such pistol/revolver is exempt from the lanyard requirements.

(4) Pistols and revolvers issued for operational purposes need not be secured by a lanyard except where specified in other regulations.

(5) Local commanders will prescribe in writing specific accountability and security measured to prevent the loss of other weapons assigned to persons.

(6) The USACIDC may authorize individuals to retain their assigned weapons in their private quarters if the necessity is dictated by operational requirements. In such instances, USACIDC will establish accountability safeguards and security measures.

4–2. Storage and supplemental controls

a. Storage and supplemental controls.

(1) New facilities built for storage of Category II arms will meet the facility criteria in appendix G.

(2) An existing facility in which Category II, III, and IV arms are stored together will meet the criteria for facilities storing Category II arms in appendix G.

(3) Category II arms stored in arms storage buildings or rooms that do not meet or exceed the criteria for Category II arms may be stored in GSA approved Class 5 security containers not containing classified documents or materials, or in a safe–type steel file container not containing classified documents or materials, having a 3–position, dial–type, combination lock providing forced entry protection as approved by GSA (Fed Spec AA–F–363D as amended) or in approved modular vaults not containing classified documents or materials with GSA approved Class 5 vault doors or GSA approved Class 5 armory doors. Modular vaults meeting Fed Spec AA–V–2737 may be used to meet this requirement. Vaults, containers and safes will be under 24–hour armed guard surveillance or protected by an approved IDS, and the facility will be checked by a security patrol at least once every 8 hours. Modular vaults are not approved for exterior use unless specifically designed for exterior applications. Modular vaults used in exterior applications are subject to the same additional controls as for the portable armories.

(4) Category III and Category IV arms will be stored in facilities meeting or exceeding the criteria in appendix G.

(5) Categories III and IV arms that are stored in facilities that do not meet or exceed the criteria for Categories III and IV arms may be stored in a GSA approved Class 5 security container, not containing classified material or documents, or a safe–type steel file cabinet not containing classified material or providing forced entry protection as approved by GSA (Fed Spec AA–F–363D, as amended). Containers weighing less than 500 pounds will be secured to the structure.

(6) Category IV arms that are stored in unmanned facilities not equipped with an IDS will be checked by a security patrol or guard patrol at irregular intervals not to exceed 24 hours.

(7) Portable armories are authorized for the storage of Category II through IV arms provided they are built to U.S. Government specification (Naval Surface Warfare Center (NSWC) 3046–93.2. Additional information can be obtained from the Naval Surface Warfare Center, 300 Highway 361, Crane, IN 47522–5001 (telephone 812–854–5615). Implement the following additional controls:

(a) Intrusion Detection System. Portable military armories storing Category II through IV arms will be provided with an approved IDS. Facilities without an operational IDS require constant surveillance by armed guards.

(b) Security patrols. Facilities will be checked by a security patrol periodically as dictated by any threat and by the vulnerability of the facility. The intervals between checks will not exceed 8 hours.

(c) Security lighting. Exterior lighting will be provided for all portable armories. The lighting will be sufficient to allow guards (or individuals responsible for maintaining surveillance) to see illegal acts such as forced entry, or the unauthorized removal of arms during hours of reduced visibility. Lighting will provide a minimum of 0.2 foot–candles (2lux) illumination measured on the horizontal plane at ground level.

(d) Locks and hasps. Doors used for access to the portable armory will be locked with an approved high security locking device or high security padlock and hasp providing comparable protection to the locks.

b. Arms racks and storage containers.

(1) When not in use, arms will be stored in banded crates, metal containers, approved standard issue racks or locally fabricated arms racks, and secured in approved weapons storage facilities. Standard issue approved metal wall lockers

or metal cabinets may be used. Crates or containers will be banded, locked, or sealed in a way that will prevent weapon removal without leaving visible signs of tampering. Screws or bolts used in assembling containers, lockers, or cabinets will be made secure to prevent disassembly.

(2) Standard issue DA approved arms racks will be obtained through Government supply channels. Consider all arms racks that have a NSN and are not a part of a shipping container as DA approved. Weapons without a specific standard issue arms rack may be secured in a DA approved Universal Arms Rack (NSN 1095–01–454–6320, rack, storage, small arms, incorporated). The continued use of existing locally fabricated arms racks is prohibited unless certified as security equivalent to standard issue racks by DA. Modifications to existing DA approved arms racks, which have assigned NSNs, are prohibited without prior approval from DA. A Tank–Automotive and Armaments Command (TACOM) logistics assistance representative and a battalion command–level representative will jointly perform certification authorizing the continued use of prior locally fabricated arms racks. The joint certification will serve as verification of the security adequacy of such arms racks. The AMC executive agent for small arms logistics and demilitarization (EA–SALD) office at Rock Island, IL will provide the certification training and administer the certification process and issue certificates required. Locally fabricated arms racks that are logistics assistance representative and battalion representative certified will be considered DA approved EA–SALD; stamped with a serial number, identifying the type of weapon rack; and tracked in a local database maintained by the EA–SALD office. The using unit will maintain the certification on file where such racks are used, as it will serve as security verification of the adequacy of such racks. The minimum requirements for certification of previously locally fabricated arms racks are—

(a) Fabrication and/or modification constructed of metal having an inherent strength that would prevent an individual from manipulating components (without tools) such that the weapon, receiver, or barrel could be removed.

(b) Overall design of fabrication and/or modification such that a weapon, receiver, or barrel cannot be removed by disassembly of the weapon/component and/or the rack without damage to the rack.

(c) Hinged locking bars for racks have the hinge pin welded or otherwise secured to prevent disassembly.

(d) Bolts or machine screws used for fabrication or modification are a minimum of 3/8–inch diameter. The bolt and nut will be tack welded, brazed, or peened to prevent disassembly.

(e) When all features in *(a)* through *(d)*, above, are adequate, apply certification serial number provided by the EA–SALD to the rack in an appropriate location. Metal stamps, indelible marker, or paint stencil may be used.

(3) Requests for certification of locally fabricated or modified arms racks will be submitted to: Commander, U.S. Army Tank–Automotive Command, ATTN: EA–SALD (AMSTA–LC–CSL), Rock Island, IL 61299–6000.

(4) All arms racks or containers will be locked with approved secondary padlocks. In facilities that are not manned 24 hours a day, rifle racks and containers weighing less than 500 pounds will be fastened to the structure (or fastened together in groups totaling more than 500 pounds) with bolts or with chains equipped with secondary padlocks. Bolts used to secure racks will be spot welded, brazed, or peened to prevent easy removal. Chains used to secure racks (and containers) will be heavy–duty hardened steel, welded, straight links steel, galvanized of at least 5/16–inch thickness, or of equivalent resistance to force required to cut or break a secondary padlock.

(5) When weapons are in transit, stored in depots or warehouses, or held for contingencies, the weapons crates or containers need not be fastened to the structure. However, such crates or containers will be banded or locked and sealed in a way that will prevent weapon removal without leaving visible signs of tampering. The facilities and buildings in which these weapons are stored will meet the structure and other security requirements of this regulation. Arms being unpacked or packed for shipping or in assembly–line configuration in a maintenance repair or rebuild facility do not require storage in racks or containers. However, the facilities in which they are stored will meet the structure and other security requirements of this regulation.

c. Security lighting.

(1) Interior and exterior lighting will be provided for all arms storage buildings, buildings in which arms storage rooms are located, and arms storage rooms. The lighting will be sufficient to allow guards (or individuals responsible for maintaining surveillance) to see illegal acts, such as forced entry or the unauthorized removal of arms during hours of reduced visibility.

(2) Areas appropriate for lighting include entrances to buildings, corridors, and arms rooms. When an arms room is located inside a building, the entrance door to the arms room will be illuminated. Arms rooms that are located within another room (for example, a supply room), do not require security lighting over the arms room door. When an arms room is located inside another secured room, the exterior door to that room will be illuminated.

(3) Security lighting will also be provided for motor pools, hangars, and outdoor parking areas for vehicles or aircraft that have weapons installed or stored on board.

(4) Switches for exterior lights will be installed so that they are not accessible to unauthorized individuals.

(5) Exterior lights will be covered with wire mesh screen or equipped with vandal resistant lenses that will prevent the lights from being broken by thrown objects.

d. Doors, locks, and locking devices.

(1) Except for GSA approved Class 5 steel vault doors with built–in, 3–position, changeable combination locks, doors used for access to arms storage rooms or structures will be locked with an approved high security locking device or high security padlock and hasp providing comparable protection to the locks. An approved high security shrouded

hasp will be used to secure Category I and II AA&E storage facilities to enhance their security. Doors used for access to arms storage rooms will be locked with approved locks and hasps. On existing storage facilities equipped with double–door protection, high security padlocks and hasps will be used on the most secure door. Secondary padlocks will be used to secure the other door of the double–door concept. Other doors that cannot be secured from the inside with locking bars or dead bolts will be secured on the inside with approved secondary padlocks (for example, issue window or portals). When high security hasps are installed, locking bars and T–pins should be left in place to aid in opening and closing doors and prevent any future misalignment of the hasps. Panic hardware, when required, will be installed to prevent opening the door by tampering from the outside. Panic hardware will meet safety, fire, and building codes and be approved by the Underwriters Laboratory or host country requirements as applicable.

(2) Key and lock controls will be established per paragraph 3–8.

(3) Facilities in which vehicles or aircraft are stored with sensitive items aboard will be secured by approved secondary padlocks. Aircrafts will be secured with manufacturer–installed or approved modification work order door–locking devices when not in use. All hatches and other openings to track vehicles which cannot be secured from the inside will be secured from the outside with approved secondary padlocks.

e. Additional controls.

(1) *Intrusion Detection System for arms storage facilities.* Arms room storing Category II arms, GSA approved Class 5 weapons storage cabinets, and GSA approved security modular vaults will be provided with an approved IDS. Facilities without an operational IDS require constant surveillance by armed guards for Category II arms while Category III and IV facilities require a check by security patrol at irregular intervals not to exceed 24 hours. In the event that the arming of guards off a military installation is prohibited by State or territorial law, a request for exception to this requirement according to paragraph 2–4 is required. The exception will include the rationale and justification for not utilizing armed guards and the compensatory security measures taken.

(2) *Security patrols.*

(a) Facilities will be checked by a security patrol periodically as dictated by any threat and by the vulnerability of the facility. For Category II IDS protected facilities, the intervals between checks will not exceed 8 hours. For Category III and IV facilities, the intervals between checks will be once every 24 hours and once every 48 hours for IDS protected storage facilities.

(b) Facilities storing arms outside a military installation will be checked by a security patrol on an irregular basis at an interval not to exceed 24 hours.

(3) *Rendering weapons inoperable.* If the facility is not located on a military installation, weapons will be rendered inoperable by the method shown in table 4–1 under any of the following conditions below:

(a) A facility does not meet structural criteria.

(b) A threat is received.

(c) An IDS is inoperative for a period of 24 hours or longer.

(d) During periods of annual field training, if arms are left in the facility.

(e) Decision of the commander having direct security responsibility for the facility.

(4) *Storing removed items.* The items removed for the purpose of rendering a weapon inoperable will be tagged with the weapons serial number to ensure return to the same weapon and secured in a separate building. Etching of weapon's serial number on the removed parts is prohibited. The removed items will be stored in a locked container in a secure area away from the arms storage facility. If a secure area is not available for separate storage of these items, the container will be stored in the arms storage facility and secured to the structure with an approved lock and chain or equal methods when the container weighs less than 500 pounds.

Table 4–1
Methods for rendering small arms inoperable

Weapon: Carbine, Caliber .30 M1 **Method:** Remove bolt assembly
Weapon: Gun, Auto 25mm M242 **Method:** Remove bolt and track assembly
Weapon: Launcher, grenade 40mm M79 **Method:** Remove barrel assembly
Weapon: Launcher, grenade 40mm M203 **Method:** Remove barrel assembly
Weapon: MG, Caliber .50 M2 series **Method:** Remove bolt assembly

Table 4–1
Methods for rendering small arms inoperable—Continued

Weapon: MG, 7.62mm M60 series **Method:** Remove breech block
Weapon: MG, 7.62mm M73 series **Method:** Remove breech block
Weapon: MG, Caliber .50 M85 **Method:** Remove bolt assembly
Weapon: MG, 7.62mm M219 **Method:** Remove Breech block
Weapon: MG, 7.62mm M240 series **Method:** Remove bolt and operating rod assembly
Weapon: MG, 5.56mm 249 **Method:** Remove bolt and slide assembly
Weapon: MG, 40mm MK19 Mod 3 **Method:** Remove bolt assembly
Weapon: Pistol, semi–auto, Caliber .45 M1911A1 **Method:** Remove firing pin and spring. Leave stop installed to prevent damage of firing pin hold
Weapon: Pistol, semi–auto, Caliber .22 **Method:** Remove bolt or slide assembly
Weapon: Pistol, semi–auto, 9mm M9 **Method:** Remove firing pin assembly, recoil spring, and the spring guide from the spring assembly
Weapon: Rifle, Caliber .22—all types **Method:** Remove bolt assembly
Weapon: Rifle, Caliber .30 M1 series **Method:** Remove bolt assembly
Weapon: Rifle, 7.62mm M14 series **Method:** Remove bolt assembly
Weapon: Rifle, 5.56mm, M16 series **Method:** Remove firing pin
Weapon: Rifle, Caliber .30 M1918 **Method:** Remove firing pin series
Weapon: Shotgun, 12–gauge, riot type **Method:** Remove barrel assembly
Weapon: Sub MG, Caliber .45 M1 series **Method:** Remove bolt assembly
Weapon: Sub MG, Caliber .45 M3 series **Method:** Remove bolt assembly
Weapon: Sub MG, 5.56mm M231 **Method:** Remove firing pin
Weapon: Recoilless rifle, 90mm M67 **Method:** Remove breech block
Weapon: Revolver, Colt **Method:** Remove cylinder and crane assembly
Weapon: Revolver, Ruger **Method:** Remove strut assembly
Weapon: Revolver, Smith and Wesson **Method:** Remove cylinder and yoke assembly

f. Reserve Component weapons. The Army policy of close cooperation between Active Army and RC activities is an essential element in eliminating the theft or loss of AA&E. At times, RC activities may need to use local Active Army facilities for the temporary storage of AA&E as the result of emergency situations (for example, during vehicle breakdown when transporting weapons) when an increased threat situation is forecast or present and during rifle matches. Active Army facilities are authorized and encouraged to assist in temporarily securing RC items. However, the receiving unit will ensure the accountability (number and type items, including serial numbers) of those items accepted for storage. The above policy also applies between RCs as well as the temporary storage of Active Army stocks at Reserve storage facilities.

4–3. Storage of classified weapon trainers

Because of security classification, nuclear weapon trainers, or other classified weapon trainers may be stored in separate locked containers or wire cages in arms storage facilities when alternate facilities are not available per AR 380–5, chapter 5. Commanders will prescribe supplementary measures and controls to prevent unauthorized access and ensure the items are accounted for at all times.

4–4. Consolidated arms rooms

a. Arms belonging to more than 1 unit or organization may be stored in the same arms room or arms storage facility.

b. One commander will be designated as having responsibility for the overall security of the consolidated storage facility.

c. Procedures will be established to fix responsibility for issue, receipt, and physical accountability for arms, including ammunition, and all other sensitive items, stored in the consolidated storage facility per AR 710–2 and DA Pam 710–2–1.

d. Access controls will be established to ensure protection of each unit's arms.

e. Arms and other sensitive items will be segregated by unit.

(1) Expanded metal mesh screening will be utilized (see USACE STD design drawing 40–21–01 at http://www.usace.army.mil).

(2) Units with small quantities of arms may use locked metal containers instead of separation by security cage.

(3) Cages will be locked. Each cage will be identified with unit designation (name).

f. Procedures for such consolidated arrangements will be established in SOP of the consolidated storage facility, or in the SOP of the higher headquarters. In addition to those procedures as mentioned in 4–4*b*, the SOP will establish who will obtain the operational load of ammunition, type/quantity, and the accountability of same for armed guard. It will also establish procedures for who is responsible for the armed guard in case of IDS failure for short and extended periods of time. The SOP will also include a plan for testing of the IDS. (Reserve Components should also include in the plan who will take over such duties in the event of mobilization and who will be responsible for weapons left behind by mobilized unit.)

4–5. Privately–owned weapons and ammunition

a. Commanders will establish procedures and publicize punitive policies that regulate privately–owned weapons, explosives, or ammunition on the installation. Such policies will provide for—

(1) Registration of firearms belonging to personnel living on the installation.

(2) Procedures for the carrying and use of weapons by hunters and marksmanship shooters using installation firing ranges.

(3) Identification of prohibited weapons, such as crossbows, numchucks, swords, throwing stars.

b. The carrying of privately–owned weapons, explosives, or ammunition on military installations are prohibited unless authorized by the installation commander or his designated representative.

(1) Signs will be posted at installation access control points depicting this prohibition.

(2) This prohibition does not apply to the lawful performance of official duties by an officer, agent, or employee of the United States, a State, or a political subdivision thereof, who is authorized by law to engage in or supervise the prevention, detection, investigation, or prosecution of any violation of law or security duties.

c. Commanders will ensure privately–owned arms and ammunition (including authorized war trophies) are protected on their installations and facilities. Commanders will—

(1) Secure arms and ammunition belonging to Soldiers living on the installation in the installation armory or unit arms rooms in approved locked containers separate from the military AA&E. Storage requirements in this regulation apply.

(2) Installation commanders may authorize storage of these items in other locations on military installations, provided they are properly secured.

(3) Account for and inventory the privately–owned arms and ammunition by conducting inventories when inventorying Government arms and ammunition.

(a) A DA Form 3749 (Equipment Receipt) will be issued for each privately–owned weapon secured in the arms rooms.

(b) Privately–owned weapons will be inventoried in conjunction with, and at the frequency of, the inventory of Government weapons.

(c) Commanders will establish limits on the quantity and type of privately–owned ammunition stored in the arms room, based upon availability of space and safety considerations.

(4) Post applicable local regulations and State and local law information on ownership, registration, and possession of weapons and ammunition on unit bulletin boards.

(5) Conduct inspections per AR 190–13 and this regulation to ensure proper storage and control.

(6) Process unauthorized AA&E in accordance with AR 195–5.

(7) Prohibit retention and storage of incendiary devices and explosives.

(8) Brief all newly assigned persons on this regulation and subordinate command guidance. All personnel will be made aware of changes.

d. Personnel keeping or storing privately–owned arms and ammunition (including authorized war trophies) on military installation will—

(1) Comply with Federal, State, and local laws and regulations on ownership, possession, registration, off–post transport, and use.

(2) Store both arms and ammunition in the unit arms room or other locations authorized by the installation commander.

(3) Follow local security and safety regulations. Safeguard the unit issued DA Form 3749 for turn–in to the unit armorer when the weapon is withdrawn from the arms room.

(4) Withdraw privately–owned weapons and ammunition from the unit arms rooms only upon approval of the unit commander or the commander's authorized representative.

(5) Comply with the National Firearms Act and other relevant laws and regulations when receiving or bringing arms into the United States. Automatic arms must be turned over to the BATF or brought under Army control.

4–6. Weapons and ammunition for marksmanship matches and other special purposes

a. Weapons and ammunition for marksmanship matches and other purposes will be protected at all times.

b. When not in use, marksmanship weapons used in matches or ceremonies away from a military installation will be stored in authorized Active Army, ARNG, USAR, or ROTC arms rooms. Weapons and ammunition may be stored in a civilian police station under police control. If these facilities are not available, weapons and ammunition will be stored in locked containers or rooms attended at all times by at least 1 team member or designated person.

c. The storage of automatic weapons in other than an authorized arms room is prohibited.

d. Exceptions to *b*, above for marksmanship weapons are authorized for ARNG, USAR, and ROTC marksmanship personnel when firing as persons away from their teams. Exception criteria are as follows:

(1) Eligibility is limited to persons who are active members representing an ARNG, ROTC region, a major USAR command, or higher–level team. Eligibility is limited only for a specified period of marksmanship participation. Weapons will be returned to the proper authorized arms rooms for storage upon completing the marksmanship match.

(2) Exceptions will be held to a minimum. Each written request for exception will include a statement that other secure facilities are not available. Each request will outline compensatory measures to be applied. If weapons are to be stored in private homes, the weapons will be secured in a locked, metal container. The container will not be prominently displayed. It will be secured to a firm structure in the home.

(3) Arms used during matches or practice away from the facility and not secured will be stored under *b*, above.

(4) All requests will be submitted through command channels to PMG.

4–7. Commercial weapons and ammunition

a. Commercial arms and ammunition in stock or maintained by nonappropriated fund activities and installation approved private organization activities will be protected according to security and accountability procedures equal to those prescribed in this regulation for military arms and ammunition. Commanders will prescribe specific inventory accountability procedures to ensure protection of these items against theft or loss.

b. Commands will discontinue the sale or possession of weapons and ammunition by nonappropriated fund activities failing to comply with this regulation.

c. During non–duty hours, commercial arms and ammunition will be stored in facilities meeting the requirements of this chapter. The storage area will be protected by a certified, approved IDS.

d. When displayed, arms and ammunition will be under the surveillance of sales personnel. Arms and ammunition will be secured in such a way as to prevent loss or theft as follows:

(1) Ammunition equal to 1 day's estimated sales may be displayed in a locked showcase or security case or fixture. If possible, empty boxes will be displayed in the showcases and sales will be made from reserve stock.

(2) Gun and ammunition fixtures will be locked except when merchandise is presented to the customer for inspection.

4–8. Contract guard weapons and ammunition

a. Protection of contract guard weapons and ammunition not U.S. Government property is the responsibility of the contractor unless stated elsewhere in the relevant contract. If granted permission by the installation commander to store on military reservations, these items will be protected in accordance with this regulation. In addition, these weapons and ammunition will be accounted for at all times. These weapons and ammunition are not authorized to be stored in AA&E storage facilities containing Government weapons and ammunition.

b. Commanders will prescribe the specific accountability procedures for contract guard weapons and ammunition.

4–9. General officer weapons and ammunition

Small arms and ammunition issued to general officers are exempt from all provisions of this regulation except loss and investigations requirements. The items will be stored in a manner deemed appropriate by the general officer.

4–10. United States Military Academy weapons

a. Weapons and ammunition will be protected at all times.

b. Weapons will be stored in accordance with the storage requirements of this chapter when not assigned to individual cadets.

c. Weapons issued to each cadet are granted an exception to the storage security requirement in this chapter. The Superintendent, United States Military Academy will set up proper security for these weapons to ensure weapons are safeguarded at all times.

4–11. Demilitarized weapons

Demilitarized weapons, although not classified as sensitive, will be secured as commanders may direct.

4–12. Foreign weapons and ammunition

Arms and ammunition of foreign origin in custody of the Army for intelligence, research, development, test, evaluation, or other purposes will be controlled and safeguarded in the same way as that prescribed for U.S. military weapons and ammunition.

4–13. Museums arms and ammunition

a. General.

(1) Arms, 19th century or older and not requiring metallic cartridges are classified as museum artifacts and are excluded from the PS requirements for storage of arms. Security requirements for these artifacts will be determined per AR 190–51, appendix B.

(2) All operable and inoperable arms not on display will be secured according to this regulation.

(3) Live ammunition will not be used for museum displays. Display ammunition, arming pins, caps, or other detonating devices will be rendered temporarily inoperable.

b. Transportation. Museum weapons in transit will be protected according to this regulation.

c. Arms storage facilities. The provisions of this regulation apply for the storage of museums arms and ammunition.

d. Arms on display.

(1) Ready–to–fire weapons containing self–primed metallic cartridges will be modified to make them temporarily inoperable. Removal of firing pins, internal mechanisms, or parts will satisfy this requirement; however, parts must be secured against pilferage. Modifications will not detract from the display value of the item. Under no conditions will any weapon be permanently altered by welding or cutting without written approval of the chief, Military History.

(2) Weapons on display in exhibit or display cases will be secured to prevent their easy removal. Security measures will be as inconspicuous as possible so as not to detract from the aesthetic appearance of the display.

(3) Classified component parts will be removed before any nonnuclear missiles, rockets, or other AA&E are displayed.

e. Accountability. All museum weapons are subject to the following requirements:

(1) A current inventory by serial number will be maintained.

(2) All weapons, with or without serial numbers, will be marked with a catalog number. Numbers should be easy to find, legible, and placed on the weapon in a position where they do not interfere with the display or study value of the weapon.

(3) Commanders should consider photographing unique museum items as an identification aid in case of theft. Color photographs often preserve a more complete and accurate record than black and white photographs. Negatives should be kept separate from the original photographs.

(4) A serial or catalog number list of weapons stored in banded or sealed containers will be fastened to the outside of each container. The contents will be authenticated with the signature of the curator or other responsible person.

Banded containers will be examined quarterly for tampering and their contents inventoried annually. When seals are used, they will be controlled as stated in AR 190–51, appendix D.

(5) All museum weapons will be visibly inventoried, except weapons stored in banded containers as follows:

(a) Museum personnel will inventory weapons by physical count weekly and serial or catalog number done quarterly.

(b) A disinterested officer will conduct a semiannual inventory of all weapons except those stored in banded containers. The results of this inventory will be kept for 1 year.

(c) Inventory records will be kept on DA Form 2609 (Historical Property Catalog) according to AR 870–20, chapter 4. Inventory files will be maintained for at least 1 year.

f. Small Arms Serialization Program. All weapons with serial numbers will be registered with the DOD Central Registry according to AR 710–3, paragraph 4–11. A manual recording system should be used for those weapons that the Small Arms Serialization Program will not accept because they are foreign, have nonnumeric serial numbers, and so forth. Questions concerning registry should be directed to the DOD Central Registry at USAMC Logistics Support Activity, ATTN: AMXLS–MN (National Channel), Redstone Arsenal, AL 35898–7466 (DSN 645–9972 or commercial (256) 955–9972).

g. Missing or recovered museum weapons. Procedures for reporting missing or recovered weapons are contained in this regulation.

4–14. Arms parts

Major parts for arms, such as barrels and major subassemblies, will be afforded at least the same protection as Category IV arms. The frame or receiver of an arm constitutes a weapon and such parts, therefore, must be stored according to the correct category (for example, the receiver of a .30 caliber machine gun will be stored as a Category II weapon).

4–15. Restricted area designation

a. Commanders of military installations and facilities have the authority to publish and enforce regulations for safeguarding personnel, facilities, and property. This authority is derived from Title 50 United States Code section 797 (50 USC 797) (Internal Security Act of 1950), implemented by DODI 5200.08 and DOD 5200.8–R.

b. Except when such action would tend to advertise an otherwise concealed area or when in conflict with host nation agreements. Signs or notices will be posted in conspicuous and appropriate places to identify the AA&E facility a restricted area. This includes signs posted at each entrance or approach to the area and on perimeter fences or boundaries of the area.

c. Post signs or notices in conspicuous and appropriate places to identify a restricted area (except when such action would tend to advertise an otherwise concealed area, or when in conflict with host nation agreements).

d. Post signs so as not to provide concealment of an intruder or obstruct visual assessment.

e. Post conspicuous signs and notices to give people approaching a restricted area actual knowledge of the restriction. Failure to do so may seriously hamper any resulting criminal prosecution. Each sign or notice will be marked with the words "RESTRICTED AREA," and include the following warning notice: THIS ACTIVITY HAS BEEN DECLARED A RESTRICTED AREA BY AUTHORITY OF THE INSTALLATION COMMANDER
IN ACCORDANCE WITH THE PROVISIONS OF THE DIRECTIVE ISSUED BY THE SECRETARY OF DEFENSE ON 10 December 2005, PURSUANT TO THE PROVISIONS OF SECTION 21, INTERNAL SECURITY ACT OF 1950. UNAUTHORIZED ENTRY IS PROHIBITED. ALL PERSONS AND VEHICLES ENTERING HEREIN ARE LIABLE TO SEARCH. PHOTOGRAPHY OF THE FACILITIES IS PROHIBITED WITHOUT SPECIFIC AUTHORIZATION FROM THE COMMANDER. DEADLY FORCE IS AUTHORIZED.

f. Post warning signs that contain the local languages besides English in areas in which English is not the only common language.

g. Continue to post existing signs containing essentially the same wording as above until replacement is necessary at which time the required wording above will be used.

4–16. Intrusion Detection System signs

Arms storage facilities having IDS will have signs prominently displayed announcing the presence of IDS (see app F). Such signs will be affixed at eye level, when possible, on the exterior of each interior wall that contains an entrance to the arms storage room, vault, or building. Signs will be affixed on exterior walls only when the exterior walls contain an entrance to the arms storage facility.

4–17. Fences

Arms storage buildings, bulk storage areas, and outside areas where vehicles and aircraft are routinely parked with weapons aboard may be surrounded with fencing when determined necessary by the commander concerned. Such

determination will be made based on an assessment of local threats, vulnerabilities, and cost–effectiveness. Fencing construction criteria is prescribed in paragraph 5–3, below.

4–18. Security of tools and high–value items

a. Tools such as hammers, bolt cutters, chisels, crowbars, hacksaws, cutting torches, and similar items which could be used to assist in gaining unauthorized access to an arms storage facility must not be readily accessible to intruders. Tools of this type should be removed from the vicinity of the arms storage facility or room. When an arms storage facility is the only security location available, such tools will be stored in a locked container within the facility. When the access door to an arms storage room is located within the unit supply room, tools will not be stored in the supply room.

b. When other secure storage facilities are reasonably available high–value items will not be stored in arms storage facilities. Such items include field glasses, compasses, watches, and highly valuable items subject to pilferage. In the absence of secure facilities, commanders may authorize, in writing, those sensitive items to be stored in arms storage facilities. In the absence of secure facilities, commanders will authorize, in writing, those sensitive items to be stored in arms storage facilities. These items should be placed in a lockable container and keys to cages and/or weapons racks/ containers should not be on the same ring as these keys. Keys to weapons racks/containers should not be issued if only the high dollar value items are to be access. The same rule should apply if only weapons are to be issued the keys to the high dollar value containers should not be issued

4–19. Access control

a. Unaccompanied access by personnel to arms storage facilities will be limited to the least practical number of responsible persons designated by the unit commander. The names and duty positions of these persons will be posted inside the arms room. These persons will be authorized unaccompanied access to the arms storage facilities only after they have satisfactorily undergone a command–developed background check that has been verified by a review of personnel records (see para 2–11).

b. An exception to *a*, above, is unit officer personnel. Unit officer personnel with the unit commander's approval, may be permitted routine unaccompanied access. However, those officers authorized unaccompanied access will be designated in writing by the commander. The list will be posted as above.

c. In addition to the requirements above, a 2–person rule may be established for access to arms storage facilities. At the option of the commander concerned, 2 authorized persons may be required to be present during any operation which affords access to these facilities. If the 2–person rule is used, commanders should establish appropriate lock and key control procedures to preclude defeat of the 2–person rule concept.

d. Routine access by personnel to arms storage facilities will be limited to the least practical number of responsible persons designated by the unit commander. Personnel will not enter the arms room to receive their weapons.

e. Weapons will be issued as follows:

(1) The unit armorer must keep a master authorization list (MAL). The MAL will contain the names and unit of the personnel who will receive issues and the number of the equipment receipts. Keep the MAL updated to show personnel changes. Before a weapon is issued, the armorer must check each Soldier's DA Form 3749 with the MAL to make sure there is no unauthorized issue of weapons.

(2) When individually assigned weapons are issued for 24 hours or less, only the turn–in of DA Form 3749 is required. An entry on the control sheet or log is not required for issues of 24 hours or less.

(3) When individually assigned weapons are issued for periods over 24 hours, the receiving individual must turn in the DA Form 3749 for the weapon to the person making the issue. The individual will also make an entry on the control sheet or the log that contains the date of the issue. The individual will enter, in ink, the nomenclature and serial number of the item received, the time of issue, and his or her signature. Enter the signature as it appears on the DA Form 3749.

(4) When weapons are turned in, close out the control sheet. Return the individual's DA Form 3749. The person receiving the weapon will enter the date, time, and his or her initials on the control sheet.

(5) Keep the weapons control sheet in the unit active file. Keep it until completion of the next monthly (quarterly for ARNG and USAR) inventory by serial number. Then destroy the control sheet.

(6) When a single weapon is needed for issue to more than 1 Soldier, prepare DA Form 3749 for each person authorized to use the weapon. Issue the weapon per paragraphs (1) through (4), above, except that control sheet entries are required regardless of the time period for which the weapon is issued.

(7) When other than individually assigned weapons are issued, use hand receipt or temporary hand receipt procedures. Control sheet entries are also required.

4–20. Security of Class 5 storage containers

a. Class 5 security containers authorized for use instead of arms rooms must be adequately protected. The following factors must be considered for each container:

(1) The vulnerability when it is left unattended for extended periods of time.

(2) The vulnerability of the location where the container is placed.

(3) The accessibility and ease of removal of the container.

(4) The position where the container will be least vulnerable to unauthorized access by heavy lifting equipment (for example, forklifts, dollies).

(5) The position from which unauthorized persons would find it extremely difficult to remove the container.

b. Positive overall security of the arms stored in the container will be achieved. Commanders will ensure that structure protection provided by the storage container is adequately increased by the PS measures specified in this regulation.

4–21. Arming of unit arms rooms armorers

Depending on the local threat, environment, and location of unit arms rooms or other arms storage facilities, commanders concerned will determine the need to arm unit armorers or other on–duty personnel during the performance of their duties to prevent the possible armed robbery or forcible theft of weapons and ammunition. If such personnel are armed, provisions of AR 190–14 apply.

4–22. Security of arms during initial entry training

The following policy prescribes the minimum criteria for the security of arms and blank ammunition in the custody of Soldiers in IET.

a. Individuals issued or in possession of arms and blank ammunition are responsible for security of this property while it is entrusted to their care.

(1) Each weapon issued will be carried on the person of the individual to whom issued at all times or it will be properly safeguarded and secured as designated below.

(2) Except during emergencies, weapons will not be entrusted to the custody of any other person except those responsible for the security of operational weapons. These persons will comply with issue and turn–in procedures. Local procedures will be established to secure and account for the weapons of personnel medically evacuated during training.

b. Initial entry training commanders will—

(1) Designate barracks facilities used in the weapons immersion training program as restricted areas.

(2) Ensure access to barracks facilities and platoon bays by unauthorized personnel is strictly enforced.

(3) Establish and enforce procedures for temporarily (not to exceed 2 hours) security of Soldier's weapons for situations where a Soldier may be separated from his or her weapon.

(4) Ensure the following physical security measures to mitigate theft of arms and blank ammunition are in place.

(a) Provide weapons racks or other security devices such as cable locks to assist Soldiers in securing their weapons during non–duty hours. If weapons racks are used, they will be locked with approved locks. If cable locks are utilized, the weapon will be secured to the Soldier's bunk.

(b) Security lighting will be installed at all barracks entry points.

(c) Vegetation around the barracks will be trimmed or pruned to eliminate concealment.

(d) Post guards in barracks areas where Soldiers are sleeping. These guards will maintain visibility of weapons secured in arms racks or other areas and will have a positive means of contacting emergency personnel.

(e) Arms racks and containers weighing less than 500 pounds will be fastened to the structure (or fastened together in groups totalling more than 500 pounds) with bolts or with chains equipped with secondary padlocks. Bolts used to secure racks will be spot welded, brazed, or peened to prevent easy removal. Chains used to secure racks (and containers) will be heavy–duty hardened steel, welded, straight links steel, galvanized of at least 5/16–inch thickness, or of equivalent resistance to force required to cut or break a secondary padlock.

(f) Keys and locks used to secure weapons racks in the barracks will be controlled in accordance with paragraph 3–8, above.

(5) Develop procedures to assist Soldiers in securing issued blank ammunition.

c. For inventory and physical counts, IET commanders will—

(1) Conduct a monthly serial number inventory.

(2) Conduct a physical count of weapons and blank ammunition twice per day.

Chapter 5
Protection of Nonnuclear Missiles, Rockets, Ammunition, and Explosives

5–1. General

a. Nonnuclear missiles, rockets, ammunition, and explosives listed in appendix B will be protected in accordance

with this chapter. Individuals issued or in possession of missiles, rockets, ammunition, or explosives are responsible for security of such property while it is charged or entrusted to their care.

b. All unused ammunition and explosives will be turned in to the proper authority per AR 710–2.

c. Ammunition and explosives deployed in the field for training or operational purposes will be protected at all times as prescribed in paragraph 2–5. Missile, rocket, ammunition, and explosive items installed in vehicles and aircraft are considered in use and will be protected as part of the overall system in which they are installed.

d. Other criteria in this chapter do not apply to such missile, rocket, ammunition, and explosive items.

e. Commanders will ensure that necessary security measures are taken to protect ammunition and explosives stored in vehicles and aircraft as prescribed in paragraphs 5–3 and 5–4.

f. Portable explosive magazines, as specified in NSWC 3046–93.2, are authorized for the storage of limited quantities of Category II through Category IV ammunition and explosives. Quantities of the ammunition and explosives to be stored inside the magazine will be coordinated with the installation's Army Safety Office. Additional PS measures in 5–2, below, apply for the category of the ammunition and explosives stored (that is, IDS, security lighting, fencing, and so on).

5–2. Bulk storage areas

a. Category I and Category II.

(1) *Bulk storage.* Bulk storage areas are considered to be depot activities, prestock points, and ammunition supply points at which bulk quantities of missiles, rockets, ammunition, and explosives are stored. Storage is usually in original containers. Storage structures acceptable for storage of Category I and II ammunition and explosives are those earth–covered magazines and igloos listed in DA Pam 385–64, appendix G.

(2) *Supplemental controls.*

(a) Intrusion Detection System. Category I and II storage facilities and structures will be protected by IDS. Facilities without an operational IDS will have armed guards posted 24 hours a day to maintain constant, unobstructed observation of the storage structures, prevent any unauthorized access to the protected structure, make known any unauthorized access to the structure.

(b) Security patrols. Storage facilities and structures will be checked by a security patrol periodically as dictated by any threat and by the vulnerability of the facility. Checks will be conducted on an irregular basis during non–duty hours. For Category I and II facilities protected by an operational IDS, the intervals between checks will be once every 24 hours. For facilities without an operational IDS, the intervals between checks will be hourly for Category I and once every 2 hours for Category II facilities.

b. Category III and Category IV.

(1) *Bulk storage.* Ammunition and explosives listed under Category III and IV will be stored in structures that meet the criteria in DA Pam 385–64, appendix G.

(2) *Intrusion Detection System.* Category III and IV facilities and structures are optional for IDS. New IDS will not be programmed for Category III and IV facilities (structures) unless it is determined necessary based on an assessment of the local threats, vulnerabilities, and cost–effectiveness.

(3) *Security patrols.* Storage facilities and structures will be checked by a security patrol periodically as dictated by any threat and by the vulnerability of the facility. For Category III and IV facilities protected by an operational IDS, the intervals between checks will be 72 hours and once every 48 hours for facilities not protected by an operational IDS.

(4) *Inert devices.* Inert and expended launcher tubes, inert mines, inert rocket launcher training devices, and practice rockets are vulnerable to pilferage, misuse, or possible conversion to live ammunition. Such items will be clearly marked to prevent accidental turn–in or turn–in as live fire residue. Those items that can be converted to operable weapons will be accounted for and secured as Category IV live ammunition and explosives.

5–3. Fences

a. Category I and II missile, rocket, ammunition, and explosive storage areas will be surrounded with security fencing constructed and configured as set forth below. New chain–link fencing will not be programmed for Category III and IV storage facilities unless it is determined necessary based on an assessment of local threats, vulnerabilities, and cost effectiveness. Standard details for chain–link security fences are covered in USACE DEF design drawing 872–90–01.

b. Fence fabric will be of chain–link (galvanized, aluminized, or plastic coated woven steel) 2–inch square mesh 9–gauge diameter steel wire, including coating. In Europe, fencing may be North Atlantic Treaty Organization (NATO) standard designed fencing (2.5–3mm gauge, 76mm grid opening, 2 meter height, and 3.76 meter post separation).

c. Posts, bracings, and other structural members will be located on the inside of the fence fabric. Galvanized or aluminized steel wire ties equal in gauge to fence fabric will be used to secure the fence fabric to posts and other structural members.

d. The minimum height of the fence fabric will be 6 feet with or without an outrigger.

e. The bottom of the fence fabric will extend to within 2 inches of firm ground. Surfaces will be stabilized in areas

where loose sand, shifting soils, or surface waters may cause erosion and thereby assist an intruder in penetrating the area. Where surface stabilization is not possible, or is impracticable, concrete curbs, sills, or other similar type anchoring devices, extending below ground level will be provided.

f. Modifications to chain–link fencing will not be made to conform to the requirements of this paragraph if the existing fencing provides an equivalent or greater penetration resistance, as determined by the commander concerned.

g. The barrier will have a minimum number of vehicular and pedestrian gates, consistent with the operational requirements. These gates will be structurally comparable, provide penetration resistance equivalent to the adjacent fence, and be designed so that the traffic through them will be under the positive control of the security force. Unless manned 24 hours a day, gates will be provided with an approved lock. Hinge pins and hardware will be welded or otherwise modified to prevent easy removal.

h. Drainage structures and water passages penetrating the barrier be barred to provide penetration resistance equivalent to the fence itself. Openings to the drainage structures having a cross–sectional area greater than 96 square inches and a smallest dimension greater than 6 inches will be protected by securely fastened welded bar grills. As an alternative, drainage structures may be constructed of multiple pipes, each pipe having a diameter of 10 inches or less, joined to each other and to the drainage culvert. Multiple pipes of this diameter may also be placed and secured in the in–flow end of the drainage culvert to prevent intrusion into the area.

i. Building walls may be incorporated into the barrier system if they provide penetration resistance equivalent to the perimeter barrier and are subject to observation.

j. Clear zones will extend 12 feet on the outside and 30 feet on the inside of the perimeter fence, if it is practical to do so. Clear zones for Categories I through IV AA&E will be free of all obstacles, topographical features, and vegetation exceeding 8 inches in height which reduce the effectiveness of the physical barrier, impede observation, or provide cover and concealment of an intruder.

(1) Vegetation or topographical features, which must be retained in clear zones for erosion control, passive defense, or for legal reasons will be trimmed or pruned to eliminate concealment and checked by security patrols at irregular intervals.

(2) Perimeter light poles, fire hydrants, steam pipes, or other similar objects; barricades for explosives safety purposes; and entry control buildings within the clear zone that represent no aid to circumvent the perimeter barrier or do not provide concealment to an intruder do not violate the requirements of clear zones.

k. Fencing needs will be evaluated and determined for each installation on a case–by–case basis. The installation of new security fencing around an outer perimeter may not be cost–effective. The following will be considered:

(1) If the storage area perimeter has adequate security fencing, fencing of inner zones may not be required.

(2) If the storage area outer perimeter has barbed wire fencing or no fencing, security fencing of inner zone storage areas may be more practical and cost–effective.

(3) If the storage area outer perimeter is partially fenced, it may be more cost–effective to complete the loop rather than to install fencing around inner zone storage areas.

(4) If natural barriers, such as mountains, cliffs, rivers, seas, or other difficult–to–traverse terrain form portions of the perimeter and provide equivalent or more security than fencing, security fencing of inner zone storage areas may not be required.

5–4. Security lighting

a. Security lighting will be provided for Category I and II storage facilities. New security lighting systems will not be programmed for Category III and IV facilities unless determined necessary based on an assessment of the local threats and vulnerabilities.

b. Security lighting will—

(1) Be provided for exterior doors of all Category I and II items storage rooms and magazines.

(2) Have switches for exterior lights installed so that they are not accessible to unauthorized individuals.

(3) Have all exterior lights covered with wire mesh screen that will prevent their being broken by thrown objects. Vandal resistant lenses may be used instead of wire mesh screen.

(4) Be provided for motor pools, hangars, and outdoor parking areas for vehicles and aircraft that have Category I and II ammunition and explosives stored on board and for such items located in open storage areas.

(5) Be provided along storage site perimeter barriers determined necessary by the commander. Commanders will determine perimeter lighting needs depending on the threat, perimeter extremities, and surveillance capabilities.

c. The following requirements apply:

(1) *Perimeter lighting.*

(a) Perimeter lighting will be positioned and designed to enable the detection of persons in the entire clear zone and outside the outer perimeter fence.

(b) When CCTV is the primary means of perimeter assessment, the lumen output throughout the clear zone may be varied as needed to accommodate the operation of the CCTV or other electronic imaging system. Primary emphasis

will focus on detection capability in the clear zone. A detailed discussion of CCTV–camera lighting requirements and guidelines for minimum lighting levels and lighting uniformity is provided in UFC 4–020–04FA.

(2) *Clear zone*. To facilitate human visual assessment, the clear zone, 30 feet outside the outer perimeter fence, will be provided with a minimum of 0.2 foot candles (2 lux) illumination measured on the horizontal plane or a minimum of 0.4 foot candles (4 lux) illumination measured on the vertical plane. This measurement will be taken 6 inches above the ground during normal visibility conditions at a point 30 feet from the outer fence.

(3) *Vehicular and pedestrian gates.* Vehicular and pedestrian gate lighting will be of sufficient intensity and designed for personnel identification and detection of unauthorized items. Such gates will be provided with 5.0 foot candles (50 lux) horizontal illumination during normal visibility conditions, measured 6 inches above ground level.

(4) *Exterior doors.* Security lighting will be provided for exterior doors of AA&E storage structures. Lights will be of sufficient intensity to allow detection of persons at the exterior doors with at least a 1 foot candle (10lux) illumination on the horizontal plane at ground level. Switches for exterior lights will be installed so they are not accessible to unauthorized persons. Exterior lights will be covered with wire mesh screen or vandal resistant lenses to protect the lights from being broken by thrown objects.

(5) *Restart capability.* The security lighting system will have a restart capability and produce required lumen output within 3 minutes after primary or emergency power is applied.

(6) *Perimeter lighting circuits.* Perimeter lighting circuits will be designed so that failure of 1 or more lights will not affect operation of the remaining lights.

(7) *Patrol roads.* Patrol roads or paths should not be lighted (incidental lighting is acceptable).

(8) *Lighting fixtures.* Whenever possible, lighting fixtures will be positioned to avoid blinding of guards from glare and silhouetting of guards.

(9) *Turning off site security lights.* The site PS plan may provide for turning off the site security lights to defend the site under anticipated or actual emergency conditions. This includes turning off the lighting over storage structure doors. A sweep will be conducted of the area immediately after restoring the site security lights.

(10) *Non–emergency conditions.* Perimeter lighting will not be turned on and off on a random basis during non–emergency conditions. Perimeter lighting may be turned off during security force exercises; however, appropriate security measures will be taken for the lack of such lighting. In such cases, a sweep will be conducted of the area immediately after restoring the site security lighting.

d. Field manual (FM) 3–19.30, chapter 5, will be used as a guide in deciding lighting descriptions, layouts, lighting patterns, and minimum protective lighting intensities and requirements. Emergency lighting and standby power are not required, but will be considered when the threat and vulnerability warrant.

5–5. Guard protection and surveillance

Protection and surveillance by guards or other personnel together with other PS measures will be established for facilities or temporary open storage areas as set forth in this regulation and otherwise as needed to ensure protection at the facilities. At a minimum, entrance and exit points into magazine and holding areas where vehicles, railcars, or aircrafts with missiles, rockets, ammunition, or explosives aboard are parked will be controlled by guards or other personnel. When duty personnel are not present or IDS or CCTV are not used, enough security patrols will be provided to allow physical inspection of each aircraft, railcar, or vehicle at a frequency determined by the commander concerned, based on the category of AA&E, the threat, and the location.

5–6. Locks and keys

a. Locks. A GSA Class 5 steel vault door with a built–in, 3–position, dial–type, changeable combination lock or a key operated high security padlock and hasp will be used on doors to structures housing classified material per AR 380–5, chapter 5. Otherwise, each ammunition magazine or room constructed in accordance with chapter 4 will be secured with an approved high security padlock and high security hasp. Storage facility hasps and locking hardware will provide comparable protection to that afforded by the locks approved or other high security locking hardware (see glossary definition of lock for a list of approved DA locks and hasps). Facilities in which aircraft or vehicles are stored with ammunition aboard will be secured with an approved security padlock (see para 3–8, above, for further guidance).

b. Key and lock control. Key and lock control will be established in accordance with paragraph 3–8. Use of master key system or multiple key system is prohibited.

c. Category I storage facilities.

(1) Doors used for access to Category I storage facilities will be locked with a high security padlock and hasp and 1 secondary padlock.

(2) Access to, or possession of, both keys to Category I storage facilities by 2 person is prohibited. A key control system will be established so that no one will be allowed to interchange access to keys to installed A and B locks.

(3) Key control officers and locksmiths will not be authorized access to information concerning the specific locations of installed locks protecting Category I structures at the site (for example, specific storage igloos within a site).

(4) Keys and locks subject to the 2–person rule will not be placed in use at the facility by the key control officer.

Such keys and locks will be placed in use by the respective key control custodians. Additionally, the key control officer is not authorized access to such keys while the locks are in use under the 2–person rule.

(5) The rotation of padlocks will not be required when 2 locks are installed on each Category I structure and a system is set up for separating these locks into A and B locks. Personnel will be identified and authorized access only to either A or B keys or locks, but not both. The system will preclude an individual from interchanging access to the A and B keys.

5–7. Communications

Reliable and efficient primary and backup means of external and internal communications, at least 1 of which is radio, will be established at magazine areas to permit notification of emergency conditions. The communication system will be easily accessible to guard and security personnel on their posts and will be tested daily by supervisory security personnel. The backup system will be of a mode other than that of the primary communication system. Both primary and backup guard (security) communications will be tested at least once during each shift.

5–8. Protection of missiles, rockets, ammunition, and explosives at unit level

a. Unit level stocks are those stored in basic load quantities (quantities stored in tactical configuration for readiness and emergency purposes) or which are on hand for operational purposes.

b. A typical facility for storage of operational quantities of ammunition is a building used to store ammunition for an MP or guard (security) arms room. Such facilities will comply with the requirements in appendix G.

c. Commanders may authorize, in writing, the storage of small quantities of ammunition in unit arms storage rooms for operational purposes. This authorization will be posted in the arms room. Storage will be consistent with operational requirements.

(1) Ammunition authorized for storage in unit arms storage rooms will be secured in banded crates, approved metal containers, or cabinets. Approved standard issue metal wall lockers may be used. Crates will be banded or sealed in a way that will prevent ammunition removal without leaving visible signs of tampering. Ammunition stored in metal containers, or cabinets, will be secured with secondary padlocks. Screws and bolts used in assembling containers, lockers, or cabinets, will be made secure to prevent disassembly.

(2) Containers weighing less than 500 pounds will be fastened to the structure (or fastened together in groups totaling more than 500 pounds) with bolts or chains equipped with secondary padlocks.

(3) Security containers (GSA approved Class 5) not storing or containing classified documents or material may also be used.

(4) Weapon magazines containing live ammunition can be stored in the arms room provided the magazines are color–coded (diagonal red striped). Weapon magazines will not be left in the weapon.

d. The following are minimum requirements for safeguarding and maintaining unit level stocks:

(1) Depending upon tactical and contingency considerations, unit level stocks will be stored in ammunition storage rooms or magazines that are equivalent to the structural standards prescribed in paragraph 5–2.

(2) When operational and training requirements preclude storage of unit level stocks or explosives in ammunition storage magazines, these stocks may be stored in or on combat vehicles, aircraft, ships, trailers, or in other configurations required by the operational environment.

(3) Ammunition and explosives may be stored aboard vehicles or aircraft provided the vehicle or aircraft is located inside a motor pool or park or aircraft park area. When stored in this configuration, supplemental security measures in AR 190–51, paragraphs 3–3 and 3–5 apply.

(4) Vehicles or aircraft with missiles and rockets in a ready–to–fire configuration will be provided 24 hour armed guard surveillance.

e. Ammunition and explosives in open storage (such as, FLMSA vehicle holding area, ASP, and aircraft cargo area) are especially vulnerable to theft or sabotage. The following guidelines apply:

(1) Access will be strictly controlled. The 2–person rule will apply to Category I missiles and rockets at these locations.

(2) Perimeter barriers, either temporary or permanent, must be placed to preclude unauthorized entry into the storage area.

(3) Storage areas will be posted as a restricted area.

(4) Armed guards will be posted to control entry, to protect the AA&E, and in the event Category I missiles and rockets are stored there, to enforce the 2–person rule. The guards will be equipped with a primary and alternate means of communications. At a minimum, armed guards will be checked every 4 hours by an individual appointed by the commander.

(5) Positive measures (for example, security lighting or additional guards so that visibility between guards is maintained, and so on) will be implemented during hours of darkness or reduced visibility.

(6) Accountability procedures will be established.

(7) Category I missiles and rockets stored in open areas are vulnerable to theft. The responsible commander should consider placing these Category I missiles and rockets in either an approved container (MILVAN, SEAVAN, or

CONNEX), or in a totally enclosed storage building. The following additional PS measures apply if the container or building is used:

(a) Doors will be secured with 2 approved medium security or low security locks.

(b) Access to, or possession of, both keys to the building by 1 person is prohibited.

(c) A key control system will be established so that no 1 person will be allowed to have access to keys to installed A and B locks.

(8) Commanders of units that routinely deploy for field training and live firing should consider having the supporting engineer activity construct a storage building to be used at the FLMSA. This building need not meet the minimum construction standards for Category 1 storage buildings in this regulation (earth covered), but should provide a degree of security necessary to enforce 2–person access and provide shelter from the weather. A Type 2 outdoor magazine may also be used as a temporary storage structure.

(9) When more than 1 unit uses the same area, stocks will be separated and identified by unit. One unit will be designated as responsible for the security of the entire area, including access control.

5–9. Entry control

a. Vehicular and personnel gates will be secured and strict key control accountability will be observed. A pass, badge, or access roster plus a registration system will be used to admit properly identified authorized personnel to storage areas.

(1) Vehicle and personnel gates will be secured except when it is necessary to allow authorized entry into or exit from the area.

(2) Keys and locks to gates will be controlled and accounted for per paragraph 3–8.

(3) Entry and exit procedures will include searches of personnel and vehicles for unauthorized material.

(4) Persons requiring frequent recurring entrance to the area will either be listed on an entry control roster, prepared by the responsible storage commander, or issued a photographic security badge which clearly establishes the authority to enter. The roster will contain as a minimum, the name, grade, and unit or organization of each authorized person.

(5) Privately–owned vehicles and leased vehicles will not be permitted inside storage facilities and areas. Government vehicles and vehicles operated by DOD contract personnel on official business are authorized entry.

(6) Upon exiting, all vehicles will be thoroughly inspected to ensure that only authorized material is being removed.

(7) Vehicles leased by Government agencies are considered to be Government vehicles for the contracted period. Rental vehicles obtained by Government employees for official use during periods of temporary duty will be allowed entry when the employee's official duties require such entry.

b. Personnel, including guards or host country guards, whose duties require unescorted access to storage facilities containing classified missiles, rockets, or other classified items will have a security clearance commensurate with the classification of the items involved.

c. A 2–person rule will be established for access to storage facilities containing Category I missiles and rockets. No 1 individual can have access.

5–10. Restricted area designation

a. Commanders of military installations and facilities have the authority to publish and enforce regulations for safeguarding personnel, facilities, and property. This authority is derived from 50 USC 797, implemented by DODI 5200.8, and DOD 5200.8–R.

b. Except when such action would tend to advertise an otherwise concealed area, or when in conflict with host nation agreements, signs or notices will be posted in conspicuous and appropriate places to identify the AA&E facility a restricted area. This includes signs posted at each entrance or approach to the area and on perimeter fences or boundaries of the area.

c. Position signs so not to provide concealment of an intruder or obstruct visual assessment.

d. Failure to post conspicuous signs and notices to give people approaching a restricted area actual knowledge of the restriction, may seriously hamper any resulting criminal prosecution. Each sign or notice will be marked with the words "RESTRICTED AREA," and include the following warning notice: THIS ACTIVITY HAS BEEN DECLARED A RESTRICTED AREA BY AUTHORITY OF THE INSTALLATION COMMANDER IN ACCORDANCE WITH THE PROVISIONS OF THE DIRECTIVE ISSUED BY THE SECRETARY OF DEFENSE ON 10 December 2005, PURSUANT TO THE PROVISIONS OF SECTION 21, INTERNAL SECURITY ACT OF 1950. UNAUTHORIZED ENTRY IS PROHIBITED. ALL PERSONS AND VEHICLES ENTERING HEREIN ARE LIABLE TO SEARCH. PHOTOGRAPHY OF THE FACILITIES IS PROHIBITED WITHOUT SPECIFIC AUTHORIZATION FROM THE COMMANDER. DEADLY FORCE IS AUTHORIZED.

e. In areas in which English is not the only common language, warning signs will contain the local languages besides English.

f. Existing signs containing essentially the same wording as above may continue to be used until replacement is necessary, at which time the required wording above will be used.

5–11. Intrusion Detection System signs

Signs clearly announcing the presence of an IDS will be displayed on ammunition storage rooms, magazines, or perimeter barriers using such a system. Signs will be affixed at eye level, when possible. They will be affixed on the exterior walls containing an entrance to the ammunition or explosives storage room, vault, building, or magazine or, in the case of alarmed barrier fences, on the outside of the fence at about 100–meter intervals. Signs will be placed at a location where they will not hinder observation or fields of fire. Signs will not be placed where they may be used by intruders to gain entry. Alarm signs will not create nuisance alarms. Otherwise, the signs will be posted outside the perimeter fence. The IDS signs meeting the specifications of appendix F will be used.

5–12. Storage of classified items

Classified AA&E storage facilities will comply with standards set forth in paragraph 4–2 or AR 380–5, appendix H. Classified missiles, rockets, or other classified items will be segregated from unclassified items stored in the same storage facility. Strict access and accountability control procedures will be established by the commander (see para 5–9 for 2–person rule requirement for access to Category I missiles and rockets). Personnel whose duties require access to above storage facilities will have a security clearance commensurate with the classification of the items involved. Classified AA&E material manuals and documents should normally be stored separately from the ordnance items per AR 380–5, paragraph 5–24.

5–13. Additional security measures for igloos and magazines

a. Additional security measures may be used to enhance overall security of ammunition and explosives stored in unalarmed igloos and magazines or to increase the delay time of alarmed igloos and magazines.

b. King Tut blocks may be placed in front of igloo or magazine doors to increase the difficulty and the delay time associated with opening them after locks have been defeated.

c. Expanded metal cages may be placed in front of igloo or magazine doors to provide an additional barrier to entry. Where the igloo or magazine is to have an IDS, sensors may be placed on the cage to provide detection prior to the aggressor reaching the door.

Chapter 6
Accountability, Disposition, Disposal, and Demilitarization

6–1. Nonnuclear missiles and rockets (Category I)

a. Each commander having custody of nonnuclear missiles and rockets will establish and maintain records which will provide for continuous accountability. This will include those issued for training by requiring the return of unexpended missiles and expended residue. When possible, such records will be maintained by serial number. Incoming shipments will be inventoried promptly after receipt to ensure that all items have been received. All contracts for the procurement of nonnuclear missiles and rockets will provide for individual serialization.

b. In addition to the inventory requirements in AR 710–2, the following apply:

(1) *Unit level.* A 100 percent serial number inventory will be taken monthly for active Army units. For ARNG and USAR activities, a physical count will be taken monthly and a 100 percent physical inventory by serial number will be taken quarterly.

(2) *Depot, post, or base level.* A 100 percent inventory will be taken semiannually.

6–2. Arms

a. Arms serial number registration and reporting.

(1) *Department of Defense Central Registry.* A DOD Central Registry will be maintained to record, by serial number, the ownership account of all arms. AR 710–3, chapter 4 establishes policies and prescribes responsibilities and procedures for serial number registration and reporting of arms belonging to Army units, organizations, activities, and installations which maintain property books and stock record accounts. Questions concerning registry and arms losses, thefts, or recoveries, will be directed to the DOD Central Registry at USAMC Logistics Support Activity, ATTN: AMXLS–MN (National Channel), Redstone Arsenal, AL 35898–7466 (DSN 645–9972 or commercial (256) 955–9972).

(2) *Delineation of responsibilities.* The Department of the Army is the assigned agency responsible for operating and maintaining the DOD Central Registry. This registry maintains control over serial numbers of arms and a file of those arms that have been lost, stolen, demilitarized, or shipped outside the DOD.

(3) *Lost, stolen, or recovered weapons.* When the DOD Central Registry receives an inquiry concerning a lost, stolen, or recovered weapon that is listed with the registry as DOD property, or as missing from a DOD activity, the Central Registry will inform the affected commander. Commanders will establish procedures to ensure that such losses, thefts, or recoveries are, or have been, appropriately investigated per paragraph 2–9 and reported as outlined in chapter

8 of this regulation. Commanders will also ensure that AA&E recovered by police or investigative agencies are returned to Army control for disposition upon completion of investigative and prosecutive action.

(4) *Exclusions.* Privately–owned arms and arms purchased with nonappropriated funds are exempt from being reported to the DOD Central Registry. However, each post, camp, or station having nonappropriated fund arms will establish procedures to identify such weapons by type and serial number.

b. The DOD component registries will reconcile inter–Service transfers of weapons on a transaction–by–transaction basis.

6–3. Ammunition and explosives

a. All items included in the definition of the terms ammunition and explosives will be subject to physical inventory control procedures per AR 710–2. Upon receipt, a check will be made to verify that all items shipped have been received.

b. Detailed policy and procedures for physical and inventory control of ammunition and explosives are per AR 710–2, chapter 2. The nature and sensitivity of ammunition control dictates strict adherence to all provisions with respect to the following:

(1) Physical inventories.

(2) Research of potential inventory adjustments.

(3) Reversal of inventory adjustments.

(4) Retention of accountable documentation.

(5) Quality control.

(6) Inventory effectiveness reporting. The special provisions for controlled inventory items are important in the control of ammunition and explosives.

6–4. Physical inventory control

a. All items included in the definition of the term arms will be subjected to physical inventory control per AR 710–2, table 2 and DA Pam 710–2–2, chapters 9 and 10. All provisions requiring a high degree of protection and inventory control specified for sensitive items apply. Policy and procedures for physical inventory control are per AR 740–26, chapter 4.

b. The special provisions for controlled inventory items are important to the control of arms. In addition to AR 740–26, the following minimum requirements will be met:

(1) *Unit level*.

(a) By serial number, 100 percent inventory will be taken monthly, except for boxed and banded arms. In this latter case, the count and inventory will consist of a 100 percent count as reflected by the number of items listed on the boxes. Any evidence of tampering will be cause for that box to be opened and 100 percent count to be taken of the weapons in the box.

(b) The ARNG, USAR, and AMC, Research and Development (AMC R&D) units/activities will conduct physical counts monthly and inventory by serial number quarterly.

(c) Change of custody of arms room. Incoming and outgoing custodians who have custody of the arms storage facility keys and who have been tasked by the unit/activity commander to either issue or receipt for arms will physically count weapons, ammunition, and parts for arms, such as barrels and subassesmblies. For consolidated arms storage facilities, verify a physical count has been conducted by each person having access to the weapons and ammunition.

(d) The inventory records will be maintained for a minimum of 2 years for inventories that do not reflect discrepancies. Records of inventories that reflect discrepancies will be maintained for a minimum of 4 years.

(2) *Depot, post, or base level*. Those arms not already entered into the DOD Central Registry will be completely inventoried in conjunction with the serialization reporting program. Therefore, the inventory will be taken once each fiscal year at depot and semiannually at post or base level. These inventories will consist of a 100 percent count as reflected by the number of items listed on the boxes. A complete count will be made of the contents of every box that is opened or damaged. The inventory records will be maintained as required in (1), above.

6–5. Inventory losses

Accounting and inventory losses of AA&E will be processed per AR 735–5 and this regulation.

6–6. Disposal and demilitarization

Disposal of all excess and surplus arms, arms parts, ammunition, and explosives is governed by the provisions of DOD 4160.21–M–1 and the demilitarization of AA&E will be accomplished in accordance with the aforementioned DOD instruction. Any AA&E undergoing demilitarization must be transported and stored in accordance with this regulation until demilitarization is completed. Any AA&E being disposed of without demilitarization (foreign military sales (FMS)), transfer to law enforcement agencies, and the like) will be transported and stored in accordance with this regulation until accountability is transferred. The following applies:

a. Arms. A report (transaction) by serial number will be made to the DOD Central Registry upon the demilitarization of each arm that has been previously entered into the DOD Central Registry.

(1) A report (transaction) will be furnished to the DOD Central Registry in the case of each arm disposed of other than by demilitarization.

(2) A demilitarization certificate will be completed by a technically qualified U.S. Government representative before residue from the demilitarization process is released from U.S. control.

b. Ammunition. Defense Reutilization Marketing Offices (DRMO) are not permitted to receive live ammunition items. The DRMO may receive inert ammunition components.

(1) In the United States, ammunition will be demilitarized by a DOD component activity having such a capability.

(2) Overseas, where U.S. forces do not have the capability to demilitarize ammunition items, demilitarization may be performed by approved contractors who are licensed or controlled by the government of the country in which the contractor operates.

(3) The military departments are responsible for the economical and effective demilitarization of ammunition under their accountability. A certificate will be executed by a technically qualified U.S. Government representative for all items demilitarized (DOD 4160.21–M–1, chapter 2).

c. Explosives. In addition to the requirements above, sales of surplus explosives in the United States are limited to individuals and companies holding a valid user's or dealer's license issued by the BATF and explosives, U.S. Department of Justice. Overseas sales are limited to companies controlled or licensed by the respective government. Purchasers of explosives must provide a Certificate Regarding End Use of Explosive Materials. (DOD 4160.21–M, chapter 2).

6–7. Disposal of abandoned and confiscated privately–owned firearms

The Anniston Army Depot, ATTN: SDSAN–DSP–PPC, Anniston, AL 36201–5000, is the CONUS disposal facility for shipping abandoned and confiscated privately–owned firearms. The following procedures apply:

a. Prior to shipment, register firearms in the DOD Central Registry per TM 38–214.

b. Use DD Form 1348–2 (Issue Release/Release Document with Address Label) to accomplish supply turn–in transactions with Anniston Army Depot.

c. Ship firearms via registered mail, return receipt requested.

d. Prior to shipment, clear firearms from PM registry files.

Chapter 7
Transportation

7–1. General

This chapter prescribes transportation security standards and procedures to be used in safeguarding categorized AA&E as described in appendix B.

a. Classified AA&E will be stored and transported in accordance with this regulation, DOD 4500.9–R, chapter 205, part II, and per AR 380–5, chapters 5 and 8. Where specific individual requirements differ between these 2 documents, the more stringent requirement will be followed.

b. Explosive ordnance disposal teams responding to off–station accidents or incidents will transport necessary explosive ingredients in accordance with requirements established by the senior mission commander concerned, based on the philosophy contained in this chapter.

c. Any AA&E in transit via the Defense Transportation System or its approved carrier will be provided security in accordance with the transportation security requirements enumerated in DOD 4500.9–R, chapter 205, part II and this regulation. Where specific individual requirements differ between these 2 documents, the more stringent Army requirement will be followed.

d. Any AA&E awaiting shipment in military terminals will be protected as specified in appendix D.

e. Army activities involved with AA&E shipments will implement a seal control program in accordance with AR 190–51, appendix D, to ensure accountability/control of seals. Such activities will appoint a seal custodian to manage the program. Seal control will include—

(1) Procurement.
(2) Storage.
(3) Accountability.
(4) Installation.
(5) Inspection.
(6) Response to seal anomalies.
(7) Removal and Inspection.

(8) Disposal.

(9) Accounting.

f. Additional information regarding seal control can be obtained by calling the DOD Lock Program Technical Hotline at 1–800–290–7607, 805–982–1212, DSN 551–1212, or https://portal.navfac.navy.mil/go/locks.

7–2. Responsibilities relating to transportation

The Commander, Military Surface Deployment and Distribution Command (SDDC) will—

a. Ensure that the transportation protective measures used for AA&E items are established in applicable tariffs, government tenders, agreements, or contracts.

b. Negotiate with commercial carriers for establishment of transportation protective measures to meet shipper requirements.

c. Determine the adequacy of the services provided by commercial carriers for movement of AA&E items.

d. Develop, administer, and maintain Joint transportation security procedures for the commercial movement of AA&E.

e. Serve as the DOD focal point for security and performance monitoring and oversight relative to the security of AA&E in transit in the custody of commercial carriers.

7–3. Standards

a. When used for transporting AA&E, the doors of approved intermodal containers (MILVANs, SEAVANs, or CONNEXs) will be securely closed and sealed. End–opening containers will be placed door–to–door during rail shipments. Barriers on the rail cars will be used to protect side–opening containers and deter the opening of such cars. The AA&E will be placed in the rear of containers behind nonsensitive items to reduce the opportunity of theft.

b. In the event of contingencies, exercises, or rotational unit movements where it is not practical to use containers, only armored vehicles that are locked and sealed will be used to ship AA&E. The AA&E will be provided double barrier protection by placing it in separate, locked, and sealed containers, affixed to the interior of the locked/sealed armored vehicles in a manner that precludes easy removal.

c. The AA&E shipments will normally be processed through military–operated and managed air and ocean terminals or through DOD approved commercial air and ocean terminals. A listing of such terminals is available from SDDC.

d. The in–transit protection of AA&E at commercial and military terminals will be in accordance with the DOD 4500.9–R, chapter 205 and applicable SDDC freight traffic rules.

e. Shipments of AA&E as defined in appendix B of this regulation will be prepared, inspected, sealed, released, and provided in–transit surveillance in accordance with DOD 4500.9–R, chapters 204 and 205. Shipments will be checked upon receipt by the receiving activity (consignee) to ensure that seals are intact and for any signs of theft, tampering, or damage. If there are such signs, an immediate inventory will be performed to determine the extent of theft/loss, tampering, or damage.

f. If the seals are intact, and there are no signs of damage or tampering, inventory quantity verification of Category I and II shipments will be conducted within 24 hours upon receipt.

g. Category III and IV shipments will be subjected to inventory quantity verification within 48 hours of receipt.

h. Instructions will be provided to rail carriers transporting Category I and II items requiring them to immediately notify consignees of shipment arrivals at rail yards serving the consignees and/or of the arrivals at the consignees' activities.

i. The following factors will be considered also:

(1) Every effort will be made to consolidate shipment into truckload or carload quantities. Less than truckload shipments are considered more vulnerable to theft.

(2) Small arms repair technicians may travel to support facilities to effect on–site repairs instead of shipping of small arms for repair.

(3) When practical, arms and ammunition of the same caliber will not be shipped in the same container or conveyance.

(4) Shipments of arms and ammunition scheduled for demilitarization and retrograde shipments will receive the same protection as other shipments of AA&E.

(5) Security provided for AA&E at commercial and military terminals will conform to the standards set forth in appendixes C and D. The standards will be provided to the commercial carriers by SDDC.

(6) When possible, strap cutters should not be attached to palletized unit loads of ammunition prior to arriving at ammunition storage areas. The strap cutters should be shipped separately from the palletized ammunition.

(7) Shipments must be checked immediately upon receipt to ensure that the seals are intact and for any signs of damage or tampering. If there are any such signs, there must be an immediate inventory to verify quantities received and to determine the extent of any damage or tampering on all Category I and II AA&E and classified AA&E shipments. If the seals are intact, quantity verification must take place no later than the next working day. The

requirement to check seals and verify quantities received includes shipments of all categories of sensitive or classified AA&E and uncategorized Class A and B ammunition and explosives.

7–4. Special consideration for Category I items

a. Missile rounds will be packaged separately from launch and control equipment. Missiles will not be shipped in the same conveyance with launch and control equipment when shipment is by commercial motor carrier. Missiles and launch and control equipment may not be loaded into the same freight container (for example, MILVAN). Category I items on board pre–positioned ships are exempt from this restriction. Separately packaged launch and control equipment may be transported in the same aircraft or on the same ocean vessel. Missile and launch and control equipment in the possession of military units may be transported together at the discretion of the unit's higher headquarters. Where satellite monitoring is not available, missile shipments will be provided by security escort vehicle service.

b. Serial number accountability will be maintained at all times from shipper to consignee. Each container will be checked, sealed, and locked by 2 agents of the shipper (in each other's presence) before delivery to the carrier. This 2–person integrity is required at each trans–shipment point and terminal whenever the shipment loses its original identity (for example, when 2 or more shipments are consolidated into another container for further movement or if repacking is required).

c. Overseas commands may use local nationals for security surveillance to accompany U.S. personnel when Status of Forces Agreements prohibits the arming of U.S. personnel.

7–5. Special considerations for water shipments

a. The Defense Transportation System will transport AA&E using MSC–controlled vessels or U.S. flag vessels (with at least 2 ship's officers who are U.S. citizens accepting security responsibility for the AA&E). When the above vessels are not available, MSC may approve use of foreign flag chartered vessels, provided—

(1) Full responsibilities placed upon the carrier for the shipment must be delineated in applicable tariffs, tenders, agreements, or contracts between the carrier and SDDC.

(2) The carrier and ship's personnel are reasonably vetted in accordance with MSC–established guidelines and MSC specifies security and accountability measures which will compensate for lack of direct U.S. control.

(3) There will be no port calls between departure port and port of destination.

(4) After being off–loaded, AA&E will not be left unattended and will be taken into custody by U.S. personnel who will check the seals and the condition of the shipment.

b. Commanders at all levels will assess the threat and vulnerability of AA&E that transit through their area of responsibility. A risk assessment will be conducted and include the following safety and security risk factors:

(1) The type of sealift assigned to the mission (U.S. Government, contractor, foreign flag carriers, and so on).

(2) The security risk category of the AA&E.

(3) The hazard classification of the ammunition and explosives.

(4) The threat assessment and Force Protection conditions (FPCON). Commanders at all levels will employ appropriate threat mitigation actions to include— crew screening; use of electronic seals, transponders, or other technologies; and assignment of embarked security forces (mobile security force and/or fleet antiterrorist support teams, embarked security detachments; and combat escorts).

c. Prior to voyage, the shipping activity will provide a written stow plan detailing the location of the AA&E aboard ship and its protection requirements to the ship's captain.

(1) Stow plans must consider security concerns such as cargo compatibility segregation, securing of ordnance cargo in lock and sealed containers, and the stowage of SEAVANs and MILVANs so that doors are not accessible to stevedores or ship's crew.

(2) Break–bulk cargo should be stowed in this priority—

(a) Lockers, reefer boxes, or deep tanks that can be locked and sealed.

(b) Bins that can be boxed solidly with plywood or other appropriate materials and stowed in the upper decks of hatches immediately fore and aft of the ship's house.

(3) During ocean transit, AA&E will be stowed in separate, locked containers, inaccessible to unauthorized personnel. The containers will be subject to periodic surveillance by the vessel's captain and/or the ship's officers as prescribed in DOD 4500.9–R, chapter 205.

d. The AA&E shipments will be direct–voyage to destination. If the cargo must be off–loaded en route, it will be provided constant surveillance by DOD personnel, if available, or by U.S. citizen crewmembers pending reloading.

7–6. Special considerations for small quantity shipments

Small quantity shipments for the purposes of these provisions will be shipments of 200 pounds or less, or in the case of small arms, 15 or less Category II through IV individual weapons per shipment.

a. Arms. Small quantities, 15 or fewer, Category II through IV small arms may be sent via registered mail (return receipt requested) when the package size and weight meet U.S. Postal Service (USPS) requirements. Small quantities may also be shipped via DOD Constant Surveillance Service (CSS) (the only required protective service) when placed

in a locked container and the size, weight, and safety factors meet the carrier's requirements. It is prohibited to ship Army weapons via the DOD Blanket Purchase Agreement (BPA)–awarded–carriers under GSA schedule.

b. Ammunition. Small quantities, 200 pounds or less gross weight, of sensitive Category IV small arms ammunition and/or cartridge actuated devices.

c. Small arms and missile inert components. Small arms and missile components (excluding components containing live ammunition and explosive sub–assembling), may be sent by registered mail (return receipt requested) when the package size and weight meet USPS requirements.

d. Department of Defense Blanket Purchase Agreement–awarded–carriers under GSA schedule. An acceptable transportation alternative to DOD CSS for small quantities of Category IV small arms ammunition and/or cartridge actuated devices within the United States and its territories, is to ship via a DOD BPA–awarded–carrier under the GSA multiple award schedule and within the contract's size and weight limitations. The following criteria applies:

(1) Ammunition must be less than .50 caliber.

(2) Individual requisitions are limited to 4,000 rounds or less.

(3) Maximum 4,000 rounds or less per unit package and each package must not exceed 150 pounds.

(4) Maximum 5 packages or 20,000 rounds per shipment per each conveyance with each package destined for a separate consignee.

(5) Unit packages not to exceed 200 pounds.

(6) Adhere to all other BPA contract shipping obligations including International Air Transportation Association and International Civil Aviation Organization safety certification regulations.

(7) The use of the DOD BPA option is prohibited for shipments of higher categories of ammunition and for shipment of arms and explosives.

7–7. Security of commercial shipments temporarily at Army installations and activities

a. After normal working hours, AA&E shipments arriving at Army installations and activities will be accepted by consignees and provided appropriate secure holding protection commensurate with the sensitivity category of the delivered items under such circumstances.

(1) Granting a holding area does not relieve the carrier of liability and it is within the prerogative of the installation commander or activity representative as to whether carrier personnel are to remain with the shipment to fulfill security requirements. Carrier is subject to pay for any additional expense incurred by the installation to accommodate their unscheduled, non–emergency arrival.

(2) Security measures, in excess of those required during transportation of the shipment are not mandated for carriers granted a holding area. Any decision to exceed transportation security standards prior to formal consignee receipt of the shipment rests with the installation commander or activity representative and are not mandated by DOD directive or Army regulation.

b. Army installation and activities will provide a secure holding area for AA&E shipments during emergency conditions (vehicle breakdowns, criminal/terrorist threats, and so on) in accordance with DOD 4500.9–R, chapter 205.

c. For deliveries of AA&E to DOD and DOD contractors from foreign contracts, the contract monitor will coordinate with applicable theater commands to arrange equivalent in–country security for delivery only to the nearest U.S. controlled port facility.

7–8. Overseas in–theater movements

Outside continental United States (OCONUS) commanders, based on host nation requirements, the local threat situation, and personnel staffing, will use discretion in providing adequate security in theater when transporting AA&E cargo. Transportation service outside of CONUS will adhere as closely as possible to the established requirements for CONUS shipments. When such service cannot be obtained, compensatory measures will be taken to achieve equivalent security standards.

7–9. Foreign military sales shipments

a. Foreign military sales shipments of AA&E will be made in accordance with DOD 5105.38–M.

b. Normally, FMS AA&E shipments will be shipped through the Defense Transportation System to military–controlled ports of embarkation. While in CONUS, such shipments destined to foreign governments, will be moved via SDDC–cleared commercial carriers.

c. Shipments subject to CONUS return for maintenance, testing, or coproduction agreements will contractually be provided equivalent security to that required by the DOD 4500.9–R and the Security Assistance Management Manual while in transit overseas and within CONUS.

d. Transportation plans for AA&E FMS shipments are required as part of the FMS negotiation process.

(1) Such plans will be coordinated in advance with the applicable Military Department Security Assistance Command or the Defense Security Cooperation Agency, as applicable.

(2) The SDDC will be contacted for assistance in developing the in–transit security portion of the transportation plan.

7–10. Movement of arms, ammunition, and explosives by unit or organization transportation

a. With the exception of weapons utilized by marksmanship weapons, it is prohibited to carry, move, or store AA&E in privately–owned vehicles either on– or off–installations.

b. Commanders will ensure that enough security measures are taken to protect AA&E being moved by unit or organization transportation, on– or off– installations. No AA&E items will be left unattended or unsecured at any time.

c. Categories I and II AA&E will be placed in the custody of a commissioned officer, warrant officer, noncommissioned officer (E–5 and above), or DOD civilian (GS–5 and above), or DOD contractor employee in a similarly responsive position. All movements of Category I and II AA&E require armed guards regardless of the FPCON.

d. Category III and IV AA&E will be under the continuous positive control of designated, responsible personnel.

e. Movement security criteria do not apply to AA&E issued to individual Soldiers or units performing mission requirements (see chapter 2 for PS requirements of AA&E deployed in the field for training or operational purposes).

f. Provisions of AR 190–14, paragraph 3–3, apply to transportation of individual weapons aboard commercial aircraft.

g. Bulk shipments of AA&E by unit transportation will be placed in approved shipping containers (for example, CONEX, MILVAN, SEAVAN). The container will be secured with approved locks.

(1) Containers will be placed door–to–door or door–to–immovable object to prevent unauthorized entry.

(2) A detailed packing list will be placed in the container for inventory purposes with serial numbered items listed by serial number.

(3) No AA&E will be left unsecured in vehicles.

h. Guard personnel are required to meet standards in accordance with AR 190–14 to include being briefed on rules for the use of force prior to escort mission. Transportation of sensitive conventional categorized AA&E, as defined in appendix B, off military installations during increased FPCON requires the following. Implementation of each successive FPCON will include the use of appropriate measures from the preceding condition.

(1) *FPCON NORMAL.* No discernable threat of terrorist activity. Routine security measures in *a* through *h*, above, apply.

(2) *FPCON ALPHA.* General threat of possible terrorist activity against installations and personnel, nature and extent unpredictable.

(a) Conduct daily liaison with supporting intelligence and security organizations.

(b) Convene a special meeting of the installation PS council to review the threat situation and provide recommended actions to the installation commander.

(3) *FPCON BRAVO.* Increased or more predictable threat of terrorist activity exists.

(a) Two drivers will accompany the shipment to ensure at least 1 driver maintains continuous observation of the shipment.

(b) Required hazardous material (HAZMAT) placards, in accordance with Federal, State, and/or foreign regulations or laws, will be displayed on the vehicle.

(c) Some type of communication (either radio or cellular telephone) is required for emergency purposes.

(d) Approval of installation commander or designated representative (at location where ammunition supply point, weapons storage area, or armory where AA&E is stored) required for off–post shipments.

(4) *FPCON CHARLIE.* Terrorist incident occurs or intelligence is received indicating action against installations or personnel is imminent.

(a) Postpone non–essential shipment of AA&E. Only shipments of AA&E required for force generations, contingency operations, execution of force protection/antiterrorism duties, explosive ordnance detachment teams responding to incidents, and training are authorized.

(b) Commence use of armed guards for Category I through IV AA&E shipments (note that guards can be drivers).

(c) Conduct liaison with State and local law enforcement prior to any shipment of AA&E to discuss support requirements, schedules, routes, and other information of mutual concern.

(d) Approval of installation commander or designated representative (at location where ammunition supply point, weapons storage area, or armory where AA&E is stored) required for off–post shipments.

(5) *FPCON DELTA.* Applies when a terrorist attack has occurred or intelligence indicates likely terrorist action against a specific location.

(a) For shipments deemed critical, ship by military air.

(b) Commence use of a security escort vehicle with armed guards if unable to ship by military air.

(c) Approval of HQDA, PMG is required for off–post shipments

7–11. Provost marshal and security office support

The local or supporting PM and security office will provide assistance to installation transportation officers in matters relating to PS requirements for transportation and storage of AA&E.

7–12. Transportation of marksmanship weapons and ammunition

Marksmanship weapons and ammunition may be transported to, from, and between ranges, matches, and authorized storage locations in privately–owned vehicles in a secure manner as possible, consistent with the design of the vehicle. Such items must be protected from view and must not be left unattended during halts. Storage during overnight halts or matches must be in accordance with paragraph 4–6, above. Authorization to transport marksmanship weapons and ammunition in a privately–owned vehicle must be listed on travel orders or other official documentation.

Chapter 8
Reports, Investigative Aids, and Disposition of Records

8–1. General

The provisions of this chapter do not apply to privately–owned weapons.

8–2. Incident reports to components

a. The IMCOM and the ARNG will establish procedures to ensure receipt of a report of AA&E stolen, lost, unaccounted for, or recovered, including gains or losses due to inventory adjustments. Notification will be furnished in a manner commensurate with the seriousness or nature of the incident. The loss, theft, recovery, or inventory adjustment of the following will be reported:

(1) One or more missiles, rockets, or Category II through IV arms.

(2) One thousand rounds or more of ammunition smaller than 40mm and 1,000 rounds or more of 40mm automatic weapon ammunition.

(3) Individual rounds of 40mm and larger nonautomatic weapon ammunition.

(4) Individual mortar, grenade, and missile rounds.

(5) Individual land mines, demolition charges, and blocks of bulk explosives.

(6) Any other explosives, to include demolition explosives (for example, detonation cord, blocks of explosives (C–4)).

(7) Any Category I or Category II item not otherwise included above.

b. Commanders will—

(1) Submit a Serious Incident Report if required by AR 190–40.

(2) Within 72 hours, provide a report on DA Form 3056 (Report of Missing/Recovered Firearms, Ammunition, and Explosives) (RCS Just–1010)) on incidents meeting criteria in *a*, above. Inventory and in–transit losses or discrepancies of AA&E, not due to theft, recovered within 12 days, need not be reported on DA Form 3056.

(3) Initiate a report of recovery on DA Form 3056 for AA&E items held as evidence by any local, State, or Federal law enforcement agency in the area. Notify the commander having lost the items.

(4) Promptly submit appropriate report to the NCIC and DOD Central Registry (see para 8–3).

(5) Conduct investigations per AR 15–6 when losses equal or exceed the amounts shown in appendix E. AR 15–6 investigations may be conducted for lesser amounts.

(6) Reports will include incidents involving arms and ammunition meeting criteria in *a*, above, in the custody of a nonappropriated fund activity (such as an exchange, rod and gun club, or recreational marksmanship activity).

c. The IMCOM and the ARNG will maintain records including, at the very minimum, all instances of thefts, losses, and recoveries of AA&E, including any reported under *a*, above.

d. These records will include—

(1) A summary of the circumstances in each instance.

(2) Dates, locations, and units such as Active Army, ARNG, or USAR.

(3) A statement regarding the loss or recovery based on the investigation, such as inventory, theft, in–transit, training, operational, or other.

e. Prepare a consolidated report on all losses, thefts, recoveries, or inventory adjustment of AA&E for the calendar year. Submit this report to HQDA, ATTN: DAPM–MPD–PS, 2800 Army Pentagon, Washington, DC 20310–2800, by 30 January of the following year.

8–3. Investigative aids

a. Lost, stolen, or recovered weapons will be entered in the NCIC per AR 190–27.

b. The USACIDC will provide the BATF, Intelligence Division, BATF Headquarters, Department of the Treasury,

Washington, DC 20226–5000, information concerning theft or loss of AA&E falling within their investigative purview, within 72 hours of confirmed theft or loss.

c. Commanders/directors (without NCIC capabilities) and OCONUS installation commanders/directors, PMs, or their designated representatives, will send the completed DA Form 3056 to Director, Crime Records Center (CRC), 6010 6th Street, Building 1465, Fort Belvoir, VA 22060–5506. Lost, stolen, or recovered weapons entries into the NCIC from overseas commands will be made by Director, CRC.

d. Ammunition and explosive losses or recoveries will not be entered in the NCIC files.

e. Lost, stolen, or recovered weapons will be promptly entered in the DOD Central Registry per AR 710–3. Information on the source of the weapon report will be included. Recovered weapons will be cleared from the NCIC files.

f. Military weapons will be accepted from civil (local, State, and Federal) law enforcement agencies if both of the following conditions exist:

(1) The weapon can be identified as a military weapon. If the weapon satisfies the general specifications for a military weapon, assume that it is a military weapon. A serial number or other identification is desirable, but not required.

(2) The weapon is no longer required for evidence in criminal or administrative proceedings.

g. To identify weapon ownership, personnel may contact the DOD Central Registry at USAMC Logistics Support Activity, ATTN: AMXLS–MN (National Channel), Redstone Arsenal, AL 35898–7466. All OCONUS and CONUS agencies can call DSN 645–9972 or commercial (256) 955–9972.

h. Recovered weapons identified as property of another DOD agency will be returned to that agency only upon request of the agency concerned. Normally, the weapons will be considered Army property and treated as such. Serviceable weapons should be returned immediately to normal use if required by the activity. The weapon may be excess or not authorized to support the mission of the activity. If so, the weapon will be reported to the proper national weapons inventory manager for redistribution or reuse. If the national weapons inventory manager provides disposal instructions, the activity will dispose of the weapon according to existing disposal and demilitarization procedures.

i. Address inquiries on loss, theft, or recovery of firearms, ammunition, and explosives to HQDA (DAPM–MPD–PS).

8–4. Disposition of records

Department of the Army components (ACOMs, ASCCs, DRUs, IMCOM, and ARNG) will establish procedures to ensure that records reflect the final disposition of investigative action, including recoveries and disciplinary action, as appropriate. The provisions of this chapter do not apply to privately–owned weapons.

Appendix A
References

Section I
Required Publications

AR 15–6
Procedures for Investigating Officers and Boards of Officers (Cited in paras 2–9, 8–2, E–1.)

AR 50–6
Nuclear and Chemical Weapons and Materiel, Chemical Surety (Cited in para B–2.)

AR 190–13
The Army Physical Security (Cited in paras 1–5, 1–6, 1–7, 1–12, 2–1, 2–6, 2–10, 4–5.)

AR 190–27
Army Participation in Criminal Justice Information Systems, Federal Bureau of Investigation (Cited in para 8–3.)

AR 190–40
Serious Incident Report (Cited in paras 1–12, 8–2.)

AR 190–51
Security of Unclassified Army Property (Sensitive and Nonsensitive) (Cited in paras 4–1, 4–13, 5–8, 7–1.)

AR 190–56
The Army Civilian Police and Security Guard Program (Cited in para 2–10.)

AR 380–5
Department of the Army Information Security Program (Cited in paras 1–1, 3–6, 3–8, 4–3, 5–6, 5–12, 7–1, D–1.)

AR 380–67
The Department of the Army Personnel Security Program (Cited in para 3–6.)

AR 385–64
U.S. Army Explosives Safety Program (Cited in paras G–3, G–4.)

AR 710–2
Supply Policy Below the National Level (Cited in paras 2–6, 2–8, 4–4, 5–1, 6–1, 6–3, 6–4.)

AR 710–3
Asset and Transaction Reporting System (Cited in paras 4–13, 6–2, 8–3.)

AR 735–5
Policies and Procedures for Property Accountability (Cited in paras 2–9, 6–5, 8–3.)

AR 740–26
Physical Inventory Control (Cited in paras 2–6, 6–4.)

DA Pam 710–2–1
Using Unit Supply System (Manual Procedures) (Cited in para 4–4.)

Section II
Related Publications

A related publication is a source of additional information. The user does not have to read a related publication to understand this publication.

AR 190–14
Carrying Firearms and Use of Force for Law Enforcement and Security Duties

AR 195–5
Evidence Procedures

AR 700 series
Logistics

AR 708–1
Logistics Management Data and Cataloging Procedures for Army Supplies and Equipment

AR 870–20
Museums and Historical Artifacts

DA Pam 385–64
Ammunition and Explosives Safety Standards

DA Pam 710–2–2
Supply Support Activity Supply System: Manual Procedures

DOD 4000.25–8–M
Military Assistance Program Address Directory (MAPAD) System

DOD 4145.26–M
DOD Contractors' Safety Manual for Ammunition and Explosives

DOD 4160.21–M
Defense Materiel Disposition Manual

DOD 4160.21–M–1
Defense Demilitarization Manual

DOD 4500.9–R, chapter 205
Defense Transportation Regualtion

DOD 5100.76–M
Physical Security of Sensitive Conventional Arms, Ammunition, and Explosives

DOD 5160.65–M
Single Manager for Conventional Ammunition (Implementing Joint Conventional Ammunition Policies and Procedures)

DOD 5200.2–R
DOD Personnel Security Program

DOD 5220.22–M
National Industrial Security Program Operating Manual

DOD 5220.22–R
Industrial Security Regulation

DOD 5105.38–M
Security Assistance Management Manual (SAMM)

DOD 5200.8–R
Physical Security Program

DOD 6055.9–STD
DOD Ammunition and Explosives Safety Standards

DODD 3224.3
Physical Security Equipment (PSE): Assignment of Responsibility for Research, Development, Testing, Evaluation, Production, Procurement, Deployment, and Support

DODD 5100.76
Physical Security Review Board

DODD 5210.65
Chemical Agent Security Program

DODI 5200.08
Security of DOD Installations and Resources

CDA Pamphlet 18–1
Code Reference Guide

FM 3–19–30
Physical Security

NSWC 3046–93.2
Purchase spec portable vault

TDS–2078–SHR
U.S Naval Facilities Engineering Service Center Technical Data Sheet 2078–SHR (TDS–2078–SHR), Pre–Engineered Explosives Magazines

TM 38–214
DOD Small Arms Serialization Program (DODSASP): Functional Users Procedures

USACE STD design drawing 40–21–21
Cage Security

USACE DEF design drawing 141–90–04
Arms Storage Room (Category II Arms) Design

USACE DEF design drawing 872–90–00
Chain-link security fence details

USACE DEF design drawing 872–90–1
Weapons Storage Area, Perimeter Warning Sign Design

UFC 4–020–04FA
Electronic Security Systems: Security Engineering

UFGS 26 20 00
Interior Distribution System

UFGS 28 20 01.00 10
Electronic Security System

GSA Fed Spec AA–D–600D
Door, Vault, Security

GSA Fed Spec AA–F–363D
Filing Cabinet, Security, Maps and Plans, General Filing Storage

GSA Fed Spec AA–V–2737
Federal Specification Modular Vault Systems

GSA Fed Spec FF–P–2827
Padlock, Key Operated, General Field Service

49 CFR
Transportation

49 CFR 177
Pipeline and Hazardous Materials Safety Administration, Department of Transportation

49 CFR 397
Federal MotorCarrier Safety Administration, Department of Transportation

21 USC 812
Schedule of controlled substances

50 USC 797
Security regulations and orders; penalty for violation

Section III
Prescribed Forms

Unless otherwise indicated, DA forms are available on the APD Web site (http://www.apd.army.mil); DD forms are available on the OSD Web site (http://www.dtic.mil/whs/directives/infomgt/forms/formsprogram.htm); Standard Forms (SF) and Optional Forms (OF) are available on the GSA Web site (http://www.gsa.gov).

DA Form 3056
Reporting of Missing/Recovered Firearms, Ammunition, and Explosives (Prescribed in para 2–9.)

DA Form 4604
Security Construction Statement (Prescribed in para 2–2.)

DA Form 4930
Alarm/Intrusion Detection Record (Prescribed in para 3–6.)

DA Form 5513
Key Control Register and Inventory (Prescribed in para 3–8.)

DA Form 7281
Command Oriented Arms, Ammunition, and Explosives (AA&E) Security Screening and Evaluation Record (Prescribed in para 2–11.)

Section IV
Referenced Forms

DA Form 2028
Recommended Changes to Publications and Blank Forms

DA Form 2609
Historical Property Catalog

DA Form 3749
Equipment Receipt

DD Form 1348–2
Issue Release/Release Document with Address Label

DD Form 1907
Signature and Tally Record

SF 700
Security Container Information

Appendix B
Sensitive Arms, Ammunition, and Explosives Security Risk Categorization

B–1. Application

The requirements of this regulation apply only to rounds of 40mm and larger, conventional, guided missile and rocket ammunition weighing 100 pounds or less per round and 1,000 or more rounds of ammunition smaller than 40mm. Blank ammunition, .22 caliber rimfire ammunition, and inert training ammunition are excluded from the requirements of this regulation. Further, artillery, tank, mortar ammunition exceeding 90mm are excluded from the requirements of this regulation.

a. On the basis of their relative utility, attractiveness, and availability to criminal elements, all AA&E will be categorized according to the risks involved. As a general rule, only arms, missiles, rockets, explosive rounds, mines, and projectiles that have an unpacked unit weight of 100 pounds or less will be categorized as sensitive for purposes of this regulation. Any single container that contains a sufficient amount of spare parts that, when assembled, will perform the basic function of the end item will be categorized the same as the end item.

b. The categories of missiles, rockets, and arms will be as stated in paragraph B–2. Nonnuclear missiles and rockets similar to those listed under Category I will automatically be included in that category as they come into the inventory.

c. Identifications, codings, corollary plans, and actions for PS accountability and transportation pertaining to sensitive conventional arms, rockets, missiles, ammunition, and explosives will be uniform throughout the DOD. These items will be integrated into standard catalog data by all services and will be included in applicable documents that address PS, accountability, storage, transportation, and other related functional activities. The Joint Ordnance Commander's Group, through tri–Service coordination, will use the DLFs (tables B–1, B–2, B–3, B–4, B–5, and B–6) to determine the appropriate categories for ammunition and explosives items. Those responsible for the PS of facilities storing AA&E will look up the assigned categories in the Army Master Data File (AMDF). Examples of sensitive ammunition and explosive items are shown in paragraph B–2.

d. To ensure a uniform approach to sensitive item identification and coding, AMC will incorporate the criteria into its respective cataloging policies and procedures. The criteria will also become a part of the Federal Cataloging System. Sensitive AA&E items are identified by the controlled item codes per AR 708–1, chapter 7. These codes indicate the controls required for storing and transporting each category of AA&E and are listed in the AMDF. The AMDF is the official source of current security risk codification of all sensitive AA&E items. Codes assigned to specific AA&E items are shown in the monthly AMDF near the center of the microfiche under the column *CIIC*. The AMDF microfiche for AA&E and CDA Pamphlet 18–1 are available upon request from Chief, U.S. Army Materiel Command, Catalog Data Activity (AMXCA–DL), New Cumberland Army Depot, New Cumberland, PA 17070–5010. The basic responsibility for the assignment and correction of the codes rests with the designated data proponent. Per AR 708–1, chapter 5, the U.S. Army Armament, Munitions, and Chemical Command is primarily responsible for materiel management for weapons and ammunition, and the U.S. Army Space and Missile Defense Command is primarily responsible for materiel management of large rockets and guided missiles. Further information or assistance regarding security risk codification may be obtained by contacting the AMC Logistics Assistance offices, which are located at selected installations Armywide.

e. The AMC will revise, as appropriate, ammunition and explosives codings by means of routine catalog data changes. The exception to applying the methodology in *c*, above will be when tri–Service agreement is reached on a case–by–case basis to place an item in a higher or lower security risk category than that indicated by the total numerical value.

B–2. Representative risk categories

a. Category I (missiles and rockets).

(1) Nonnuclear manportable missiles and rockets "in a ready to fire" configuration; for example, Redeye, Stinger, Dragon, Javelin, light antitank weapon (66mm), shoulder–launched multi–purpose assault weapon rocket (83mm), and AT–4 anti–armor launcher and cartridge (84mm). Also included are the tube–launched, optically tracked, wire–guided missile (TOW) weapon and the Hellfire missile.

(2) These weapons, when jointly stored or transported with the launcher tube and/or grip stock and the explosive round, though not in a ready–to–fire configuration will be considered Category I weapon items. moure is category also applies where the launcher tube and the explosive rounds are jointly stored or transported.

b. Arms.

(1) *Category II.* Light automatic weapons, including .50 caliber, M16A2 rifle, M4 rifle, Squad Automatic Weapon,

M60 machine gun, and 40mm MK 19 grenade launcher. Weapon components such as silencers, mufflers, and noise suppression devices will be treated as Category II items.

(2) *Category III.*

(a) Launch tube and gripstock for Stinger missile.

(b) Launch tube, sight assembly, and gripstock for Hamlet and Redeye missiles.

(c) Tracker for Dragon missiles.

(d) Mortar tubes up to and including 81mm.

(e) Grenade launchers.

(f) Rocket and missile launchers, unpacked weight of 100 pounds or less.

(g) Flame throwers.

(h) The launcher or missile guidance set or the optical sight for the ground–mounted TOW.

(i) Launch control unit for Javelin missile.

(3) *Category IV.*

(a) Shoulder–fired weapons, other than manportable missiles, rockets, and grenade launchers, not fully automatic.

(b) Handguns.

(c) Recoilless rifles, including 90mm.

c. Ammunition and explosives.

(1) *Category I.* Explosive complete rounds for Category I missiles and rockets (see *a*(1), above).

(2) *Category II.*

(a) Hand or rifle grenades, high explosive, and white phosphorus.

(b) Mines, antitank, or antipersonnel (unpacked weight of 50 pounds or less each).

(c) Explosives used in demolition operations (for example, C–4, military dynamite, and TNT).

(d) Critical binary munitions components containing "DF " and "QL" when stored separately from each other and from the binary chemical munition bodies in which they are intended to be employed (see AR 50–6, chap 5).

(3) *Category III.*

(a) Ammunition, .50 caliber and larger, with explosive filled projectile (unpacked weight of 100 pounds or less each).

(b) Grenades, incendiary, and fuzes for high explosive grenades.

(c) Blasting caps.

(d) Supplementary charges (uninstalled, or installed in projectiles in a manner allowing easy removal without special tools or equipment).

(e) Bulk explosives.

(f) Detonating cord.

(4) *Category IV.*

(a) Ammunition with non–explosive projectile (unpacked weight of 100 pounds or less each).

(b) Fuzes, except for (3)(*b*), above.

(c) Grenades, illumination, smoke, and tear gas (CS)/chloroacetophenone (CN) (tear–producing).

(d) Incendiary destroyers.

(e) Riot control agents, 100 pound package or less.

(f) Ammunition for weapons in (3), above, not otherwise categorized.

Table B–1
Decision logic formulas (DLFs)

Factor: 1
Utility: High
Casualty/Damage Effect: High
Adaptability: Without modification
Portability: Easily carried or concealed by 1 person.

Factor: 2
Utility: Moderate
Casualty/Damage Effect: Moderate
Adaptability: Slight modification
Portability: Can be carried by 1 person for short distances.

Table B–1
Decision logic formulas (DLFs)—Continued

Factor: 3
Utility: Low
Casualty/Damage Effect: Low
Adaptability: Major modification
Portability: Requires at least 2 persons to carry.

Factor: 4
Utility: Impractical
Casualty/Damage Effect: None
Adaptability: Impractical
Portability: Requires materials handling equipment (MHE) to move.

Table B–2
Risk factors—utility

Risk Factor: 1
Utility: High
Description: High explosive, concussion, and fragmentation devices.

Risk Factor: 2
Utility: Moderate
Description: Small arms ammunition.

Risk Factor: 3
Utility: Low
Description: Ammunition items not described above—NONLETHAL, civil disturbance chemicals, incendiary devices.

Risk Factor: 4
Utility: Impracticable
Description: Practice, inert, or dummy munitions; small electric explosive devices; fuel thickening compound; or items possessing other characteristics which clearly and positively negate potential use by terrorist, criminal, or dissident functions.

Table B–3
Risk factors—casualty/damage effect

Risk Factor: 1
Casualty/Damage Effect: High
Description: Extremely damaging or lethal to personnel; devices which will probably cause death to personnel or major material damage.

Risk Factor: 2
Casualty/Damage Effect: Moderate
Description: Moderately damaging or injurious to personnel; devices which could probably cause personnel injury or material damage.

Risk Factor: 3
Casualty/Damage Effect: Low
Description: Temporarily incapacitating to personnel.

Risk Factor: 4
Casualty/Damage Effect: None
Description: Flammable items and petroleum based products readily obtainable from commercial sources.

Table B–4
Risk factors—adaptability

Risk Factor: 1
Adaptability: Without
Description: Unusable as is; simple to function without modification use of other components.

Table B–4
Risk factors—adaptability—Continued

Risk Factor: 2
Adaptability: Slight Modification
Description: Other components required; or can be used with slight modification.

Risk Factor: 3
Adaptability: Major Modification
Description: Requires the use of other components which are not available on the commercial market; or can be used with modification that changes the configuration.

Risk Factor: 4
Adaptability: Impracticable
Description: Requires specified functions or environmental sequences which are not readily reproducible, or construction makes it incapable of producing high order detonation; for example, gas generator grains, and impulse cartridges.

Table B–5
Risk factors—portability

Risk Factor: 1
Adaptability: High
Description: Items which easily can be carried by 1 person and easily concealed.

Risk Factor: 2
Adaptability: Moderate
Description: Items whose shape, size, and weight allows them to be carried by 1 person for a short distance.

Risk Factor: 3
Adaptability: Low
Description: An item whose shape, size, and weight requires at least 2 persons to carry.

Risk Factor: 4
Adaptability: MHE Required
Description: The weight, size, and shape of these items preclude movement without MHE.

Table B–6
Computation of risk factor numerical values[1]

Evaluation: High Sensitivity
Numerical Values of Risk Factors: (4–5)
Physical Security Risk Category Code: II

Evaluation: Moderate Sensitivity
Numerical Values of Risk Factors: (6–8)
Physical Security Risk Category Code: III

Evaluation: Low Sensitivity
Numerical Values of Risk Factors: (9–12)
Physical Security Risk Category Code: IV

Notes:
[1] [1]The AMC will use the logic formula in table B–1, to determine the numerical values and the PS risk category codes as shown above. (Use only 1 factor value for each column and total the numbers for each column to obtain the security risk category.)

Appendix C
Physical Security Standards for Commercial Terminals

C–1. If the carrier service on the Government bill of loading is armed guard surveillance
Then the equivalent terminal standards are—

a. Stop must be at a carrier terminal, a State or local safe haven under 49 CFR or during emergencies, at a DOD safe haven or refuge location.

b. The vehicle or shipment must be under constant surveillance by an armed guard specifically dedicated to the shipment or shipments secured in an adequately lighted area that is surrounded by a chain–link fence, minimum height 6 feet, and continuously patrolled by an armed carrier or terminal employee who checks the shipment at least once every 30 minutes.

C–2. If the carrier service on the Government bill of loading is protective security service

Then the equivalent terminal standards are—

a. If the shipment is unloaded from a conveyance, it must be at a facility cleared under the Defense Industrial Security Program or at a DOD safe haven and be placed under constant surveillance by a qualified carrier representative.

b. As an alternative, the shipment may be placed in a closed area, vault or strong room approved by the Defense Investigative Service. Construction standards for closed areas, vaults, and strong rooms are contained in DOD 5220.22–M, appendixes IV and V.

C–3. If the carrier service on the Government bill of loading is dual driver protective service

Then the equivalent terminal standards are—

a. Stop must be at a carrier terminal, a State or local safe haven under 49 CFR or, during emergencies, at a DOD safe haven or refuge location.

b. The vehicle or shipment must be under constant surveillance by a qualified carrier or terminal representative who must keep the shipment in unobstructed view at all times and stay within 10 feet of the vehicle or the shipment must be secured in a fenced and lighted area under the general observation of a qualified carrier or terminal representative at all times.

c. As an alternative, the shipment may be placed in a security cage.

C–4. If the carrier service on the Government bill of loading is Department of Defense constant surveillance service

Then the equivalent terminal standards are—

a. Stop must be at a carrier terminal, a State or local safe haven under 49 CFR or, during emergencies, at a DOD safe haven or refuge location.

b. The vehicle or shipment must be under constant surveillance by a qualified carrier or terminal representative who must keep the shipment in view at all times and stay within 100 feet of the vehicle or the shipment must be secured in a fenced and lighted area under the general observation of a qualified carrier or terminal representative at all times.

c. As an alternative, the shipment may be placed in a security cage.

C–5. If the carrier service on the Government bill of loading is rail surveillance service

Then the equivalent terminal standards are—

a. Within rail yards, rail surveillance service applies.

b. If the carrier service on the Government bill of loading (GBL) is Within other terminals, shipment will be secured in a fenced and lighted area under the general observation of a qualified carrier or terminal representative at all times.

C–6. If the carrier service on the Government bill of loading is signature and tally record

Then the equivalent terminal standards are—

a. Each person responsible for proper handling of a shipment during any terminal stop must sign the signature and tally record at the time they assume responsibility for a shipment.

b. The shipment must always be in the custody of the last person signing the signature and tally record.

C–7. If the carrier service on the Government bill of loading is security cage requirements

The equivalent terminal standards will be in accordance with requirements identified in DOD 5220.22–M, appendixes IV and V.

Appendix D
Physical Security Standards for Military Terminals

D–1. Introduction

This appendix prescribes standards for protection of sensitive conventional AA&E at military transportation terminals. It also applies to sensitive classified AA&E that meet requirements of this regulation, as implemented by AR 380–5.

When a terminal has a separate, long–term storage mission, storage criteria of chapters 4 and 5 of this regulation apply to the long–term storage areas of the terminal. Criteria for commercially operated, in–transit transportation terminals are found in appendix B.

D–2. Security priorities

The provisions of this appendix are based on the following priorities for cargo and area security protection. The responsible command will ensure that security resources are allocated to meet the highest priority requirements first. The priorities, in descending order, are—

a. Category I cargo protection.

b. Pier and waterfront security.

c. Category II cargo protection.

d. Gates and perimeter security.

e. Category III and IV cargo protection.

f. Support activity security.

D–3. Risk category identification

Terminals will establish procedures to ensure prompt identification of the risk categories of arriving cargo in order to provide security protection required by this regulation. When cargo cannot be immediately identified upon arrival, it will be secured as Category I pending identification.

D–4. Temporary storage

a. Category I and II cargo.

(1) *Fencing.* Category I and II cargo will be stored only in fenced and lighted areas dedicated to cargo storage. Fencing requirements in paragraph 5–4 apply.

(2) *Supplemental controls.*

(a) Category I temporary storage areas or individual conveyances will be equipped with IDS or provided constant surveillance. Pending installation of IDS, the intervals between checks may not exceed 1 hour. When IDS is used, patrol intervals may not exceed 8 hours.

(b) Category II temporary storage areas or individual conveyances will be equipped with IDS or checked by a guard patrol at irregular intervals not to exceed 1 hour while in storage. When IDS is used, patrol intervals may not exceed 16 hours.

b. Category III and IV munitions cargo.

(1) *Fencing.* Category III and IV cargo will be enclosed within barbed wire fencing where terminal perimeter fencing is not in place or does not meet the criteria of this regulation. New security lighting systems may not be programmed for Category III and IV storage areas unless determined necessary based on an assessment of the local threats and vulnerabilities.

(2) *Supplemental controls.* IDS may not be programmed for Category III or IV storage areas unless determined necessary based on an assessment of the local threats and vulnerabilities. Cargo that is protected by IDS will be checked by a guard patrol at irregular intervals not to exceed 48 hours. Unalarmed cargo will be checked at least once each 24 hours.

(3) *Placement of cargo.* Placement of cargo other than Category I and II in fenced or lighted areas will be in priority order based on the risk category of cargo.

D–5. Cargo movement

a. Category I and II.

(1) Each Category I conveyance or integrated grouping of 5 or fewer conveyances moved within the terminal will be under continuous surveillance of at least 1 terminal employee or selected contractor employee under contract to the terminal to handle cargo. Where the terminal area is physically separated from a long–term storage area, movement between these areas will be under continuous armed guard surveillance, with 2 drivers for each conveyance.

(2) Each Category II conveyance or integrated grouping of 5 or fewer conveyances moved within the terminal will be under continuous surveillance of at least 1 terminal employee or selected contractor employee under contract to the terminal to handle cargo. Where the terminal area is physically separated from a long–term storage area, movement between these areas will be under continuous employee surveillance, with 2 drivers for each conveyance.

b. Category III and IV cargo.

(1) Category III and IV cargo will be moved within the terminal under the general surveillance of the terminal or contractor employees moving the cargo. There is no distance requirement for general surveillance. However, procedures for movement will ensure cargo is either within sight of employees or is provided the required guard patrol checks for storage areas.

(2) Where the terminal area is physically separated from a long–term storage area, movement between these areas

will be under continuous surveillance of at least 1 terminal employee or selected contractor employee for each conveyance.

D–6. Terminal area security

a. Waterfront and Ships at Berth. Piers and adjacent waterfront areas without cargo or ships will be patrolled at least hourly by an armed guard. When ships are at berth, piers will be patrolled by armed guard at irregular intervals not to exceed 30 minutes. The IDS may be used at the terminal commander's discretion. When IDS is used, the patrol frequency may extend to 4 hours for piers or waterfront without ships or cargo. When cargo is present, armed guards, IDS surveillance, or patrol checks will be as prescribed for the highest category of cargo or at intervals not to exceed 30 minutes whichever is more stringent. Waterborne patrols will be used to augment land based patrols where feasible.

b. Terminal Gates and Perimeter Areas. Terminal gates require continuous armed guard protection or surveillance while in use. Secured gates and perimeter areas require IDS protection or patrol checks at least once each 4 hours. When IDS is used, patrol intervals may extend to 24 hours.

D–7. Seals and twists

Terminals will install an approved seal on all AA&E conveyances on which the original shipper seal is removed. Additionally, all conveyances will have a No. 5 steel wire twist installed on door openings if the seal does not provide equivalent protection. Seal and twist checks for evidence of breakage or tampering will be made a part of regular patrol or surveillance procedures and of pier loading procedures. Category I and II seals will be verified by number once each shift.

D–8. Guard protection and surveillance

The requirements in paragraph 5–5, above, apply.

D–9. Terminal entry controls

a. Terminals will be closed areas with strict vehicle and pedestrian entry controls. All pedestrians or vehicles will be subject to search and a visitor control system will be established. When feasible, entry to the AA&E storage and processing areas will be separately controlled from the terminal administrative areas. Privately–owned vehicles may not be allowed into AA&E storage and processing areas of the terminal without the terminal commander's permission. Hunting, if allowed, will be rigidly controlled and minimized.

b. Piers, waterfront, and AA&E storage and processing areas will be designated and posted as restricted areas.

Appendix E
Losses/Overages List for AR 15–6 Investigations

E–1. General

Appendix B describes in detail items that must be secured according to this regulation. When losses equal or exceed the amounts shown below, commanders will conduct investigations under AR 15–6, chapters 3 through 5, and as specified in chapter 2 of this regulation. AR 15–6 investigations may be conducted for lesser amounts.

E–2. Losses/overages list

a. Missiles and rockets. All nonnuclear missile systems in a ready–to–fire configuration or when the launcher tube and explosive rounds are jointly stored or transported.

b. Arms. One or more of the following:

(1) Machine guns and automatic weapons up to and including .50 caliber.
(2) Launch tube and gripstock for Stinger missile.
(3) Launch tube, sight assembly, and gripstock for Hamlet and Redeye missiles.
(4) Tracker for Dragon Missiles.
(5) Mortar tubes.
(6) Grenade launchers.
(7) Rocket and missile launchers, unpacked weight of 100 pounds or less.
(8) Flame thrower.
(9) Launcher and/or missile guidance set and/or the optical sight for the TOW.
(10) Shoulder–fired weapons, other than grenade launchers, not fully automatic.
(11) Handguns.
(12) Recoilless rifles up to and including 90mm.
(13) Major parts (for example, barrels, frames, receivers, major subassemblies).
(14) Subcaliber training aids capable of firing a projectile by means of a powder charge.

(15) Other individually operated weapons that are—

(a) Portable and can be fired without special mounts or firing devices.

(b) Have potential use in civil disturbances.

(c) Vulnerable to theft.

c. Ammunition and explosives.

(1) One or more of the following:

(a) Explosive complete rounds or warheads for Category I missiles and rockets.

(b) Hand or rifle grenades (fragmentation, high explosive, concussion, white phosphorus, or incendiary).

(c) Mortar rounds up to and including 81mm.

(d) Mines, antitank, or antipersonnel.

(e) High–explosive complete rounds or war–heads for missiles and rockets other than Category I (unpacked weight of 50 pounds or less each).

(f) Safety and arming device.

(g) Incendiary destroyer.

(h) 40mm grenades for grenade launcher.

(i) Demolition kits.

(2) Ten pounds or more of explosives used in demolition operations (for example, C–4; military dynamite, TNT, and so on).

(3) 100 or more blasting caps, detonators, destruction or firing devices, primers, squibs, and igniters.

(4) 100 or more fuses.

(5) 100 or more supplementary charges.

(6) 100 or more explosive bolts, explosive cartridges, and related devices.

(7) 50 pounds or more bulk explosives.

(8) 1000 feet or more detonating cord and safety fuse.

(9) Two or more riot control agents, 100–pound package or less.

(10) Two or more rounds of ammunition of 40mm and larger nonautomatic weapon.

(11) One or more artillery, naval, tank, and mortar ammunition, 75mm and larger.

(12) Ammunition for weapons in paragraph *b*, above, not otherwise categorized.

(13) One box or more (normally 16 or more) grenades, illumination, smoke, and CS/CN (tear–producing).

(14) End items of conventional and guided missile ammunition (except artillery rounds, bombs, and torpedoes) that—

(a) Have an individual item (for example, unit of issue) container or package weight of 60 pounds or less.

(b) Have potential use in civil disturbances.

(c) Are vulnerable to theft.

Appendix F
Specification for Intrusion Detection System Signs

F–1. Specification for Intrusion Detection System signs

A sample IDS sign that may be used is shown below in figure F–1. The sign is flat with shape, size, and legend as shown. The sign face should consist of reflectorized sheeting bonded to an aluminum backing.

F–2. Sign composition

Sign backing is flat, degreased, etched, and unpainted aluminum alloy, type 6061T6, not less than1⁄16–inch thick. For interior posting, plastic or wood could be used.

F–3. Overseas areas

In non–English speaking overseas areas, a sign in the language of the host country should be mounted alongside the English language sign. In the United States and its possessions where a major minority language is spoken, similar signs may be posted as a safety precaution.

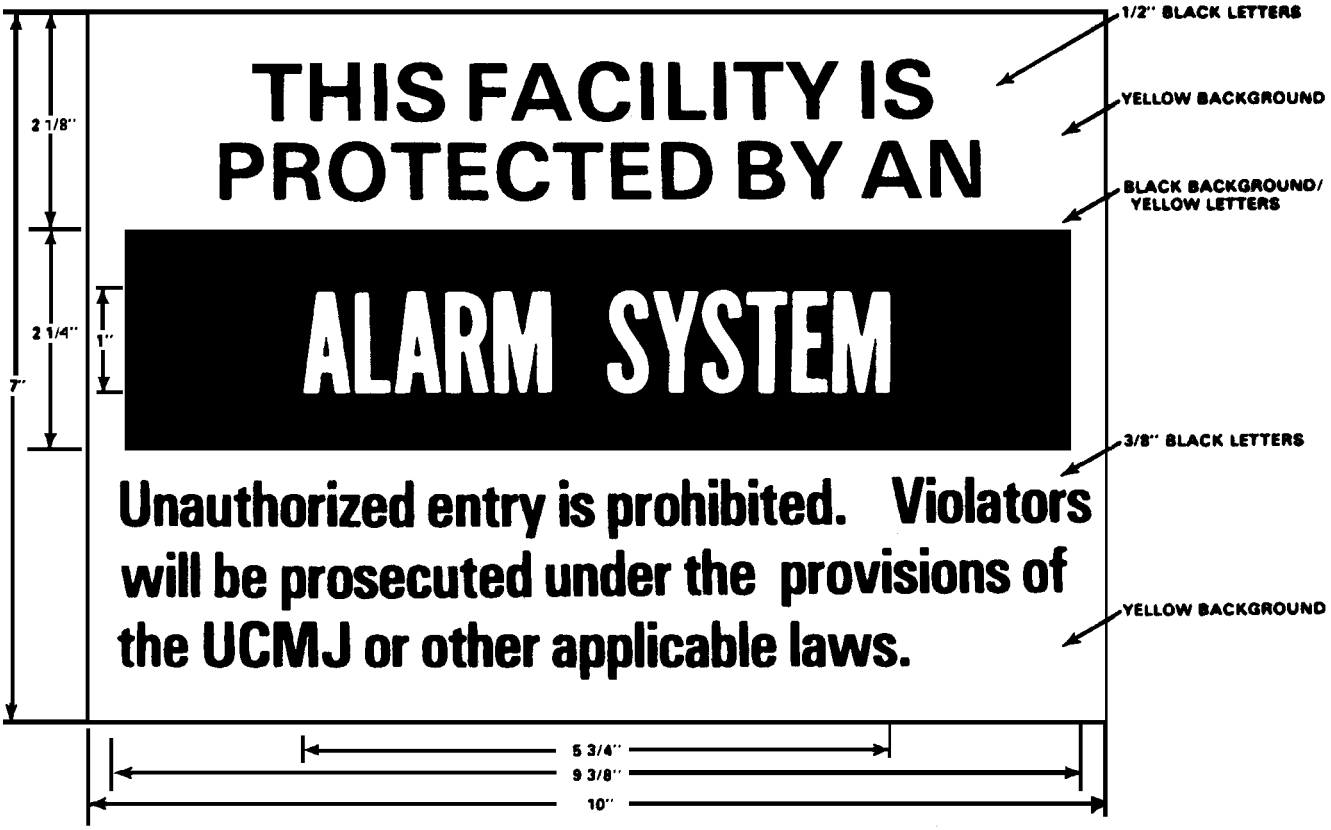

Figure F–1. Sample Intrusion Detection System sign

Appendix G
Criteria for Facilities Storing Sensitive arms, ammunition, and explosives

G–1. New facility criteria for the storage of Category II through Category IV arms

New facilities constructed to store Category II through Category IV arms will meet the following criteria:

a. Walls. Walls will be of 8 inches of concrete reinforced with No. 4 reinforcing bars at 9 inches on center in each direction in each face of the wall. Reinforcement in the 2 faces of the wall will be staggered on each face to form a projected grid approximately 4–1/2 inches square. Reinforcement in the walls will be tied into floors and ceilings in accordance with American Concrete Institute standards.

b. Ceiling and roofs. Ceilings and roofs will be of reinforced concrete construction. The thinnest portion may not be less than 6 inches. reinforcing bar spacing will form a grid so that the area of any opening does not exceed 96 square inches using No. 4 bars or larger.

c. Floors. Floors, if on grade, will be a minimum of 6–inch thick reinforced concrete construction reinforced with 6 inches by 6 inches, W4 by W4 welded wire fabric or equivalent steel reinforcing bars (based on area of steel per square foot). Where the floor slab acts as the ceiling of an underlying room or area, the ceiling standards will apply. Where equivalent steel reinforcing bars are used, bar spacing will form a grid so that the area of any opening does not exceed 96 square inches.

d. Doors and door frames. The door will be GSA approved Class 5 armory door per GSA Fed Spec AA–D–600D. A GSA approved Class 5 vault door is not encouraged due to its electromechanical lock. Double door protection for arms storage facilities is not required. Door frames will be per Fed Spec AA–D–600D

e. Windows and other openings. Windows are not authorized. Ducts, vents, and other openings of 96 square inches or more with the least dimension greater than 6 inches will be secured in accordance with 1 of the following methods and otherwise limited to the minimum number and size that are essential —

(1) Sealed with material comparable to that forming the adjacent walls.

(2) Fitted with any of the barriers below with bars or steel mesh securely embedded in the structure of the building or welded to a steel frame that will be securely attached to the wall with fastenings inaccessible from the exterior of arms storage facility.

(a) Three–eighth inch or larger hardened steel bars with vertical bars not more than 4 inches apart and with horizontal bars welded to the vertical bars so that the openings do not exceed 32 square inches.

(b) A minimum of 8–gauge high carbon manganese steel mesh with 2–inch diamond grid.

(c) A 6–gauge cold drawn steel wire mesh with 2–inch diamond grid when 8–gauge mesh above is not available.

G–2. Criteria for existing facilities storing Category II through IV arms

The following exceptions to the new facility criteria are permitted for storing Category II through IV arms in an existing facility located on or off a military installation.

a. Doors and door frames. Door frames, for doors other than Class 5 doors specified in paragraph G–1, will be as follows:

(1) Door bucks, frames, and keepers will be rigidly anchored and provided with anti–spread space filler reinforced to prevent disengagement of the lock bolt by prying or jacking of the door frame. The frames and locks for both interior and exterior doors will be so designed and installed as to prevent sufficient removal of the frame facing or the built–in locking mechanism to allow disengagement of the lock bolt from outside a secured room when the door is closed and locked.

(2) Construction requirements for door frames and thresholds will be as exacting as those for the doors themselves. For example, where metal doors are used, the frame and thresholds will be of metal. Various types of hinges are commercially available. When choosing the proper type of hinge for secure area doors, hinges will be of the fixed pin security hinge type or equivalent; exposed hinge pins will be peened, spot welded, or otherwise secured to prevent removal; and hinge mounting screws may not be exposed to the outside of the arms room except for Class 5 steel vault door hinges.

b. Windows and other openings. Windows and other openings will be kept to a minimum. When required, windows and other openings will be secured as required in paragraph G–1.

c. Walls. Walls will be as required in paragraph G–1, except that in addition to those construction types, 12–inch unreinforced, solid brick interlocked between the inner and outer courses will be allowed. In addition, where walls do not meet that standard or the standards in paragraph G–1, they may be reinforced per paragraph G–2*f*.

d. Ceilings and roofs. Ceilings and roofs of existing facilities will be reinforced concrete where possible in accordance with paragraph G–1. Where ceilings and roofs do not meet the standards in paragraph G–1, they may be reinforced per paragraph G–2*f*.

e. Floors. Floors, if on grade, will meet the standards in paragraph G–1. Where the floor slab acts as the ceiling of an under–lying room or area, the ceiling standards in paragraph G–2*d* apply. Where such floors do not meet the standards in paragraph G–1, they may be reinforced per paragraph G–2*f*.

f. Existing wall, ceiling, roof, or floor reinforcement. Walls, ceilings, roofs, and floors that do not meet the structural criteria above will be reinforced by 1 of the following methods. When any of these reinforcing materials are used, they will be applied and fastened to the existing structure so that destruction of the existing and reinforcing materials is required to remove them.

(1) *Steel bars.* Three–eighth inch steel bars, 4 inches apart with bars in 1 direction welded to the bars in the opposite direction so that the openings do not exceed 32 square inches. Ends of the steel bars will be embedded securely in the structure of the building or welded to a steel frame securely fastened to the building.

(2) *Steel landing mat.* Marsten, Irving, or pierced steel planking.

(3) *Expanded metal.* Three–sixteenth–inch with a maximum grid opening of 1 inch by 3 inches and weighing a minimum of 4.27 pounds per square foot.

(4) *Steel plate.* One–fourth–inch steel plate.

(5) *Steel mesh.* Number 8–gauge high carbon manganese steel, or for existing facilities, number 6–gauge cold drawn steel wire with a grid of not more than 2 inches center to center. The number 6–gauge material is not authorized for future upgrading.

(6) *Sheet metal.* For existing facilities, 16–gauge steel sheets or plates securely fastened together. This material is not authorized for future upgrading.

G–3. New facility criteria for the storage of all categories of ammunition and explosives

Storage structures approved for storage in DA Pam 385–64 will be considered to comply with this regulation subject to the additional security requirements in chapter 5.

G–4. Existing facility criteria for the storage of ammunition and explosives

Existing storage structures approved for storage in DA Pam 385–64 will be considered to comply with this regulation subject to the additional security requirements in chapter 5.

G–5. Portable explosives magazines

Portable explosives magazines as specified in Naval Facilities Engineering Service Center Technical Data Sheet 2078–SHR (TDS–2078–SHR) are authorized for the storage of limited quantities of Category II through Category IV ammunition and explosives. Quantities of the ammunition and explosives to be stored inside the magazine will be coordinated with the installation Army Safety Office. Additional PS measures in paragraph 5–2, above, apply for the category of the ammunition and explosives stored (that is, IDS, security lighting, fencing, and so on).

G–6. GOLAN–10 explosives container

The GOLAN–10 container is authorized for the storage of training quantities of explosives for the training of military working dogs. Refer to the DOD Safety Board approval memo for restrictions and conditions associated with the use of the GOLAN–10. If this container is used, the following additional controls will be implemented:

a. Intrusion Detection System. GOLAN–10 containers storing Category II through IV A&E will be provided with approved IDS. Facilities without operational IDS require constant surveillance by armed guards.

b. Security patrols. Containers will be checked by a security patrol periodically as dictated by any threat and by the vulnerability of the facility. The intervals between checks will not exceed 8 hours.

c. Security lighting. Exterior lighting will be provided for all GOLAN–10 containers. The lighting will be sufficient to allow guards or individuals responsible for maintaining surveillance to see illegal acts such as forced entry or the unauthorized removal of AA&E during hours of reduced visibility. Lighting will provide a minimum of 0.2 foot–candles (2 lux) illumination measured on the horizontal plane at ground level.

d. Locks and hasps. Doors used to access GOLAN–10 containers will be locked with an approved high security locking device or high security padlock and hasp providing comparable protection to the locks.

Appendix H
Physical Security Standards for Sensitive Conventional Ammunition and Explosives During Production, Manufacturing, Renovation, and Demilitarization Operations at Government Facilities

H–1. General information

This appendix presents the minimum PS standards for ammunition and explosives during production, manufacturing, renovation, and demilitarization operations at Government facilities.

a. In–depth security will be attained by applying the PS standards of this appendix for production, manufacturing, renovation, and demilitarization operations.

b. Sensitive ammunition and explosives will be protected according to their sensitivity categories.

c. Different degrees of sensitivity may apply to ammunition and explosives during various stages of manufacture, renovation, or demilitarization. Commanders will pay special attention to the safeguarding of inventory items by judiciously implementing and monitoring PS measures.

d. Control of sensitive ammunition and explosives will conform to normally prescribed accountability procedures and inventory requirements. Commanders must establish local accountability systems that will identify shortages or losses if there are indications of unauthorized access to the production, manufacturing, renovation, and demilitarization areas during non–operational hours. Commanders will also establish procedures that will verify that the end–of–shift, beginning–of–shift counts, match for all munitions/sub–munitions.

H–2. Standards

a. Key and lock control standards will comply with the standards of this regulation.

b. All buildings used in production, manufacturing, renovation, and demilitarization operations will be within a designated and posted restricted area and during non–operational hours. All primary entrance and emergency doors will be secured with padlocks meeting Commercial Item Description (CID) A–A 59487. All other doors may be secured from the inside with bars or dead bolt locking devices. Windows, glass door panels, and similar man passable openings less than 12 feet from the ground level will be protected with security screening equivalent to 9–gauge chain–link material when the area is not separately fenced with FE–5 or equivalent chain–link fencing.

c. Service magazines must meet the construction requirements described in chapter 5 of this regulation. Service magazines will be secured with high security padlocks and hasps that meet the requirements of this regulation. Scrap cages will also be secured with approved padlocks. (The above requirements are not mandatory when sensitive items are under constant surveillance during operating hours and are removed to proper storage during non–operating hours.)

d. Installation of IDS is optional on production buildings or service magazines unless used for unattended storage of Categories I and II items.

e. Vans and rail cars used to support production, manufacturing, renovation, and demilitarization operations will be secured with 5–gauge wire twists or low security padlocks meeting CID A–A 59487 and controlled with serial numbered seals.

f. Badges or pass systems will be used for access control and will be administered through security or operations personnel. All packages and vehicles entering and departing the area will be inspected.

g. Personnel authorized unaccompanied access to production, manufacturing, renovation, and demilitarization operations will meet the command developed background check standards specified in chapter 2 of this regulation.

h. Security patrols are required as follows:

(1) Category I and II—

(a) Operating hours— none.

(b) Non–operating hours— 24–hour intervals when protected by IDS. Category I and II items will not be left unattended. When these items are not in proper storage and protected by IDS, they will remain under constant surveillance.

(2) Category III and IV—

(a) Operating hours— none.

(b) Non–operating hours– none required when protected by IDS. At least 1 patrol every 24 hours if IDS is not present. Patrols will be more frequent if local vulnerability and threat assessments warrant increased security.

(3) Security Patrols for Service Magazines are as required for magazines in chapter 5 of this regulation.

i. Protective Lighting is required for primary and emergency entrances of production, manufacturing, renovation and demilitarization operations and all service magazines. If protective lighting is inoperable, security patrols will physically check primary and emergency entrances a minimum of once per hour for Category I and II items and once per 8–hour security guard shift (or 3 times per 24–hour time period) for Category III and IV.

j. If the production, manufacturing, renovation and demilitarization operations are not a part of an ammunition and explosive storage area, Privately–owned vehicles may be parked inside the production, manufacturing, renovation, and demilitarization operations area provided they are inspected on entry and exit and are not parked within 30 feet of any structure or 100 feet of any service magazine.

k. Munitions undergoing test or quality production related cycling may remain in designated production line buildings the minimum time necessary in accordance with safety criteria identified in DOD 6055.9 STD.

l. In–process explosives/ammunition items and/or explosives that are required for initial daily start–up operations that must remain in buildings when not attended will be secured and/or marked in such manor as to provide positive accountability and inventory controls. Magazine data cards or equivalent may be used for this purpose.

m. Positive means to detect unauthorized loss of explosives scrap material (such as accumulated explosives dusts from vacuum collection systems, bag house, or riser scrap/flake/powder explosive material, and so on) from production processes must be instituted. Positive means may include regular, periodic, unannounced, and/or random inspections of personnel lockers, vehicles, lunch boxes, brief cases, and so on. In creating such inspection programs, commanders should coordinate with their servicing staff judge advocate.

Appendix I
Arms, Ammunition, and Explosives Guide

I–1. Application

This appendix provides a guide that may be used to quickly check for compliance with PS requirements. The guide—

a. Is not intended to be used in place of applicable regulations.

b. Is only a guide.

c. Does not cover all security requirements for AA&E.

I–2. Physical Security Compliance

Location: (Enter location)
Unit: (Enter unit)
Date: (Enter date)

a. Arms room.

(1) Was the arms storage facility designated as a mission essential/vulnerable area (AR 190–13, para 2–4*d*(1))?

(2) Was the storage facility wherein arms were stored, designated and posted as a restricted area (AR 190–11, para 4–15 and AR 190–13, para 6–3 and 6–4)?

(3) Was security lighting at the entrance or issue window of the arms room (AR 190–11, para 4–2*c*)?

(4) Were switches for exterior lights located in such a place as to be inaccessible to unauthorized personnel (AR 190–11, para 4–2*c*)?

(5) Was the most secured door to the arms storage facility secured with a high security padlock and hasp (AR 190–11, para 4–2*e*(1))?

(6) Did the arms room maintaining IDS have signs displaying the fact that IDS was present (AR 190–11, para 4–16)?

(7) Were PS inspections conducted at least every 18 months (AR 190–11, para 2–6*a*; and AR 190–13, para 2–11*b*)?

(8) Was the arms room, not continuously manned or under constant surveillance, protected by IDS (AR 190–11, para 4–2*e*)?

(9) Was the arms room protected by at least 2 types of sensors, one of which is a volumetric sensor (AR 190–11, para 3–6*c*)? (Have armorer conduct test.)

(10) Were bimonthly operational checks to IDS being conducted and recorded. (AR 190–11, para 3–6*c*)?

(11) Check the IDS agreement. Does it require either a response by security personnel or law enforcement authorities to respond within 15 minutes (AR 190–11, 3–6*b*)?

(12) Have qualified engineer personnel verified the structural composition of the arms room on DA Form 4604, indicating thereon the highest construction Category met (AR 190–11, para 2–2*d*)?

(13) Is the AA&E storage facility approved for the storage of the highest category of AA&E stored therein? If not, has a waiver been approved (AR 190–11, para 4–2(*a*)(2))?

(14) Was DA Form 4604 posted in each AA&E storage facility and readily available for inspection (AR 190–11, para 2–2*d*)?

(15) Was DA Form 4604 revalidated by qualified engineer personnel at least every 5 years (AR 190–11, para 2–2*d*)?

(16) In the arms room, a facility not continuously manned, were weapons stored in racks/containers weighing more than 500 pounds or were the racks/containers fastened to the structure or fastened together in groups totaling more than 500 pounds (AR 190–11, para 4–2*b*(4))?

(17) Were locally fabricated racks in use certified by engineers as meeting construction specifications (AR 190–11, para 4–2*b*(2))?

(18) Was ammunition authorized for retention in the unit arms room stored separately in banded or sealed cartons or locked containers (AR 190–11, para 5–8*c*(1)(*a*))?

(19) Were ammunition containers in the unit arms room weighing less than 500 pounds fastened to the structure or fastened together, with bolts or chains equipped with secondary padlocks, in groups totaling more than 500 pounds (AR 190–11, para 5–8*c*(1)(*a*))?

(20) Were weapons stored in the arms room inventoried by serial number monthly (AR 190–11, para 2–6*d*; AR 710–2, para 1–13*d*, para 2–12 *d*, and table 2–1, para *j*; and DA Pam 710–2–1, para 9–11*b*)? As part of this inspection, check physical count of M16 rifles with the armorer's hand receipt. If the count is off, conduct a 100 percent inventory of the weapons.

(21) Had the same individual conducted consecutive inventories of weapons (AR 190–11, para 2–6*d*; AR 710–2, para 1–13*d*, 2–12*d*, and table 2–1, para *j*; and DA Pam 710–2–1, para 9–11*b*)?

(22) Did records of monthly inventories reflect those weapons that were signed out or in maintenance at the time of the inventories (AR 190–11, para 2–6*d*; AR 710–2, para 1–13*d*; and DA Pam 710–2–1, para 9–11*b*(4))?

(23) Were individuals drawing their weapons from the arms room turning in DA Form 3749 (AR 190–11, para 2–6*d*; AR 710–2, para 1–13*d*; and DA Pam 710–2–1, para 5–5*d*(3))?

(24) When weapons were issued for periods of 24 hours, did individuals—

(a) Enter their signature in ink, as it appeared on DA Form 3749, Equipment Receipt?

(b) Enter the nomenclature and serial number of the weapon drawn?

(c) Enter the date/time of the transaction on the issue sheet/log (AR 190–11, para 2–6*d*; AR 710–2, para 1–13*d*; and DA Pam 710–2–1)?

(25) When weapons were returned to the arms room, were entries on the issue sheet/log voided? Did the individual receiving the returned weapons enter the date/time, and his/her initials on the issue sheet/log (AR 190–11, para 2–6*d*; AR 710–2, para 1–13*d*; and DA Pam710–2–1, para 5–5*d*(4))?

(26) Had individuals authorized unaccompanied access to receive, store, or issue arms, undergone a command security screening/background check (AR 190–11, para 2–11*b*)?

(27) Had persons not authorized unaccompanied access to the arms room been allowed access to the IDS keys (AR 190–11, para 3–8*b*)?

(28) Is the unaccompanied access list (by name, duty position) signed by the unit commander and posted inside the arms room (AR 190–11, para 4–19*a*)?

(29) In the unit arms room, were privately–owned weapons or authorized war trophies stored in a locked container separate from military weapons (AR 190–11, para 4–5*a*(1))?

(30) In the unit arms room, were privately–owned weapons inventoried in conjunction with, and at the frequency of the inventory of Government weapons (AR 190–11, para 4–5*a*(2)(*b*))?

(31) Has a DA Form 3749 been issued for each privately owned weapon stored in the arms room (AR 190–11, para 4–5*a*(2)(*a*))?

(32) Is the DA Form 3749 retained in the arms room when the weapon is in the possession of the individual owner (AR 190–11, para 4–5*b*(3))?

(33) Are privately–owned weapons withdrawn from the unit arms room only upon approval of the unit commander or the commander's designated representative (AR 190–11, para 4–5*b*(4))?

(34) Are applicable local regulations and State and local law information on ownership, registration, and possession of weapons and ammunition posted on unit bulletin boards (AR 190–11, para 4–5*a*(3))?

(35) Is the retention and storage of incendiary devices and explosives prohibited in the unit arms room (AR 190–11, para 4–5*a*(6))?

b. Ammunition and explosives storage areas.

(1) Are Category I and II ammunition and explosives stored in earth–covered magazines and igloos (AR 190–11, para 5–2*a*(1))?

(2) Are Category I and II ammunition and explosives protected by a intrusion detection system (IDS) (AR 190–11, para 5–2*a*(2)(*a*))?

(3) In the event of IDS failure, are armed guards posted 24 hours each day to maintain constant, unobstructed observation of the Category I and II storage facilities (AR 190–11, para 5–2*a*(2)(*a*))?

(4) Are security checks conducted once every 24 hours for IDS protected Category I and II facilities (AR 190–11, para 5–2*a*(2)(*b*))?

(5) Are security checks conducted at irregular hours not to exceed 48 hours for Category III and IV facilities (72 hours, IDS protected) (AR 190–11, para 5–2*b*)?

(6) Are Category I and II storage facility protected by security fencing (AR 190–11, para 5–3)?

(7) Are unmanned gates to ammunition and explosives storage areas locked (AR 190–11, para 5–3*g*)?

(8) Do clear zones extend 12 feet on the outside and 30 feet on the inside of the perimeter fence for Category I and II AA&E (para 5–3*j*)?

(9) Are clear zones for Category I and II free of all obstacles, topographical features and vegetation exceeding 8 inches in height (AR 190–11, para 5–3*j*)?

(10) Is security lighting provided for Category I and II storage facilities (AR 190–11, para 5–4)?

(a) Switches installed so that they are not accessible?

(b) Lights covered with wire mesh screen?

(11) Are the ammunition and explosives storage facilities secured by a high security lock and hasp (AR 190–11, para 5–6*a*)?

(12) Upon entering and exiting ammunition and explosives storage areas, are personnel and vehicles checked for unauthorized material (AR 190–11, para 5–9*a*)?

(13) Are Privately Owned Vehicles prohibited from ammunition and explosives storage areas (AR 190–11, para 5–9*a*)?

(14) Are persons requiring frequent recurring entrance to ammunition and explosives areas listed on an entry control roster or issued a photographic security badge (AR 190–11, para 5–9*a*)?

(15) Are doors used for access to Category I storage facilities locked with 2 locking devices, one of which is a high security lock and hasp (AR 190–11, para 5–6*c*)?

(16) Are Category I missiles and rockets stored in open storage (AR 190–11, para 5–8*d*)?

(17) When Category I missiles in open storage at vehicle holding areas, aircraft cargo holding areas, or unit storage, are they stored in an approved container or in a totally enclosed storage structure (AR 190– 11, para 5–8*e*)?

c. Key and lock control.

(1) Are keys to arms storage buildings, rooms, racks, and containers maintained separately from other keys and accessible only to those individuals whose official duties require access to them (AR 190–11, para 3–8)?

(2) Is a current roster of these individuals kept within the unit (AR 190–11, para 3–8)?

(3) Is the key control register kept in a locked container (AR 190–11, para 3–8)?

(4) Are padlocks and their keys inventoried by serial number semi–annually (AR 190–11, para 3–8)?

(5) Are combinations to locks on vault doors or GSA approved Class 5 or Class 6 security containers changed annually or upon change of custodian or armorer (AR 190–11, para 3–8)?

(6) Is the key and lock custodian appointed in writing (AR 190–11, para 3–8)?

(7) Is the DA Form 5513 being utilized to sign out keys and is the form properly filled out (AR 190–11, para 3–8)?

(8) Are keys required for the maintenance and repair of IDS, including keys to the control unit door and monitor cabinet, kept separate from other operational IDS keys (AR 190–11, para 3–8)?

Appendix J
Joint–Services Interior Intrusion Detection System Operational Checks

J–1. Joint–Services Interior Intrusion Detection System Operational Test

Arms room ID number:
Date:

a. The following test procedures have been developed specifically for the Joint–Services Interior Intrusion Detection System (J–SIIDS) and are directly applicable for J–SIIDS installations. For installations having commercial intrusion detection systems, it may be necessary to modify these procedures to reflect differences in commercial equipment operation.

b. Follow the basic test procedure below for each protected area.

(1) Basic test procedure—

(a) Contact the MP desk prior to conducting the operational tests. Identify yourself, your location (for example, building name/number and room number), and the purpose of the test. Inform them that multiple alarms will be generated during the test.

(b) Before conducting the J–SIIDS operability tests, it will be necessary to close all doors and openings equipped with balanced magnetic switches and it will be necessary to mask ultrasonic motion sensors, passive infrared motion sensors, and passive ultrasonic sensors so the tester can test each individual sensor without generating unintentional alarms from the other sensors in the protected area. Close doors/drawers or otherwise secure protected objects equipped with the capacitance proximity sensor. Allow 1 minute for the system to stabilize.

(c) Set the control unit mode switch to the test/reset position.

(d) Conduct J–SIIDS Operational Tests #1 – #6 for applicable sensors.

(e) Unmask all sensors.

(f) Contact the MP desk. Identify yourself, your location (for example, building name/number and room number). Verify that they received multiple alarms during the test period. If the protected area is equipped with an alarm latching switch which must be tested, inform the MP desk that this test will be conducted. Place the control unit mode switch in the access position. Verify with the MP desk that the zone status is access.

(g) Conduct J–SIIDS Operational Test #7 for the alarm latching switch (If so equipped).

(h) Contact MP desk. Verify that the zone status is access. Inform them of test completion.

(2) Test/inspection guide—

(a) This arms room passed:

(b) This arms room failed: (contact maintainer for service)

(c) Tester name:

(d) Signature:

J–2. J–SIIDS operational test #l—balanced magnetic switch

a. The balanced magnetic switch consists of a magnet assembly and a reed switch assembly enclosed in individual housings. The switch assembly is mounted to the moveable door or window. With the door or window closed, the magnet assembly acts on the switch assembly holding it closed to complete a circuit. When the door or window is opened, the magnet moves away from the switch releasing it. As the switch is released, it opens the circuit causing an alarm. Balanced magnetic switches (BMS) are used to detect the opening and closing of doors, windows, skylights, and other similar moveable entryways.

b. Test procedure:

(1) Verify the control unit mode switch is in the test/reset position.

(2) With the door/window closed and locked, attempt to rattle or move the door/window. Alarm should not activate. If an audible signal initiates from the control unit, contact maintainer for adjustment.

(3) Slowly open the door, gate, or window. An audible alarm should initiate immediately from the control unit when the latching edge of the opening has moved not more than 1–1/4 inches from the closed position.

(4) Close the door, date, or window. After 10 seconds, the audible alarm will stop at the control unit.

(5) Repeat steps 2,3, and 4 for each BMS installed in the protected area.

c. Test/inspection guide:

(1) Number of BMS in this room:

(2) Number of BMS in this room passed:

(3) Number of BMS in this room failed (contact maintainer for service):

(4) Tester name:
(5) Signature:

J–3. J–SIIDS operational test #2–capacitance proximity sensor

a. The capacitance proximity sensor (CPS) establishes an electrical field around the protected objects, which must be metallic and insulated from ground. An intruder approaching or touching the protected object disturbs the field causing a change in system capacitance, resulting in an alarm.

b. Test procedure:

(1) Verify the control unit mode switch is in the test/reset position.

(2) Slowly approach the protected area. An audible alarm should sound at the control unit immediately either just prior, or as you touch the object.

(3) After the audible signal initiates, move away from the object. The control unit audible signal will stop within 1 minute.

(4) Repeat steps 2 and 3 for each protected object.

c. Test/inspection guide:

(1) Number of objects protected by CPS in this room:
(2) Number of objects protected by CPS in this room passed:
(3) Number of objects protected by CPS in this room failed: (contact maintainer for service)
(4) Tester name:
(5) Signature:

J–4. J–SIIDS operational check #3–passive infrared motion sensor

a. All objects radiate infrared energy to some degree. The intensity of infrared energy emitted is dependent on the temperature, color, and surface texture of the object. Infrared energy is always present, and its intensity changes as the temperature of the object changes. The passive infrared motion detector is able to detect an intrusion because the entry of an intruder into the detection field abruptly changes the background level of infrared energy being sensed by the detector, and an alarm signal is generated.

b. Test procedure:

(1) Verify the control unit mode switch is in the test/reset position.

(2) Unmask the passive infrared motion sensor (PIMS) being tested.

(3) Allow 1 minute for system to stabilize.

(4) Conduct a walk test by beginning at a point outside the protected area or at the doorway to the protected area moving along likely intruder paths until audible alarm is activated at the control unit.

(5) Re–mask the sensor.

(6) Repeat steps 2, 3, 4, and 5 for each PIMS in the protected area.

c. Test/inspection guide:

(1) Number of PIMS in this room:
(2) Number of PIMS in this room passed:
(3) Number of PIMS in this room failed (contact maintainer for service):
(4) Tester name:
(5) Signature:

J–5. J–SIIDS operational test #4–passive ultrasonic sensor

a. The passive ultrasonic sensor (PUS) is a microphonic type device which detects the ultrasonic energy frequencies produced by breaking construction materials such as wood, glass, masonry, cinder block, brick, or metals. Different structural materials transmit different specific frequencies, thus, the range, detection characteristics, and effectiveness are variable from surface to surface.

b. Test procedure:

(1) Verify the control unit mode switch is in the test/reset position.

(2) Unmask the passive ultrasonic sensor to be tested.

(3) Allow 1 minute for system to stabilize.

(4) Use a set of metallic keys (6 or more) on a ring to generate noise. Jingle the keys 4 to 6 times at l–second intervals. Testing should take place along the walls or other protected surfaces where intrusion is likely, not in the middle of the room. At the end of the fourth to sixth jingle, an audible signal should initiate immediately at the control unit. The audible alarm will stop at the control unit 10 seconds after the sensor is out of alarm.

(5) Re–mask the sensor.

(6) Repeat steps 2, 3, 4, and 5 for each passive ultrasonic sensor in the protected area.

c. Test/inspection guide:

(1) Number of PUS in this room:
(2) Number of PUS in this room passed:
(3) Number of PUS in this room failed: (contact maintainer for service)
(4) Tester name:
(5) Signature:

J–6. J–SIIDS operational test #5–vibration signal detector

a. Vibration signal detectors (VSD) are typically mounted directly on expanded metal cages, walls, and ceilings. Attempts to penetrate structural materials generate shock waves which are transmitted through the structural material to the sensor. Different structural materials transmit different specific frequencies, thus, the range, detection characteristics, and effectiveness are variable from surface to surface.

b. Test procedure:

(1) Verify the control unit mode switch is in the test/reset position.
(2) Allow 1 minute for system to stabilize.
(3) Tap the protected surface with a solid object several times in succession. An audible signal should initiate from the control unit when the required number of taps or pulses have been received within the proper time interval. The audible signal will stop at the control unit 10 seconds after the detector is out of alarm.
(4) Repeat steps 2 and 3 for each vibration signal detector in the protected area.

c. Test/inspection check list:

(1) Number of VSD in this room:
(2) Number of VSD in this room passed:
(3) Number of VSD in this room failed: (contact maintainer for service)
(4) Tester name:
(5) Signature:

J–7. J–SIIDS operational test #6–ultrasonic motion sensor

a. Ultrasonic motion sensor (UMS) detection operates on the Doppler frequency shift principle. A pattern of inaudible sound waves, generally in the 20 to 45kHz range are transmitted into the room and monitored by the system receiver(s). Intruder motion within the room disturbs the sound wave pattern, altering its frequency. The change in frequency or Doppler shift is detected and an alarm is generated.

b. Numerous configurations of the sensor and detection pattern are available, including wall mounts, ceiling mounts, and covert mounts where the sensor is disguised as an everyday office or home object. Sensors are available as transceivers where both transmitter and receiver are mounted in the same housing, or as split head systems where individual transmitters and receivers are utilized. The type and location of the transmitters and receivers determine the detection pattern and extent of coverage.

c. Test procedure:

(1) Verify the control unit mode switch is in the test/reset position.
(2) Unmask the ultrasonic motion sensor to be tested.
(3) Allow 1 minute for system to stabilize.
(4) Conduct a walk test by beginning a point outside the protected area or at the protected area boundary and moving along likely intruder paths until an audible signal is initiated at the control unit. The audible alarm will stop at the control unit 10 seconds after the sensor is out of alarm.
(5) Re–mask the sensor.
(6) Repeat steps 2, 3, 4, and 5 for each ultrasonic motion sensor installed in the protected area.

d. Test/inspection guide:

(1) Number of UMS in this room:
(2) Number of UMS in this room passed:
(3) Number of UMS in this room failed: (contact maintainer for service)
(4) Tester name:
(5) Signature:

J–8. J–SIIDS operational check #7–alarm latching switch

a. The alarm latching switch (ALS) is incorporated into the intrusion detection system to provide individuals with a means of signaling, in a covert manner, that they have been placed under duress. Is intended to be foot operated and located in such a way that it can be easily reached and covertly operated during duty hours. For the protection of the user, the alarm latching switch must never annunciate in the area where they are located.

b. Test procedure:

(1) Activate the alarm latching switch to be tested. Test should be accomplished with the control unit in the access position.

(2) Call the MP desk and verify that they received an alarm from the zone under test. If no alarm was received, contact the maintainer for service.

(3) Reset the sensor by removing the switch cover and depressing the red reset switch. Install the cover.

(4) Reset the control unit by placing the control unit mode switch to the secure position momentarily and then setting the mode switch to the access position.

(5) Contact MP desk and verify that the zone status is access.

(6) Repeat steps 1 through 5 for each alarm latching switch to be tested.

c. Test/inspection guide:

(1) Number of ALS in this room:

(2) Number of ALS in this room passed:

(3) Number of ALS in this room failed: (contact maintainer for service)

(4) Tester name:

(5) Signature:

Glossary

Section I
Abbreviations

AA&E
arms, ammunition, and explosives

ACOM
Army Command

ALS
alarm latching switch

AMC
U.S. Army Materiel Command

AMC (R&D)
U.S. Army Materiel Command, Research and Development

AMDF
Army Master Data File

AR
Army regulation

ARNG
Army National Guard

ASCC
Army Service Component Command

ASP
ammunition supply point

BATF
Bureau of Alcohol, Tobacco, and Firearms

BMS
balance magnetic switch

BPA
Blanket Purchase Agreement

CCTV
closed circuit television

CDA
catalog data activity

CID
commercial item description

CMS
central monitoring station

CG
commanding general

COE
Chief of Engineers

CONNEX
container express

CONUS
continental United States

CPS
capacitance proximity sensor

CRC
Crime Records Center

CS/CN
tear gas/chloroacetophenone

CSS
Constant Surveillance Service

DA
Department of the Army

DES
Director, Emergency Services

DLF
decision logic formulas

DOD
Department of Defense

DODD
Department of Defense directive

DODI
Department of Defense instruction

DRMO
Defense Reutilization Marketing Offices

DRU
Direct Reporting Unit

ES–SALD
Executive Agent for Small Arms Logistics and Demilitarization

FBI
Federal Bureau of Investigation

Fed Spec
GSA Federal specification

FLMSA
field level munitions storage area

FM
field manual

FMS
foreign military sales

FPCON
Force Protection conditions

GBL
Government bill of loading

GSA
General Services Administration

HAZMAT
hazardous materials

HQDA
Headquarters, Department of the Army

IDS
Intrusion Detection System

IET
initial entry training

INSCOM
U.S. Army Intelligence and Security Command

IMCOM
U.S. Army Installation Management Command

J–SIIDS
Joint–Service Interior Intrusion Detection System

LEA
law enforcement activity

MAL
master authorization list

MHE
materials handling equipment

MI
Military Intelligence

MILVAN
military van

MP
military police

NATO
North Atlantic Treaty Organization

NFESC
Naval Facilities Engineering Service Center

NCIC
National Crime Information Center

NSN
national stock number

NSWC
Naval Surface Warfare Center

OCONUS
outside continental United States

PIMS
passive infrared motor sensor

PIN
personnel identification number

PM
provost marshal

PMG
The Provost Marshal General

PUS
passive ultrasonic sensor

RC
Reserve Component

ROTC
Reserve Officers' Training Corps

SDDC
Surface Deployment and Distribution Command

SOP
standing operating procedure

SSS
signature security service

TACOM
Tank–Automotive and Armaments Command

TOW
tube–launched, optically tracked, wire–guided missile weapon

TM
technical manual

TRADOC
U.S. Army Training and Doctrine Command

UFC
unified facilities criteria

UFGS
Unified Facilities Guide Specification

UMS
ultrasonic motion sensor

U.S.
United States

USACE
U.S. Army Corps of Engineers

USACIDC
U.S. Army Criminal Investigation Command

USPS
United States Postal Service

USAR
U.S. Army Reserve

USC
United States Code

VSD
vibration signal detector

Section II
Terms

Access (when pertaining to a restricted area or CCI)
Personnel movement within a restricted area that allows the chance for visual observation of, or physical proximity to, either classified or protected materiel. It is also the ability and opportunity to obtain detailed knowledge of CCI through uncontrolled physical possession. External viewing or escorted proximity to CCI does not constitute access.

Army Command (ACOM)
U.S. Army Forces Command (also an Army Service Component Command), U.S. Army Training and Doctrine Command, and U.S. Army Materiel Command.

Aggressor
Any person seeking to compromise an asset. Aggressor categories include criminals, terrorists and protestors.

Ammunition
A device charged with explosives, propellants, pyrotechnics, initiating composition, riot control agents, chemical herbicides, smoke and flame, for use in connection with defense or offense, including demolition. Excluded from this definition are devices charged with chemical agents defined in Joint Chiefs of Staff Pub. 1 and nuclear or biological materiel. Ammunition includes cartridges, projectiles, including missile rounds, grenades, mines, and pyrotechnics together with bullets, shot and their necessary primers, propellants, fuses, and detonators individually or having a unit of issue, container, or package weight of 100 pounds or less. Blank, inert training ammunition and caliber .22 ammunition are excluded.

Antiterrorism
Defensive measure used to reduce the vulnerability of individuals and property to terrorist acts, to include limited response and containment by military forces.

Armed guard surveillance
A service that provides armed guards to maintain constant and specific surveillance of shipments for which the service is requested. Armed is defined as having a firearm and appropriate ammunition readily available for immediate use. (DOD 5100.76–M)

Arms
A weapon included in AR 190–11, appendix A, that will or is designated to expel a projectile or flame by the action of the explosive, and the frame or receiver of any such weapon.

Army Service Component Command
U.S. Army Europe, U.S. Army Central, U.S. Army North, U.S. Army South, U.S. Army Pacific, U.S. Army Special Operations Command, Military Surface Deployment and Distribution Command, U.S. Army Space and Missile Defense Command/Army Strategic Command, and Eighth U.S. Army. U.S. Army Forces Command is both an Army Command and Army Service Component Command of the U.S. Joint Forces Command.

Asset
Any resource requiring protection.

Aviation facility
A department of the Army activity or area collocated with facilities for the takeoff and landing of aircraft. The facility has the mission of command and control of administrative, operational, training, and/or logistical support of Army aviation.

Badge
A security credential that is worn on the possessor's outer garment and validates (his or her) authority for access to a restricted area.

Bulk storage
Storage in a facility above the using or dispensing level specifically applicable to logistics warehouse and depot stocks. This applies to activities using controlled medical substances and items (such as pharmacies, wards, or clinics) only when a separate facility (building or room) is used to store quantities that exceed normal operating stocks.

Cable seal lock
A seal in which the cable is passed through the locking hardware of a truck trailer or railcar door and the bullet nose is inserted into the barrel and the end of the cable until securely anchored. Once locked any force exerted to separate the lockpoint from the lockbody will strengthen its connection. (DOD 5100.76–M)

Carrier custodian
An employee who has been assigned responsibility for controlled shipments containing SECRET material by the carrier and who has been issued a personnel security clearance by the Government. (DOD 5100.76–M)

Certification
The process whereby a patrol or detector dog's and handler's proficiency is verified to be in compliance with minimum training standards.

Chains
Chains used to secure racks or containers will be of heavy–duty, hardened steel chain, welded, straight–link steel that meets Federal Specification RR–C–271D. The steel will be galvanized of at least 5/16–inch thickness or of equal resistance required to force, to cut, or break an approved low security padlock. An example of such a chain is Type 1, Grade C, Class 4 NSN 4010–0–149–5583.

Closed circuit television
Television that serves a number of different functions, one of which is PS. As it pertains to the field of PS, CCTV is used to augment, not replace, existing IDS or security patrols. It is not used as a primary sensor, but rather as a means of assessing alarms. A CCTV also may be used as a surveillance means, but if used in this way, it will augment, not replace, existing IDS.

Closed post
An Army installation or activity to which ground and water access is controlled at all times by perimeter barriers with limited, manned entry control points.

Closed vehicle or equipment
A conveyance that is fully enclosed with permanent sides and a permanent top, with installed doors that can be locked and sealed. (DOD 5100.76–M)

Combatting terrorism
Actions, including AT and CT, taken to oppose terrorism throughout the entire threat spectrum.

Commercial–type vehicle
A vehicle designed to meet civilian requirements, and used without major modifications, for routine purposes in connection with the transportation of supplies, personnel, or equipment.

CONNEX
A reusable container for shipment of troop support cargo, quasi–military cargo, household goods, and personal baggage.

Constant surveillance service
A service that is an integral part of the provisions of 49 CFR 397 (reference (b)) that a carrier must apply when transporting hazardous or Class A and B explosive materials. It provides constant surveillance over a shipment. The transporting conveyance containing the shipment must be attended at all times by a qualified representative of the carrier. A motor vehicle is "attended" when the person in charge of the vehicle is awake and not in a sleeper berth and is within 100 feet of the vehicle, provided the vehicle is within the person's obstructed field of vision. The qualified representative "attending" the vehicle must—

a. Be aware of the nature of the material contained in the vehicle.

b. Have been instructed on procedures to follow in case of emergency.

c. Be authorized to move the vehicle and have the means and capability to do so. The CSS does not include a signature and tally service as provided under signature security service (SSS) (see DOD 5100.76–M).

Container Express
A reusable container for shipment of troop support cargo, quasi–military cargo, household goods, and personal baggage.

Containerization
A box or other device in which a number of packages are stored, protected, and handled as a unit in transit; for example, CONEX, MILVAN, and SEAVAN. This term also refers to the shipping system based on large cargo–carrying containers that can be easily interchanged between trucks, trains, and ships, without rehandling of contents. (DOD 5100.76–M)

Container on a flat car
A large box–like demountable body without undercarriage used to transport cargo that is mounted on a railroad flat car. (DOD 5100.76–M)

Constant surveillance
Observing or protecting a storage facility containing AA&E by a human, intrusion detection system, closed circuit television, or combination, to prevent unobserved access, or make known any unauthorized access to the protected facility.

Continuous surveillance
Constant unobstructed observance of items or an area to prevent unauthorized access. Continuous surveillance may be maintained by dedicated guards, other on–duty personnel, or intrusion detection systems and those enhanced by closed–circuit television.

Controlled area
See restricted area.

Controlled cryptographic item
A secure telecommunications or information handling equipment ancillary device, or associated cryptographic component, which is unclassified but is controlled.

Controlled medical substance
A drug or other substance, or its immediate precursor, listed in current schedules of 21 USC 812 in medical facilities for the purpose of military treatment, therapy, or research. Categories listed in this section are narcotics, amphetamines, barbiturates, and hallucinogens.

Counterterrorism
Offensive measures taken to prevent, deter, and respond to terrorism.

Crime analysis
The process used to determine the essential features of a criminal act. It is a mandatory part of any crime prevention program.

Crime prevention
The anticipation, recognition, and appraisal of a crime risk, and initiation of some action to remove or reduce it. Crime prevention is a direct crime control method that applies to before–the–fact efforts to reduce criminal opportunity, protect potential human victims, and prevent property loss.

Crime prevention inspection
An on–site evaluation of the crime prevention program of a unit, section, office, or other facility.

Crime risk management
The development of systematic approaches to reduce crime risks.

Crisis management team
A team found at a major command or installation level. A crisis management team is concerned with plan, procedures, techniques, policies, and controls for dealing with terrorism, special threats, or other major disruptions occurring on Government installations and facilities. A crisis management team considers all aspects of the incident and establishes contact with the AOC.

Critical communications facility
A communications facility that is essential to the continuity of operations of the National Command Authority during the initial phases of national emergencies, and other nodal points or elements designated as crucial to mission accomplishment.

Cryptographic component
The embodiment of a cryptographic logic in either hardware or firmware form, such as a modular assembly, a printed circuit board, a microcircuit, or any combination of these.

Cryptographic equipment
Any equipment employing a cryptographic logic.

Cryptographic logic
A deterministic logic by which information may be converted to an unintelligible form and reconverted to an intelligible form. Logic may take the form of engineering drawings, schematics, hardware, or firmware circuitry.

Day gate
Any barriers, used in a doorway or entrance to pharmacy or medically sensitive item storage areas, that prevents unauthorized personnel access during operating hours. Such barriers normally are not the sole protection afforded the entrance during non–operating hours; however, during operating hours, the barrier ensures positive entry control by on–duty personnel (for example, electronic buzzer control entry to the area after positive identification by receptionist or on–duty personnel).

Dedicated guards
Individuals charged with performing the primary task of safeguarding designated facilities, material, and personnel within a defined area during a tour of duty. A dedicated guard may perform this function as a static post. He or she remains within or on the perimeter of a protected area and maintains continuous surveillance over that which is being protected during the tour of duty.

Defense Transportation System
Consists of military controlled terminal facilities, Military Airlift Command controlled airlift, Military Sealift Command controlled or arranged sealift, and Government controlled air or land transportation. (DOD 5100.76–M)

Demilitarization
The act of destroying the offensive or defensive characteristics inherent in certain types of equipment and materiel. The term comprehends mutilation, scrapping, burning, or alteration designed so as to prevent the further use of such equipment and materiel for its originally intended military or lethal purpose.

Direct Reporting Unit
U.S. Army Network Enterprise Technology Command/9th Signal Command (Army), U.S. Army Medical Command, U.S. Army Intelligence and Security Command, U.S. Army Criminal Investigation Command, U.S. Army Corps of Engineers, U.S. Army Military District of Washington, U.S. Army Test and Evaluation Command, United States Military Academy, U.S. Army Reserve Command, U.S. Army Acquisition Support Center, and U.S. Army Installation Management Command.

Double–locked container
A steel container of not less than 26–gauge which is secured by an approved locking device and which encases an

inner container that also is equipped with an approved locking device. Cabinet, medicine, combination with narcotic locker, NSN 6530–00–702–9240, or equivalent, meets requirements for a double–locked container.

Dromedary
A freight box carried on and securely fastened to the chassis of the tractor or on a flatbed trailer. The dromedary is demountable by the use of a forklift truck, is protected by a plymetal shield, and is equipped with doors on each side that may be locked with seals or padlocks. All explosive items carried in the dromedary must be compatible and in compliance with 49 CFR 177 (ref (c)) or host nation regulations (DOD 5100.76–M).

Dual driver protective service
A service requiring SSS plus continuous attendance and surveillance of the shipment through the use of 2 drivers.

a. The vehicle containing the shipment must be attended at all times by 1 of the drivers. A vehicle is attended when at least 1 of the drivers is in the cab of the vehicle, awake, and not in a sleeper berth or is within 10 feet of the vehicle.

b. An SSS signature and tally requirements are not required between the same pair of drivers for a particular movement (DOD 5100.76–M).

Duress alarm system
A method by which authorized personnel can covertly communicate a situation of duress to a security control center or to other personnel in a position to notify a security control center (DOD 5100.76–M).

Duress or holdup alarms
Devices which allow personnel on duty to transmit a signal to the alarm monitoring station from which an armed response force can be dispatched if a holdup or a duress situation occurs.

Emergency aircraft
An aircraft designated by the commander to respond to emergency situations and provide lifesaving and property–saving services. Normally, such aircraft has special equipment and markings. Air ambulances and fire fighting aircraft are examples.

Emergency vehicle
A vehicle designated by the commander to respond to emergency situations and provide lifesaving and property–saving services. Normally, the vehicle has special equipment and markings. Ambulances and fire fighting and military or security police vehicles are examples.

Enclosed vehicle or equipment
A conveyance that is fully enclosed with permanent sides and permanent top, with installed doors that can be locked and sealed.

Entry control (when pertaining to a restricted area)
Security actions, procedures, equipment, and techniques, employed within restricted areas to ensure that persons who are present in the areas at any time have authority and official reason for being there.

Escorted personnel (when pertaining to a restricted area)
Those persons authorized access to a restricted areas who are escorted at all times by a designated person.

Escorts and couriers
Military members, U.S. civilian employees, or DOD contractor employees responsible for the continuous surveillance and control over movements of classified material. Individuals designated as escorts and couriers must possess a Government–issued security clearance at least equal to that of the material being transported.

Exception
An approved permanent exclusion from specific requirements of this regulation. Exceptions will be based on a case–by–case determination and involve unique circumstances which make conformance to security standards impossible or highly impractical. An exception can also be an approved permanent deviation from the provisions of this regulation.

Exclusion area
See restricted area.

Exclusive use
A conveyance unit or vehicle that is used only for a shipment from origin to destination without transfer of lading, and that permits locking of the unit and use of seals

Explosives
Any chemical compound, mixture or device, the primary or common purpose of which is to function by explosion. The term includes, but is not limited to, individual land mines, demolition charges, blocks of explosives (dynamite, trinitrotoluene, C–4, and other high explosives), and other explosives consisting of 10 pounds or more; for example, gunpowder or nitroguanidine.

Facility
Any single building, project, or site.

Force Protection
Security program developed to protect Soldiers, civilian employees and family members, facilities and equipment, in all locations and situations. This is accomplished through the planned integration of combatting terrorism, PS, operations security, protective services and law enforcement operations, all supported by foreign intelligence, counterintelligence and other security programs.

Greater security
A seal tracing and inspection rail service for unclassified sensitive cargo that includes a military traffic expending service and provides—

a. Inspection of railcars at major terminals by railroad personnel for evidence of forced entry or tampering with seals or security devices.

b. Name of carrier reporting.

c. Time of inspection; that is, a.m. or p.m.

d. Actual arrival and actual departure time from inspection terminal (DOD 5100.76–M).

Handler
A military police person or DOD civilian guard or police person who has been qualified by training and certification to care for, train, and employ a military working dog.

Handling
Controlled physical possession without access.

High risk personnel
Personnel who, by their grade, assignment, value, location, or specific threat, are more likely to be attractive or accessible terrorist targets.

Independent power source
A power source, normally battery, independent of any other source (DOD 5100.76–M)

Industrial and utility equipment
Equipment used in the manufacture or in support of the manufacture of goods and equipment used to support the operation of utilities such as power and water distribution and treatment.

In flight
The condition of an aircraft from the moment when all external doors are closed following embarkation until the moment when one such door is opened for disembarkation.

Installations
Such real properties as Reserve centers, depots, arsenals, ammunition plants (both contractor–operated and Government–operated, hospitals, terminals, and other special mission facilities, as well as those used primarily by troops (see also JCS Pub. 1)

Internal controls (when pertaining to a restricted area)
Security actions, procedures, and techniques employed within restricted areas to ensure persons who are present in these areas at any time have authority and official reason.

Intrusion detection system
The combination of electronic components, including sensors, control units, transmission lines, and monitoring units

integrated to be capable of detecting 1 or more types of intrusion into the area protected by the system and reporting directly to an alarm monitoring station. The IDS will be an approved DOD standardized system such as the Integrated Commercial Intrusion Detection System or command–approved commercial equipment.

Justification for major system new start
A requirement document that the combat developer prepares with the material developer, training developer, manpower and personnel planner, and logistician. A justification for major system new start is prepared to describe the mission need and justifies the acquisition of a major new system at program initiation in the acquisition cycle.

Kennel facilities
The buildings, the kennels, the runs, and the exercise and training areas which are used to house, care for, and train military working dogs.

Key and lock control system
A system of identifying both locks and their locations and personnel in possession of keys and/or combinations.

Keying
The process of establishing a sequence of random binary digits used to initially set up and periodically change permutations in cryptographic equipment for purpose of encrypting or decrypting electronic signals, for controlling transmission security processes, or for producing other keys.

King Tut block
A King Tut block is a specially designed large concrete block. It is placed in front of an igloo or magazine entrance with a fork lift. Access to the igloo or magazine therefore requires a fork lift to move the block. The King Tut block is of sufficient weight to prevent removal without a fork lift.

Letter of agreement
A document jointly prepared and signed by the combat and materiel developers when a potential materiel system need has been identified and it has been determined that 1 or more technological approaches may satisfy the need. Even though it may be in an early stage of development, the letter of agreement will address the materiel system from the Total System Management standpoint. The letter of agreement describes operational, technical, training, personnel, and logistical system unique events that must be undertaken to produce the total system.

Lightweight construction
Building construction other than reinforced concrete or masonry (concrete block or clay brick) such as wood or metal siding.

Limited area
See restricted area.

Locked container
A container or room of substantial construction secured with an approved locking device. For pharmacy operating stocks, lockable automated counting systems meet requirements for a locked container.

Locks
Locks should be considered as delay devices only, not as positive bars to unauthorized entry, since any lock can be defeated by expert manipulation or force.

a. Padlocks.

(1) *High security padlock*. A key–operated padlock that meets military specification MIL–DTL–43607H, NSN: 5340–01–510–2351, designed to resist forced entry and surreptitious entry.

(2) *Internal locking device*. A DOD–approved key–operated locking system affixed to AA&E Category I and II storage structures. Can be used as "an alternative to the current high security padlock and hasp requirement." The dual cylinder model meets the 2 person integrity requirements. Information on procurement and installation of the internal locking device may be obtained from the NFESC, Port Hueneme, CA 93043–5000, (805) 982–3542 (DSN 551–3542) and the DOD Lock Program Office at https://portal.navfac.navy.mil/go/locks.

(3) *General field service padlock*. A key–operated padlock that meets GSA Fed Spec FF–P–2827. This padlock is recommended in applications where padlocks are exposed to grit, corrosive environments or freezing conditions.

(4) *Medium security padlocks*. Military Specification MIL–P–43951, open shackle with clevis and chain, NSN 5340–00–799–8016. Authorized for continued use to secure Categories III and IV AA&E only until stocks are depleted or replaced.

(5) *Low security padlocks*. Commercial Item Description A–A–1927, hardened steel shackle and case, without chain,

NSN 5340–00–158–3805; with chain, NSN 5340–00–158–3807. Authorized for continued use to secure Categories III and IV AA&E only until stocks are depleted or replaced.

(6) *Contact*. Any questions regarding the above specifications will be addressed to the DOD Lock Program Technical Manager, Naval Facilities Engineering Service Center, Code C66, 560 Center Drive, Port Hueneme, CA 93043–4328 (DSN 551–1567 or 551–1212).

b. Hasps.

(1) *High security hasp*. A high security hasp (NAPEC hasp) is a shrouded hasp that meets military specification MIL–DTL–29181C. It is approved for use with the high security padlock to secure all categories of AA&E. The hasp has a cover that protects the lock from cutting or hammer tools and inclement weather. It should be used to secure Category I and II AA&E storage facilities. When replacement of a hasp on Category III, IV or uncategorized AA&E is necessary, this hasp should also be used.

(2) *Hasp, pin–type, locking T*. This hasp that was authorized previously to secure ammunition storage magazines. Magazines were secured using the installed locking bar in conjunction with a T pin and high security padlock. The locking T hasp does not provide adequate security for sensitive AA&E. It must be replaced with a high security hasp to enhance security. It will not be used to secure AA&E storage facilities.

(3) *Built–in combination locks*. Built–in combination locks, meeting Underwriters Laboratories Standard 768, Group 1 (NSN 5340–01–375–7593) are approved for use on GSA approved Class 5 vault doors and GSA approved Class 5 weapons containers storing unclassified material and unclassified AA&E.

LOGAIR
Long–term contract airlift service within CONUS for the movement of cargo in support of the logistics system of the military Services (primarily the Army and Air Force) and Defense agencies (DOD 5100.76–M).

Major disruption on installations
Acts, threats, or attempts to commit such acts as kidnapping, extortion, bombings, hijackings, ambushing, major weapons thefts, arson, assassination, and hostage taking on a military installation. These acts that have potential for widespread publicity require special response, tactics, and management.

Military traffic expediting service
A service providing for movement from origin to destination in the shortest time possible for specifically identified rail shipments, and which is required for the shipment of firearms and other sensitive shipments. This service, which uses electrical communications between members of the Association of American Railroads, is available for either single–line haul or joint–line movements and provides progress reports as required (DOD 5100.76–M).

Military van (MILVAN)
Military–owned demountable container, conforming to U.S. and international standards, operated in a centrally controlled fleet for movement of military cargo (DOD 5100.76–M).

Military working dog
Dogs required by the using DOD component for a specific purpose, mission, or combat capability. Military working dogs include patrol, patrol and narcotic/contraband, and patrol and explosive detector dogs.

Military working dog team
The military working dog and its appropriately qualified and assigned handler.

Mission–critical personnel
Personnel who are essential to the operation of an organization of function.

Mission essential and vulnerable areas
Facilities or activities within the installation that, by virtue of their function, are evaluated by the commander as vital to the successful accomplishment of the installation's State National Guard, or MUSARC mission. This includes areas non–essential to the installation's/facility's operational mission but which, by nature of the activity, are considered vulnerable to theft, trespass, damage, or other criminal activity.

Motor pool
A group of motor vehicles used as needed by different organizations or individuals and parked in a common location when not in use. On an Army installation, a non–tenant Army activity with 10 or less assigned commercial–type vehicles but no local organizational maintenance support does not have a motor pool, under this regulation, even though the vehicles are parked together.

Motor vehicle
A self–propelled, boosted, or towed conveyance used to transport a burden on land. This includes all Army wheeled and track vehicles, trailers, and semitrailers, but not railroad locomotives and rolling stock.

National Defense Area
An area set up on non–Federal lands located within the United States, its possessions or territories, to safeguard classified defense information or DOD equipment or materiel. Establishment of a National Defense Area temporarily places such non–Federal lands under the effective control of DOD and results only from an emergency event.

Negotiations
A dialogue between authorities and offenders which has as the ultimate goal for the safe release of hostages and the surrender of the offenders.

One dog–1 handler
The concept that each military working dog will have only 1 handler. Personnel shortages may necessitate assigning a handler responsibility for more than 1 dog. However, 2 or more handlers cannot handle the same dog.

Open post
Installations or activities that do not qualify as closed or limited access posts. Access to the installation or activity is not controlled during or after normal duty hours.

Perimeter fence
Fences for the security of unclassified, nonsensitive items that meet the requirements of USACE STD design drawing code 872–90–00 series. The minimum height will be 6 feet with or without an outrigger. Use of NATO standard design fencing is also authorized.

Perimeter wall
Any wall over 6 feet tall which delineates a boundary and serves as a barrier to personnel and/or vehicles. These walls may be constructed of reinforced concrete, masonry, or stone.

Physical protective measures
Physical security measures used to counter risk factors that usually do not change over a period of time such as mission impact, cost, volume, and criticality of resources and vulnerabilities. The measures are usually permanent and involve expenditure of funds.

Physical security
That part of the Army security system, based on threat analysis, concerned with procedures and physical measures designed to safeguard personnel, property, and operations; to prevent unauthorized access to equipment, facilities, materiel, and information; and to protect against espionage, terrorism, sabotage, damage, misuse, and theft. Operations security and security targeted against traditional criminal activity are included.

a. Physical security procedures include, but are not limited to, the application of physical measures to reduce vulnerability to the threat; integration of PS into contingency, mobilization, and wartime plans; the testing of PS procedures and measures during the exercise of these plans; the interface of installation operations security, crime prevention and PS programs to protect against the traditional criminal; training of guards at sensitive or other storage sites in tactical defense against and response to attempted penetrations; and creating PS awareness.

b. Physical security measures are physical systems, devices, personnel, animals, and procedures employed to protect security interests from possible threats and include, but are not limited to, security guards; military working dogs; lights and physical barriers; explosives and bomb detection equipment; protective vests and similar equipment; badging systems; electronic entry control systems and access control devices; security containers; locking devices; electronic intrusion detection systems; standardized command, control, and display subsystems; radio frequency data links used for PS; security lighting; delay devices; artificial intelligence (robotics); and assessment and/or surveillance systems to include closed–circuit television. Depending on the circumstances of the particular situation, security specialists may have an interest in other items of equipment such as armored sedans.

Physical security equipment
A generic term for any item, device, or system that is used primarily to protect Government property, including nuclear, chemical, and other munitions, personnel, and installations, and to safeguard national security information and

material, including the destruction of such information and material both by routine means and by emergency destruct measures.

a. Interior PS equipment. Physical security equipment used internal to a structure to make that structure a secure area.

b. Exterior PS equipment. Physical security equipment used external to a structure to make the structure a secure area.

c. Intrusion detection system. See glossary definition, above.

Physical security inspection
A formal, recorded assessment of physical procedures and measures implemented by a unit or activity to protect its assets.

Physical security measures
See physical security.

Physical security plan
A comprehensive written plan providing proper and economical use of personnel, land, and equipment to prevent or minimize loss or damage from theft, misuse, espionage, sabotage, and other criminal or disruptive activities.

Physical security procedures
See physical security.

Physical security program
The interrelationship of various components that complement each other to produce a comprehensive approach to security matters. These components include, as a minimum, the PS plan; PS inspections and surveys; participation in combatting terrorism committees and fusion cells; and a continuing assessment of the installation's PS posture.

Physical security resource plan
Plan developed by the PS officer that identifies PS needs, and shows proposed programmed procurement of those needs.

Physical security survey
A formal, recorded assessment of the installation PS program.

Physical security system architecture
A system ensuring that IDS components designed by the various services are compatible when used together. The Air Force is responsible for systems architecture.

Pier service
Ocean carrier booking is restricted over ocean movement from port of embarkation to port of debarkation. It precludes prearranged–through–booking employing surface transportation to inland destinations (DOD 5100.76–M).

Pilferable assets
Any asset which can be stolen and which does not fall under the other asset categories discussed in this publication.

Pilferage–coded items
Items with a code indicating that the material has a ready resale value or civilian application and, therefore, is especially subject to theft.

Portable
Capable of being carried in the hand or on the person. As a general rule, a single item weighing less than 100 pounds (45.34 kilograms) is considered portable.

Primary electrical power source
That source of power, either external (commercial) or internal, that provides power to site facilities on a daily basis (DOD 5100.76–M).

Protection in depth
A system providing several supplementary security barriers. For example, a perimeter fence, a secure building, a vault, and a locked container provide 3 layers of protection. (DOD 5100.76–M)

Protective layer
Any envelope of building components which surrounds an asset and delays or prevents aggressor movement toward the asset or which shields the asset from weapons and explosives effects.

Protective security service
A service to protect shipments. Protective security service involves a transporting carrier that must be a cleared carrier under provisions of DOD 5220.22–R, paragraph 1–702.a (ref (d)). A shipment must be under the constant surveillance of designated carrier employees, unless it is stored in containers or an area approved by the cognizant Defense Investigative Service regional office. The designated carrier employees providing constant surveillance when protective security service is required must possess a Government–issued SECRET clearance and a carrier–issued identification (DOD 5100.76–M).

QUICKTRANS
Long–term contract airlift service within the CONUS for the movement of cargo in support of the logistic system for the military Services (primarily the Navy and Marine Corps) and Defense agencies (DOD 5100.76–M).

Rail surveillance service
An inspection service of rail shipments. An inspection is made within 1 hour after each stop, if the trailer containing a shipment remains at a halt. Reinspection is made a minimum of once each hour, as long as the railcar containing the shipment remains at a halt (DOD 5100.76–M).

Report of Shipment
An advanced report furnished by message or telephone immediately upon dispatch of a shipment within CONUS for domestic shipments. A report goes to both Water Terminal Clearance Authority and the water port trans–shipping facility for surface export shipments, or to the Military Air Traffic Coordinating Officer for air export shipments. The advance notice of shipments will include the following applicable data:

a. For domestic shipments, see AR 55–355/NAVSUPINST 4600.70/AFM 75–2/MCO P4600.14A/DLAR 4500.3, Routing Instruction Note 146, appendix L (reference (e)).

b. For export shipments, see DOD 4500.32–R (reference (f)), chapter 4 (DOD 5100.76–M.

Required operational capability
A requirements document that the combat developer prepares with input from the training developer in coordination with the material developer, logistician, and manpower and personnel planner. The required operational capability is a concise statement of the minimum essential operational; reliability, availability, and maintainability; technical; personnel and manpower; training, safety; health; human factors engineering; logistical, and cost information to start full scale development or procurement of a material system.

Restricted area
Any area to which entry is subject to special restrictions or control for security reasons or to safeguard property or material. This does not include those designated areas over which aircraft flight is restricted. Restricted areas may be of different types. The type depends on the nature and varying degree of importance, from a security standpoint, of the security interest or other matter contained therein.

a. Exclusion area. A restricted area containing—

(1) A security interest or other matter of such nature that access to the area constitutes, for all practical purposes, access to such security interests or matter.

(2) A security interest or other matter of such vital importance that proximity resulting from access to the area is treated equal to (1), above.

b. Limited area. A restricted area containing a security interest or other matter, in which uncontrolled movement will permit access to such security interest or matter; access within limited areas may be prevented by escort and other internal restrictions and controls.

c. Controlled area. That portion of a restricted area usually near or surrounding an exclusion or limited area. Entry to the controlled area is restricted to authorized personnel. However, movement of authorized personnel within this area is not necessarily controlled. Mere entry to the area does not provide access to the security interest or other matter within the exclusion or limited area. The controlled area is provided for administrative control, safety, or as a buffer zone for security in depth for the exclusion or limited area. The proper commander establishes the degree of control of movement.

Ride awhile–walk awhile method
A law enforcement or security patrolling technique. The military working dog team patrols for a period of time in a vehicle and then dismounts for an appropriate period of time to patrol an area on foot. This method increases the

potential area the team can cover, as well as allowing the team to concentrate their foot patrols in especially critical areas.

Risk
The degree or likelihood of loss of an asset. Factors that determine risk are the value of the asset to its user in terms of mission criticality, replaceability, and relative value and the likelihood of aggressor activity in terms of the attractiveness of the asset to the aggressor, the history of or potential for aggressor activity, and the vulnerability of the asset.

Risk analysis
Method of examining various risk factors to determine the risk value of likelihood of resource loss. This analysis will be used to decide the level of security warranted for protection of resources.

Risk factors
Elements that make up the total degree of resource loss liability. Factors to be considered in a risk analysis include the importance of the resource to mission accomplishment; the cost, volume, criticality and vulnerabilities of the resources; and the severity of threats to the resources.

Risk level
An indication of the degree of risk associated with an asset based on risk analysis. Risk levels may be Levels I, II, or III, which correspond to low, medium, and high.

Risk value
Degree of expectation or likelihood of resource loss. The value may be classified as low, medium, or high.

Safe
A GSA Class 5 map and plans security container, Class 6 security filing cabinet or refrigerator or freezer, secured with an approved locking device and weighing 500 pounds or more, or secured to the structure to prevent removal.

Seal
A device to show whether the integrity of a shipment has been compromised. Seals are numbered serially, are tamper proof, and will be safeguarded while in storage. The serial number of a seal will be shown on GBL. A cable seal lock provides both a seal and locking device.

Sealed containers
Wooden boxes, crates, metal containers, and fiber containers sealed in a way to show when the containers are tampered with after sealing. The method of sealing depends of the type of construction of the containers. Sealing may be by metal banding, nailing, airtight sealing, or wax dripping (for fiber containers). In key control, a sealed container is also a locked key container or a sealed envelope containing the key or combination to the key container.

Sealed protection
A container or an area enclosed by a plastic or soft metal device which is opened easily without the use of a key or combination.

SEAVAN
A commercial, Government–owned or leased shipping container and without bogey wheels attached that is moved by ocean transportation and must be lifted on and off the ship (DOD 5100.76–M).

Security card
An official distinctive identification (pass or card) that identifies and authorizes the possessor to be physically present in a U.S. Army designated restricted area.

Security engineering
The application of engineering principles to the protection of assets against various threats through the application of construction and equipment application.

Security lighting
The amount of lighting necessary to permit visual surveillance by security police or by supervisory personnel.

Security procedural measures
Physical security measures to counter risk factors that will periodically change over a period of time such as criminal,

terrorist, and hostile threats. The procedures can usually be changed within a short amount of time and involve manpower.

Sensitive conventional arms, ammunition, and explosives
See categorization of such items in appendix A.

Sensitive items
Material requiring a high degree of protection to prevent unauthorized acquisition. This includes arms, ammunition, explosives, drugs, precious metals, or other substances determined by the Administrator, Drug Enforcement Administration to be designated Schedule Symbol II, III, IV, or V under the Controlled Substance Act of 1970.

Signal intelligence
Intelligence derived from communications means (such as telephone, telegraph, radio), electronic signal emitters (such as navigation radar, identification friend or foe, and weapons guidance devices) and instrumentation signals (such as telemetry and beaconry).

Signature Security Service
A service designed to provide continuous responsibility for the custody of shipments in transit. A signature and tally record is required from each person responsible for the proper handling of the shipment at specified stages of its transit from origin to destination.

a. The initial signature on the signature and tally record should be the same as that of the carrier's agent on the GBL. When SSS is used in conjunction with dual driver protective service, both drivers in each pair of drivers will sign the signature and tally record when that pair assumes responsibility for the shipment.

b. Commercial carriers offering SSS must be able to trace a shipment in less than 24 hours. The following forms will be used to obtain SSS:

(1) *Surface shipments.* DD Form 1907 (Signature and Tally Record) will accompany every surface shipment of classified or protected material accorded a signature and tally service by surface commercial carriers. Carrier tariffs and tenders may describe this type of service under different titles for example, Hand–to–Hand Signature Service or Signature Service.

(2) *Commercial air shipments.* The air industry shall use the DD Form 1907 to obtain the signature and tally record. No receipt is required from the flight crew or attendants while the aircraft is in flight. A signature and tally record is required; however, from air carrier personnel whenever the aircraft is on the ground and access to the cargo compartment containing the sensitive AA&E is available for any purpose. A signature and tally record is also required from pickup and delivery carriers used by the airlines for such purposes.

(3) *Military air shipments.* The DD Form 1907, or similar document, will be used to provide hand–to–hand receipt control for sensitive and classified shipments being transferred in the Defense Transportation System.

Steel bar
A flat bar, 3/8–inch by 1–inch minimum; or round bar 1/2–inch diameter minimum.

Steel mesh
High carbon, manganese steel not less than 15/100–inch (8–gauge) in thickness, and a grid of not more than 2 inches center to center.

Storage
Any area where AA&E are kept. Storage does not include items in process of manufacture, in use, or being transported to a place of storage or use.

Survivability
The ability to withstand or repel an attack, or other hostile action, to the extent that essential functions can continue or be resumed after the hostile action.

Tactics
The specific methods of achieving the aggressor's goals to injure personnel, destroy Army assets, or steal Army materiel.

Tactical vehicle
A vehicle with military characteristics designed primarily for use by forces in the field in direct connection with, or support of, combat or tactical operations, or the training of troops for such operations.

Tenant activity
A unit or activity of 1 Government agency, military department, or command that occupies facilities on an installation of another military department or command and that receives supplies or other support services from that installation.

Terrorism
The calculated use of violence or the threat of violence to inculcate fear; intended to coerce or to intimidate governments or societies in the pursuit of goals, that are generally political, religious, or ideological.

Terrorism counteraction measures
Term used previously for combatting terrorism (see definition of this term).

Terrorist group
A politically, religious, or ideologically oriented group which uses terrorism as its prime mode of operations.

Threat management force
An action force from the installation that responds to major disruptions on installations. The threat management force should be of sufficient size to manage the disruption and will usually involve a command element, security element, negotiation team, special reaction team, and logistical element.

TOW
A tube–launched, optically tracked, wire–guided missile designed as an antitank weapon system (DOD 5100.76–M).

Two–person concept
A system designed to prohibit access by an individual to nuclear weapons and certain designated components by requiring the presence at all times of at least 2 authorized persons, each capable of detecting incorrect or unauthorized procedures with respect to the task being performed. (Also referred to as the 2–man rule, 2–man policy, or 2–person rule.)

Upper rail lock
A set screw operated variation of a C clamp designed for gripping the upper sliding rail which supports or guides the weight of some styles of railroad boxcar doors. Gripping the upper sliding rail, the lock blocks and prevents the door's roller hangers or carriers from sliding past, thereby effectively preventing the door from being moved (DOD 5100. 76–M).

Waiver
Temporary relief from specific standards imposed by this manual (regulation) pending actions accomplishment of actions that will conform to the standards required. Compensatory measures are required.

Section III
Special Abbreviations and Terms
There are no entries in this section.

USAPD

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Columbus Water Works

Serving our Community
Protecting the Environment

CWW Facts Sheet Feb. 1st, 2010
All water and sewer designs, installations must adhere to CWW standards and specifications
Include CWW specs for sanitary sewer and potable water in the project RFP and Specifications.
On line specifications for water and sewer design as well as Sanitary Sewer and Disposal Ordinance are available at the website for CWW (cwwga.org)

Submit 2 hard copies of water and sanitary plans for review and approval.
Ft. Benning Engineering located at WWTP #1, Bld 2685, 7301 Marne Road
Kyle Fikes, FB Eng 706-587-0409 Kfikes@cwwga.org
Howard Shiver, FB Inspector 706-575-3342 hshiver@cwwga.org

Design Build Contractors are expected to perform their own flow test for water and capacity measurements for sewer. Please notify (706-575-3304 Tom Blake) CWW before performing flow testing.

Water and Sewer Service must be maintained to others on lines running through site.
Design Builder is responsible for protection and relocation of CWW utilities if needed. Call for locates 72 hours before digging. 811 Ga locates, 706-545-7264 Shaw locates

Notify CWW 48 hrs prior to water / sanitary sewer construction start. Water Utility Contractors are required to have valid Georgia Utility License. Final water connection or wet tap must be done by a CWW approved contractor.

Domestic water: meter size 3" and above requires vault with bypass per CWW specs. Design builders to supply meter and BFP. Place BFP in mechanical room when possible. Ft Benning requires each building to be metered in cubic feet. Neptune style meters have necessary connections for remote reading. Irrigation and Fire suppression do not require metering.

Water Mains must be approved ductile iron pipe. Domestic water service 2" and below are to be copper tubing, type "K". Copper larger than 2 inches isn't approved by CWW, change to dip. Sewer mains are 8" minimum, laterals are 6" minimum. Sewers less than 3' shallow or more that 14' deep must be DIP. Normal main material is SDR35. Fire Hydrants and Valves close clockwise on Ft Benning.

Grease Traps or Oil/Water Seperator style and designs are required on all facilities that cook, serve or render food or food products. All designs must be approved by; Mark Hernandez CWW cell 706-577-4246
Industrial pollutants or wastewater may require permitting by; Chris Cornett 706-649-3310

Back Flow Protection for different services are required on all domestic, lawn irrigation and fire services.
Design, type and installation are to be approved by; Gerald Hall CWW 706-649-3445
Construction trailer water taps are arranged by CWW Customer Service Natilie 706-649-3419
There are no CWW connection or impact fees for Fort Benning buildings water and sewer service

Fire Lines – Final approval of Fire Lines by Ft. Benning Fire Department

Fire Line BFP – Double Detector Check type, located in mechanical room on riser.
- PIV w/tamper switch. Set distance from building per FBFD
- CWW doesn't maintain water storage tanks for fire systems.

FORT BENNING, GEORGIA

OUTSIDE PLANT CONDUIT AND MANHOLE

INSTALLATION REQUIREMENTS

FORT BENNING NEC

26 MARCH 2010

1. LOCATING EXISTING UNDERGROUND UTILITIES

(a) Locating, marking and protecting existing underground utilities shall be the responsibility of the Contractor, and shall be done at the Contractor's expense. Prior to the initiation of any digging, excavation, and or other activity that could possibly impact utilities associated with the contract effort, the Contractor shall utilize the procedures outlined herein to have all utilities in the work area located and marked.

(b) Procedures and responsibilities of Contractor when requesting a utility locate:

1. Contractor shall call the Georgia One Call-Utilities Protection Center (UPC) at 1-800-282-7411 and request a locate. The UPC handles locate requests for off Post utilities to include electric, gas water and waste water utilities. The UPC will issue a locate ticket number to the Contractor with the legal date to dig, ticket expiration date and date to renew if work not complete.

2. After obtaining the locate ticket number from the UPC, the Contractor shall call the Fort Benning Locate Office-Shaw at 706-545-7264 to obtain locates on fiber optic lines, CATV cable lines and Post telephone lines.

3. Locate call requires at least 72 hours advance notice. The Contractor's responsibility is to locate and to protect utilities from damage resulting from activity associated with the contract effort is a continuing responsibility throughout the period of performance. The Contractor is responsible for initiating and maintaining an active utility locate ticket (dig permit) throughout the end of digging operations during any period of performance to include renewal of ticket with UPC and Shaw. According to Georgia One-Call H.B. No. 1290 Section 1 25-9-3, the "tolerance zone" means the width of the utility facility plus 24 inches on either side of the outside edge of the utility facility on a horizontal plane. The Contractor is responsible for potholing, prior to digging, to physically locate underground utility.

4. The Contractor shall notify the Government immediately of damages to existing utilities caused by his or his subcontractor's employees. After the Government inspects all damages, the Contractor shall take immediate action to repair such damages at the Contractor's expense and in a manner that will result in minimal impact of utility users, with the quality of repair being subject to approval by the owner of the utility or utilities damaged. (Note: Electric, water, waste water, gas and television cable on Fort Benning are owned and operated by non-Government entities). If the Contractor fails or refuses to repair the damages promptly, the Contracting Officer may have the necessary work performed and charge costs to the Contractor.

5. Only the Contracting Officer is authorized to relieve the Contractor from its responsibility to have utilities located and marked.

6. NEC after duty, weekend and holiday contact number 706-545-2178.

2. MANHOLE TYPE:

Manhole shall be 6'X12'X7' Communication "T" Type pre-cast 38Y unless permission from the NEC is acquired.

- 36" Frame and Cover rated at H-20 loading
- Complete communication racking package including stand-offs, wall racks, steps and corner brackets
- Quantity 1- 15" pre-cast collar
- Collar must be centered with top of manhole and secured in place in such a manner that the collar cannot move during back filling and final grade restorations.
- Water proof sealer shall be placed between bottom and top half of manhole
- Quantity 1- ¾"X10' copper ground rod. The ground must have 25 OHMS or less resistance to ground. If not additional rods must be driven. A number 2 solid ground shall be placed from the ground rod into the manhole. The ground wire shall enter the manhole no more 4" from the inside roof and 6" from the inside wall of the manhole. The bottom section of pre-cast manhole shall be core drilled and ground rod driven into the earth with a minimum of 4" of ground rod being exposed above floor level. After ground rod is placed, the floor shall be sealed with waterproof sealer around ground rod. A number 6 solid ground shall be bonded to existing bonding ribbon in pre-cast hole.
- Manhole shall be placed level and shall have a minimum of 24" cover over top of manhole
- A minimum of 6" of number 57 crushed stone shall be placed in the bottom of the excavation before bottom half of manhole is placed
- All newly installed manholes will be stenciled with a manhole number that will be provided by Ft. Benning, NEC.
- Manhole shall be equipped with sump pump hole with cover and cable pulling eyes.

- Manholes being installed shall be orientated with the T-portion of the manhole pointing away from the DCO.
- Hand Holes are not permitted unless it has been approved by the U.S. Government before installation. Minimum size requirement for hand holes are 4x4x6 concrete hand holes and shall be placed with a minimum of 24 inches of cover. Same specifications apply to hand holes as stated in above specifications.
- The use of Quazite hand holes are not to be used unless it has been approved by the U.S. Government before installation.

- **Fort Benning QA/QC will be on site before placing manhole. It is the contractor's responsibility to notify the QA/QC with ample time to inspect the excavation before the manhole is installed.**

3. MANHOLE NUMBERING:

Manhole numbers will be issued by the NEC. Contractors will meet with the NEC representatives accompanied with sets prints for numbers to be issued.

4. LOCKING COVERS

All manholes shall have locking covers installed. Contractor shall contact the NEC for specifications and installation before ordering or installing.

5. CONDUIT INSTALLATION:

In main duct runs a minimum of 6, 4" PVC conduits shall be placed between manholes. A minimum of 3, 4" PVC conduits shall be placed from manholes to EUB's.

a. Examples of conduit types include the following:
   - Encased Buried (EB)-20 – for encasement in concrete
   - EB-35 – for encasement in concrete
   - DB-60 – for direct burial or encasement in concrete
   - DB-100 – for direct burial or encasement in concrete
   - DB-120 – for direct burial or encasement in concrete
   - Rigid Nonmetallic Conduit Schedule 40 – for direct burial or encasement in concrete
   - Rigid Nonmetallic Conduit Schedule 80 – for direct burial or encasement in concrete
   - Multiple Plastic Duct (MPD) – for direct burial or installation in conduit
   - Rigid Metallic Conduit – for direct burial or encasement in concrete
   - Intermediate Metallic Conduit – for direct burial or encasement in concrete
   - Fiberglass Duct – for direct burial or encasement in concrete
   - Innerduct Polyethylene (PE) – for direct burial or installation in conduit
   - Innerduct Polyvinyl Chloride (PVC) – for direct burial or installation in conduit

- High Density Polyethylene (HDPE) – for directional drilling
- EB-20 and DB-60 conduit will meet National Electrical Manufacturers Association (NEMA) Standard TC-6
- EB-35 and DB-120 conduit will meet NEMA Standard TC-8
- Schedule 40 and Schedule 80 rigid nonmetallic conduit will meet NEMA Standard TC-2
- Nonmetallic conduits will be encased in concrete of minimum 20,700 kPa (3,000 lb/in^2) compressive strength where vehicular traffic (i.e., automotive, railway) is above the pathway, or where a bend or sweep is placed.
- Spacers will properly support concrete-encased ducts. Spacers will be installed in accordance with the manufacturer's specifications. If the manufacturer's specifications are unknown, a spacer will be installed a minimum of one spacer every 3 m (10 ft). Ducts supplied in 6.1-m (20-ft) lengths require spacers every 1.5 m (5 ft). The duct will not be damaged, cracked, or crushed prior to or during installation. Conduit systems not encased in concrete will be installed in layers with backfill installed around and between the ducts. Construction vehicles will not be driven over DB conduits.
- Ensure the integrity of the orientation of the duct bank between maintenance holes. Do not allow the ducts to twist or tangle between maintenance holes.

4. DUCTS TO BE INSTALLED IN TRENCHES:

- The type of duct for new installation will be PVC, Schedule EB, DB, or Schedule 40. Schedule EB duct will be used only if the duct is encased in concrete. Schedule DB or Schedule 40 duct will be used for applications where the duct is DB or encased in concrete.
- Ducts will be joined in such a manner as to be soil tight. Joints will form a sufficiently smooth interior surface between joining sections so that cables will not be damaged when pulled past the joint. Joints between dissimilar types of ducts (PVC,HDPE, galvanized steel pipe (GSP), EB, DB, etc.) will use the appropriate connectors designed for the purpose of providing a seal between the ducts and preventing damage to cables pulled through these joints.
- Accomplished changes in direction of runs exceeding a total of 10 degrees, either vertically or horizontally, by long sweeping bends having a minimum radius of 7.62 m (25ft.). Long sweeps may be made up of one or more curved or straight sections and/or combinations thereof. Bends made manually will not reduce the internal diameter of the conduit. There will be no more than the equivalent of two 90 degree bends (180) degrees total) between pull points, including offsets and kicks with a curvature radius of less than 30 m (100 ft.). Back-to-back 90 degree bends will be avoided.

- Where the radius is less than 12m (40ft.), 4.6m (15ft.) radius-manufactured bends must be used. If possible, the entire change in direction should be made with a single arc of 4.6-m (15ft.) radius. Manufactured bends may be used on subsidiary/lateral conduits at the riser pole or building entrance. Manufactured bends will have a minimum radius of 10 times the internal diameter of the conduit in accordance with NEC Chapter 9 and ANSI/TIA/SIA-758.
- Bends and sweeps will be concrete-encased to protect the duct from the pressures developed while pulling cables. Where a duct enters a building and sweeps up through a floor slab or foundation wall galvanized RSC will be used. For ducts transitioning from the lower duct window of a maintenance hole to the nominal trench depth, the transition will be accomplished in no less than 9.1 m (30 linear ft) from the maintenance hole in order to reduce the radius of the bends. The duct should be concrete-encased in the transition area.

5. SECTION LENGTHS AND FORMATIONS:

- The section length of conduit will not exceed 183 m (600 ft) between pulling points in main conduit runs without U.S. Government approval. The section length of subsidiary duct is limited mainly by the size of the cable to be pulled into it and the number of bends it will contain.
- Ducts between the cable vault and the first manhole will be based upon the size of the switch, the number of outside cable pairs served from the switch location, the fiber optic requirements, and future growth.
- A main duct run includes the manholes and ducts from a DCO or node and provides the pathways for large feeder cables and/or core FOCs. New main duct runs will consist of a minimum of 6-way, 4-in duct banks. One of the ducts will contain a minimum of two runs of three-way maxcell innerduct.
- A lateral duct run is defined as a minor branch run from the main duct run between manholes. New lateral duct runs will be a minimum of four-way, 4-in duct banks. One of the ducts will contain a minimum of two runs of three-way maxcell inner duct.
- Entrance ducts are defined as ducts from the manhole or hand hole to a EUB. New EUB entrance ducts shall be a minimum of three way, 4-inch duct banks. One duct shall be equipped with a minimum of one run of three-way maxcell inner duct. Installation of maxcell is dependent on duct bank configuration. If duct is stacked maxcell will be placed in the top duct closest to the wall of the manhole.
- Depth of Cover – At least 600 mm (36 in) of cover is required above the top of the duct bank. At least 457 mm (18 in) of cover is required under roads or sidewalks (if duct is concrete-encased). For ducts installed in solid rock, the cover will consist of at least 150 mm (6 in) of concrete. If rock is

encountered below grade, the minimum cover above the concrete-encased duct will be 300 mm (12 in).

- Trench Width – The contractor will engineer the trench width to the minimum width required to support the size of the duct bank being installed. For installing ducts, the trench width depends on the number of ducts, size of ducts, arrangement of ducts, and space around ducts (at least 50 mm [2 in]). Additional width may be required to work in deep trenches or with large count duct banks. Shoring of walls or sloping will be performed as required by the Occupational Safety and Health Administration (OSHA) and/or local requirements. The trench width for DB conduit will be wide enough to permit tamping of dirt on the sides of the conduit formation.
- Concrete Encasement – The duct system will be concrete-encased in all main cantonment areas. At a minimum, the duct system will be encased under all traffic areas, where any bend/sweep exceeds 10 degrees, in any direction, and in any stream/drainage area subject to washing out. Concrete-encased duct, galvanized RSC, or pipe casings will also be placed under all paved road surfaces and certain heavy traffic non-surfaced roads as documented in the site-specific SOR/EDP. The encasement/pipe will be extended a minimum of 1.8-m (6-ft) beyond the roadbed for all road crossings. The contractor will use only one brand of Portland cement that conforms to ASTM C 150. The concrete will be a wet type mix and placed in such a manner as to ensure the concrete completely surrounds all ducts and that no air or voids are trapped in the mix. Concrete used to encase conduits will be a minimum 20,700 kPa (3,000 lb/in^2) compressive strength. Duct systems to be concrete-encased shall be tied down to minimize, if not eliminate the duct system from moving during the placement of concrete. All sections of conduit systems to be concrete-encased shall be tied down every 10 ft.
- Duct Placement – New ducts will be swept down and installed in the lowest available duct positions within the lowest available duct window in the manhole. Additional ducts required in the future will be placed on top of the existing ducts. Ducts placed under this project will not prevent placement of future ducts in the upper duct positions. Conduits will terminate in bell ends or duct terminators at the point of entrance into the manholes and buildings. All newly installed duct runs require a minimum of 36" cover from top of duct. Ducts transitioning from the lower duct window of a manhole to the nominal trench depth, the transition the transition shall be accomplished in no less than 30 linear ft. from the MH in order to reduce the radius of the bends. The ducts shall be concrete-encased in the transition area.
- Reinforcement of Existing Ducts – New ducts installed to reinforce an existing duct bank will be placed above the existing duct bank if the minimum top cover of 600 mm (24 in) can be maintained. If there is not sufficient top cover available, the new duct will be placed beside the existing duct bank.
- Pull String/Rope/Tape – Once ducts have been mandrelled to verify their integrity, a pull string, pull rope, or pull tape rated at not less that 890-newton

(N) (200-lb) tensile strength will be installed in each new conduit and innerduct/subduct. A minimum of 1.5 m (5 ft) will be provided at each end of the conduit. The string/rope/tape will be coiled and secured at each end in such a manner as to prevent it from being accidentally pulled back into the duct.

- Plugs – All ducts, subducts, and, innerducts, whether main or subsidiary runs, will be plugged using universal screw type duct plugs in maintenance holes, hand holes and building entrances. Foam sealant is not acceptable in a building.
- Duct Seals – The area between the entrance conduits and the penetrated floors and/or walls of a building or maintenance hole will be sealed to be waterproof or fire-stopped as appropriate. Use of hydraulic cement between the duct and wall is acceptable for waterproofing the duct entry point.

6. WARNING TAPE:

All warning tape will be polyethylene plastic tape, a minimum width of 6". IAW, APWA Uniform Color Code and imprinted with the words: **WARNING TELECOMMUNICATION CABLE BELOW**. Tape will be manufactured with integral wires, foil backing or other means of enabling detection by a metal detector when tape is buried up to (3'). The materials in the warning tape will be chemically inert and will not degrade when exposed to acids, alkalis and other destructive substances found in soil.

7. Detectable Warning Tape Installation:

Detectable warning tape will be installed (12 in) to (18 in) above all new non-metallic conduit formations and DB installations, and will not exceed the manufacturer's recommended depths below grade. Tape will be placed at a depth of no less than (12 in) below surface grade. Buried cables include cables placed in open trenches and cables placed by plowing.

8. CONDUIT ROAD CROSSINGS:

- For road crossings not using the cut and restore method, RSC or steel pipe casings will be used as specified in the site-specific SOR/EDP. The RSC and steel casings will be placed under the highway in a manner that does not damage the conduit or casing.
- The contractor will use a steel casing, a minimum of 300-mm (12-in) diameter with a minimum wall thickness of 5-mm (3/16-in), for pushing

under commercial railroad crossings and for multiduct conduit runs under non-commercial railroad beds. The steel casing will have an inner diameter, a minimum of 100-mm (4-in) wider than the outer diameter of the conduit formation (with spacers) that is to be placed within the casing. A single 100-mm (4-in) diameter RSC can be installed under non-commercial railroad beds in single conduit applications. After the duct installation, the casing must be filled with fine sand (blown in with air pressure) or slurry and sealed on both ends with at least a 75-mm (3-in) thick concrete wall.

9. RODDING AND MANDRELLING DUCT

a. Rodding a duct entails inserting or pushing a rod into the duct to:

- Determine the length of the duct
- Locate the other end of the duct
- Determine if the duct is usable or blocked
- Insert a pull string in the duct
- Mandrelling a duct consists of pulling a test mandrel or slug through the duct to insure that the duct diameter is intact and ready for the installation of cables. Mandrelling can also be used to clean any mud, sand, or dirt out of the duct. The mandrel's diameter, 13-mm (1/2-in) less than the duct's inside diameter, depends on the type and size of the ducts. New ducts in main and subsidiary duct runs will be mandrelled with a test mandrel (non-flexible) or slug that is approximately 300 mm (12 in) in length and 13 mm (1/2 in) less than the duct inside diameter. The test mandrel will be used to verify the integrity of the duct joints, to test for out-of-round duct, and to verify that sweeps are not so severe as to preclude the placement of large diameter cables. The 300-mm (12-in) test mandrel will not pass through ducts with 90-degree sweeps. A 150-mm (6-in) length test mandrel may be used to test duct runs to buildings or riser poles. Flexible mandrels, wire brushes, rubber duct swabs, leather washer duct cleaners, etc., may be used to clean the ducts.
- **Fort Benning QA/QC will be on site during mandrel testing. It is the contractor's responsibility to notify the QA before work begins.**

10. CABLE ID/TAGGING:

All cable tags will be printed by machine and applied to tags. Hand written tags are not permitted. No other type of tag will be accepted unless approved by the NEC. Contractor will meet with the NEC to receive proper cable identification and type of cable tags to be used.

Examples of Cable Tags:

CABLE NO.	**FOC 4488D**	**96 SM**	**1800-24**
SOURCE	**BLDG 4488**		**CA-4488-1**
DESTINATION	**BLDG 5510**		**1-1800**
FIBER COUNT	**25-48**		

10.1 CABLE ID/TAGGING:

a. Destination will change on Fiber tags if the backbone or feeder cable ends in a certain manhole where it will be spliced to EUB'S or buildings.
b. All tags will be applied at the splice case and entering and exiting manhole
c. All FIBER cables will be designated with a LETTER behind the SOURCE or BUILDING number from where it is fed from.
d. All COPPER cables will be designated with a NUMBER behind the SOURCE or BUILDING number from where it is fed from.
e. All cables will be tagged at building entry and at the rack.

11. DIRECTIONAL BORING:

a. Horizontal Directional Drilling (HDD) is a trenchless method for installing ducts for underground cable. Ducts are installed by drilling or boring a path through the soil and placing the ducts within this path. The vertical profile of the bore alignment is typically in the shape of an inverted arc.

- Ducts installed using the HDD method under roads will be deep enough to clear existing utilities and meet H-20 load ratings. The ducts placed by HDD will not directly enter a maintenance hole but will be attached to conduit stub-outs that extend a minimum of 3 m (10 ft) from the maintenance hole. The HDD may be done in areas approved by the U.S. Government or as stated in the site SOR/EDP. The maximum radius curvature of a bore is limited to the maximum conduit diameter times 30.5 m per 25 mm (100 ft per in).
- The HDD is a multi-stage process consisting of drilling a pilot bore along a predetermined path and then pulling the desired product back through the drilled space. When necessary, enlargement of the pilot bore hole is accomplished by back reaming. In order to minimize friction and provide a soil-stabilizing agent, a drilling fluid is introduced into the annular space created during the boring operation. The rotation of the bit in the soil wetted by the drilling fluid creates slurry. This slurry acts to stabilize the surrounding soil and prevents collapse of the borehole and loss of lubrication.
- In order to confine any free flowing slurry at the ground surface during pull back or drilling, sump areas will be created to contain any escaping slurry that might damage or be hazardous in surrounding areas. All residual slurry will be removed from the surface and the site restored to preconstruction conditions.
- A mixture of bentonite clay or other approved slurry and potable water will be used as the cutting and soil stabilization fluid. The viscosity will vary to best fit the soil conditions encountered. Water used will be clean and fresh, with a minimum of a 6-pH level. No other chemicals or polymer surfactant

(surface-active substance) are to be used in the drilling fluid without the written consent of the U.S. Government and after a determination is made that the chemicals to be added are environmentally safe and not harmful or corrosive to the facility. When drilling in suspected contaminated ground, the drilling fluid will be tested for contamination and disposed of appropriately. Any excess material will be removed upon the completion of the bore.

- The contractor will provide a method of locating and tracking the drill head during the pilot bore and will ensure the proposed installation is installed as intended. All facilities will be installed in such a way that their location can be readily determined by electronic designation after installation. For non-conductive installations, this will be accomplished by attaching a continuous conductive material externally, internally, or integrally with the product. A copper wire line or a coated conductive tape may be used for this conductive material.
- Materials must meet or exceed EIA, TIA standards
- An HDD conduit will be placed with soil tight joints. Joints between dissimilar types of ducts (PVC, HDPE, GSP, EB, DB, etc.) will use the appropriate connectors to provide a seal between the ducts and to prevent damage to cables pulled through these joints.
- The site will be restored after installation of the conduit is complete. The work site will be cleaned of all excess slurry remaining on the ground. The contractor performing the boring is responsible for removal and final disposition of excess slurry or spoils as the conduit is introduced.

12. CATV INSTALLATION: OUTSIDE PLANT

- Installation of CATV in government owned manholes or hand holes shall be racked, tagged and tie wrapped to racking system in accordance with government specifications. NEC QA will be onsite for installation and all work performed will have to pass QA'S inspection before acceptance. A final inspection sheet will be signed off by a representative of CATV Organization. Any deficiencies found will be corrected before signing. NEC QA will designate which duct will be used by CATV Organization. Duct used shall have maxcell inner duct placed in duct and cable pulled through the inner duct. Duct used will be sealed with foam sealant in manhole or hand hole after installation. Duct entering communication closet shall be fire stopped IAW the NEC, local codes and the manufacturer's instructions.

13. CATV INSTALLATION: INSIDE PLANT:

- Installation of CATV in government owned Communications Closet shall be installed to I3A specifications. A back board of sufficient size (minimum 4'X4') or larger if needed to accommodate equipment shall be installed by

CATV Organization. Backboard shall be ¾ inch finished plywood with two coats of fire retardant paint (both sides) and attached to wall with anchors. All cable placed in communications closet will also be anchored to wall in accordance with government specifications.

14. OTHER CONSIDERATIONS:

- The NEC/DPW may have special depth requirements for certain areas (i.e., tank tracks, ranges, etc.), which will be provided in the site-specific SOR/EDP.
- **Fort Benning QA/QC will perform a final inspection of all manholes installed and will provide contractor with a punch list of all deficiencies to be corrected.**
- **Contractor will provide Fort Benning QA/QC with as-built drawings for inspection at project's end.**

FORT BENNING NEC
VOICE AND NETWORK
INFRASTRUCTURE WIRING REQUIREMENTS
IN ACCORDANCE WITH I3A STANDARDS

1. NEW BUILDINGS:

All new buildings and/or structures require the placement of CAT-6 Voice and Network wiring. Blue colored cable will be used for networking and white will be used for voice. All CAT-6 cables will be punched down on 210 blocks. One voice and one data will be pulled to each location unless approved by the government prior to implementation. Example: Classrooms and Hospital Facilities will more than likely be an acceptation. Orange RJ45 jacks will be used for networking and Ivory jacks will be used for voice. All CAT-6 cabling, jacks and patch panels shall be Systimax approved and wired to 568 B standards. If alternate vendor parts are being used, they must be Systimax compatable and be manufactured approved and provide Systimax certification and warranty. Telecommunications room I3A standard is 10 ft by 7 ft. Also telecommunications room shall be on a separate air conditioner. Also phone jacks and patch panels shall be labeled to I3A standards. (a) All new buildings will have Secret Internet Protocol Router Network (SIPRNET) capabilities. The NEC standard for SIPRNET runs will be Holocom Networks solution.

All new buildings will have Wireless Intrusion Devises (WIDS) installed. NEC point of contact for this action is P. J. Edwards. All CAT-6 cabling to these devices will be YELLOW in color for easy identification.

(a) Copper and Fiber cable installation standard for new brigade, battalion, company, barracks and dining facilities (DFAC) distribution is at a minimum the following:

Brigade- 200 copper; 12 strands fiber.

Battalion- 200 copper; 12 strands fiber.

Company- 200 copper; 12 strands fiber.

DFAC- 50 copper; 12 strands fiber

Barracks -200 copper; 12 strands fiber.

Copper count can be changed of course depending on amount of occupants or if the structure to be built is not of standard design, but the NEC will make that decision. The NEC requirement is 25% growth to all facilities.

In the event of a combining of two or more facilities listed above, i.e. Company and DFAC, the copper and fiber cable requirement will be a total of the minimum requirement of each facility. New construction standard requirement will be one (1) each voice drop, NIPRNET drop, SIPRNET drop, WIDS/WAPS.

2. EXISTING BUILDINGS:

Existing buildings currently wired with CAT-5 E wiring shall remain and any additional wiring shall also be CAT-5 E. All wiring, patch panels and jacks shall be wired to 568 B standards.

3. MAXIMUM CABLE LENGTHS:

The maximum horizontal cable length is 90 m (295 ft.) This is the length from the work station wall outlet to the telecommunications closet cross connect. A total of 10 meters is allowed for cords in the work area and for patch cords or jumpers in the telecommunications closet.

4. PULLING TENSIONS:

The maximum pulling tension for a 4 pair horizontal cable is 25 LBF. This is the amount of force that may be exerted on a cable before transmission performance begins to deteriorate.

- Excessive pulling tension may occur during installation. This can result in damage to the cable geometry, torn jackets from snagging or excessive abrasion and in severe conditions, elongation of the copper conductor may occur.

5. MAXIMUM BEND RADIUS:

Exceeding the minimum bend radius can distort the cable geometry and result in degradation of transmission performance. There are two common places where exceeding the minimum bend radius may occur:

- At the work station wall outlet. After the cable is terminated, too often the remaining cable is jammed into the wall outlet or worse, wrapped around itself and shoved into the outlet. A better practice would be to gently work the excess cable length back through the wall outlet into the wall.
- At the wiring closet during routing of the cable to the terminal block or patch panel, prior cable placement practices may have encouraged making the cable appear form fitting or tight against a routing structure (cable tray or rack) as possible. A better practice would be to incorporate gently sweeping curves along with a cable path, avoiding sharp bends or changes in direction.

- The maximum bend radius is 4 times the cable diameter. Never exceed a 90 degree bending radius. Any kinking or twisting as a result of former cable dressing techniques may result in irreparable damage to the cable geometry, resulting in loss of transmission performance. Every effort should be made to insure the path the cable follows has smooth gradual sweeps at any transmission point. A cable bending radius may be exceeded when the cable is installed in conduit with a sharp bend radius.

6. OVER STRESSING:

Eliminate cable stress caused by tension in suspended cable runs and tightly cinched cable bundles

- Excessive cable loading or stress can also occur if a cable is incorrectly suspended in a cable run. If the distance between supports, such as D0Rings, J-Hooks or similar functioning hardware, is too great the weight of the cable and/or in combination with any other cables in the support may create excessive stress on the cable. Recommended cable support spacing is 48" to 60" centers for up to 50 cables. For 50 or more cables, special supports are required to support and distribute the additional weight. J-Hooks cannot exceed 50% fill ratio.
- Cable bundles, which are cinched excessively tight to the point of jacket deformation, can result in distortion of cable geometry. Also, large cable bundles laid in a tray or duct can exert undue stress on the bottom layers of cables. Both instances can result in a loss of optimum transmission performance. Velcro and D-Rings or J-Hooks, when used correctly, offer excellent cable management. Cable tie wraps will not be used.
- Avoid twisting of cable during installation. Excessive twisting may result in distortion of cable geometry, and in severe cases tears in the jacket.

7. ADDITONAL INSTALLATION REQUIREMENTS:

- Velcro shall be the method of wrapping cables together. Tie Wraps are not acceptable.
- Minimize amount of jacket twisting
- Buy the right UTP cabling: the higher the application being run, the higher the cable's performance should be.
- Wire towards anticipated data rates or higher. This will ensure headroom for testing and performance for future applications.
- Keep maximum runs to 90 meters (295 ft.)

- When terminating cable, allow no more than ½" untwisting of the conductors in a pair. Keep the twists of each pair as close to the termination on the IDC as possible.
- Do not use any splices or bridge taps in the horizontal cabling, as they are not allowed.
- Provide 1 to 3 foot service loop at each work station to allow for flexibility with moves, adds or changes.
- Remember to fire stop when going through walls, floor or ceiling spaces.
- Remember to ground shielded systems to avoid potential voltage shifts.
- No shared sheath applications, running multiple applications under the same jacket; such as voice and data.
- Different punch down blocks or patch panels should be used for voice and data to facilitate moves, add ons or changes.
- Match patch cords and connecting hardware to the category grade of cable installed.
- Patch cords are often viewed as the weakest link. Keep them as short as possible to reduce potential problems.
- Avoid walking or stepping on high performance cable. Avoid running over high performance cable with hand trucks or forklifts. This can exert excessive force on the cable, distorting cable geometry or crushing the pairs, resulting in electrical shorts.
- Avoid the use of staples, either from a staple gun or mounting in a traditional manner with a hammer. These can exert excessive force on the cable and distort the pair geometry.
- D-Rings, J-Hooks, or Velcro straps all offer acceptable cable management techniques without compressing the cable.
- Avoid cable runs near heat sources. These may negatively impact cable attenuation.
- Maintain a 5" minimum spacing between cables and sources of EMI, such as florescent lights or unshielded power lines.
- All internal drops, inside wall will be in 1" metal conduit with pull string from each jack location to cable tray or building demark.

8. TESTING REQUIREMENTS:

All CAT-5 E and CAT-6 cable should be tested with a level 3 test set. All tests should be made at a minimum of 100 meg. All circuits shall be tested and documented and a copy of test results shall be provided to the Ft. Benning NEC.

9. GROUNDING REQUIREMENTS: I3A

2.6.3 Telecommunications Room Signal Ground.

All TRs must have a high frequency signal ground designed IAW MIL-STD-188-124-B. The signal ground should consist of a ground plane in the room, a ring around the inside perimeter of the room for TR, or a ground bus bar for telecommunications closets. The signal ground ring or bar should be connected to the building EES by using the building steel girders or a ground cable if the girders are not accessible. The size of the grounding electrode conductor of a grounded or ungrounded alternating current (AC) system must not be less than given in National Electrical Code (NEC) Table 250.66. The values in Table 250.66 are based on the size of the service-entrance conductors, but the grounding electrode conductor is not required to exceed 3/0 AWG copper or 250-kcmil aluminum. The telecommunications designer must ensure that the different signal grounding system does not interconnect with the fault protection and lightning protection sub-systems within the building.

2.6.4 Telecommunications Rack and Supporting Structure.

All telecommunications racks and supporting structures (cable trays, ladders, conduits, and baskets) within a TR must be bonded to the TR signal ground plane, ring, or bus bar asdefined in and TIA/EIA-569-B.

10. LABELING:

2.7.1 Outlet/Patch Panel Labels. I3A

The telecommunications systems labeling must be done IAW TIA/EIA-606-A. All outlets and patch panel positions must be labeled as to their function and with a unique Identifier code. All devices, outlet locations, and designations must also appear on the system drawings. As a minimum the following must be reflected in the outlet/patch panel labeling:

- Security Level (if applicable)
- Room Number
- Alpha or Numeric Designator
- Labeling must be a minimum of ¼-inch (6mm) high
- Handwritten labels must not be used for the final configuration

2.7.2 Conformance to Existing Standards.

It is desirable that the labeling system conforms to any existing labeling, to the DOIM standard, or if neither exists to the method described above. All designations must be done in standard commercial labeling. Handwritten labels must not be used for the final configuration.

2.7.3 Telecommunications Outlet Labeling.

Outlet labeling must be done IAW TIA/EIA-606. Each outlet location must be labeled with a unique designator and level of classification, in sequence starting with "A" or "1" and proceeding clockwise around the room. The left or top 8-pin (RJ-45 type) Cat 6 or

compliant connector should be designated for voice and be labeled "VOICE." The right or bottom 8-pin (RJ-45 type) Cat 6 compliant connector should be designated for data and be labeled "DATA." All LAN components in the system must also be labeled with similar designations IAW TIA/EIA 606. For FO connections, the left or top FO connection should be labeled "A" and the right or bottom FO connection should be labeled "B."

2.7.4 Telecommunications Patch Panel Labeling.

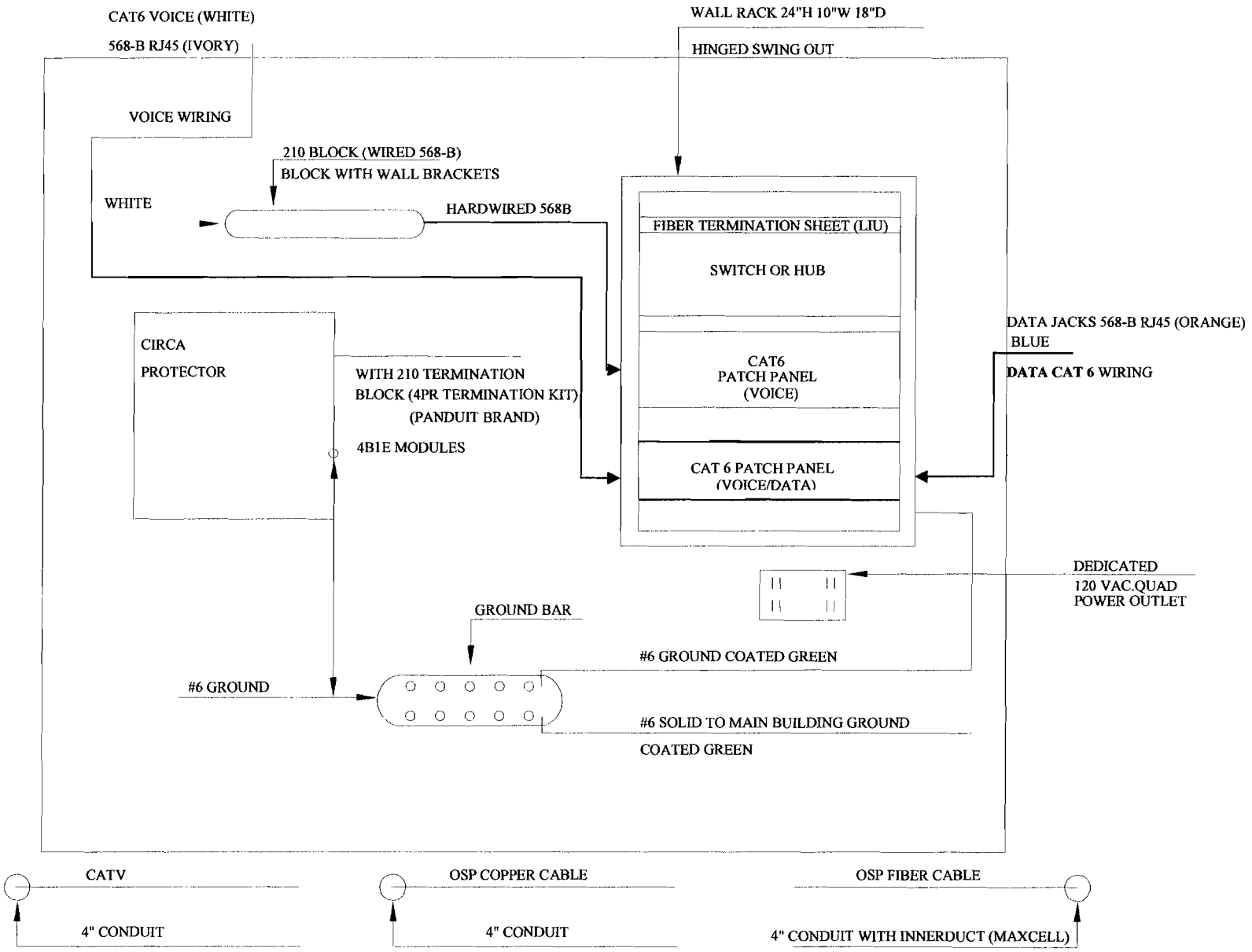
Patch panel labeling must be done IAW TIA/EIA 606. Each position must be labeled with a unique designator corresponding to the outlet location. In addition to TIA/EIA-606-A requirements, the top or left 8-pin (RJ-45 type) Cat 6 compliant port for each outlet location should be designated for voice and be labeled "VOICE." The bottom or right 8-pin (RJ-45type) Cat 6 compliant port for each outlet location should be designated for data and be labeled "DATA." Fiber optic port labeling must be done IAW TIA/EIA 606. The left or top connection should be labeled "A." The right or bottom connection should be labeled "B." Color-coding IAW TIA/EIA-606-A may be added to the labeling.

11. CAT 6 COLOR CODING:

COLOR	JACK COLOR
WHITE/VOICE	IVORY/WHITE
DATA/BLUE	ORANGE
INTRANET/GREEN	GREEN
WIDS/WAPS/YELLOW	YELLOW
SIPR/RED	RED

FT. BENNING, GA. I3A BACKBOARD INSTALLATION STANDARDS

3/4" A-C PLYWOOD PAINTED WITH 2 COATS FIRE RETARDANT PAINT
ALL NEW CONSTRUCTION NEEDS TO FOLLOW ALL I3A STANDARDS
REFERENCE 2.5.6 TELEPHONE BACKBOARDS



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ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.1 REFERENCES

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

STATE OF GEORGIA ENVIRONMENTAL PROTECTION DIVISION (EPD)

General NPDES Permit General NPDES Permit No. GAR100001

THE NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

33 CFR 328	Definitions of Waters of the United States
40 CFR 110	Discharge of Oil - Spill Contingency Plan (SCP)
40 CFR 112	Oil Pollution Prevention - Spill Prevention, Control and Countermeasures
40 CFR 136	NPDES Stormwater Sampling Guidance Document
40 CFR 152 - 186	Pesticide Programs
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 279	Standards for the Management of Used Oil
40 CFR 302	Designation, Reportable Quantities, and Notification
40 CFR 355	Emergency Planning and Notification
40 CFR 68	Chemical Accident Prevention Provisions
49 CFR 171 - 178	Hazardous Materials Regulations

U.S. ARMY (DA)

AR 200-5 (1999)	Pest Management

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (1996)	Safety and Health Requirements Manual
WETLAND MANUAL	Corps of Engineers Wetlands Delineation Manual Technical Report Y-87-1

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 833-B-92-001 NPDES Stormwater Sampling Guidance Document

1.2 DEFINITIONS

1.2.1 Environmental Pollution and Damage

Environmental pollution and damage is the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade the environment aesthetically, culturally and/or historically.

1.2.2 Environmental Protection

Environmental protection is the prevention/control of pollution and habitat disruption that may occur to the environment during construction. The control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2.3 Contractor Generated Hazardous Waste

Contractor generated hazardous waste means materials that, if abandoned or disposed of, may meet the definition of a hazardous waste. These waste streams would typically consist of material brought on site by the Contractor to execute work, but are not fully consumed during the course of construction. Examples include, but are not limited to, excess paint thinners (i.e. methyl ethyl ketone, toluene etc.), waste thinners, excess paints, excess solvents, waste solvents, and excess pesticides, and contaminated pesticide equipment rinse water.

1.2.4 Installation Pest Management Coordinator

Installation Pest Management Coordinator (IPMC) is the individual officially designated by the Installation Commander to oversee the Installation Pest Management Program and the Installation Pest Management Plan.

1.2.4 Project Pesticide Coordinator

The Project Pesticide Coordinator (PPC) is an individual that resides at a Civil Works Project office and that is responsible for oversight of pesticide application on Project grounds.

1.2.5 Land Application for Discharge Water

The term "Land Application" for discharge water implies that the Contractor shall discharge water at a rate which allows the water to percolate into the soil. No sheeting action, soil erosion, discharge into storm sewers, discharge into defined drainage areas, or discharge into the "waters of the United States" shall occur. Land Application shall be in compliance with all applicable Federal, State, and local laws and regulations.

1.2.6 Pesticide

Pesticide is defined as any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, or intended for

use as a plant regulator, defoliant or desiccant.

1.2.7 Pests

The term "pests" means arthropods, birds, rodents, nematodes, fungi, bacteria, viruses, algae, snails, marine borers, snakes, weeds and other organisms (except for human or animal disease-causing organisms) that adversely affect readiness, military operations, or the well-being of personnel and animals; attack or damage real property, supplies, equipment, or vegetation; or are otherwise undesirable.

1.2.8 Surface Discharge

The term "Surface Discharge" implies that the water is discharged with possible sheeting action and subsequent soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers, creeks, and/or "waters of the United States" and would require a permit to discharge water from the governing agency.

1.2.9 Waters of the United States

All waters which are under the jurisdiction of the Clean Water Act, as defined in 33 CFR 328.

1.2.10 Wetlands

Wetlands means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, and bogs. Official determination of whether or not an area is classified as a wetland must be done in accordance with WETLAND MANUAL.

1.3 GENERAL REQUIREMENTS

The Contractor shall minimize environmental pollution and damage that may occur as the result of construction operations. The environmental resources within the project boundaries and those affected outside the limits of permanent work shall be protected during the entire duration of this contract. The Contractor shall 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.

1.4 SUBCONTRACTORS

The Contractor shall ensure compliance with this section by subcontractors.

1.5 PAYMENT

No separate payment will be made for work covered under this section. The Contractor shall be responsible for payment of fees associated with environmental permits, application, and/or notices obtained by the Contractor. All costs associated with this section shall be included in the contract price. The Contractor shall be responsible for payment of all fines/fees for violation or non-compliance with Federal, State, Regional and local laws and regulations and supplemental environmental projects negotiated for resolution of any violations or non-compliance.

1.6 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Environmental Protection Plan; G

The environmental protection plan.

1.7 ENVIRONMENTAL PROTECTION PLAN

Prior to commencing construction activities or delivery of materials to the site, the Contractor shall submit an Environmental Protection Plan for review and approval to the Facility's Environmental Management Division (EMD) via the Contracting Officer. 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. Issues of concern shall be defined within the Environmental Protection Plan as outlined in this section. The Contractor shall address each topic at a level of detail commensurate with the environmental issue and required construction task(s). Topics or issues which are not identified in this section, but which the Contractor considers necessary, shall be identified and discussed after those items formally identified in this section. Prior to submittal of the Environmental Protection Plan, the Contractor shall meet with the Contracting Officer for the purpose of discussing the implementation of the initial Environmental Protection Plan; possible subsequent additions and revisions to the plan including any reporting requirements; and methods for administration of the Contractor's Environmental Plans. The Environmental Protection Plan shall be current and maintained onsite by the Contractor.

1.7.1 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.

1.7.2 Contents

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

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

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

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

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

e. An Erosion, Sedimentation, and Pollution Control Plan (ESPCP) must be prepared and certified in accordance with the General NPDES Permit No. GAR100001. The plan will identify an appropriate and comprehensive system and design of Best Management Practices (BMPs) required to control erosion and sedimentation runoff from construction activities and sampling and monitoring requirements. The plan also must identify all potential sources of pollution and describe practices to prevent/reduce pollutants in storm water discharges. This includes

measurements to meet SPCC requirements. The ESPCP must be in accordance with Georgia Water Quality Control Act (GWQCA) of 1964 and the Manual for Erosion and Sediment Control in Georgia (Latest Edition).

f. 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.

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

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

i. Drawing showing the location of borrow areas.

j. The 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 110, 40 CFR 112, 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:

1. 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 Contracting Officer and Facility Environmental Office if a reportable quantity is released to the environment. The plan shall contain a list of the required reporting channels and telephone numbers.

2. The name and qualifications of the individual who will be responsible for implementing and supervising the containment and cleanup.

3. Training requirements for Contractor's personnel and methods of accomplishing the training.

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

5. 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.

6. The methods and procedures to be used for expeditious contaminant cleanup.

k. A non-hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris. The plan shall include schedules for disposal. The Contractor shall identify any subcontractors responsible for the transportation and disposal of solid waste. Licenses or permits shall be submitted for solid waste disposal sites that are not a commercial operating facility. Evidence of the disposal facility's acceptance of the solid waste shall be attached to this plan during the construction. The Contractor shall

attach a copy of each of the Non-hazardous Solid Waste Diversion Reports to the disposal plan. The report shall be submitted on the first working day after the first quarter that non-hazardous solid waste has been disposed and/or diverted and shall be for the previous quarter (e.g. the first working day of January, April, July, and October). The report shall indicate the total amount of waste generated and total amount of waste diverted in cubic yards or tons along with the percent that was diverted.

l. A recycling and solid waste minimization plan with a list of measures to reduce consumption of energy and natural resources. The plan shall detail the Contractor's actions to comply with and to participate in Federal, State, Regional, and local government sponsored recycling programs to reduce the volume of solid waste at the source.

m. 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.

n. 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, 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 shall be included in the contaminant prevention plan. As new hazardous materials are brought on site or removed from the site, the plan shall be updated.

o. 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, the plan shall 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, the plan shall include a sketch showing the location for land application along with a description of the pretreatment methods to be implemented. If surface discharge will be the method of disposal, a copy of the permit and associated documents shall be included as an attachment prior to discharging the waste water. If disposal is to a sanitary sewer, the plan shall include documentation that the Waste Water Treatment Plant Operator has approved the flow rate, volume, and type of discharge.

p. 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. The plan shall include methods to assure the protection of known or discovered resources and shall identify lines of communication between Contractor personnel and the Contracting Officer.

q. A pesticide treatment plan shall be included and updated, as information becomes available. The plan shall 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 Project Office specific requirements. The Contractor shall follow AR 200-5 Pest Management, Chapter 2, Section III "Pest Management Records and Reports" for data required to be reported to the Installation.

1.7.3 Appendix

Copies of all environmental permits, permit application packages, approvals to construct, notifications, certifications, reports, and termination documents shall be attached, as an appendix, to the Environmental Protection Plan.

1.8 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 Contracting Officer 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. This survey report shall be signed by both the Contractor and the Contracting Officer upon mutual agreement as to its accuracy and completeness. The Contractor shall 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.

1.9 SPECIAL ENVIRONMENTAL REQUIREMENTS

The Contractor shall comply with the special environmental requirements listed here and included at the end of this section.

1.10 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 Facility's Environmental Management Division via the Contracting Officer and may require an extended review, processing, and approval time. The Contracting Officer reserves the right to disapprove alternate methods, even if they are more cost effective, if the Contracting Officer determines that the proposed alternate method will have an adverse environmental impact.

1.11 NOTIFICATION

The Facility's Environmental Management Division will notify the Contractor in writing, via the Contracting Officer, 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 Contracting Officer of the proposed corrective action and take such action when approved by the Contracting Officer. The Contracting Officer 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 Contracting Officer may take under the

contract, or in accordance with the Federal Acquisition Regulation or Federal Law.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 ENVIRONMENTAL PERMITS AND COMMITMENTS

The Contractor shall be responsible for obtaining and complying with all environmental permits and commitments required by Federal, State, Regional, and local environmental laws and regulations.

3.2 LAND RESOURCES

The Contractor shall confine all activities to areas defined by the drawings and specifications. Prior to the beginning of any construction, the Contractor shall identify any land resources to be preserved within the work area. Except in areas indicated on the drawings or specified to be cleared, the Contractor shall not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without approval. No ropes, cables, or guys shall be fastened to or attached to any trees for anchorage unless specifically authorized. The Contractor shall provide effective protection for land and vegetation resources at all times as defined in the following subparagraphs. Stone, soil, or other materials displaced into uncleared areas shall be removed by the Contractor.

3.2.1 Work Area Limits

Prior to commencing construction activities, the Contractor shall mark the areas that need not be disturbed under this contract. Isolated areas within the general work area which are not to be disturbed shall be marked or fenced. Monuments and markers shall be protected before construction operations commence. Where construction operations are to be conducted during darkness, any markers shall be visible in the dark. The Contractor's personnel shall be knowledgeable of the purpose for marking and/or protecting particular objects.

3.2.2 Landscape

Trees, shrubs, vines, grasses, land forms and other landscape features indicated and defined on the drawings to be preserved shall be clearly identified by marking, fencing, or wrapping with boards, or any other approved techniques. The Contractor shall restore landscape features damaged or destroyed during construction operations outside the limits of the approved work area.

3.2.3 Erosion and Sediment Controls

The Contractor shall be responsible for providing erosion and sediment control measures in accordance with Federal, State, and local laws and regulations. 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. The area of bare soil exposed at any one time by construction operations should be kept to a minimum. The Contractor shall construct or install temporary and permanent erosion and sediment control best management practices (BMPs) as indicated on the drawings and as specified in Section 01 57 23.00 10 STORM WATER POLLUTION
PREVENTION MEASURES. 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. The

Contractor's best management practices shall also be in accordance with the Manual for Erosion and Sediment Control in Georgia (Latest Edition) and the General NPDES Permit No. GAR100001. The plan shall be available at the construction site until a notice of termination is filed. Any temporary measures shall be removed after the area has been stabilized.

3.2.4 Contractor Facilities and Work Areas

The Contractor's field offices, staging areas, stockpile storage, and temporary buildings shall be placed in areas designated on the drawings or as directed by the Contracting Officer. Temporary movement or relocation of Contractor facilities shall be made only when approved. Erosion and sediment controls shall be provided for on-site borrow and spoil areas to prevent sediment from entering nearby waters. Temporary excavation and embankments for plant and/or work areas shall be controlled to protect adjacent areas.

3.3 WATER RESOURCES

The Contractor shall monitor construction activities to prevent pollution of surface and ground waters. Toxic or hazardous chemicals shall not be applied to soil or vegetation unless otherwise indicated. All water areas affected by construction activities shall be monitored by the Contractor. For construction activities, sampling, monitoring of outfalls, and reporting must be implemented as described in the General NPDES Permit No. GAR100001 to include required turbidity samples. All samples must be in accordance with NPDES Stormwater Sampling Guidance Document, EPA 833-B-92-001 and 40 CFR 136.

3.3.1 Cofferdams, Diversions, and Dewatering Operations

Construction operations for dewatering, removal of cofferdams, and diversion ditches shall be controlled at all times to maintain compliance with existing State water quality standards and designated uses of the surface water body. The Contractor shall comply with the State of Georgia water quality standards and anti-degradation provisions and the Clean Water Act Section 404, Individual Permit maybe required for this project.

3.3.2 Stream Crossings

Stream crossings shall allow movement of materials or equipment without violating water pollution control standards of the Federal, State, and local governments. Construction of stream crossing structures shall be in compliance with Clean Water Act Section 404. Individual Permit maybe required for this project.

3.3.3 Wetlands

The Contractor shall not enter, disturb, destroy, or allow discharge of contaminants into any wetlands except as authorized herein. Wetlands shall be stalked staked by the Contractor before clearing. The Contractor shall be responsible for the protection of wetlands shown on the drawings in accordance with paragraph ENVIRONMENTAL PERMITS, REVIEWS, AND APPROVALS. Authorization to enter specific wetlands identified shall not relieve the Contractor from any obligation to protect other wetlands within, adjacent to, or in the vicinity of the construction site and associated boundaries. Regulated stream bank buffers also must be marked and protected.

3.4 AIR RESOURCES

Equipment operation, activities, or processes performed by the Contractor shall be in accordance with all Federal and State air emission and

performance laws and standards.

3.4.1 Particulates

Dust particles; aerosols and gaseous by-products from construction activities; and processing and preparation of materials, such as from asphaltic batch plants; shall be controlled at all times, including weekends, holidays and hours when work is not in progress. The Contractor shall maintain 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 will be permitted to control particulates in the work area. Sprinkling, to be efficient, must be repeated to keep the disturbed area damp at all times. Sprinkling shall only dampen the disturbed area and shall not precipitate any runoff from the site. The Contractor must have sufficient, competent equipment available to accomplish these tasks. Particulate control shall be performed as the work proceeds and whenever a particulate nuisance or hazard occurs. The Contractor shall comply with all State and local visibility regulations.

3.4.2 Odors

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

3.4.3 Sound Intrusions

The Contractor shall keep construction activities under surveillance and control to minimize environment damage by noise. The Contractor shall comply with the provisions of the State of Georgia rules.

3.5 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.

3.5.1 Solid Wastes

Solid wastes shall be placed in containers which are emptied on a regular schedule. Handling, storage, and disposal shall be conducted to prevent contamination. Segregation measures shall be employed so that no hazardous or toxic waste will become co-mingled with solid waste. The Contractor shall transport all solid waste off Government property and dispose of it in compliance with Federal, State, and local requirements for solid waste disposal option. The Contractor shall verify that the selected transporters and disposal facilities have the necessary permits and licenses to operate. The Contractor shall comply with Federal, State, and local laws and regulations pertaining to the use of landfill areas.

3.5.2 Chemicals and Chemical Wastes

Chemicals shall be dispensed ensuring no spillage to the ground or water. Periodic inspections of dispensing areas to identify leakage and initiate corrective action shall be performed and documented. Implementation of SPCC requirements where hazardous materials/chemicals are stored/used/managed will prevent/minimize pollution of ground and water sources. This documentation will be periodically reviewed by the Government. Chemical waste shall be collected in corrosion resistant, compatible containers. Collection drums shall be monitored and removed to a staging or storage area when contents are within 6 inches of the top.

Wastes shall be classified, managed, stored, and disposed of in accordance with Federal, State, and local laws and regulations.

3.5.3 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. The Contractor shall, at a minimum, manage and store hazardous waste in compliance with 40 CFR 262 and shall manage and store hazardous waste in accordance with the Installation hazardous waste management plan. The Contractor shall take sufficient measures to prevent spillage of hazardous and toxic materials during dispensing. The Contractor shall segregate hazardous waste from other materials and wastes, shall protect it from the weather by placing it in a safe covered location, and shall take precautionary measures such as berming or other appropriate measures against accidental spillage. The Contractor shall be responsible for storage, describing, packaging, labeling, marking, and placarding of hazardous waste and hazardous material in accordance with 49 CFR 171 - 178, State, and local laws and regulations. The Contractor shall transport Contractor generated hazardous waste off Government property within 60 days in accordance with the Environmental Protection Agency and the Department of Transportation laws and regulations. The Contractor shall dispose of hazardous waste in compliance with Federal, State and local laws and regulations. Spills of hazardous or toxic materials shall be immediately reported to the Contracting Officer and the Facility's Environmental Management Division at 706-545-9879. Cleanup and cleanup costs due to spills shall be the Contractor's responsibility. The disposition of Contractor generated hazardous waste and excess hazardous materials are the Contractor's responsibility. The Contractor shall coordinate the disposition of hazardous waste with the Facility's Hazardous Waste Manager and the Contracting Officer.

3.5.4 Fuel and Lubricants

Storage, fueling and lubrication of equipment and motor vehicles shall be conducted in a manner that affords the maximum protection against spill and evaporation. Fuel, lubricants and oil shall be managed and stored in accordance with all Federal, State, Regional, and local laws and regulations. Used lubricants and used oil to be discarded shall be stored in marked corrosion-resistant containers and recycled or disposed in accordance with 40 CFR 279, State, and local laws and regulations. Storage of fuel on the project site shall be accordance with all Federal, State, and local laws and regulations. Implementation of SPCC requirements where fuel and lubricants are stored/used/managed will prevent/minimize pollution of ground and water sources. This is a requirement under Ft. Benning SPCC Plan and the ESPCP under the General NPDES Permit GAR100001. As part of construction operations, pollutants include, but not limited to: POL products (fuel, oil, lubricants), solvents, paints, pesticides, herbicides, fertilizers, chemicals, etc. Other pollutants considered under NPDES include litter and biological waste. Sources of these pollutants include fuel tanks, drums, cans, heavy equipment, and the materials used for construction.

3.5.5 Waste Water

Disposal of waste water shall be as specified below.

a. Waste water from construction activities, such as onsite material processing, concrete curing, foundation and concrete clean-up, water used in concrete trucks, forms, etc. shall not be allowed to enter water ways or to be discharged prior to being treated to remove pollutants. The Contractor shall dispose of the construction related waste water off-Government property in accordance with all Federal, State, Regional and Local laws and

regulations or by collecting and placing it in a retention pond where suspended material can be settled out and/or the water can evaporate to separate pollutants from the water. The site for the retention pond shall be coordinated and approved with the Contracting Officer. The residue left in the pond prior to completion of the project shall be removed, tested, and disposed off-Government property in accordance with Federal, State, and local laws and regulations. The area shall be backfilled to the original grade, top-soiled and seeded/sodded. The water in the retention pond shall be tested for in accordance with requirements of the NPDES permit and the results reviewed and approved by the Contracting Officer, prior to being discharged or disposed off-Government property.

b. For discharge of ground water, the Contractor shall obtain a State or Federal permit specific for pumping and discharging ground water prior to surface discharge in accordance with the requirements of the NPDES or State STORM WATER DISCHARGES FROM CONSTRUCTION SITES permit. Land application shall be in accordance with all Federal, State, Regional, and/or Local laws and regulations for pumping and land applying ground water.

c. Water generated from the flushing of lines after disinfection or disinfection in conjunction with hydrostatic testing shall be land applied in accordance with all Federal, State, and local laws and regulations for land application.

3.6 RECYCLING AND WASTE MINIMIZATION

The Contractor shall 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.

3.7 NON-HAZARDOUS SOLID WASTE DIVERSION REPORT

The Contractor shall maintain an inventory of non-hazardous solid waste diversion and disposal of construction and demolition debris. The Contractor shall submit a report to the Facility's Environmental Management Division, Recycling Department via the Contracting Officer on the first working day after each fiscal year quarter, starting the first quarter that non-hazardous solid waste has been generated. The following shall be included in the report:

a. Construction and Demolition (C&D) Debris Disposed = _____ in cubic yards or tons, as appropriate.

b. Construction and Demolition (C&D) Debris Recycled = _____ in cubic yards or tons, as appropriate.

c. Total C&D Debris Generated = _____ in cubic yards or tons, as appropriate.

d. Waste Sent to Waste-To-Energy Incineration Plant (This amount should not be included in the recycled amount) = _____ in cubic yards or tons, as appropriate.

3.8 HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

Existing historical, archaeological, and cultural resources within the Contractor's work area are shown on the drawings. The Contractor shall protect these resources and shall be responsible for their preservation during the life of the Contract. If during excavation or other construction activities any previously unidentified or unanticipated historical, archaeological, and cultural resources are discovered or found, all

activities that may damage or alter such resources shall be temporarily suspended. 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, the Contractor shall immediately notify the Contracting Officer and the EMD Cultural Resource Manager 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. The Contractor shall cease all activities that may result in impact to or the destruction of these resources. The Contractor shall secure the area and prevent employees or other persons from trespassing on, removing, or otherwise disturbing such resources.

3.9 BIOLOGICAL RESOURCES

The Contractor shall minimize interference with, disturbance to, and damage to fish, wildlife, and plants including their habitat. The Contractor shall be responsible for the protection of threatened and endangered animal and plant species including their habitat in accordance with Federal, State, Regional, and local laws and regulations.

3.10 INTEGRATED PEST MANAGEMENT

In order to minimize impacts to existing fauna and flora, the Contractor, through the Contracting Officer, shall coordinate with the Installation Pest Management Coordinator (IPMC) at the earliest possible time prior to pesticide application. The Contractor shall discuss integrated pest management strategies with the IPMC PPC and receive concurrence from the IPMC through the COR prior to the application of any pesticide associated with these specifications. Installation Project Office Pest Management personnel shall be given the opportunity to be present at all meetings concerning treatment measures for pest or disease control and during application of the pesticide. For termiticide requirements see Section 31 31 16 SOIL TREATMENT FOR SUBTERRANEAN TERMITE CONTROL. The use and management of pesticides are regulated under 40 CFR 152 - 186.

3.10.1 Pesticide Delivery and Storage

Pesticides shall be delivered to the site in the original, unopened containers bearing legible labels indicating the EPA registration number and the manufacturer's registered uses. Pesticides shall be stored according to manufacturer's instructions and under lock and key when unattended.

3.10.2 Qualifications

For the application of pesticides, the Contractor shall use the services of a subcontractor whose principal business is pest control. The subcontractor shall be licensed and certified in the state where the work is to be performed.

3.10.3 Pesticide Handling Requirements

The Contractor shall formulate, treat with, and dispose of pesticides and associated containers in accordance with label directions and shall use the clothing and personal protective equipment specified on the labeling for use during all phases of the application. Material Safety Data Sheets (MSDS)shall be available for all pesticide products.

3.10.4 Application

Pesticides shall be applied by a State Certified Pesticide Applicator in

accordance with EPA label restrictions and recommendation. The Certified Applicator shall wear clothing and personal protective equipment as specified on the pesticide label. Water used for formulating shall only come from locations designated by the Contracting Officer. The Contractor shall not allow the equipment to overflow. Prior to application of pesticide, all equipment shall be inspected for leaks, clogging, wear, or damage and shall be repaired prior to being used.

3.11 PREVIOUSLY USED EQUIPMENT

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

3.12 MAINTENANCE OF POLLUTION FACILITIES

The Contractor shall maintain permanent and temporary pollution control facilities and devices for the duration of the contract or for that length of time construction activities create the particular pollutant.

3.13 MILITARY MUNITIONS

In the event the Contractor discovers or uncovers military munitions as defined in 40 CFR 260, the Contractor shall immediately stop work in that area and immediately inform the Contracting Officer.

3.14 TRAINING OF CONTRACTOR PERSONNEL

The Contractor's personnel shall be trained in all phases of environmental protection and pollution control. The Contractor shall conduct environmental protection/pollution control meetings for all Contractor personnel prior to commencing construction activities. Additional meetings shall be conducted 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.

3.15 CONTAMINATED MEDIA MANAGEMENT

Contaminated environmental media consisting of, but not limited to, ground water, soils, and sediments shall be managed in accordance with Section 01355A.

3.16 POST CONSTRUCTION CLEANUP

The Contractor shall clean up all areas used for construction in accordance with Contract Clause: "Cleaning Up". The Contractor shall, unless otherwise instructed in writing by the Contracting Officer, 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. The disturbed area shall be graded, filled and the entire area seeded unless otherwise indicated.

-- End of Section --

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SECTION 01 57 23.00 10

STORM WATER POLLUTION PREVENTION MEASURES

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM D 4439 (2002)	Geosynthetics
ASTM D 4491 (1999a)	Water Permeability of Geotextiles by Permittivity
ASTM D 4533 (1991; R 1996)	Trapezoid Tearing Strength of Geotextiles
ASTM D 4632 (1991; R 1996)	Grab Breaking Load and Elongation of Geotextiles
ASTM D 4751 (1999a)	Determining Apparent Opening Size of a Geotextile
ASTM D 4873 (2002)	Identification, Storage, and Handling of Geosynthetic Rolls and Samples

STATE OF GEORGIA ENVIRONMENTAL PROTECTION DIVISION (EPD)

General NPDES Permit	General NPDES Permit No. GAR100001

THE NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 136	NPDES Stormwater Sampling Guidance Document

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 833-B-92-001	NPDES Stormwater Sampling Guidance Document

1.2 GENERAL

The Contractor shall implement the storm ESPCP as specified in this section in a manner which will meet the requirements of Section 01 57 20.00 10 ENVIRONMENTAL PROTECTION, and the requirements of the National Pollution Discharge Elimination System (NPDES) General Permit No. GAR100001.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-07 Certificates

Mill Certificate or Affidavit; G, PO

Certificate attesting that the Contractor has met all specified requirements.

1.4 EROSION AND SEDIMENT CONTROLS

All erosion and sedimentation control measures and/or Best Management Practices (BMP) shall be planned, and implemented in accordance with the General NPDES Permit No. GAR100001, the ESPCP, and the Manual for Erosion and Sediment Control in Georgia (Latest Edition). Any deviation from this must be approved by the State or designated agency during the revision of the plan.

All requirements identified in the General NPDES Permit No. GAR100001 must be implemented during the construction activities. All specifications of BMPs must be in accordance with the Manual for Erosion and Sediment Control in Georgia (Latest Edition).

The controls and measures required by the Contractor are described below.

1.4.1 Stabilization Practices

The stabilization practices to be implemented shall include mulching, geotextiles, erosion control matting, 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 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

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. Location and details of installation and construction are shown on the drawings.

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.

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 as 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 as 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. 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. Diversion dikes shall be located as shown on the drawings.

1.4.2.4 Brush Barriers

The Contractor shall provide brush barriers as a temporary structural practice to minimize erosion and sediment runoff. Brush should be wind-rowed on the contour as nearly as possible and may require compaction. Brush barriers shall be installed in the areas shown on the drawings and shall be in accordance with the details shown in the drawings.

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 filter fabric shall meet the following requirements:

FILTER FABRIC FOR SILT SCREEN FENCE

PHYSICAL PROPERTY	TEST PROCEDURE	STRENGTH REQUIREMENT
Grab Tensile	ASTM D 4632	100 lbs. min.
Elongation (%)		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.

PART 3 EXECUTION

3.1 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.

3.2 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.

3.3 MAINTENANCE

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.

3.3.1 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 be seeded in accordance with Section 02921A SEEDING.

3.3.2 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 in accordance with Section 32 92 19 SEEDING.

3.3.3 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 in accordance with Section 32 92 19 SEEDING.

3.4 INSPECTIONS

3.4.1 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 inches or more rainfall at the site. Where sites have been finally stabilized, such inspection shall be conducted at least once every month. All required inspections, monitoring, sampling, and reporting during construction shall be implemented in accordance with General NPDES Permit No. GAR100001.

3.4.2 Inspections Details

Disturbed areas and areas used for material storage that are exposed to precipitation shall be inspected by the Contractor for evidence of, or the potential for, pollutants entering the drainage system. Erosion and sediment control measures identified in the ESPCP 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.

3.4.3 Inspection Reports

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 ESPCP, maintenance performed, and actions taken. 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 forwarded to the Environmental Management Division and be maintained on the job site.

3.4.4 Monthly Inspection Report and Certification Form for Erosion and Sediment Controls

The Contractor shall submit a summary of monitoring results to GA EPD by the 15th day of the month following each month during which samples are collected. The Contractor shall retain all detailed monitoring information

including laboratory bench sheets, instrument readouts, etc. The report should be sent to the following address:
West Central District Office
Georgia Environmental Protection Division
2640 Shurling Drive
Macon, GA 31211-3576
(478) 757-6612

On the first working day of each month the Contractor shall furnish copies of the completed form submitted to the GA EPD (one to the Contracting Officer and on to the Facility's Environmental Management Division)and as part of the Contractor's daily CQC Report and attach a copy of the completed form to the Plan. Unless otherwise notified by the GA EPD, the Contractor shall submit the Monthly Inspection Report and Certification Forms for an additional two months after the final completion of all storm water pollution prevention measures required in this contract have been implemented.

3.5 SAMPLING

Sampling shall be in accordance with Part IV, D., 5 of the General NPDES Permit No. GAR100001. Other references include 40 CFR 136 and EPA 833-B-92-001.

-- End of Section --

SECTION 31 00 00

EARTHWORK
08/03

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN WATER WORKS ASSOCIATION(AWWA)

AWWA C600	(1999) Installation of Ductile-Iron Water Mains and Their Appurtenances

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2002) Structural Welding Code - Steel

AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)

AWPA C2	(2001) Lumber, Timber, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processes
AWPA P5	(2002) Standard for Waterborne Preservatives

ASTM INTERNATIONAL (ASTM)

ASTM A 139	(2000) Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 and Over)
ASTM A 252	(1998; R 2002) Welded and Seamless Steel Pipe Piles
ASTM C 136	(2001) Sieve Analysis of Fine and Coarse Aggregates
ASTM C 33	(2003) Concrete Aggregates
ASTM D 1140	(2000) Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve
ASTM D 1556	(2000) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(2002) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.))
ASTM D 2434	(1968; R 2000) Permeability of Granular Soils (Constant Head)

ASTM D 2487	(2000) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2937	(2000e1) Density of Soil in Place by the Drive-Cylinder Method
ASTM D 422	(1963; R 2002) Particle-Size Analysis of Soils
ASTM D 4318	(2000) Liquid Limit, Plastic Limit, and Plasticity Index of Soils

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(1996) Safety and Health Requirements Manual

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 530/F-93/004	(1993; Rev O; Updates I, II, IIA, IIB, and III) Test Methods for Evaluating Solid Waste (Vol IA, IB, IC, and II) (SW-846)
EPA 600/4-79/020	(1983) Methods for Chemical Analysis of Water and Wastes

1.2 OMITTED
1.3 OMITTED

1.4 DEFINITIONS

1.4.1 Satisfactory Materials

1.4.1.1 Earthwork, Roadwork, and Utilities Systems (except beneath buildings)

Satisfactory materials shall comprise any materials classified by ASTM D 2487 as GW, GP, GM, GP-GM, GW-GM, GC, GP-GC, GM-GC, SW, SP, SM, SW-SM, SC, SW-SC, SP-SM, SP-SC, CL, ML, and CL-ML. Satisfactory materials for grading shall be free from roots and other organic matter, trash, debris, frozen material, and stones larger than 75 mm(3 inches) in any dimension.

1.4.1.2 Beneath Buildings

a. Natural Insitu Soil: Satisfactory materials for natural insitu soil supporting building foundations and/or slabs shall be limited to materials classified in ASTM D 2487 as GW, GP, GM, GP-GM, GW-GM, GC, GP-GC, GM-GC, SW, SP, SM, SW-SM, SC, SW-SC, SP-SM, SP-SC, CL, ML, CL-ML, CH, MH, and shall be free of trash, debris, roots or other organic matter, frozen material, and stones larger than 75 mm(3 inches) in any dimension.

b. Foundation Fill or Backfill: Satisfactory materials for fill or backfill supporting building foundations and/or slabs shall be limited to materials classified in ASTM D 2487 as GW, GP, GM, GP-GM, GW-GM, GC, GP-GC, GM-GC, SW, SP, SM, SW-SM, SC, SW-SC, SP-SM,

SP-SC, CL, ML, CL-ML, and shall be free of trash, debris, roots or other organic matter, frozen material, and stones larger than 75 mm(3 inches) in any dimension.

c. Fill or Backfill Adjacent to Walls: Satisfactory materials for fill or backfill adjacent to walls shall be limited to cohesionless, free draining materials classified in ASTM D 2487 as GW, GP, GM, SW, SP, SM, and SP-SM, and shall be free of trash, debris, roots or other organic matter, frozen material, and stones larger than 75 mm(3 inches) in any dimension.

1.4.2 Unsatisfactory Materials

1.4.2.1 Earthwork, Roadwork, and Utilities Systems (except beneath buildings)

Materials which do not comply with the requirements for satisfactory materials are unsatisfactory. Unsatisfactory materials also include man-made fills; trash; refuse; backfills from previous construction; demolition debris; and material classified as satisfactory which contains root and other organic matter or frozen material. The Contracting Officer shall be notified of any contaminated materials.

1.4.2.2 Beneath Buildings

a. Natural Insitu Soil: Unsatisfactory materials for fill or backfill supporting building foundations and/or slabs shall be materials classified in ASTM D 2487 as Pt, OH, and OL and any other materials not defined as satisfactory. The Contracting Officer shall be notified of any contaminated materials.

b. Foundation Fill or Backfill: Unsatisfactory materials for fill or backfill supporting building foundations and/or slabs shall be materials classified in ASTM D 2487 as Pt, OH, OL, CH, and MH.

c. Fill or Backfill Adjacent to Walls: Unsatisfactory materials for fill or backfill adjacent to walls shall be materials classified in accordance with ASTM D 2487 as Pt, OH, OL, GC, SC, CL, CH, ML and MH, GP-GM, GW-GM, GC, GP-GC, GM-GC, SW-SM, SC, SW-SC, SP-SC, CL, ML, and CL-ML.

d. Wet of Soft Materials: Materials determined by the Contracting Officer as too wet or too soft to provide a stable subgrade, foundation, or fill will be classified as unsatisfactory regardless of classification. However, if such materials do meet the appropriate ASTM D 2487 classification, the Contractor shall at no additional cost to the Government, recondition the materials.

1.4.3 Cohesionless and Cohesive Materials

Cohesionless materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, CH, GP-GC, GM-GC, SW-SC, SP-SC, and CL-ML and the unsatisfactory organic materials Pt, OL, and OH. Materials classified as GM, GP-GM, GW-GM, SW-SM, SP-SM, and SM will be identified as cohesionless only when the fines are nonplastic (plasticity index of zero); otherwise they will be considered

cohesive. Testing required for classifying materials shall be in accordance with ASTM D 4318, ASTM C 136, ASTM D 422, and ASTM D 1140.

1.4.4 Degree of Compaction

Degree of compaction is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557 abbreviated as a percent of laboratory maximum density.

1.4.5 Omitted

1.4.6 Topsoil

Material suitable for topsoil shall be obtained from required stripping of the project site and/or areas off the installation. Material obtained from off-installation areas suitable for topsoil shall meet the requirements specified for topsoil in Section . Amend topsoil pH range to obtain a pH of 5.5 to 7.

1.4.7 Hard/Unyielding Materials

Unyielding material shall consist of rock and gravelly soils with stones greater than 75 mm(3 inches) in any dimension or as defined by the pipe manufacturer, whichever is smaller.

1.4.8 Rock

Solid homogeneous interlocking crystalline material with firmly cemented, laminated, or foliated masses or conglomerate deposits, neither of which can be removed without systematic drilling and blasting, drilling and the use of expansion jacks or feather wedges, or the use of backhoe-mounted pneumatic hole punchers or rock breakers; also large boulders, buried masonry, or concrete other than pavement exceeding 0.375 cubic meter (1/2 cubic yard) in volume. Removal of hard material will not be considered rock excavation because of intermittent drilling and blasting that is performed merely to increase production.

1.4.9 Unstable Material

Unstable material shall consist of materials too wet to properly support the utility pipe, conduit, or appurtenant structure.

1.4.10 Select Granular Material

Select granular material shall consist of well-graded sand, gravel, crushed gravel, crushed stone, or crushed slag composed of hard, tough, and durable particles, and shall contain not more than 10 percent by weight of material passing a 75 micrometers(No. 200) mesh sieve and no less than 95 percent by weight passing the 25 mm(1 inch) sieve. The maximum allowable aggregate size shall be 40 mm(1.6 inches), or the maximum size recommended by the pipe manufacturer, whichever is smaller.

1.4.11 Initial Backfill Material

Initial backfill shall consist of select granular material or satisfactory materials free from rocks 75 mm (3 inches) or larger in any dimension or free from rocks of such size as recommended by the pipe manufacturer,

whichever is smaller. When the pipe is coated or wrapped for corrosion protection, the initial backfill material shall be free of stones larger than 25 mm (1 inch) in any dimension or as recommended by the pipe manufacturer, whichever is smaller.

1.4.12 Omitted
1.4.13 Omitted
1.4.14 Omitted

1.4.15 Maximum Dry Density

The maximum dry density is expressed as the maximum density obtained when the soil is compacted in accordance with ASTM D 1557, abbreviated as laboratory maximum dry density.

1.4.16 Optimum Moisture Content

The optimum moisture content is the moisture content corresponding to the maximum dry density obtained by the test procedure presented in ASTM D 1557.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Dewatering Work Plan; G

1.5.1 General Earthwork and Roadwork

SD-03 Product Data

Earthwork; G

Procedure and location for disposal of unused satisfactory material. Proposed source of borrow material.

Notification of Earthwork; G

Advance notice on the opening of excavation or borrow areas. Advance notice on shoulder construction for rigid pavements.

SD-06 Test Reports

Testing

Within 24 hours of conclusion of physical tests, three copies of test results.

SD-07 Certificates

Testing; G

Qualifications of the commercial testing laboratory.

1.5.2 Earthwork Beneath Buildings

SD-06 Test Reports

Field Density Tests
Testing of Fill and Backfill Materials

Copies of all laboratory and field test reports within 24 hours of the completion of the test. Each report shall be properly identified. Test methods used and compliance with specified test standards shall be described. Summary sheets specified herein shall be submitted as indicated.

SD-07 Certificates

Certificates of Compliance

Certificates of compliance indicating conformance with specified requirements shall be furnished for capillary water barrier materials.

Testing; G

Testing facilities for the performance of laboratory soil tests must be approved by the Contracting Officer prior to work being performed.

1.5.3 Earthwork for Utilities Systems

SD-04 Samples

Tracer Wire; G

Sample of tracer wire, including manufacturer's descriptive technical literature, specifications, and installation instructions. Sample and information shall be submitted at least 60 days prior to the initial installation of any tracer wire.

SD-06 Test Reports

Field Density Tests
Testing of Fill and Backfill Materials

Copies of all laboratory and field test reports within 24 hours of the completion of the test.

SD-07 Certificates

Testing; G

Qualifications of the commercial testing laboratory.

1.6 OMITTED

1.7 CLASSIFICATION OF EXCAVATION

No consideration will be given to the nature of the materials, and all excavation will be designated as unclassified excavation.

1.7.1 Omitted

1.7.2 Omitted

1.7.3 Blasting

Blasting will not be permitted.

1.8 CRITERIA FOR BIDDING

Base bids on the following criteria:

a. Surface elevations are as indicated.

b. Pipes or other artificial obstructions, except those indicated, will not be encountered.

c. Ground water elevations indicated by the boring log were those existing at the time subsurface investigations were made and do not necessarily represent ground water elevation at the time of construction.

1.9 DEWATERING WORK PLAN

Submit procedures for accomplishing dewatering work.

1.10 TERMITE PROTECTION

Termite protection is specified under Section 31 31 16 SOIL TREATMENT FOR SUBTERRANEAN TERMITE CONTROL.

PART 2 PRODUCTS

2.1 REQUIREMENTS FOR OFFSITE SOILS

All soils, other than Government furnished borrow, brought in for use as backfill shall be tested for TPH, BTEX and full TCLP including ignitability, corrosivity and reactivity. Backfill shall contain less than 100 parts per million (ppm) of total petroleum hydrocarbons (TPH) and less than 10 ppm of the sum of Benzene, Toluene, Ethyl Benzene, and Xylene (BTEX) and shall not fail the TCPL test. TPH concentrations shall be determined by using EPA 600/4-79/020 Method 418.1. BTEX concentrations shall be determined by using EPA 530/F-93/004 Method 5030/8020. TCLP shall be performed in accordance with EPA 530/F-93/004 Method 1311. Provide Borrow Site Testing for TPH, BTEX and TCLP from a composite sample of material from the borrow site, with at least one test from each borrow site. Material shall not be brought on site until tests have been approved by the Contracting Officer.

2.2 BURIED WARNING AND IDENTIFICATION TAPE

Polyethylene plastic and metallic core or metallic-faced, acid- and alkali-resistant, polyethylene plastic warning tape manufactured specifically for

warning and identification of buried utility lines. Provide tape on rolls, 75 mm (3-inch) minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing shall be permanent, unaffected by moisture or soil.

Warning Tape Color Codes

Yellow:	Electric
Yellow:	Gas, Oil; Dangerous Materials
Orange:	Telephone and Other Communications
Blue:	Water Systems
Green:	Sewer Systems
White:	Steam Systems
Gray:	Compressed Air

2.2.1 Warning Tape for Metallic Piping

Acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of tape shall be 0.08 mm (0.003 inch). Tape shall have a minimum strength of 10.3 MPa (1500 psi) lengthwise, and 8.6 MPa (1250 psi) crosswise, with a maximum 350 percent elongation.

2.2.2 Detectable Warning Tape for Non-Metallic Piping

Polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of the tape shall be 0.10 mm (0.004 inch). Tape shall have a minimum strength of 10.3 MPa (1500 psi) lengthwise and 8.6 MPa (1250 psi) crosswise. Tape shall be manufactured with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 920 mm (3 feet) deep. Encase metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

2.3 DETECTION WIRE FOR NON-METALLIC PIPING

Detection wire shall be insulated single strand, solid copper with a minimum of 12 AWG.

2.4 OMITTED

2.5 CAPILLARY WATER BARRIER

Capillary Water Barrier shall consist of clean, crushed, nonporous stone, crushed gravel, or uncrushed gravel conforming to the requirements of ASTM C 33 for coarse aggregate grading size 57, 67, 7, or 78.

2.6 PIPE CASING

2.6.1 Casing Pipe

ASTM A 139, Grade B, or ASTM A 252, Grade 2, smooth wall pipe. Casing size shall be of the outside diameter and wall thickness as indicated. Protective coating is not required on casing pipe.

2.6.2 Wood Supports

Treated Yellow Pine or Douglas Fir, rough, structural grade. Provide wood with nonleaching water-borne pressure preservative (ACA or CCA) and treatment conforming to AWPA P5 and AWPA C2, respectively. Secure wood supports to carrier pipe with stainless steel or zinc-coated steel bands.

PART 3 EXECUTION

3.1 STRIPPING OF TOPSOIL

Where indicated or directed, topsoil shall be stripped to full depth. Topsoil shall be spread on areas already graded and prepared for topsoil, or transported and deposited in stockpiles convenient to areas that are to receive application of the topsoil later, or at locations indicated or specified. Topsoil shall be kept separate from other excavated materials, brush, litter, objectionable weeds, roots, stones larger than 50 mm (2 inches) in diameter, and other materials that would interfere with planting and maintenance operations. Any surplus of topsoil from excavations and grading shall be removed from the site and disposed of in designated areas approved for surplus material storage or designated waste disposal areas as directed.

3.2 GENERAL EXCAVATION

The Contractor shall perform excavation of every type of material encountered within the limits of the project to the lines, grades, and elevations indicated and as specified. Grading shall be in conformity with the typical sections shown and the tolerances specified in paragraph FINISHING. Satisfactory excavated materials shall be transported to and placed in fill or embankment within the limits of the work. Unsatisfactory materials encountered within the limits of the work shall be excavated below grade and replaced with satisfactory materials as directed. Such excavated material and the satisfactory material ordered as replacement shall be included in excavation. Surplus satisfactory excavated material not required for fill or embankment shall be disposed of in areas approved for surplus material storage or designated waste areas. Unsatisfactory excavated material shall be disposed of in designated waste or spoil areas. During construction, excavation and fill shall be performed in a manner and sequence that will provide proper drainage at all times. Material required for fill or embankment in excess of that produced by excavation within the grading limits shall be excavated from the borrow areas indicated or, if no borrow areas are indicated, from other approved areas selected by the Contractor as specified.

3.2.1 Ditches, Gutters, and Channel Changes

Excavation of ditches, gutters, and channel changes shall be accomplished by cutting accurately to the cross sections, grades, and elevations shown. Ditches and gutters shall not be excavated below grades shown. Excessive open ditch or gutter excavation shall be backfilled with satisfactory, thoroughly compacted, material to grades shown. Material excavated shall be disposed of as shown or as directed, except that in no case shall material be deposited less than 1 meter (4 feet) from the edge of a ditch. The Contractor shall maintain excavations free from detrimental quantities of

leaves, brush, sticks, trash, and other debris until final acceptance of the work.

3.2.2 Drainage Structures

Excavations shall be made to the lines, grades, and elevations shown, or as directed. Trenches and foundation pits shall be of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Rock or other hard foundation material shall be cleaned of loose debris and cut to a firm, level, stepped, or serrated surface. Loose disintegrated rock and thin strata shall be removed. When concrete or masonry is to be placed in an excavated area, the bottom of the excavation shall not be disturbed. Excavation to the final grade level shall not be made until just before the concrete or masonry is to be placed.

3.2.3 Drainage

Provide for the collection and disposal of surface and subsurface water encountered during construction. Completely drain construction site during periods of construction to keep soil materials sufficiently dry. The Contractor shall establish/construct storm drainage features (ponds/basins) at the earliest stages of site development, and throughout construction grade the construction area to provide positive surface water runoff away from the construction activity and/or provide temporary ditches, swales, and other drainage features and equipment as required to maintain dry soils. When unsuitable working platforms for equipment operation and unsuitable soil support for subsequent construction features develop, remove unsuitable material and provide new soil material as specified herein. It is the responsibility of the Contractor to assess the soil and ground water conditions presented by the plans and specifications and to employ necessary measures to permit construction to proceed.

3.2.4 Dewatering

Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. French drains, sumps, ditches or trenches will not be permitted within 1 m (3 feet) of the foundation of any structure, except with specific written approval, and after specific contractual provisions for restoration of the foundation area have been made. Control measures shall be taken by the time the excavation reaches the water level in order to maintain the integrity of the in situ material. While the excavation is open, the water level shall be maintained continuously, at least 0.6 m(2 feet) below the working level. The Contractor shall provide drainage and dewatering as required to ensure that all footing excavations are accomplished with the subgrade soils remaining dry and firm until after the footings are placed and backfilled.

3.2.5 Trench Excavation Requirements

The trench shall be excavated as recommended by the manufacturer of the pipe to be installed. Trench walls below the top of the pipe shall be sloped, or made vertical, and of such width as recommended in the manufacturer's installation manual. Where no manufacturer's installation manual is available, trench walls shall be made vertical, except that trench

construction shall be in accordance with OHSA. Trench walls more than 3 feet deep shall be cut back, excavated to at least the angle of repose of the soil. Special attention shall be given to slopes which may be adversely affected by weather or moisture content. The trench width below the top of pipe shall not exceed 600 mm(24 inches) plus pipe outside diameter (O.D.) for pipes of less than 600 mm(24 inches) inside diameter and shall not exceed 900 mm (36 inches) plus pipe outside diameter for sizes larger than 600 mm(24 inches) inside diameter. Where recommended trench widths are exceeded, redesign, stronger pipe, or special installation procedures shall be utilized by the Contractor. The cost of redesign, stronger pipe, or special installation procedures shall be borne by the Contractor without any additional cost to the Government.

3.2.5.1 Bottom Preparation

The bottoms of trenches shall be accurately graded to provide uniform bearing and support for the bottom quadrant of each section of the pipe. Bell holes shall be excavated to the necessary size at each joint or coupling to eliminate point bearing. Stones of 75 mm(3 inches) or greater in any dimension, or as recommended by the pipe manufacturer, whichever is smaller, shall be removed to avoid point bearing.

3.2.5.2 Removal of Unyielding Material

Where unyielding material is encountered in the bottom of the trench, such material shall be removed 100mm(4 inches) below the required grade and replaced with suitable materials as provided in paragraph BACKFILLING AND COMPACTION.

3.2.5.3 Removal of Unstable Material

Where unstable material is encountered in the bottom of the trench, such material shall be removed to the depth directed and replaced to the proper grade with select granular material as provided in paragraph BACKFILLING AND COMPACTION. When removal of unstable material is required due to the Contractor's fault or neglect in performing the work, the resulting material shall be excavated and replaced by the Contractor without additional cost to the Government.

3.2.5.4 Excavation for Appurtenances

Excavation for manholes, catch-basins, inlets, or similar structures shall be sufficient to leave at least 300 mm(12 inches) clear between the outer structure surfaces and the face of the excavation or support members and of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Removal of unstable material shall be as specified above. When concrete or masonry is to be placed in an excavated area, special care shall be taken not to disturb the bottom of the excavation. Excavation to the final grade level shall not be made until just before the concrete or masonry is to be placed.

3.2.5.5 Jacking, Boring, and Tunneling

Unless otherwise indicated, excavation shall be by open cut except that sections of a trench may be jacked, bored, or tunneled if, in the opinion of the Contracting Officer, the pipe, cable, or duct can be safely and properly installed and backfill can be properly compacted in such sections.

3.2.6 Underground Utilities

Movement of construction machinery and equipment over pipes and utilities during construction shall be at the Contractor's risk. Perform work adjacent to non-Government utilities as indicated in accordance with procedures outlined by utility company. Excavation made with power-driven equipment is not permitted within 600 mm (2 feet) of known Government-owned utility or subsurface construction. For work immediately adjacent to or for excavations exposing a utility or other buried obstruction, excavate by hand. Start hand excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured. Support uncovered lines or other existing work affected by the contract excavation until approval for backfill is granted by the Contracting Officer. Report damage to utility lines or subsurface construction immediately to the Contracting Officer.

3.2.7 Structural Excavation

Excavation shall conform to the dimensions and elevations indicated for each building, structure, and footing except as specified, and shall include trenching for utility and foundation drainage systems to a point 1.5 m(5 feet) beyond the building line of each building and structure, excavation for outside grease interceptors and all work incidental thereof. Excavation shall extend a sufficient distance from walls and footings to allow for placing and removal of forms. Excavations below indicated depths will not be permitted except to remove unsatisfactory material. Unsatisfactory material encountered below the grades shown shall be removed as directed and replaced with satisfactory material; and payment will be made in conformance with the CHANGES clause of the CONTRACT CLAUSES. Satisfactory material removed below the depths indicated, without specific direction of the Contracting Officer, shall be replaced, at no additional cost to the Government, with satisfactory materials to the indicated excavation grade. Satisfactory material shall be placed and compacted as specified in paragraph FILLING AND BACKFILLING. Determination of elevations and measurements of approved overdepth excavation of unsatisfactory material below grades indicated shall be done under the direction of the Contracting Officer.

3.3 SELECTION OF BORROW MATERIAL

Borrow material shall be selected to meet the requirements and conditions of the particular fill or embankment for which it is to be used. Borrow material shall be obtained from the borrow areas shown on drawings or from approved private sources, selected by the Contractor. Unless otherwise provided in the contract, the Contractor shall obtain from the owners the right to procure material, pay royalties and other charges involved, and bear the expense of developing the sources, including rights-of-way for hauling. Borrow material from approved sources on Government-controlled land may be obtained without payment of royalties. Unless specifically provided, no borrow shall be obtained within the limits of the project site without prior written approval. Necessary clearing, grubbing, and satisfactory drainage of borrow pits and the disposal of debris thereon shall be considered related operations to the borrow excavation.

3.4 OPENING AND DRAINAGE OF EXCAVATION AND BORROW PITS

Except as otherwise permitted, borrow pits and other excavation areas shall be excavated providing adequate drainage. Overburden and other spoil material shall be transported to designated spoil areas or otherwise disposed of as directed. Borrow pits shall be neatly trimmed and drained after the excavation is completed. The Contractor shall ensure that excavation of any area, operation of borrow pits, or dumping of spoil material results in minimum detrimental effects on natural environmental conditions.

3.5 SHORING

3.5.1 General Requirements

When shoring is required, the Contractor shall submit a Shoring and Sheeting plan for approval 15 days prior to starting work. Submit drawings and calculations, certified by a registered professional engineer, describing the methods for shoring and sheeting of excavations.

3.5.2 Geotechnical Engineer

The Contractor is required to hire a Professional Geotechnical Engineer to provide inspection of excavations and soil/groundwater conditions throughout construction. The Geotechnical Engineer shall be responsible for performing pre-construction and periodic site visits throughout construction to assess site conditions. The Geotechnical Engineer shall update the excavation, sheeting and dewatering plans as construction progresses to reflect changing conditions and shall submit an updated plan if necessary. A written report shall be submitted, at least monthly, informing the Contractor and Contracting Officer of the status of the plan and an accounting of the Contractor's adherence to the plan addressing any present or potential problems. The Geotechnical Engineer shall be available to meet with the Contracting Officer at any time throughout the contract duration.

3.6 GRADING AREAS

Where indicated, work will be divided into grading areas within which satisfactory excavated material shall be placed in embankments, fills, and required backfills. The Contractor shall not haul satisfactory material excavated in one grading area to another grading area except when so directed in writing. Stockpiles of satisfactory shall be placed and graded as specified. Stockpiles shall be kept in a neat and well drained condition, giving due consideration to drainage at all times. The ground surface at stockpile locations shall be cleared, grubbed, and sealed by rubber-tired equipment, excavated satisfactory and unsatisfactory materials shall be separately stockpiled. Stockpiles of satisfactory materials shall be protected from contamination which may destroy the quality and fitness of the stockpiled material. If the Contractor fails to protect the stockpiles, and any material becomes unsatisfactory, such material shall be removed and replaced with satisfactory material from approved sources at no additional cost to the Government. Locations of stockpiles shall be subject to prior approval of the Contracting Officer.

3.7 FINAL GRADE OF SURFACES TO SUPPORT CONCRETE

Excavation to final grade shall not be made until just before subgrade materials, capillary water barrier, or concrete is to be placed. All surfaces shall be protected from erosion resulting from ponding or flow of water.

3.8 GROUND SURFACE PREPARATION

3.8.1 General Requirements

Ground surface on which fill is to be placed shall be stripped of live, dead, or decayed vegetation, rubbish, debris, and other unsatisfactory material; plowed, disked, or otherwise broken up to a depth of 200 mm(8 inches); pulverized; moistened or aerated as necessary to plus or minus 2.5 percent of optimum moisture; thoroughly mixed; and compacted to at least 92 percent laboratory maximum density. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment. The prepared ground surface shall be scarified and moistened or aerated as required just prior to placement of embankment materials to assure adequate bond between embankment material and the prepared ground surface.

3.8.1.1 Subgrade Preparation for Building Sites

Unsatisfactory material in surfaces to receive fill or in excavated areas shall be removed and replaced with satisfactory materials as directed by the Contracting Officer. The surface shall be scarified to a depth of 150 mm(6 inches) before the fill is started. Sloped surfaces steeper than 1 vertical to 4 horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. When subgrades are less than the specified density, the ground surface shall be broken up to a minimum depth of 150 mm (6 inches), pulverized, and compacted to the specified density. When the subgrade is part fill and part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 300 mm (12 inches) and compacted as specified for the adjacent fill. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Material shall be moistened or aerated as necessary to plus or minus 2.5 percent of optimum moisture. Minimum subgrade density shall be as specified in paragraph FILLING AND BACKFILLING.

3.8.2 Frozen Material

Material shall not be placed on surfaces that are muddy, frozen, or contain frost. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Material shall be moistened or aerated as necessary to plus or minus 2.5 percent of optimum moisture. This prohibition encompasses all foundation types, including the natural ground, all prepared subgrades (whether in an excavation or on an embankment) and all layers of previously placed and compacted earth fill which become the foundations for successive layers of earth fill. All material that freezes or has been subjected to freeze-thaw action during the construction work, or during periods of temporary shutdowns, such as, but not limited to, nights, holidays, weekends, winter shutdowns, or earthwork operations, shall be removed to a depth that is acceptable to the Contracting Officer and

replaced with new material. Alternatively, the material shall be thawed, dried, reworked, and recompacted to the specified criteria before additional material is placed. The Contracting Officer will determine when placement of fill shall cease due to cold weather. The Contracting Officer may elect to use average daily air temperatures, and/or physical observation of the soils for his determination. Fill material shall not contain frozen clumps of soil, snow, or ice. Minimum subgrade density shall be as specified in paragraph TESTING.

3.9 UTILIZATION OF EXCAVATED MATERIALS

Unsatisfactory materials removed from excavations shall be disposed of in designated waste disposal or spoil areas. Satisfactory material removed from excavations shall be used, insofar as practicable, in the construction of fills, embankments, subgrades, shoulders, bedding (as backfill), and for similar purposes. No satisfactory excavated material shall be wasted without specific written authorization. Satisfactory material authorized to be wasted shall be disposed of in designated areas approved for surplus material storage or designated waste areas as directed. No excavated material shall be disposed of to obstruct the flow of any stream, endanger a partly finished structure, impair the efficiency or appearance of any structure, or be detrimental to the completed work in any way.

3.10 MOISTURE CONTENT

Satisfactory materials in each layer of fill shall contain the amount of moisture within the limits specified below. Materials that are not within the specified limits after compaction shall be reworked regardless of density. The moisture content after compaction shall be as uniform as practicable throughout any one layer and shall be within the limits of 2.5 percentage points above optimum moisture content and 2.5 percentage points below optimum moisture content. Materials which are too wet shall be disked, harrowed, plowed, bladed, or otherwise manipulated to reduce the moisture content to within the specified limits. Materials which are too dry shall be broken up, sprinkled, and thoroughly mixed to bring the moisture content uniformly up to within specified limits of moisture content specified above, the Contractor shall either adjust the moisture content to bring it within the specified limits or remove it from the fill.

3.11 GENERAL EARTHWORK

3.11.1 Earth Embankments

Earth embankments shall be constructed from satisfactory materials free of organic or frozen material and rocks with any dimension greater than 75 mm (3 inches). The material shall be placed in successive horizontal layers of loose material not more than 200 mm (8 inches) in depth. Each layer shall be spread uniformly on a soil surface that has been moistened or aerated as necessary, and scarified or otherwise broken up so that the fill will bond with the surface on which it is placed. After spreading, each layer shall be plowed, disked, or otherwise broken up; moistened or aerated as necessary; thoroughly mixed; and compacted to at least 92 percent laboratory maximum density. Compaction requirements for the upper portion of earth embankments forming subgrade for pavements shall be identical with those requirements specified in paragraph SUBGRADE PREPARATION. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.11.2 Subgrade Preparation

3.11.2.1 Proof Rolling

Proof rolling shall be done on an exposed subgrade free of surface water (wet conditions resulting from rainfall) which would promote degradation of an otherwise acceptable subgrade. After stripping, proof roll the existing subgrade under buildings and pavements with six passes of a dump truck loaded with 6 cubic meters (4 cubic yards) of soil or 13.6 meter tons (15 ton), pneumatic-tired roller. Operate the roller or a truck in a systematic manner to ensure the number of passes over all areas, and at speeds between 4 to 5.5 km/hour (2 1/2 to 3 1/2 mph). When proof rolling, one-half of the passes made with the roller shall be in a direction perpendicular to the other passes. Notify the Contracting Officer a minimum of 3 days prior to proof rolling. Proof rolling shall be performed in the presence of the Contracting Officer. Soft or unstable material shall be undercut as directed by the Contractor's Geotechnical Engineer.

3.11.2.2 Construction

Subgrade shall be shaped to line, grade, and cross section, and compacted as specified. This operation shall include plowing, disking, and any moistening or aerating required to obtain specified compaction. Materials shall be moistened or aerated as necessary to plus or minus 2.5 percent of optimum moisture. Soft or otherwise unsatisfactory material shall be removed and replaced with satisfactory excavated material or other approved material as directed as directed by the Contractor's Geotechnical Engineer. Low areas resulting from removal of unsatisfactory material or excavation of rock shall be brought up to required grade with satisfactory materials, and the entire subgrade shall be shaped to line, grade, and cross section and compacted as specified. When the subgrade is in cut, the top 200 mm(8 inches) of subgrade shall be scarified, windrowed, moistened or aerated as necessary to plus or minus 2.5 percent of optimum moisture, thoroughly blended, reshaped, and compacted. The elevation of the finish subgrade shall not vary more than 15 mm (0.05 foot) from the established grade and cross section.

3.11.2.3 Compaction

Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.11.2.4 Subgrade for Pavements

Subgrade for pavements shall be compacted to at least 92 percent laboratory maximum density for the depth below the subgrade of 300 mm(12 inches) in fill or backfill and 200 mm(8 inches) in undisturbed native soil or cut.

3.11.2.5 Subgrade for Shoulders

Subgrade for shoulders shall be compacted to at least 92 percent laboratory maximum density for a depth of 200 mm(8 inches) below finish grade. In areas where the shoulder is to be grassed the top 200 mm(8 inches) shall be compacted to a density of at least 92 percent laboratory maximum density.

3.11.3 Shoulder Construction

Shoulders shall be constructed of satisfactory excavated or borrow material or as otherwise shown or specified. Shoulders shall be constructed as soon as possible after adjacent paving is complete, but in the case of rigid pavements, shoulders shall not be constructed until permission of the Contracting Officer has been obtained. The entire shoulder area shall be compacted to at least the percentage of maximum density as specified in paragraph SUBGRADE PREPARATION above, for specific ranges of depth below the surface of the shoulder. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment. Shoulder construction shall be done in proper sequence in such a manner that adjacent ditches will be drained effectively and that no damage of any kind is done to the adjacent completed pavement. The completed shoulders shall be true to alignment and grade and shaped to drain in conformity with the cross section shown.

3.12 FILLING AND BACKFILLING FOR BUILDINGS

3.12.1 General

Filling and backfilling shall not begin until construction below finish grade has been approved, underground utilities systems have been inspected, tested and approved, forms removed and the excavation cleaned of trash and debris. Backfill shall not be placed in areas that are wet, muddy, contain organic materials or are otherwise unacceptable to the Contracting Officer. Satisfactory materials shall be used in bringing fills and backfills to the lines and grades indicated and for replacing unsatisfactory materials. Satisfactory material shall be free from roots and other organic matter, trash, debris, frozen materials, and stones larger than 75 mm(3 inches) in any dimension. Where pipe and/or utility lines are coated or wrapped for protection against corrosion, the backfill material up to an elevation of 600 mm(two feet) above sewer lines and 300 mm(one foot) above other utility lines shall be free from stones larger than 25 mm(one inch) in any dimension.

3.12.2 Placement

Satisfactory materials shall be placed in horizontal layers not exceeding 200 mm(8 inches) in loose thickness, or 100 mm(4 inches) in loose thickness where hand-operated compactors are used. After placing, each layer shall be plowed, disked, or otherwise broken up, moistened or aerated as necessary, thoroughly mixed and compacted as specified. Backfill shall be brought to the indicated finish grade. Heavy equipment for spreading and compacting backfill shall not be operated closer to foundation or retaining walls than a distance equal to the height of backfill above the top of footing; the area remaining shall be compacted in layers not more than 100 mm in loose thickness with power-driven hand tampers suitable for the material being compacted. Backfill shall be placed carefully around pipes or tanks to avoid damage to coatings, wrappings, or tanks. Backfill shall not be placed against foundation walls prior to 7 days after completion of each compaction, each layer shall be thoroughly and uniformly blended throughout its entire thickness by disking.

3.12.3 Compaction

Compaction shall be accomplished by sheepsfoot roller, pneumatic-tired rollers, smooth-drum vibratory rollers or other approved equipment well suited to the soil being compacted. Generally, sheepsfoot rollers are best suited for compacting cohesive material while smooth-drum vibratory rollers are best suited for compacting cohesionless materials. In areas inaccessible to heavy equipment, or where in the opinion of the Contracting Officer, use of heavy equipment may cause damage to pipes, conduits, or structures, approved power-driven hand tampers suitable for the material being compacted shall be used. Each layer of fill and backfill shall be compacted to not less than the percentage of maximum density specified below.

	Percent Laboratory Maximum Density
Fill, Embankment, and Backfill	
Under structures, steps,paved areas, and in trenches	92
Beside structures, footings, and walls	92
Under sidewalks and grassed areas	85
Subgrade (Top of Fill, Embankment, and Backfill)	
Under building slabs, steps, paved areas, and footings, top 300 mm(12 inches)	92
Under sidewalks and grassed areas, top 150 mm(6 inches)	85
Subgrade (Undisturbed Native Soil or Cut)	
Under building slabs, steps, paved areas, and footings, top 200 mm(8 inches)	92
Under sidewalks and grassed areas, top 150 mm(6 inches)	85

Approved compacted subgrades that are disturbed by the Contractor's operations or adverse weather shall be scarified and recompacted to the required density prior to further construction thereon. Recompaction over underground utilities and heating lines shall be by hand tamping. For compacted subgrades and/or any lift of fill or backfill that fails to meet the specified density and/or moisture requirements, the entire subgrade and/or entire lift of fill shall be broken up to a minimum depth of 200 mm(8 inches), pulverized, the moisture content adjusted as necessary, and recompacted to the specified density, even if this action requires the removal and replacement of subsequently placed satisfactory lifts of fill. Tests on recompacted areas shall be performed to determine conformance with specification requirements. Lifts of fill placed without being field density tested will not be accepted as satisfactory under any circumstances.

3.13 BACKFILLING AND COMPACTION FOR UTILITIES SYSTEMS

Backfill material shall consist of satisfactory material, select granular material, or initial backfill material as required. Backfill shall be placed in layers not exceeding 150 mm(6 inches) loose thickness for compaction by hand operated machine compactors, and 200 mm(8 inches) loose thickness for other than hand operated machines, unless otherwise specified.

Each layer shall be compacted to at least 92 percent maximum density, unless otherwise specified.

3.13.1 Trench Backfill

Trenches shall be backfilled to the grade shown. The trench shall be backfilled to 0.6 meters(two feet) above the top of pipe prior to performing the required pressure tests. The joints and couplings shall be left uncovered during the pressure test. The trench shall not be backfilled until all specified tests are performed.

3.13.1.1 Replacement of Unyielding Material

Unyielding material removed from the bottom of the trench shall be replaced with select granular material or initial backfill material.

3.13.1.2 Replacement of Unstable Material

Unstable material removed from the bottom of the trench or excavation shall be replaced with select granular material placed in layers not exceeding 150 mm (6 inches) loose thickness.

3.13.1.3 Initial Backfill

Initial backfill material shall be placed and compacted with approved tampers to a height of at least 300 mm(one foot) above the utility pipe or conduit. The backfill shall be brought up evenly on both sides of the pipe for the full length of the pipe. Care shall be taken to ensure thorough compaction of the fill under the haunches of the pipe.

3.13.1.4 Final Backfill

The remainder of the trench, except for special materials for roadways, railroads and airfields, shall be filled with satisfactory material. Backfill material shall be placed and compacted as follows:

a. Roadways: Backfill shall be placed up to the required elevation as specified. Water flooding or jetting methods of compaction will not be permitted.

b. Sidewalks, Turfed or Seeded Areas and Miscellaneous Areas: Backfill shall be deposited in layers of a maximum of 300 mm(one foot) loose thickness, and compacted to 85 percent maximum density. Compaction by water flooding or jetting will not be permitted. This requirement shall also apply to all other areas not specifically designated above.

3.13.2 Backfill for Appurtances

After the manhole, catchbasin, inlet, or similar structure has been constructed and the concrete has been allowed to cure for 7 days, backfill shall be placed in such a manner that the structure will not be damaged by the shock of falling earth. The backfill material shall be deposited and compacted as specified for final backfill, and shall be brought up evenly on all sides of the structure to prevent eccentric loading and excessive stress.

3.13.3 Special Requirements

Special requirements for both excavation and backfill relating to the specific utilities are as follows.

3.13.3.1 Omitted
3.13.3.2 Omitted
3.13.3.3 Omitted

3.13.3.4 Electrical Distribution System

Direct burial cable and conduit or duct line shall have a minimum cover of 600 mm (24 inches) from the finished grade, unless otherwise indicated. Special trenching requirements for direct-burial electrical cables and conduits are specified in Section 33 71 02.00 20 UNDERGROUND ELECTRICAL DISTRIBUTION SYSTEM.

3.13.4 Buried Tape and Detection Wire

3.13.4.1 Plastic Marking Tape

Warning tapes shall be installed directly above the pipe, at a depth of 450 mm below finished grade unless otherwise shown.Provide buried utility lines with utility identification tape. Bury tape 300 mm (12 inches) below finished grade; under pavements and slabs, bury tape 150 mm (6 inches) below top of subgrade.

3.13.4.2 Buried Detection Wire

Bury detection wire directly above non-metallic piping at a distance not to exceed 300 mm(12 inches) above the top of pipe. The wire shall extend continuously and unbroken, from manhole to manhole. The ends of the wire shall terminate inside the manholes at each end of the pipe, with a minimum of 0.9 m(3 feet) of wire, coiled, remaining accessible in each manhole. The wire shall remain insulated over it's entire length. The wire shall enter manholes between the top of the corbel and the frame, and extend up through the chimney seal between the frame and the chimney seal. For force mains, the wire shall terminate in the valve pit at the pump station end of the pipe.

3.13.5 Porous Fill

Backfill material consisting of clean crushed rock or gravel having a gradation such that 100 percent passes the 50 mm(2 inch) sieve and zero percent passes the 12.5 mm(1/2 inch) sieve.

3.14 PIPELINE CASING

Provide new smooth wall steel pipeline casing where required. Provide each new pipeline casing, where indicated and to the lengths and dimensions shown, complete and suitable for use with the new piped utility as indicated.

3.14.1 Bore Holes

Mechanically bore holes and case through the soil with a cutting head on a continuous auger mounted inside the casing pipe. Weld lengths of pipe

together in accordance with AWS D1.1/D1.1M. Do not use water or other fluids in connection with the boring operation.

3.14.2 Cleaning

Clean inside of the pipeline casing of dirt, weld splatters, and other foreign matter which would interfere with insertion of the piped utilities by attaching a pipe cleaning plug to the boring rig and passing it through the pipe.

3.14.3 End Seals

After installation of piped utilities in pipeline casing, provide watertight end seals at each end of pipeline casing between pipeline casing and piping utilities. Provide watertight end seals.

3.15 OMITTED

3.16 FINISHING

The surface of excavations, embankments, and subgrades shall be finished to a smooth and compact surface in accordance with the lines, grades, and cross sections or elevations shown. The degree of finish for graded areas shall be within 30 mm (0.1 foot) of the grades and elevations indicated except that the degree of finish for subgrades shall be specified in paragraph SUBGRADE PREPARATION. Gutters and ditches shall be finished in a manner that will result in effective drainage. The surface of areas to be turfed shall be finished to a smoothness suitable for the application of turfing materials.

3.16.1 Subgrade and Embankment Protection

During construction, embankments and excavations shall be kept shaped and drained. Ditches and drains along subgrade shall be maintained to drain effectively at all times. The finished subgrade shall not be disturbed by traffic or other operation and shall be protected and maintained by the Contractor in a satisfactory condition until ballast, subbase, base, or pavement is placed. The storage or stockpiling of materials on the finished subgrade will not be permitted. No subbase, base course, ballast, or pavement shall be laid until the subgrade has been checked and approved, and in no case shall subbase, base, surfacing, pavement, or ballast be placed on a muddy, spongy, or frozen subgrade.

3.16.2 Capillary Water Barrier

Capillary water barrier under concrete floor and area-way slabs on grade shall be placed directly on the subgrade and shall be compacted with a minimum of two passes of a hand-operated plate-type vibratory compactor.

3.16.3 Grading Around Structures

Areas within 1.5 m (5 feet) outside of each building and structure line shall be constructed true-to-grade, shaped to drain, and shall be maintained free of trash and debris until final inspection has been completed and the work has been accepted.

3.17 PLACING TOPSOIL

On areas to receive topsoil, the surface shall be free of materials that would hinder planting or maintenance operations. The compacted subgrade soil shall be scarified to a 50 mm (2 inch) depth by disking or plowing for the bonding of topsoil with subsoil. Topsoil then shall be spread evenly to a thickness of 100 mm (4 inches) and graded to the elevations and slopes shown. Topsoil shall not be spread when frozen or excessively wet or dry. Material required for topsoil in excess of that produced by excavation within the grading limits shall be obtained from offsite areas.

3.18 TESTING

Testing shall be the responsibility of the Contractor and shall be performed at no additional cost to the Government. Tests shall be performed by an approved commercial testing laboratory. Field in-place density shall be determined in accordance with ASTM D 1556 and ASTM D 2937. ASTM D 2937, Drive Cylinder Method shall be used only for soft, fine-grained, cohesive soils. When test results indicate that compaction is not as specified, the material shall be removed, replaced and recompacted to meet specification requirements. Tests on recompacted areas shall be performed to determine conformance with specification requirements. Inspections and test results shall be certified by a registered professional civil engineer. These certifications shall state that the tests and observations were performed by or under the direct supervision of the engineer and that the results are representative of the materials or conditions being certified by the tests. The following number of tests, if performed at the appropriate time, will be the minimum acceptable for each type operation.

3.18.1 Fill and Backfill Material Gradation, Classification, and Moisture Content

One test per 150 cubic meters(200yards) stockpiled or in-place source material. Gradation of fill and backfill material shall be determined in accordance with ASTM D 422 and ASTM D 1140 (wash 75 micrometers(0.003 inches), without hydrometer). Liquid limit and plasticity index shall be determined in accordance with ASTM D 4318. Classification of soils shall be in accordance with ASTM D 2487. Moisture content shall be determined in accordance with ASTM D 2216.

3.18.2 Compaction tests shall be performed by the test procedure presented in ASTM D 1557. Adequate testing shall be conducted to establish at least five points with at least one point falling within plus or minus 1.5 percentage points of the plotted optimum moisture content.

3.18.3 Tests Required on Material Prior to Placement

3.18.3.1 General

All material from required excavations and borrow shall be tested prior to incorporation into the permanent work. The tests shall be performed on samples representative of the various materials to be utilized. Samples shall be carefully selected to represent the full range of materials to be used as fill and/or backfill. The following minimum number of tests shall be performed on the materials prior to the placement of the materials in the work. Additional tests of these types shall be performed when materials of different classification or compaction characteristics are encountered to

determine the properties of the materials. The Contracting Officer reserves the right to direct additional testing as required.

3.18.3.2 Classification Tests

Classification tests shall be performed to determine the acceptability of materials in accordance with paragraph MATERIALS. Such tests on materials proposed for use as fill and/or backfill shall be performed prior to their use. Sufficient classification tests shall be performed to define the full range of all materials proposed for use. A minimum of two classification tests shall be performed on each material classified as satisfactory for use. The Contracting Officer may at any time require additional classification tests to confirm material acceptability.

3.18.3.3 Compaction Tests

Compaction tests shall be performed prior to commencement of construction in order to determine the moisture-density relationships of all satisfactory materials proposed for use as fill and/or backfill. For each compaction test performed, an associated or companion classification test and moisture content test shall be performed. Compaction tests shall be performed in sufficient number to establish the full range of maximum dry density and optimum water content. A minimum of 8 compaction tests shall be performed on materials classified as satisfactory for use. Samples for these tests shall not be obtained from the same locations. The Contracting Officer reserves the right to direct where samples for additional compaction tests are obtained. In the event that the compaction characteristics of materials having the same classification vary appreciably, additional compaction tests shall be performed.

3.18.3.4 Moisture Content Tests

Moisture content tests shall be performed on all materials proposed for use as fill and/or backfill to determine their suitability for use in accordance with paragraph Moisture Content. Moisture content tests shall be performed in sufficient number to determine the full range of moisture contents. Moisture content test shall be performed for each compaction test and as required to determine acceptability of material prior to placement. Not less than two moisture content tests shall be performed on each material classified as satisfactory for use.

3.18.4 Tests Required During Placement

3.18.4.1 In-Place Density Tests for General Earthwork

a. One test per 1000 square meters(10,000 square feet), or fraction thereof, of each lift of fill or backfill areas compacted by other than hand-operated machines.

b. One test per 10 square meters(100 square feet), or fraction thereof, of each lift of fill or backfill areas compacted by hand-operated machines.

c. One test per 30 linear meters(100 linear feet), or fraction thereof, of each lift of embankment or backfill for roads.

d. One test per 700 square meters(7500 square feet), or fraction thereof, of subgrade in native soil or cut in all areas, excluding roads.

e. One test per 15 linear meters(50 linear feet), or fraction thereof, of subgrade in embankment or backfill, and in native soil or cut in roads.

3.18.4.2 In-Place Tests for Buildings

Acceptance of the compacted materials shall be determined by the results of field in-place density tests. Density tests in randomly selected locations shall be performed in the material and at the minimum frequency specified below:

Material Type	Location of Material	Minimum Test Frequency
Fill, embankment and backfill	Beneath structures, to the 1.5 m building line	One test per lift per each increment or fraction of 4000 square feet
Fill and backfill	Areas beside structures, footings, walls, and areas enclosed by grade beams that are compacted by hand operated compaction equipment	One test per foot of depth per each increment or fraction of 200 square feet, or for each (50 linear feet) of long narrow (less than 3 feet wide) fills 50 linear meters or more
Subgrade	Under building slabs on grade and paved areas	One test per each increment or fraction of 2500 square feet
Subgrade	Under footings	One test per every fifth column footing and for each increment or fraction of 75 linear feet of wall footings

3.18.4.3 In-Place Density Tests for Utility Systems

Tests shall be performed in sufficient numbers to ensure that the specified density is being obtained. A minimum of one field density test per lift of

backfill for every 150 linear feet, or fraction thereof, of installation shall be performed.

3.18.4.4 Moisture Content

In the stockpile(s), excavation, or borrow areas, a minimum of two tests, each with a one-point or two-point compaction test, shall be performed per day per type of material or source of material being placed during stable weather conditions. During unstable weather, tests shall be made as dictated by the local conditions to ensure the moisture content of the placed materials is within the specified limits.

3.18.4.5 Optimum Moisture and Laboratory Maximum Density

One representative test shall be performed per 200 cubic meters of fill, embankment, and backfill, or when any change in material occurs which may affect the optimum moisture content of laboratory maximum density.

3.18.4.6 Time and Location of Tests

The Government reserves the right to specify the location of any test. Whenever there is doubt as to the adequacy of the testing or validity of results, the Contracting Officer may direct that additional tests be performed, at not additional cost to the Government. The field density tests shall be performed at times and locations which will assure the specified compaction is being obtained throughout each lift for all materials placed. Additional field density tests shall be performed in areas where the Contracting Officer determines there is reason to doubt the adequacy of the natural subgrade.

3.18.4.7 Field Density Control

The results of field density tests shall be compared to results of compaction tests performed as required elsewhere in these specifications by the use of the appropriate procedures described in the following paragraphs.

3.18.5 Compaction Control

For fine grained (clayey and silty) soils and for sands with appreciable fines such that normal shaped compaction curves are obtained, results of all compaction tests shall be plotted on a common plot as a family of curves. For each field density test performed, a one-point compaction test, with additional points as needed, shall be performed on the same material on which the field density test was conducted. The one-point compaction test shall be performed on the dry side of the optimum moisture content. For comparison of field density data to the proper laboratory compaction test results, the procedures for the one-point and/or two-point compaction control methods as described in paragraph Compaction Procedure, shall be used. Compaction curves plotted on the family of curves shall be of such a scale that the optimum moisture content can be interpreted to the nearest 0.1 percent and the maximum dry density can be interpreted to the nearest 0.5 pounds per cubic foot. When a one-point test plots outside the range of the family of curves, an additional five-point compaction test shall be performed.

3.18.6 Compaction Procedure

3.18.6.1 General

The following paragraphs describe methods of relating field density data to desired or specified values. Compaction control of soils requires comparison of fill water content and/or dry density values obtained in field density tests with optimum water content and/or maximum dry density. At a minimum, control shall be in accordance with the One-Point Compaction Method. Where conditions require, the Two-Point Compaction Method shall be used.

3.18.6.2 One-Point Compaction Method

The material from the field density test is allowed to dry to a water content on the dry side of estimated optimum, and then compacted using the same equipment and procedures used in the five-point compaction test. Thorough mixing is required to obtain uniform drying; otherwise, results obtained may be erroneous. The water content and dry density of the compacted sample are determined and then used to estimate its optimum water content and maximum dry density as illustrated in Figure 1 at the end of this section. In Figure 1, the line of optimums is well defined and the compaction curves are approximately parallel to each other, consequently, the one-point compaction method could be used with a relatively high degree of confidence. However, in Figure 2 at the end of this section, the curves are not parallel to each other and in several instances will cross if extended on the dry side. Consequently, the correct curve cannot be determined from the one-point method; therefore, the two-point compaction method should be used. The one-point method should be used only when the data define a relatively good line of optimums.

3.18.6.3 Two-Point Compaction Method

In the two-point test, one sample of material from the location of the field density test is compacted at the fill water content if thought to be at or on the dry side of optimum water content (otherwise, reduced by drying to this condition) using the same equipment and procedures used in the five-point compaction test. A second sample of material is allowed to dry back about 2 to 3 percentage points dry of the water content of the first sample and then compacted in the same manner. At least one point shall fall within 3 percent of the line of optimum. After compaction, the water contents and dry densities for the two samples are determined. The results are used to identify the appropriate compaction curve for the material being tested as shown in Figure 2 at the end of this section. The data shown in Figure 2 warrant the use of the two-point compaction test because the five-point compaction curves are not parallel. Using point A only, as in the one-point test method, would result in appreciable error as the shape of the curve would not be defined. The estimated compaction curve can be more accurately defined by two compaction points.

3.18.7 Tolerance Tests for Subgrades

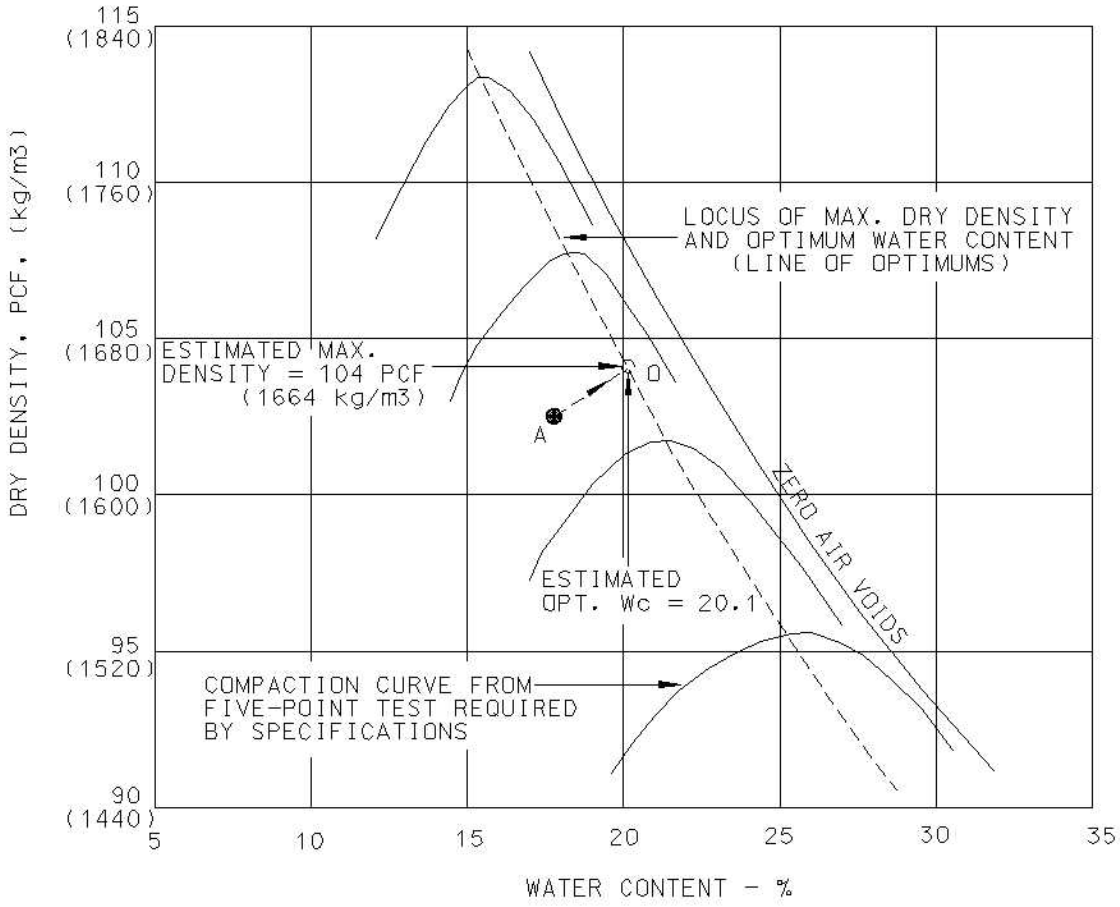
Continuous checks on the degree of finish specified in paragraph SUBGRADE PREPARATION shall be made during construction on the subgrades.

3.19 DISPOSITION OF SURPLUS MATERIAL

Surplus material or other soil material not required or suitable for filling or backfilling, and brush, refuse, stumps, roots, and timber shall be removed from Government property as directed by the Contracting Officer.

3.20 PROTECTION

Settlement or washing that occurs in graded, topsoiled, or backfilled areas prior to acceptance of the work, shall be repaired and grades reestablished to the required elevations and slopes.



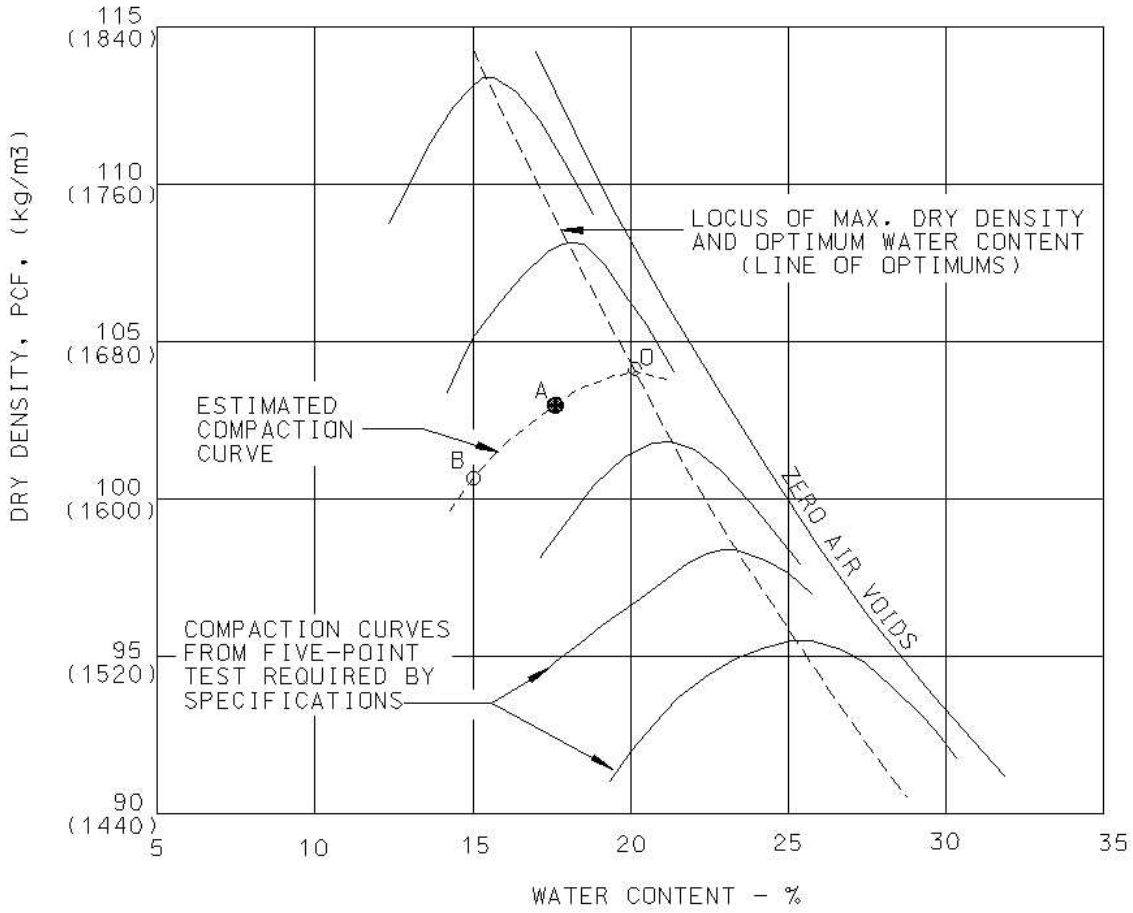
PROCEDURE:

1. Point A is the result of a one-point compaction test on material from field density test. This point must be on the dry side of optimum water content.

2. Point O is the estimated optimum water content and maximum density of the fill material based on a projection of point A approximately parallel to the adjacent compaction curves.

3. Point A must plot within 3 percent of the line of optimums.

Figure 1. Illustration of one-point compaction method.



PROCEDURE:

1. Points A and B are results of a two-point compaction test on material from field density test. Points A and B must be on the dry side of optimum water content.

2. The estimated compaction curve based on Points A and B establishes Point O on the locus, which is the estimated maximum dry density and optimum water content of the fill material.

3. One point must plot within 3 percent of the line of optimums.

Figure 2. Illustration of two-point compaction method.

-- End of Section --

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SECTION 31 11 00

CLEARING AND GRUBBING

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Materials Other Than Saleable Timber

Written permission to dispose of cleared and grubbed material on private property shall be filed with the Contracting Officer.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 PROTECTION

3.1.1 Roads

Keep roads free of construction and/or timber harvest-related dirt and debris at all times.

3.1.2 Trees and Vegetation

Trees and vegetation to be left standing shall be protected from damage incident to clearing, grubbing, and construction operations by the erection of barriers or by such other means as the circumstances require.

3.1.3 UTILITY LINES

Protect existing utility lines that are indicated to remain from damage. Notify the Contracting Officer immediately of damage to or an encounter with an unknown existing utility line. The Contractor shall be responsible for the repairs of damage to existing utility lines that are indicated or made known to the Contractor prior to start of clearing and grubbing operations. When utility lines which are to be removed are encountered within the area of operations, the Contractor shall notify the Contracting Officer in ample time to minimize interruption of the service.

3.2 CLEARING

Clearing shall consist of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within the areas to be cleared. Clearing shall also include the removal and disposal of structures that obtrude, encroach upon, or otherwise obstruct the work. Trees, stumps, roots, brush, and other vegetation in areas to be cleared shall be cut off flush with or below the original ground surface, except such trees and vegetation as may be indicated or directed to be left standing. Any application of any herbicide or pesticide must be pre-approved by the IMPC in EMD prior to the

application. See Section 02360 for more on pesticides.

3.3 GRUBBING

Grubbing shall consist of the removal and disposal of stumps, roots larger than 3 inches in diameter, and matted roots from the designated grubbing areas, which are all areas to be improved, including Trails, Targets, Buildings, Roadways, etc.
Material to be grubbed, together with logs and other organic or metallic debris not suitable for foundation purposes, shall be removed to a depth of not less than 18 inches below the original surface level of the ground in areas indicated to be grubbed and in areas indicated as construction areas under this contract, such as areas for buildings target emplacements, trails, roads, drains, battle positions, electrical/data distribution, camera towers, graded areas, etc. Depressions made by grubbing shall be filled with suitable material and compacted to make the surface conform with the original adjacent surface of the ground.

3.4 TIMBER

The Construction Contractor shall submit a tree removal plan to the Government as soon as possible after receiving Notice-to-Proceed for design. The Construction Contractor shall show the new tree line on a site layout plan. The new tree line should take into account all buffer requirements, roads, wetlands, streams, etc. The trees on the project site are Government property and therefore the Government through the established Fort Benning timber disposal process will sell all merchantable trees identified and approved for removal. The Construction Contractor will delineate the clearing limits by surveying and flagging the perimeter trees with red flagging tape. The Construction Contractor will notify the Government when this has been accomplished. A representative knowledgeable about the clearing limit surveying and flagging will be designated by the Construction Contractor to answer any questions that may arise regarding clearing limits. The Government and Construction Contractor will determine the site start point of the clearing operation. Once the clearing limits are delineated by the Construction Contractor, the Government will determine the volume of merchantable timber to be harvested and then advertise, sell, and remove all merchantable timber within 120 days of notification of the clearing limits delineation. Clearing will begin no later than 60 days after the Government and Construction Contractor have agreed on the clearing limits. Merchantable / saleable timber classification is driven by local market conditions and the discretion of the government timber harvester. Pine and hardwood trees greater than 6 inches in diameter at 4.5 feet above the ground (DBH) and at least 25 feet to a 3 inch top shall be considered as merchantable timber. Trees maybe classified as non-merchantable due to size (too small or too large), deformities, accessibility to harvest the trees, metal contamination, and/or any other factor that may affect the timber harvest contractor’s ability to efficiently harvest, transport, and sale the trees. Timber harvesting to include removal of non-merchantable trees as fuel wood can be implemented before the issuance of a NPDES permit, provided that the guidelines established by the Georgia’s Best Management Practices (BMP’s) for Forestry Manual are followed, and no ground disturbing activities in areas to be constructed or developed (to include grading and grubbing) occur until the NPDES permit and soil erosion control plan is in order.

Note: These guidelines were developed to minimize non-point source (soil erosion and stream sedimentation) and thermal pollution in order to adhere to the Federal Water Pollution Control Act. Ground

disturbance activities and guidelines for the stabilization of sites such as but not limited to roads, stream crossings, log decks, skid trails, firebreaks and others must follow the Georgia Forestry BMP's manual recommendations.

After the Government's Timber Harvest Contractor has cleared a minimum of 5 acres, the Construction Contractor may begin any clearing and grubbing required under the contract once all required environmental permits are in place. After the Timber Harvest Contractor has completed his operations all trees or portions of trees remaining shall be considered to be non-merchantable and are to be removed by the Construction Contractor.

3.4.1 TIMBER HARVESTING IN WETLANDS AND STREAMSIDE MANAGEMENT ZONES

If clearing of trees is required within 25 feet of the wrested vegetation of either side of a stream and/or state water, then a stream buffer variance must be acquired from the Georgia Environmental Protection Division (EPD) before the trees can be removed.

If at the time of timber harvest, stream buffer variance permits have not been acquired by the Construction Contractor, then the stream buffer areas must remain untouched until the required stream buffer variance permits have been issued.

Note: Removal of timber products as a silvicultural practice within a 25' buffer from a state water, will prevent future construction activities at this area for a period of 3 years.

The Construction Contractor must cut and stockpile all merchantable trees in stream buffer areas. All merchantable trees that meet the following criteria must be stock piled on the foot print of the construction site for pick-up by the government timber harvest contractor.

- Pine Sawtimber is a minimum of 10 inches DBH and 25 foot length to an 8 inch top.
- Pine Pulpwood is a minimum of 6 inches in DBH and 25 foot length to a 3 inch top.
- Hardwood Pulpwood is a minimum of 6 inches DBH and 25 foot length to a 3 inch top.
- Hardwood Sawtimber is a minimum of 12 inches DBH and 16.5 foot length to a 12 inch top.

The Construction Contractor through the Contracting Officer's Representative (COR) must schedule with the Land Management Branch, DPW for removal of the stock piled timber. If the remaining timber in wetlands and stream variance areas is deemed non-merchantable, then it shall be disposed of as stated below by the Construction Contractor. Trees/timber can only be deemed non-merchantable by the Land Management Branch, DPW. A signed letter from the Land Management Branch to the Construction Contractor's COR will designate the timber as non-merchantable. Only then is the timber released to the Construction Contractor. The Construction Contractor through the COR must make a request to the Land Management Branch if they think the timber is non-merchantable.

Harvesting Streamside Management Zones and Wetlands

o Use site-specific equipment and methods to minimize water quality impacts, including high-flotation, low-pressure harvesting equipment, shovel logging, or cable yarding.
o Concentrate skid trails and use logging slash, mats or other techniques to minimize soil compaction and rutting.
o Use techniques that minimize soil disturbance, such as backing trees out with machine, using low ground pressure equipment, using equipment with a boom or cable winch.
o Maintain the integrity of stream banks.
o Minimize the exposure of mineral soil by spreading logging slash and using it to drive over.
o Follow Federal mandated stream and wetland crossing procedures.
o Ruts can not be deeper than 12 inches in wetland areas and stream variance areas

Must Avoid
o Using de-limbing gates or trees as de-limbing gates in the wetlands or stream variance areas.
o Leaving tops in stream channels.

3.4.2 SLASH AND RESIDUAL TREE REMOVAL

The Construction Contractor shall submit to the Government a written plan for disposal of all remaining timber. This plan shall be submitted at least 15 days prior to any removal. The plan will indicate the method of disposal and the location. The disposal will occur in one of the following ways unless approved otherwise by the Government:

o Chip the debris and haul off Fort Benning.

o Chip the debris and use as mulch for landscaping. Chips used for this purpose cannot exceed a depth of 3 inches.

o Haul debris to a non-government landfill off of Fort Benning.

o Pile debris in trenches and burn at high temperatures using an air curtain destructor or similar equipment able to achieve high temperatures outlined in GA Rules for Air Quality Control Chapter 391-3-1. The incinerated material would be buried in the trench. This process would require monitoring by and coordination with the Contracting Officer Representative and the Fort Benning Environmental office. This process would need to meet any Title V Permit or other federal, State, and local air permits or regulatory requirements. The Construction Contractor shall keep records of the amount of debris burned, location of trenches, weather conditions, and other data as required by the Government. All proposed locations for this method of disposal must be approved by the Government.

-- End of Section --

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PART 1 GENERAL

1.1 REFERENCES

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

THE NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

7 USC Section 136	Federal Insecticide, Fungicide, and Rodenticide Act

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. 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-03 Product Data

Termiticide Application Plan; G, G

Termiticide application plan with proposed sequence of treatment work with dates and times. The termiticide trade name, EPA registration number, chemical composition, formulation, concentration of original and diluted material, application rate of active ingredients, method of application, area/volume treated, amount applied; and the name and state license number of the state certified applicator shall be included.

Termiticides; G

Manufacturer's label and Material Safety Data Sheet (MSDS) for termiticides proposed for use.

Foundation Exterior; G

Written verification that other site work will not disturb the treatment.

Utilities and Vents; G

Written verification that utilities and vents have been located.

Crawl and Plenum Air Spaces; G

Written verification that crawl spaces and plenum air spaces have been located.

Verification of Measurement; G

Written verification that the volume of termiticide used meets the application rate.

Application Equipment; G

A listing of equipment to be used.

Warranty; G

Copy of Contractor's warranty.

SD-04 Samples

Termiticides; G

Submit on request samples of the pesticides used in this work or the Contracting Officer, the Installation Pest Management Coordinator (IPMC), or Pest Management Quality Assurance Evaluator (PMQAE) may draw, at any time and without prior notice, from stocks at the job site. Should analysis, performed by the Government, indicate such samples to contain less than the amount of active ingredient specified on the label, work performed with such products shall be repeated, with pesticides conforming to this specification, at no additional cost to the Government.

SD-06 Test Reports

Equipment Calibration and Tank Measurement; G

Certification of calibration tests conducted on the equipment used in the termiticide application.

Soil Moisture; G

Soil moisture test result.

Quality Assurance; G

Pest Management Report and copies of daily records signed by an officer of the Contractor, the IMPC, and the PMQAE. Contact EMD prior to work to obtain copies of necessary reporting forms and instructions regarding how to fill them out.

SD-07 Certificates

Qualifications; G

Qualifications and state certification number of the termicide applicator that will be performing the application. Applicator must be certified by Georgia Department of Agriculture in category 30 wood destroying organisms.

1.3 QUALIFICATIONS

The Contractor's principal business shall be pest control. The Contractor shall be licensed and the termiticide applicators certified in the state where the work is to be performed. Termiticide applicators shall also be certified in the U.S. Environmental Protection Agency (EPA) pesticide applicator category which includes structural pest control. The Contractor must possess a Georgia Department of Agriculture business license for termite control. All records, including but not limited to business license, certification of application and liablity insurance, must be submitted prior to application of any pesticide.

The Contractor shall:

a. Have personnel with a state of Georgia certification as required.

b. Provide a submittal with the following information to Contracting Officer and the IPMC:

(1) Quantity of pesticide used.
(2) Rate of dispersion.
(3) Percent of use.
(4) Total amount used.

c. The contractor must coordinate with the Pest Management QAE at 545-1350 or 545-3224, at least 48 hours prior to application of pesticides. The PMQAE has to be onsite to observe the mixing and preparation and application of chemical and to ensure that at the time of any soil treatment application, the soil is in a condition with low moisture to allow uniform distribution of the treatment solution throughout the soil. Treatment can not occur without this coordination.

1.4 SAFETY REQUIREMENTS

Formulate, treat, and dispose of termiticides and their containers in accordance with label directions. Draw water for formulating only from sites designated by the Contracting Officer, and fit the filling hose with a backflow preventer meeting local plumbing codes or standards. The filling operation shall be under the direct and continuous observation of a contractor's representative to prevent overflow. Secure pesticides and related materials under lock and key when unattended. Ensure that proper protective clothing and equipment are worn and used during all phases of termiticide application. Dispose of used pesticide containers off Government property.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery

Termiticide material shall be delivered to the site in the original unopened containers bearing legible labels indicating the EPA registration number and manufacturer's registered uses. All other materials to be used on site for the purpose of termite control shall be delivered in new or otherwise good condition as supplied by the manufacturer or formulator.

1.5.2 Storage

Materials shall be stored off Post and in accordance with manufacturer's labels. Termiticides and related materials shall be kept under lock and key when unattended.

1.5.3 Handling

Termiticides shall be handled in accordance with manufacturer's labels. Manufacturer's warnings and precautions shall be observed. Materials shall be handled preventing contamination by dirt, water, and organic material. Protect termiticides from sunlight as recommended by the manufacturer.

1.6 INSPECTION

Termiticides shall be inspected upon arrival at the job site for conformity to type and quality in accordance with paragraph TERMITICIDES. Each label shall bear evidence of registration under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended or under appropriate regulations of the host county. Other materials shall be inspected for conformance with specified requirements. Unacceptable materials shall be removed from the job site.

1.7 WARRANTY

The Contractor shall provide a 5-year written warranty against infestations

or reinfestations by subterranean termites of the buildings or building additions constructed under this contract. Warranty shall include annual inspections of the buildings or building additions. If live subterranean termite infestation or subterranean termite damage is discovered during the warranty period, and the soil and building conditions have not been altered in the interim, the Contractor shall:

a. Retreat the soil and perform other treatment as may be necessary for elimination of subterranean termite infestation;

b. Repair damage caused by termite infestation; and

c. Re-inspect the building approximately 180 days after the retreatment.

1.8 QUALITY ASSURANCE

The Contractor shall comply with 7 USC Section 136 for requirements on contractor's licensing, certification, and record keeping. The Contractor shall maintain daily records using Pest Management Maintenance Record, DD Form 1532-1 and submit copies of records when requested by the Contracting Officer. These forms may be obtained from the main web site: http://web1.whs.osd.mil/icdhome/formsrpt/WWWDDAllbyNumber_1Page10.htm. Or directly from the following websites: http://web1.whs.osd.mil/forms/DD1532-1.pdf and http://web1.whs.osd.mil/forms/DD1532.pdf. Upon completion of this work, submit Pest Management Report. DD Form 1532 identifying target pest, type of operation, brand name and manufacturer of pesticide, formulation, concentration or rate of application used.

PART 2 PRODUCTS

2.1 TERMITICIDES

Termiticides shall be non-repellant. Termiticides shall be currently registered by the EPA or approved for such use by the appropriate agency of the host county. Termiticide shall be selected for maximum effectiveness and duration after application. Termiticide shall be applied at the maximum label application rate. The selected termiticide shall be suitable for the soil and climatic conditions at the project site. The selected termitcide shall be approved by the IMPC.

PART 3 EXECUTION

3.1 TECHNICAL REPRESENTATIVE

The certified Pest Management Quality Assurance Evaluator (PMQAE), shall be present at all meetings concerning treatment measures for subterranean termites, and must be present during treatment application. The command Pest Control Coordinator IMPC shall be contacted prior to starting work.

3.2 SITE PREPARATION

Site preparation shall be in accordance with Sections 02231 CLEARING AND GRUBBING, 02300A EARTHWORK FOR ROADWAYS, TRAILS, TARGETS, AND BERMS, 02315A EXCAVATION, FILLING AND BACKFILLING FOR BUILDINGS, 02921A SEEDING. Work related to final grades, landscape plantings, foundations, or any other alterations to finished construction which might alter the condition of treated soils, shall be coordinated with this specification.

3.2.1 Ground Preparation

Food sources shall be eliminated by removing debris from clearing and grubbing and post construction wood scraps such as ground stakes, form

boards, and scrap lumber from the site, before termiticide application begins.

3.2.2 Verification

Before work starts, the Contractor shall verify that final grades are as indicated and smooth grading has been completed in accordance with Section 31 00 00 EARTHWORK ~~FOR ROADWAYS, TRAILS, TARGETS, AND BERMS~~. Soil particles shall be finely graded with particles no larger than 1 inch and compacted to eliminate soil movement to the greatest degree.

3.2.3 Foundation Exterior

The Contractor shall provide written verification that final grading and landscape planting operations will not disturb treatment of the soil on the exterior sides of foundation walls, grade beams, and similar structures.

3.2.4 Utilities and Vents

The Contractor shall provide written verification that the location and identity of HVAC ducts and vents, water and sewer lines, and plumbing have been accomplished prior to the termiticide application.

3.2.5 Crawl and Plenum Air Spaces

The Contractor shall provide written verification that the location and identity of crawl and plenum air spaces have been accomplished prior to the termiticide application.

3.3 SITE CONDITIONS

The following conditions shall determine the time of application.

3.3.1 Soil Moisture

Soils to be treated shall be tested immediately before application. Soil moisture content shall be tested to a minimum depth of 3 inches. The soil moisture shall be as recommended by the termiticide manufacturer. The termiticide will not be applied when soil moisture exceeds manufacturer's recommendations because termiticides do not adhere to the soil particles in saturated soils.

3.3.2 Runoff and Wind Drift

Termiticide shall not be applied during or immediately following heavy rains. Applications shall not be performed when conditions may cause runoff or create an environmental hazard. Applications shall not be performed when average wind speed exceeds 10 miles per hour. The termiticide shall not be allowed to enter water systems, aquifers, or endanger humans or animals.

3.3.2.1 Vapor Barriers and Waterproof Membranes

Termiticide shall be applied prior to placement of a vapor barrier or waterproof membrane.

3.3.2.2 Utilities and Vents

Prior to application, HVAC ducts and vents located in treatment area shall be turned off and blocked to protect people and animals from termiticide.

3.3.3 Placement of Concrete

Concrete covering treated soils shall be placed as soon as the termiticide

has reached maximum penetration into the soil. Time for maximum penetration shall be as recommended by the manufacturer.

3.4 TERMITICIDE TREATMENT

The Contractor shall submit a Termiticide Application Plan to the Facility's Environmental Management Division, Pesticide Department for review and approval before starting the specified treatment.

3.4.1 Equipment Calibration and Tank Measurement

Immediately prior to commencement of termiticide application, calibration tests shall be conducted on the application equipment to be used and the application tank shall be measured to determine the volume and contents. These tests shall confirm that the application equipment is operating within the manufacturer's specifications and will meet the specified requirements. The Contractor shall provide written certification of the equipment calibration test results within 1 week of testing.

3.4.2 Mixing and Application

Formulating, mixing, and application shall be performed in the presence of the Contracting Officer or the technical representative and the PMQAE. A closed system is recommended as it prevents the termiticide from coming into contact with the applicator or other persons. Water for formulating shall only come from designated locations. Filling hoses shall be fitted with a backflow preventer meeting local plumbing codes or standards. Overflow shall be prevented during the filling operation. Prior to each day of use, the equipment used for applying termiticides shall be inspected for leaks, clogging, wear, or damage. Any repairs are to be performed immediately.

3.4.3 Treatment Method

For areas to be treated, the Contractor shall establish complete and unbroken vertical and/or horizontal soil poison barriers between the soil and all portions of the intended structure which may allow termite access to wood and wood related products. Application shall not be made to areas which serve as crawl spaces or for use as a plenum air space. The treatment method shall comply with the provisions of Georgia Rules of Structural Pest Control.

3.4.3.1 Surface Application

Surface application shall be used for establishing horizontal barriers. Surface applicants shall be applied as a coarse spray and provide uniform distribution over the soil surface. Termiticide shall penetrate a minimum of 1 inch into the soil, or as recommended by the manufacturer.

3.4.3.2 Rodding and Trenching

Rodding and trenching shall be used for establishing vertical soil barriers. Trenching shall be to the depth of the foundation footing. Width of trench shall be as recommended by the manufacturer, or as indicated. Rodding or other approved method may be implemented for saturating the base of the trench with termiticide. Immediately after termiticide has reached maximum penetration as recommended by the manufacturer, backfilling of the trench shall commence. Backfilling shall be in 6 inch rises or layers. Each rise shall be treated with termiticide.

3.4.4 Sampling

The Contracting Officer or the PMQAE may draw from stocks at the job site, at any time and without prior notice, samples of the termiticides used to

determine if the amount of active ingredient specified on the label is being applied.

3.5 VERIFICATION OF MEASUREMENT

Once termiticide application has been completed, tank contents shall be measured to determine the remaining volume. The total volume measurement of used contents for the application shall equal the established application rate for the project site conditions. The Contractor shall provide written verification of the measurements.

3.6 CLEAN UP, DISPOSAL, AND PROTECTION

Once application has been completed, the Contractor shall proceed with clean up and protection of the site without delay.

3.6.1 Clean Up

The site shall be cleaned of all material associated with the treatment measures, according to label instructions, and as indicated. Excess and waste material shall be removed and disposed off of Government property.

3.6.2 Disposal of Termiticide

The Contractor shall dispose of residual termiticides and containers off Government property, and in accordance with label instructions and EPA criteria.

3.6.3 Protection of Treated Area

Immediately after the application, the area shall be protected from other use by erecting barricades and providing signage as required or directed. Signage shall be placed inside the entrances to crawl spaces and shall identify the space as treated with termiticide and not safe for children and animals.

3.7 CONDITIONS FOR SATISFACTORY TREATMENT

3.7.1 Equipment Calibrations and Measurements

Where results from the equipment calibration and tank measurements tests are unsatisfactory, re-treatment will be required.

3.7.2 Testing

Should an analysis, performed by a third party, indicate that the samples of the applied termiticide contain less than the amount of active ingredient specified on the label, and/or if soils are treated to a depth less than specified or approved, re-treatment will be required.

3.7.3 Disturbance of Treated Soils

Soil and fill material disturbed after treatment shall be re-treated before placement of slabs or other covering structures.

3.7.4 Termites Found Within the Warranty Period

If live subterranean termite infestation or termite damage is discovered during the warranty period, the Contractor shall re-treat the site.

3.8 RE-TREATMENT

Where re-treatment is required, the Contractor shall comply with the requirements specified in paragraph WARRANTY.

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SECTION 32 01 19

FIELD MOLDED SEALANTS FOR SEALING JOINTS IN RIGID PAVEMENTS
04/06

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM C 509	(2006) Elastomeric Cellular Preformed Gasket and Sealing Material
ASTM D 5893	(2004) Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements
ASTM D 6690	(2006a) Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
ASTM D 7116	(2005) Standard Specification for Joint Sealants, Hot Applied, Jet Fuel Resistant Types, for Portland Cement Concrete
ASTM D 789	(2006a) Determination of Relative Viscosity and Moisture Content of Polyamide (PA)

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 525	(1989) Test Method for Evaluation of Hot-Applied Joint Sealants for Bubbling Due to Heating

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Manufacturer's Recommendations; G.

Where installation procedures, or any part thereof, are required to be in accordance with the manufacturer's recommendations, printed copies of these recommendations, 30 days prior to use on the project. Installation of the material will not be allowed until the recommendations are received. Failure to furnish these

recommendations can be cause for rejection of the material.

Equipment.

List of proposed equipment to be used in performance of construction work including descriptive data, 30 days prior to use on the project.

SD-04 Samples

Materials; G.

Samples of the materials (sealant, primer if required, and backup material), in sufficient quantity for testing and approval 30 days prior to the beginning of work. No material will be allowed to be used until it has been approved.

1.3 SAFETY

Joint sealant shall not be placed within 25 feet of any liquid oxygen (LOX) equipment, LOX storage, or LOX piping. Joints in this area shall be thoroughly cleaned and left unsealed.

1.4 TEST REQUIREMENTS

The joint sealant and backup or separating material shall be tested for conformance with the referenced applicable material specification. Testing of the materials shall be performed in an approved independent laboratory and certified copies of the test reports shall be submitted and approved 30 days prior to the use of the materials at the job site. Samples will be retained by the Government for possible future testing should the materials appear defective during or after application. Conformance with the requirements of the laboratory tests specified will not constitute final acceptance of the materials. Final acceptance will be based on the performance of the in-place materials.

1.5 EQUIPMENT

Machines, tools, and equipment used in the performance of the work required by this section shall be approved before the work is started and shall be maintained in satisfactory condition at all times.

1.5.1 Joint Cleaning Equipment

1.5.1.1 Tractor-Mounted Routing Tool

The routing tool used for removing old sealant from the joints shall be of such shape and dimensions and so mounted on the tractor that it will not damage the sides of the joints. The tool shall be designed so that it can be adjusted to remove the old material to varying depths as required. The use of V-shaped tools or rotary impact routing devices will not be permitted. Hand-operated spindle routing devices may be used to clean and enlarge random cracks.

1.5.1.2 Concrete Saw

A self-propelled power saw with water-cooled diamond or abrasive saw blades will be provided for cutting joints to the depths and widths specified or for refacing joints or cleaning sawed joints where sandblasting does not

provide a clean joint.

1.5.1.3 Sandblasting Equipment

Sandblasting equipment shall include an air compressor, hose, and long-wearing venturi-type nozzle of proper size, shape and opening. The maximum nozzle opening should not exceed 1/4 inch. The air compressor shall be portable and shall be capable of furnishing not less than 150 cfm and maintaining a line pressure of not less than 90 psi at the nozzle while in use. Compressor capability under job conditions must be demonstrated before approval. The compressor shall be equipped with traps that will maintain the compressed air free of oil and water. The nozzle shall have an adjustable guide that will hold the nozzle aligned with the joint approximately 1 inch above the pavement surface. The height, angle of inclination and the size of the nozzle shall be adjusted as necessary to secure satisfactory results.

1.5.1.4 Waterblasting Equipment

Waterblasting equipment shall include a trailer-mounted water tank, pumps, high-pressure hose, wand with safety release cutoff control, nozzle, and auxiliary water resupply equipment. The water tank and auxiliary resupply equipment shall be of sufficient capacity to permit continuous operations. The nozzle shall have an adjustable guide that will hold the nozzle aligned with the joint approximately 1 inch above the pavement surface. The height, angle of inclination and the size of the nozzle shall be adjustable as necessary to obtain satisfactory results. A pressure gauge mounted at the pump shall show at all times the pressure in pounds per square inch at which the equipment is operating.

1.5.1.5 Hand Tools

Hand tools may be used, when approved, for removing defective sealant from a crack and repairing or cleaning the crack faces.

1.5.2 Sealing Equipment

1.5.2.1 Hot-Poured Sealing Equipment

The unit applicators used for heating and installing ASTM D 6690 joint sealant materials shall be mobile and shall be equipped with a double-boiler, agitator-type kettle with an oil medium in the outer space for heat transfer; a direct-connected pressure-type extruding device with a nozzle shaped for inserting in the joint to be filled; positive temperature devices for controlling the temperature of the transfer oil and sealant; and a recording type thermometer for indicating the temperature of the sealant. The applicator unit shall be designed so that the sealant will circulate through the delivery hose and return to the inner kettle when not in use.

1.5.2.2 Cold-Applied, Single-Component Sealing Equipment

The equipment for installing ASTM D 5893 single component joint sealants shall consist of an extrusion pump, air compressor, following plate, hoses, and nozzle for transferring the sealant from the storage container into the joint opening. The dimension of the nozzle shall be such that the tip of the nozzle will extend into the joint to allow sealing from the bottom of the joint to the top. The initially approved equipment shall be maintained in good working condition, serviced in accordance with the supplier's

instructions, and shall not be altered in any way without obtaining prior approval. Small hand-held air-powered equipment (i.e., caulking guns) may be used for small applications.

1.6 DELIVERY AND STORAGE

Materials delivered to the job site shall be inspected for defects, unloaded, and stored with a minimum of handling to avoid damage. Storage facilities shall be provided by the Contractor at the job site for maintaining materials at the temperatures and conditions recommended by the manufacturer.

1.7 ENVIRONMENTAL CONDITIONS

The ambient air temperature and the pavement temperature within the joint wall shall be a minimum of 50 degrees F and rising at the time of application of the materials. Sealant shall not be applied if moisture is observed in the joint.

PART 2 PRODUCTS

2.1 SEALANTS

Materials for sealing cracks in the various paved areas indicated on the drawings shall be ASTM D 7116 and COE CRD-C 525 or ASTM D 5893.

2.2 PRIMERS

When primers are recommended by the manufacturer of the sealant, their use shall be in accordance with the recommendation of the manufacturer.

2.3 BACKUP MATERIALS

The backup material shall be a compressible, nonshrinking, nonstaining, nonabsorbing material and shall be nonreactive with the joint sealant. The material shall have a melting point at least 5 degrees F greater than the pouring temperature of the sealant being used when tested in accordance with ASTM D 789. The material shall have a water absorption of not more than 5 percent of the sample weight when tested in accordance with ASTM C 509. The backup material shall be 25 plus or minus 5 percent larger in diameter than the nominal width of the crack.

2.4 BOND BREAKING TAPES

The bond breaking tape or separating material shall be a flexible, nonshrinkable, nonabsorbing, nonstaining, and nonreacting adhesive-backed tape. The material shall have a melting point at least 5 degrees F greater than the pouring temperature of the sealant being used when tested in accordance with ASTM D 789. The bond breaker tape shall be approximately 1/8 inch wider than the nominal width of the joint and shall not bond to the joint sealant.

PART 3 EXECUTION

3.1 PREPARATION OF JOINTS

Immediately before the installation of the sealant, the joints shall be thoroughly cleaned to remove all laitance, curing compound, filler, protrusions of hardened concrete, and old sealant from the sides and upper

edges of the joint space to be sealed.

3.1.1 Existing Sealant Removal

The in-place sealant shall be cut loose from both joint faces and to the depth shown on the drawings, using the tractor-mounted routing equipment, concrete saw, sandblaster, or waterblaster as specified in paragraph EQUIPMENT. Depth shall be sufficient to accommodate any separating or backup material that is required to maintain the depth of new sealant to be installed. Prior to further cleaning operations, all loose old sealant remaining in the joint opening shall be removed by blowing with compressed air. Hand tools may be required to remove sealant from random cracks. Chipping, spalling, or otherwise damaging the concrete will not be allowed.

3.1.2 Sawing

3.1.2.1 Facing of Joints

Facing of joints shall be accomplished using a concrete saw as specified in paragraph EQUIPMENT to saw through sawed and filler-type joints to loosen and remove material until the joint is clean and open to the full specified width and depth. The blade shall be stiffened with a sufficient number of suitable dummy (used) blades or washers. Immediately following the sawing operation, the joint opening shall be thoroughly cleaned using a water jet to remove all saw cuttings and debris.

3.1.2.2 Facing of Random Cracks

Sawing of the cracks shall be accomplished using a power-driven concrete saw as specified in paragraph EQUIPMENT. The saw blade shall be 6 inches or less in diameter to enable the saw to follow the trace of the crack. The blade shall be stiffened as necessary with suitable dummy (or used) blades or washers. Immediately following the sawing operation, the crack opening shall be thoroughly cleaned using a water jet to remove all saw cuttings and debris.

3.1.3 Sandblasting

The newly exposed concrete joint faces and the pavement surfaces extending a minimum of 1/2 inch from the joint edges shall be sandblasted or waterblasted clean. A multiple-pass technique shall be used until the surfaces are free of dust, dirt, curing compound, filler, old sealant residue, or any foreign debris that might prevent the bonding of the sealant to the concrete. After final cleaning and immediately prior to sealing, the joints shall be blown out with compressed air and left completely free of debris and water.

3.1.4 Back-Up Material

When the joint opening is of a greater depth than indicated for the sealant depth, the lower portion of the joint opening shall be plugged or sealed off using a back-up material to prevent the entrance of the sealant below the specified depth. Care shall be taken to ensure that the backup material is placed at the specified depth and is not stretched or twisted during installation.

3.1.5 Bond Breaking Tape

Where inserts or filler materials contain bitumen, or the depth of the

joint opening does not allow for the use of a backup material, a bond breaker separating tape will be inserted to prevent incompatibility with the filler materials and three-sided adhesion of the sealant. The tape shall be securely bonded to the bottom of the joint opening so it will not float up into the new sealant.

3.1.6 Rate of Progress of Joint Preparation

The stages of joint preparation which include sandblasting, air pressure cleaning and placing of the back-up material shall be limited to only that lineal footage that can be sealed during the same day.

3.2 PREPARATION OF SEALANT

3.2.1 Hot-Poured Sealants

Sealants conforming to ASTM D 6690 shall not be heated in excess of the safe heating temperature recommended by the manufacturer as shown on the sealant containers. Sealant that has been overheated or subjected to application temperatures for over 4 hours or that has remained in the applicator at the end of the day's operation shall be withdrawn and wasted.

3.2.2 Single-Component, Cold-Applied Sealants

The ASTM D 5893 sealant and containers shall be inspected prior to use. Any materials that contain water, hard caking of any separated constituents, nonreversible jell, or materials that are otherwise unsatisfactory shall be rejected. Settlement of constituents in a soft mass that can be readily and uniformly remixed in the field with simple tools will not be cause for rejection.

3.3 INSTALLATION OF SEALANT

3.3.1 Time of Application

Joints shall be sealed immediately following final cleaning of the joint walls and following the placement of the separating or backup material. Open joints that cannot be sealed under the conditions specified, or when rain interrupts sealing operations shall be recleaned and allowed to dry prior to installing the sealant.

3.3.2 Sealing Joints

Immediately preceding, but not more than 50 feet ahead of the joint sealing operations, a final cleaning with compressed air shall be performed. The joints shall be filled from the bottom up to 1/8 inch plus or minus 1/16 inch below the pavement surface. Excess or spilled sealant shall be removed from the pavement by approved methods and shall be discarded. The sealant shall be installed in such a manner as to prevent the formation of voids and entrapped air. In no case shall gravity methods or pouring pots be used to install the sealant material. Traffic shall not be permitted over newly sealed pavement until authorized by the Contracting Officer. When a primer is recommended by the manufacturer, it shall be applied evenly to the joint faces in accordance with the manufacturer's instructions. Joints shall be checked frequently to ensure that the newly installed sealant is cured to a tack-free condition within the time specified.

3.4 INSPECTION

3.4.1 Joint Cleaning

Joints shall be inspected during the cleaning process to correct improper equipment and cleaning techniques that damage the concrete pavement in any manner. Cleaned joints shall be approved prior to installation of the separating or back-up material and joint sealant.

3.4.2 Joint Sealant Application Equipment

The application equipment shall be inspected to ensure conformance to temperature requirements and proper installation. Evidences of bubbling, improper installation, failure to cure or set shall be cause to suspend operations until causes of the deficiencies are determined and corrected.

3.4.3 Joint Sealant

The joint sealant shall be inspected for proper rate of cure and set, bonding to the joint walls, cohesive separation within the sealant, reversion to liquid, entrapped air and voids. Sealants exhibiting any of these deficiencies at any time prior to the final acceptance of the project shall be removed from the joint, wasted, and replaced as specified herein at no additional cost to the Government.

3.5 CLEAN-UP

Upon completion of the project, all unused materials shall be removed from the site and the pavement shall be left in a clean condition.

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SECTION 32 05 33

LANDSCAPE ESTABLISHMENT
07/06

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z133.1	(2006) Arboricultural Operations - Safety Requirements for Pruning, Repairing, Maintaining, and Removing Trees, and Cutting Brush

ASTM INTERNATIONAL (ASTM)

ASTM D 5851	(1995; R 2006) Planning and Implementing a Water Monitoring Program

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED	(2002; R 2005) Leadership in Energy and Environmental Design(tm) Green Building Rating System for New Construction (LEED-NC)

1.2 DEFINITIONS

1.2.1 Pesticide

Any substance or mixture of substances, including biological control agents, that may pervent, destroy, repel, or mitigate pests and are specifically labeled for use by the U.S. Environmental Protection Agency (EPA). Also, any substance used as a plant regulator, defoliant, disinfectant, or biocide. Examples of pesticides include fumigants, herbicides, insecticides, fungicides, nematicides, molluscicides and rodenticides.

1.2.2 Stand of Turf

100 percent ground cover of the established species.

1.2.3 Planter Beds

A planter bed is defined as an area containing one or a combination of the following plant types: shrubs, vines, wildflowers, annuals, perennials, ground cover, and a mulch topdressing excluding turf. Trees may also be found in planter beds.

1.3 RELATED REQUIREMENTS

Section 32 92 23 SODDING applies to this section for installation of sod requirements, with additions and modifications herein.

Section 32 93 00 EXTERIOR PLANTS applies to this section for installation of trees, shrubs, and ground cover, with additions and modifications herein.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Integrated Pest Management Plan; G

SD-03 Product Data

Local/Regional Materials; (LEED)

Submit documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in project.

Fertilizer; G

Hose; (LEED)
Mulches Topdressing; (LEED)

Submit documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product. Indicate relative dollar value of recycled content products to total dollar value of products included in project.

Organic Mulch Materials

Submit documentation indicating type of biobased material in product and biobased content. Indicate relative dollar value of biobased content products to total dollar value of products included in project.

SD-07 Certificates

Maintenance inspection report

Plant quantities; G

SD-10 Operation and Maintenance Data

Maintenance

SD-11 Closeout Submittals

Tree, staking and guying removal

1.5 DELIVERY, STORAGE AND HANDLING

1.5.1 Delivery

Deliver fertilizer, gypsum, iron to the site in original containers bearing manufacturer's chemical analysis, name, trade name, or trademark, and indication of conformance to state and federal laws. Instead of containers, fertilizer, gypsum may be furnished in bulk with a certificate indicating the above information.

1.5.2 Storage

1.5.2.1 Fertilizer, Lime, Iron, Mulch Storage

Material shall be stored in designated areas. Lime and fertilizer shall be stored in cool, dry locations away from contaminants.

1.5.2.2 Antidessicants Storage

Do not store with fertilizers or other landscape maintenance materials.

1.5.3 Handling

Do not drop or dump materials from vehicles.

1.6 SUSTAINABLE DESIGN REQUIREMENTS

1.6.1 Local/Regional Materials

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a 500 mile radius from the project site, if available from a minimum of three sources.See Section 01 33 29 LEED(tm) DOCUMENTATION for cumulative total local material requirements. Landscaping materials may be locally available.

1.7 MAINTENANCE

Submit Operation and Maintenance (O&M) Manuals for planting materials. Include instructions indicating procedures during one typical year including variations of maintenance for climatic conditions throughout the year. Provide instructions and procedures for watering; promotion of growth, including fertilizing, pruning, and mowing; and integrated pest management. O&M Manuals shall include pictures of planting materials cross referenced to botanical and common names, with a description of the normal appearance in each season.

Develop a water monitoring program for surface and ground water on the project site in accordance with ASTM D 5851 and consistent with the water management program utilized during construction operations.

PART 2 PRODUCTS

2.1 POST-PLANT FERTILIZER

Fertilizer for groundcover, wildflowers, and grasses is not permitted. Fertilizer for trees, plants, and shrubs shall be as recommended by plant supplier, except synthetic chemical fertilizers are not permitted.

Fertilizers containing petrochemical additives or that have been treated with pesticides or herbicides are not permitted.

2.1.1 Granular Fertilizer

Organic, granular controlled release fertilizer applied according to the results of the soils test.

2.2 WATER

Source of water shall be approved by the Contracting Officer, and be of suitable quality for irrigation. Use collected storm water or graywater when available.

2.2.1 Hose

Hoses used for watering shall be a minimum of 60 percent post-consumer rubber or plastic.

2.3 MULCHES TOPDRESSING

Free from noxious weeds, mold, pesticides, or other deleterious materials.

2.3.1 Organic Mulch Materials

Shredded hardwood pine and straw mulch recycled from site when available. Biobased content shall be a minimum of 100 percent.

2.3.2 Recycled Organic Mulch

Recycled mulch may include compost, tree trimmings, or pine needles with a gradation that passes through a 2-1/2 by 2-1/2 inch screen. It shall be cleaned of all sticks a minimum 1 inch in diameter and plastic materials a minimum 3 inch length. The material shall be treated to retard the growth of mold and fungi.

2.4 PESTICIDES

Pesticides and herbicides are not permitted. Submit an Integrated Pest Management Plan, including weed and pest management strategies and proposed alternatives to herbicides and pesticides. Use biological pest controls as approved in the Plan.

PART 3 EXECUTION

3.1 EXTENT OF WORK

Provide landscape construction maintenance to include mowing, edging, overseeding, fertilizing, hand watering, weeding, pruning, and stake and guy adjusting, for all newly installed landscape areas, unless indicated otherwise, and at all areas inside or outside the limits of the construction that are disturbed by the Contractor's operations.

3.1.1 Policing

The Contractor shall police all landscaped areas. Policing includes removal of leaves, branches and limbs regardless of length or diameter, dead vegetation, paper, trash, cigarette butts, garbage, rocks or other debris. Policing shall extend to both sides of fencing or walls. Collected

debris shall be promptly removed and disposed of at an approved disposal site.

3.1.2 Drainage System Maintenance

The Contractor shall remove all obstructions from surface and subsurface drain lines to allow water to flow unrestricted in swales, gutters, catch basins, storm drain curb inlets, and yard drains. Remove grates and clear debris in catch basins. Open drainage channels are to be maintained free of all debris and vegetation at all times. Edges of these channels shall be clear of any encroachment by vegetation.

3.2 GROUNDCOVER ESTABLISHMENT PERIOD

Groundcover establishment period will commence on the date that inspection by the Contracting Officer shows that the new turf furnished under this contract has been satisfactorily installed to a 100 percent stand of coverage. The establishment period shall continue for a period of 365 days.

3.2.1 Frequency of Maintenance

Begin maintenance immediately after turf has been installed. Inspect area once a week during the installation and establishment period and perform needed maintenance promptly.

3.2.2 Promotion of Growth

Groundcover shall be maintained in a manner that promotes proper health, growth, natural color.Turf shall have a neat uniform manicured appearance, free of bare areas, ruts, holes, weeds, pests, dead vegetation, debris, and unwanted vegetation that present an unsightly appearance. Mow, remove excess clippings, eradicate weeds, water, fertilize, and perform other operations necessary to promote growth, as approved by Contracting Officer and consistent with approved Integrated Pest Management Plan. Remove noxious weeds common to the area from planting areas by mechanical means.

3.2.3 Mowing

3.2.3.1 Turf

Turf shall be mowed at a uniform finished height. Mow turfed area to a minimum average height of 3 inches when average height of grass becomes 4 inches for spring/summer maintenance and to a minimum average height of 3 inches when the average height of grass reaches 4 inches for fall maintenance. The height of turf is measured from the soil. Mowing of turf shall be performed in a manner that prevents scalping, rutting, bruising, uneven and rough cutting. Prior to mowing, all rubbish, debris, trash, leaves, rocks, paper, and limbs or branches on a turf area shall be picked up and disposed. Adjacent paved areas shall be swept/vacuumed clean.

3.2.4 Turf Edging and Trimming

Perimeter of planter bed edges, sidewalks, driveways, curbs, and other paved surfaces shall be edged. Uniformly edge these areas to prevent encroachment of vegetation onto paved surfaces and to provide a clear cut division line between planter beds, turf, and ground cover. Edging is to be accomplished in a manner that prevents scalping, rutting, bruising, uneven and rough cutting. Edging shall be performed on the same day that turf is mowed. Use of string line trimmers is permitted in "soft" areas

such as an edge between turfgrass and a planter bed. Care shall be exercised to avoid damage to any plant materials, structures, and other landscape features.

Trimming around trees, fences, poles, walls, and other similar objects is to be accomplished to match the height and appearance of surrounding mowed turf growth. Trimming shall be performed on the same day the turf's mowed. Care shall be exercised to avoid "Girdling" trees located in turf areas. The use of protective tree collars on trees in turf areas may be utilized as a temporary means to avoid injury to tree trunks. At the end of the plant establishment period Contractor will be responsible for removing all protective tree collars.

3.2.5 Post-Fertilizer Application

Do not fertilize wildflowers, groundcover, and grasses. Apply turf fertilizer in a manner that promotes health, growth, vigor, color and appearance of cultivated turf areas. The method of application, fertilizer type and frequencies shall be determined by the laboratory soil analysis results the requirements of the particular turf species. Organic fertilizer shall be used. In the event that organic fertilizer is not producing the desired effect, the Contractor shall contract the Contracting Officer for approval prior to the use of a synthetic type of fertilizer. Fertilizer shall be applied by approved methods in accordance with the manufacturer's recommendations.

3.2.6 Turf Watering

The Contractor shall perform irrigation in a manner that promotes the health, growth, color and appearance of cultivated vegetation and that complies with all Federal, State, and local water agencies and authorities directives. The Contractor shall be responsible to prevent over watering, water run-off, erosion, and ponding due to excessive quantities or rate of application. The Contractor shall abide by state, local or other water conservation regulations or restrictions in force during the establishment period.

3.2.7 Turf Clearance Area

Trees located in turf areas shall be maintained with a growth free clearance of 18 inches from the tree trunk base. The use of mechanical weed whips to accomplish the turf growth free bed area is prohibited.

3.2.8 Replanting

Replant in accordance with Section 32 92 23 SODDING and within specified planting dates areas which do not have a satisfactory stand of turf. Replant areas which do not have a satisfactory stand of other groundcover and grasses.

3.2.9 Final Inspection and Acceptance

Final inspection will be make upon written request from the Contractor at least 10 days prior to the last day of the turf establishment period. Final turf acceptance will be based upon a satisfactory stand of turf.

3.2.10 Unsatisfactory Work

When work is found to not meet design intent and specifications,

maintenance period will be extended at no additional cost to the Government until work has been completed, inspected and accepted by Contracting Officer.

3.3 EXTERIOR PLANT ESTABLISHMENT PERIOD

The exterior plant establishment period will commence on the date that inspection by the Contracting Officer shows that the new plants furnished under this contract have been satisfactorily installed and shall continue for a period of 365 days.

3.3.1 Frequency of Maintenance

Begin maintenance immediately after plants have been installed. Inspect exterior plants at least once a week during the installation and establishment period and perform needed maintenance promptly.

3.3.2 Promotion of Plant Growth and Vigor

Water, prune, fertilize, mulch, adjust stakes, guys and turnbuckles, eradicate weeds and perform other operations necessary to promote plant growth, and vigor.

3.3.3 Planter Bed Maintenance

Planter beds shall be weeded, fertilized, irrigated, kept pest free, turf free, pruned, and mulch levels maintained. Planter beds will not be allowed to encroach into turf areas. A definite break shall be maintained between turf areas and planter beds. Fertilize exterior planting materials to promote healthy plant growth without encouraging excessive top foliar growth. Remove noxious weeds common to the area from planting areas by mechanical means.

3.3.3.1 Shrub Selective Maintenance

In addition to the above requirements, shrubs shall be selectively pruned, and shaped for health and safety when the following conditions exist: Remove growth in front of windows, over entrance ways or walks, and any growth which will obstruct vision at street intersections or of security personnel; Remove dead, damaged or diseased branches or limbs; where shrub growth obstructs pedestrian walkways; where shrub growth is found growing against or over structures; where shrub growth permits concealment of unauthorized persons. All pruning debris shall be disposed of in a proper manner.

3.3.3.2 Tree Maintenance

Tree maintenance shall include adjustment of stakes, ties, guy supports and turnbuckles, watering, fertilizing, pest control, mulching, pruning for health and safety and fall leaf cleanup. Fertilize exterior trees to promote healthy plant growth without encouraging excessive top foliar growth. Stakes, ties, guy supports and turnbuckles shall be inspected and adjusted to avoid girdling and promote natural development. All trees within the project boundaries, regardless of caliper, shall be selectively pruned for safety and health reasons. These include but are not limited to removal of dead and broken branches and correction of structural defects. Prune trees according to their natural growth characteristics leaving trees well shaped and balanced. Pruning of all trees shall be accomplished by or in the presence of a certified member of the International Society of

Arboriculture and in accordance with ANSI Z133.1. All pruning debris generated shall be disposed of in a proper manner.

3.3.4 Slope Erosion Control Maintenance

The Contractor shall provide slope erosion control maintenance to prevent undermining of all slopes in newly landscaped. Maintenance tasks include immediate repairs to weak spots in sloped areas, and maintaining clean, clear culverts, and graded berms, and terraces to intercept and direct water flow to prevent development of large gullies and slope erosion Eroded areas shall be filled with amended topsoil and replanted with the same plant species.

3.3.5 Removal of Dying or Dead Plants

Remove dead and dying plants and provide new plants immediately upon commencement of the specified planting season, and replace stakes, guys, mulch and eroded earth mound water basins. No additional plant establishment period will be required for replacement plants beyond the original warranty period. A tree shall be considered dying or dead when the main leader has died back, or a minimum of 20 percent of the crown has died. A shrub or ground cover shall be considered dying or dead when a minimum of 20 percent of the plant has died. This condition shall be determined by scraping on a branch an area 1/16 inch square, maximum, to determine the cause for dying plant material and shall provide recommendations for replacement. The Contractor shall determine the cause for dying plant material and provide recommendations for replacement.

3.3.6 Tracking of Unhealthy Plants

Note plants not in healthy growing condition, as determined by the Contracting Officer, and as soon as seasonal conditions permit, remove and replace with plants of the same species and sizes as originally specified. Install replacement plantings in accordance with Section 32 93 00 EXTERIOR PLANTS.

3.3.7 Final Inspection

Final inspection will be made upon written request from the Contractor at least 10 days prior to the last day of the establishment period. Final inspection will be based upon satisfactory health and growth of plants and on the following:

3.3.7.1 Total Plants on Site

Plants have been accepted and required number of replacements have been installed.

3.3.7.2 Mulching and Weeding

Planter beds and earth mound water basins are properly mulched and free of weeds.

3.3.7.3 Tree Supports

Stakes, guys and turnbuckles are in good condition.

3.3.7.4 Remedial Work

Remedial measures directed by the Contracting Officer to ensure plant material survival and promote healthy growth have been completed.

3.3.8 Unsatisfactory Work

When work is found to not meet design intent and specifications, maintenance period will be extended at no additional cost to the Government until work has been completed, inspected and accepted by Contracting Officer.

3.4 FIELD QUALITY CONTROL

3.4.1 Maintenance Inspection Report

Provide maintenance inspection report to assure that landscape maintenance is being performed in accordance with the specifications and in the best interest of plant growth and survivability. Site observations shall be documented at the start of the establishment period, then quarterly following the start, and at the end of establishment period. Results of site observation visits shall be submitted to the Contracting Officer within 7 calendar days of each site observation visit.

3.4.2 Plant Quantities

The Contractor shall provide Contracting Officer with the number of plant quantities. In addition, provide total exterior area of hardscape and landscaping such as turf and total number of shrubs.

3.4.3 Tree Staking and Guying Removal

The Contractor shall provide a certified letter that all stakes and guys are removed from all project trees at the end of the establishment period.

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AGGREGATE BASE COURSE
04/06

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM C 117	(2004) Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 1260	(2005a) Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C 127	(2004) Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
ASTM C 128	(2004a) Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate
ASTM C 131	(2006) Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	(2006) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C 29/C 29M	(1997; R 2003) Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate
ASTM D 1557	(2002e1) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3)
ASTM D 2487	(2006) Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	(2005) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(2005) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

ASTM D 4318	(2005) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 75	(2003) Standard Practice for Sampling Aggregates
ASTM E 11	(2004) Wire Cloth and Sieves for Testing Purposes

1.2 DEFINITIONS

For the purposes of this specification, the following definitions apply.

1.2.1 Aggregate Base Course

Aggregate base course (ABC) is well graded, durable aggregate uniformly moistened and mechanically stabilized by compaction.

1.2.2 Degree of Compaction

Degree of compaction required, except as noted in the second sentence, is expressed as a percentage of the maximum laboratory dry density obtained by the test procedure presented in ASTM D 1557 abbreviated as a percent of laboratory maximum dry density.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Plant, Equipment, and Tools

List of proposed equipment to be used in performance of construction work, including descriptive data.

Waybills and Delivery Tickets

Copies of waybills and delivery tickets during the progress of the work.

SD-06 Test Reports

Sampling and Testing; G
Field Density Tests; G

Certified copies of test results for approval not less than 30 days before material is required for the work.

Calibration curves and related test results prior to using the device or equipment being calibrated.

Copies of field test results within 24 hours after the tests are performed.

1.4 SAMPLING AND TESTING

Sampling and testing shall be the responsibility of the Contractor. Sampling and testing shall be performed by a testing laboratory approved in accordance with Section 01 45 04.00 10 CONTRACTOR QUALITY CONTROL. Work requiring testing will not be permitted until the testing laboratory has been inspected and approved. The materials shall be tested to establish compliance with the specified requirements; testing shall be performed at the specified frequency. The Contracting Officer may specify the time and location of the tests. Copies of test results shall be furnished to the Contracting Officer within 24 hours of completion of the tests.

1.4.1 Sampling

Samples for laboratory testing shall be taken in conformance with ASTM D 75. When deemed necessary, the sampling will be observed by the Contracting Officer.

1.4.2 Tests

The following tests shall be performed in conformance with the applicable standards listed.

1.4.2.1 Sieve Analysis

Sieve analysis shall be made in conformance with ASTM C 117 and ASTM C 136. Sieves shall conform to ASTM E 11.

1.4.2.2 Liquid Limit and Plasticity Index

Liquid limit and plasticity index shall be determined in accordance with ASTM D 4318.

1.4.2.3 Moisture-Density Determinations

The laboratory maximum dry density and optimum moisture content shall be determined in accordance with ASTM D 1557.

1.4.2.4 Field Density Tests

Density shall be field measured in accordance with ASTM D 2922. For the method presented in ASTM D 2922 the calibration curves shall be checked and adjusted if necessary using only the sand cone method as described in paragraph Calibration, of the ASTM publication. Tests performed in accordance with ASTM D 2922 result in a wet unit weight of soil and when using this method, ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall also be checked along with density calibration checks as described in ASTM D 3017. The calibration checks of both the density and moisture gauges shall be made by the prepared containers of material method, as described in paragraph Calibration of ASTM D 2922, on each different type of material being tested at the beginning of a job and at intervals as directed.

1.4.2.5 Wear Test

Wear tests shall be made on ABC course material in conformance with ASTM C 131.

1.4.2.6 Weight of Slag

Weight per cubic foot of slag shall be determined in accordance with ASTM C 29/C 29M on the ABC course material.

1.4.3 Testing Frequency

1.4.3.1 Initial Tests

One of each of the following tests shall be performed on the proposed material prior to commencing construction to demonstrate that the proposed material meets all specified requirements when furnished. If materials from more than one source are going to be utilized, this testing shall be completed for each source.

a. Sieve Analysis.

b. Liquid limit and plasticity index.

c. Moisture-density relationship.

d. Wear.

e. Weight per cubic foot of Slag.

1.4.3.2 In Place Tests

Each of the following tests shall be performed on samples taken from the placed and compacted ABC. Samples shall be taken and tested at the rates indicated. Sampling and testing of recycled concrete aggregate shall be performed at twice the specified frequency until the material uniformity is established.

a. Density tests shall be performed on every lift of material placed and at a frequency of one set of tests for every 250 square yards, or portion thereof, of completed area.

b. Sieve Analysis shall be performed on every lift of material placed and at a frequency of one sieve analysis for every 500 square yards, or portion thereof, of material placed.

c. Liquid limit and plasticity index tests shall be performed at the same frequency as the sieve analysis.

d. The total thickness of the base course shall be measured at intervals in such a manner as to ensure one measurement for each 500 square yards of base course. Measurements shall be made in 3 inch diameter test holes penetrating the base course.

1.4.4 Approval of Material

The source of the material shall be selected 30 days prior to the time the material will be required in the work. Tentative approval of material will be based on initial test results. Final approval of the materials will be based on sieve analysis, liquid limit, and plasticity index tests performed on samples taken from the completed and fully compacted course(s).

1.5 WEATHER LIMITATIONS

Construction shall be done when the atmospheric temperature is above 35 degrees F. When the temperature falls below 35 degrees F, the Contractor shall protect all completed areas by approved methods against detrimental effects of freezing. Completed areas damaged by freezing, rainfall, or other weather conditions shall be corrected to meet specified requirements.

1.6 PLANT, EQUIPMENT, AND TOOLS

All plant, equipment, and tools used in the performance of the work shall be subject to approval before the work is started and shall be maintained in satisfactory working condition at all times. The equipment shall be adequate and shall have the capability of producing the required compaction, meeting grade controls, thickness control, and smoothness requirements as set forth herein.

PART 2 PRODUCTS

2.1 AGGREGATES

The ABC shall consist of clean, sound, durable particles of crushed stone, crushed slag, crushed gravel, crushed recycled concrete, angular sand, or other approved material. ABC shall be free of lumps of clay, organic matter, and other objectionable materials or coatings. The portion retained on the No. 4 sieve shall be known as coarse aggregate; that portion passing the No. 4 sieve shall be known as fine aggregate.

2.1.1 Coarse Aggregate

Coarse aggregates shall be angular particles of uniform density. When the coarse aggregate is supplied from more than one source, aggregate from each source shall meet the specified requirements and shall be stockpiled separately.

a. Crushed Gravel: Crushed gravel shall be manufactured by crushing gravels, and shall meet all the requirements specified below.

b. Crushed Stone: Crushed stone shall consist of freshly mined quarry rock, and shall meet all the requirements specified below.

c. Crushed Recycled Concrete: Crushed recycled concrete shall consist of previously hardened portland cement concrete or other concrete containing pozzolanic binder material. The recycled material shall be free of all reinforcing steel, bituminous concrete surfacing, and any other foreign material and shall be crushed and processed to meet the required gradations for coarse aggregate. The recycled concrete aggregate shall have a percent of expansion not to exceed 0.08 percent, when tested in accordance with ASTM C 1260. Recycled concrete aggregate exceeding this value shall be rejected. Crushed recycled concrete shall meet all other applicable requirements specified below.

d. Crushed Slag: Crushed slag shall be an air-cooled blast-furnace product having an air dry unit weight of not less than 70 pcf as determined by ASTM C 29/C 29M, and shall meet all the requirements specified below.

2.1.1.1 Aggregate Base Course

ABC coarse aggregate shall not show more than 50 percent loss when subjected to the Los Angeles abrasion test in accordance with ASTM C 131. The amount of flat and elongated particles shall not exceed 30 percent. A flat particle is one having a ratio of width to thickness greater than 3; an elongated particle is one having a ratio of length to width greater than 3. In the portion retained on each sieve specified, the crushed aggregates shall contain at least 50 percent by weight of crushed pieces having two or more freshly fractured faces with the area of each face being at least equal to 75 percent of the smallest midsectional area of the piece. When two fractures are contiguous, the angle between planes of the fractures must be at least 30 degrees in order to count as two fractured faces. Crushed gravel shall be manufactured from gravel particles 50 percent of which, by weight, are retained on the maximum size sieve listed in TABLE 1.

2.1.2 Fine Aggregate

Fine aggregates shall be angular particles of uniform density. When the fine aggregate is supplied from more than one source, aggregate from each source shall meet the specified requirements.

2.1.2.1 Aggregate Base Course

ABC fine aggregate shall consist of screenings, angular sand, crushed recycled concrete fines, or other finely divided mineral matter processed or naturally combined with the coarse aggregate.

2.1.3 Gradation Requirements

The specified gradation requirements shall apply to the completed base course. The aggregates shall be continuously well graded within the limits specified in TABLE 1. Sieves shall conform to ASTM E 11.

TABLE I. GRADATION OF AGGREGATES

Percentage by Weight Passing Square-Mesh Sieve

Sieve Designation	No. 3
2 inch	----
1-1/2 inch	----
1 inch	100
1/2 inch	40-70
No. 4	20-50
No. 10	15-40
No. 40	5-25
No. 200	0-8

NOTE 1: Particles having diameters less than shall not be in excess of 3 percent by weight of the total sample tested.

NOTE 2: The values are based on aggregates of uniform specific gravity. If materials from different sources are used for the coarse and fine aggregates, they shall be tested in accordance with ASTM C 127 and

ASTM C 128 to determine their specific gravities. If the specific gravities vary by more than 10 percent, the percentages passing the various sieves shall be corrected as directed by the Contracting Officer.

2.2 LIQUID LIMIT AND PLASTICITY INDEX

Liquid limit and plasticity index requirements shall apply to the completed course and shall also apply to any component that is blended to meet the required gradation. The portion of any component or of the completed course passing the No. 40 sieve shall be either nonplastic or have a liquid limit not greater than 25 and a plasticity index not greater than 5.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

When the ABC is constructed in more than one layer, the previously constructed layer shall be cleaned of loose and foreign matter by sweeping with power sweepers or power brooms, except that hand brooms may be used in areas where power cleaning is not practicable. Adequate drainage shall be provided during the entire period of construction to prevent water from collecting or standing on the working area. Line and grade stakes shall be provided as necessary for control. Grade stakes shall be in lines parallel to the centerline of the area under construction and suitably spaced for string lining.

3.2 OPERATION OF AGGREGATE SOURCES

Clearing, stripping, and excavating shall be the responsibility of the Contractor. The aggregate sources shall be operated to produce the quantity and quality of materials meeting these specifications requirements in the specified time limit. Aggregate sources on private lands shall be conditioned in agreement with local laws or authorities.

3.3 STOCKPILING MATERIAL

Prior to stockpiling of material, storage sites shall be cleared and leveled by the Contractor. All materials, including approved material available from excavation and grading, shall be stockpiled in the manner and at the locations designated. Aggregates shall be stockpiled on the cleared and leveled areas designated by the Contracting Officer to prevent segregation. Materials obtained from different sources shall be stockpiled separately.

3.4 PREPARATION OF UNDERLYING COURSE

Prior to constructing the base course(s), the underlying course or subgrade shall be cleaned of all foreign substances. At the time of construction of the base course(s), the underlying course shall contain no frozen material. The surface of the underlying course or subgrade shall meet specified compaction and surface tolerances. The underlying course shall conform to Section 31 00 00 EARTHWORK. Ruts or soft yielding spots in the underlying courses, areas having inadequate compaction, and deviations of the surface from the requirements set forth herein shall be corrected by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line and grade, and recompacting to specified density requirements. For cohesionless underlying courses containing sands or gravels, as defined in ASTM D 2487, the surface shall be stabilized prior to placement of the base course(s). Stabilization

shall be accomplished by mixing ABC into the underlying course and compacting by approved methods. The stabilized material shall be considered as part of the underlying course and shall meet all requirements of the underlying course. The finished underlying course shall not be disturbed by traffic or other operations and shall be maintained by the Contractor in a satisfactory condition until the base course is placed.

3.5 INSTALLATION

3.5.1 Mixing the Materials

The coarse and fine aggregates shall be mixed in a stationary plant, or in a traveling plant or bucket loader on an approved paved working area. The Contractor shall make adjustments in mixing procedures or in equipment as directed to obtain true grades, to minimize segregation or degradation, to obtain the required water content, and to insure a satisfactory base course meeting all requirements of this specification. Adjustments to the JMF shall be limited to plus or minus 5 percent on the 1-1/2 inch and coarser sieves; plus or minus 8 percent on the 1 inch to No. 4 sieves; plus or minus 5 percent on the No. 30 sieve, and plus or minus 3 percent on the No. 200 sieve. Tolerances given above may permit the aggregate grading to be outside the limits shown in Table 2; this is acceptable.

3.5.2 Placing

The mixed material shall be placed on the prepared subgrade or subbase in layers of uniform thickness with an approved spreader. When a compacted layer 6 inches or less in thickness is required, the material shall be placed in a single layer. When a compacted layer in excess of 6 inches is required, the material shall be placed in layers of equal thickness. No layer shall be thicker than 6 inches or thinner than 3 inches when compacted. The layers shall be so placed that when compacted they will be true to the grades or levels required with the least possible surface disturbance. Where the base course is placed in more than one layer, the previously constructed layers shall be cleaned of loose and foreign matter by sweeping with power sweepers, power brooms, or hand brooms, as directed. Such adjustments in placing procedures or equipment shall be made as may be directed to obtain true grades, to minimize segregation and degradation, to adjust the water content, and to insure an acceptable base course.

3.5.3 Grade Control

The finished and completed base course shall conform to the lines, grades, and cross sections shown. Underlying material(s) shall be excavated and prepared at sufficient depth for the required base course thickness so that the finished base course and the subsequent surface course will meet the designated grades.

3.5.4 Edges of Base Course

The base course(s) shall be placed so that the completed section will be a minimum of 2 feet wider, on all sides, than the next layer that will be placed above it. Additionally, approved fill material shall be placed along the outer edges of the base course in sufficient quantities to compact to the thickness of the course being constructed, or to the thickness of each layer in a multiple layer course, allowing in each operation at least a 2 foot width of this material to be rolled and compacted simultaneously with rolling and compacting of each layer of base

course. If this base course material is to be placed adjacent to another pavement section, then the layers for both of these sections shall be placed and compacted along this edge at the same time.

3.5.5 Compaction

Each layer of the base course shall be compacted as specified with approved compaction equipment. Water content shall be maintained during the compaction procedure to within plus or minus 2 percent of the optimum water content determined from laboratory tests as specified in paragraph SAMPLING AND TESTING. Rolling shall begin at the outside edge of the surface and proceed to the center, overlapping on successive trips at least one-half the width of the roller. Alternate trips of the roller shall be slightly different lengths. Speed of the roller shall be such that displacement of the aggregate does not occur. In all places not accessible to the rollers, the mixture shall be compacted with hand-operated power tampers. Compaction shall continue until each layer has a degree of compaction that is at least 100 percent of laboratory maximum density through the full depth of the layer. The Contractor shall make such adjustments in compacting or finishing procedures as may be directed to obtain true grades, to minimize segregation and degradation, to reduce or increase water content, and to ensure a satisfactory base course. Any materials that are found to be unsatisfactory shall be removed and replaced with satisfactory material or reworked, as directed, to meet the requirements of this specification.

3.5.6 Thickness

Compacted thickness of the base course shall be as indicated. No individual layer shall be thicker than 6 inches nor be thinner than 3 inches in compacted thickness. The total compacted thickness of the base course(s) shall be within 1/2 inch of the thickness indicated. Where the measured thickness is more than 1/2 inch deficient, such areas shall be corrected by scarifying, adding new material of proper gradation, reblading, and recompacting as directed. Where the measured thickness is more than 1/2 inch thicker than indicated, the course shall be considered as conforming to the specified thickness requirements. Average job thickness shall be the average of all thickness measurements taken for the job, but shall be within 1/4 inch of the thickness indicated. The total thickness of the base course shall be measured at intervals in such a manner as to ensure one measurement for each 500 square yards of base course. Measurements shall be made in 3 inch diameter test holes penetrating the base course.

3.5.7 Finishing

The surface of the top layer of base course shall be finished after final compaction by cutting any overbuild to grade and rolling with a steel-wheeled roller. Thin layers of material shall not be added to the top layer of base course to meet grade. If the elevation of the top layer of base course is 1/2 inch or more below grade, then the top layer should be scarified to a depth of at least 3 inches and new material shall be blended in and compacted to bring to grade. Adjustments to rolling and finishing procedures shall be made as directed to minimize segregation and degradation, obtain grades, maintain moisture content, and insure an acceptable base course. Should the surface become rough, corrugated, uneven in texture, or traffic marked prior to completion, the unsatisfactory portion shall be scarified, reworked and recompacted or it shall be replaced as directed.

3.5.8 Smoothness

The surface of the top layer shall show no deviations in excess of 3/8 inch when tested with a 12 foot straightedge. Measurements shall be taken in successive positions parallel to the centerline of the area to be paved. Measurements shall also be taken perpendicular to the centerline at 50 foot intervals. Deviations exceeding this amount shall be corrected by removing material and replacing with new material, or by reworking existing material and compacting it to meet these specifications.

3.6 TRAFFIC

Traffic shall not be allowed on the completed base course.

3.7 MAINTENANCE

The base course shall be maintained in a satisfactory condition until the full pavement section is completed and accepted. Maintenance shall include immediate repairs to any defects and shall be repeated as often as necessary to keep the area intact. Any base course that is not paved over prior to the onset of winter, shall be retested to verify that it still complies with the requirements of this specification. Any area of base course that is damaged shall be reworked or replaced as necessary to comply with this specification.

3.8 DISPOSAL OF UNSATISFACTORY MATERIALS

Any unsuitable materials that must be removed shall be disposed of outside the limits of Government-controlled land. No additional payments will be made for materials that must be replaced.

-- End of Section --

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SECTION 32 13 14

CONCRETE PAVEMENTS FOR SMALL PROJECTS
04/06

PART 1 GENERAL

1.1 REFERENCES

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

ACI INTERNATIONAL (ACI)

ACI 211.1	(1991; R 2002) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 301	(2005) Specifications for Structural Concrete
ACI 305R	(1999) Hot Weather Concreting

ASTM INTERNATIONAL (ASTM)

ASTM A 184/A 184M	(2006) Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A 615/A 615M	(2006a) Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement
ASTM C 1077	(2006) Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C 123	(2004) Lightweight Particles in Aggregate
ASTM C 143/C 143M	(2005a) Slump of Hydraulic Cement Concrete
ASTM C 150	(2005) Portland Cement
ASTM C 192/C 192M	(2006) Making and Curing Concrete Test Specimens in the Laboratory
ASTM C 231	(2004) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	(2006) Air-Entraining Admixtures for Concrete
ASTM C 31/C 31M	(2006) Making and Curing Concrete Test Specimens in the Field

ASTM C 33	(2003) Concrete Aggregates
ASTM C 39/C 39M	(2005e1) Compressive Strength of Cylindrical Concrete Specimens
ASTM C 494/C 494M	(2005a) Standard Specification for Chemical Admixtures for Concrete
ASTM C 618	(2005) Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM C 666/C 666M	(2003) Resistance of Concrete to Rapid Freezing and Thawing
ASTM C 881/C 881M	(2002) Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C 94/C 94M	(2006) Ready-Mixed Concrete
ASTM D 1751	(2004) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

NATIONAL READY MIXED CONCRETE ASSOCIATION (NRMCA)

NRMCA CPMB 100	(2000) Concrete Plant Standards

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 300	(1990) Specifications for Membrane-Forming Compounds for Curing Concrete
COE CRD-C 540	(2001) Standard Specification for Nonbituminous Inserts for Contraction Joints in Portland Cement Concrete Airfield Pavements, Sawable Type
COE CRD-C 572	(1974) Specifications for Polyvinylchloride Waterstops

1.2 SYSTEM DESCRIPTION

This section is intended to stand alone for construction of concrete (rigid) pavement. However, where the construction covered herein interfaces with other sections, the construction at each interface shall conform to the requirements of both this section and the other section, including tolerances for both.

1.3 ACCEPTABILITY OF WORK

The pavement will be accepted on the basis of tests made by the Government and by the Contractor or its suppliers, as specified herein. The Government may, at its discretion, make check tests to validate the results of the Contractor's testing. Concrete samples shall be taken by the Contractor at the placement to determine the slump, air content, and strength of the concrete. Test cylinders shall be made for determining conformance with the strength requirements of these specifications and,

when required, for determining the time at which pavements may be placed into service. All air content measurements shall be determined in accordance with ASTM C 231. All slump tests shall be made in accordance with ASTM C 143/C 143M. All test cylinders shall be 6 by 12 inch cylinders and shall be fabricated in accordance with ASTM C 192/C 192M, using only steel molds, cured in accordance with ASTM C 31/C 31M, and tested in accordance with ASTM C 39/C 39M. A strength test shall be the average of the strengths of two cylinders made from the same sample of concrete and tested at 28 days. The Contractor shall furnish all materials, labor, and facilities required for molding, curing, testing, and protecting test specimens at the site and in the laboratory.

1.3.1 Evaluation Sampling

Sampling, testing, and mixture proportioning shall be performed by a commercial Testing Laboratory, conforming with ASTM C 1077. The individuals who sample and test concrete and concrete constituents shall be certified as American Concrete Institute (ACI) Concrete Field Testing Technicians, Grade I. The individuals who perform the inspection of concrete shall be certified as ACI Concrete Construction Inspector, Level II. All mix design, weekly quality control reports, smoothness reports, and project certification reports shall be signed by a Registered Engineer.

1.3.2 Surface Testing

Surface testing for surface smoothness and plan grade shall be performed as indicated below by the Testing Laboratory. The measurements shall be properly referenced in accordance with paving lane identification and stationing, and a report given to the Government within 24 hours after measurement is made. A final report of surface testing, signed by a Registered Engineer, containing all surface measurements and a description of all actions taken to correct deficiencies, shall be provided to the Government upon conclusion of surface testing.

1.3.2.1 Surface Smoothness Requirements

The finished surfaces of the pavements shall have no abrupt change of 1/8 inch or more, and all pavements shall be within the tolerances specified in Table 1 when checked with the straightedge.

TABLE 1
STRAIGHTEDGE SURFACE SMOOTHNESS--PAVEMENTS

Pavement Category	Direction of Testing	Tolerances inches
Tank Hardstands, Parking Areas, Open Storage Areas	Longitudinal	1/4
	Transverse	1/4

1.3.2.2 Surface Smoothness Testing Method

The surface of the pavement shall be tested with the straightedge to identify all surface irregularities exceeding the tolerances specified above. The entire area of the pavement shall be tested in both a longitudinal and a transverse direction on parallel lines approximately 15 feet apart. The straightedge shall be held in contact with the surface and moved ahead one-half the length of the straightedge for each successive measurement. The amount of surface irregularity shall be determined by

placing the straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length and measuring the maximum gap between the straightedge and the pavement surface, in the area between these two high points.

1.3.3 Plan Grade Testing and Conformance

The finished surface of the pavements shall conform, within the tolerances shown in Table 1, to the lines, grades, and cross sections shown. The finished surface of new abutting pavements shall coincide at their juncture. The finished surface of pavements shall vary not more than 0.04 foot above or below the plan grade line or elevation indicated. The surfaces of other pavements shall vary not more than 0.06 foot above or below the plan grade line or elevation indicated. Each pavement category shall be checked by the Contractor for conformance with plan grade requirements by running lines of levels at intervals to determine the elevation at each joint intersection.

1.4 PRECONSTRUCTION TESTING OF MATERIALS

The Contractor shall not be entitled to any additional payment or extension of time because of delays caused by sampling and testing additional sources, or samples, necessitated by failure of any samples. Aggregates shall be sampled and tested by the Test Laboratory and shall be representative of the materials to be used for the project. Test results, signed by a Registered Engineer, shall be submitted 45 days before commencing paving. No aggregate shall be used unless test results show that it meets all requirements of these specifications, including compliance with ASTM C 33 and deleterious materials limitations.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Equipment

Manufacturer's literature on the concrete plant; mixing equipment; hauling equipment; placing and finishing, and curing equipment; at least 7 days prior to start of paving.

Paving

Paving Schedules at least 7 days prior to start of paving.

Mixture Proportions; G

The report of the Contractor's mixture proportioning studies showing the proportions of all ingredients and supporting information on aggregate and other materials that will be used in the manufacture of concrete, at least 14 days prior to commencing concrete placing operations.

1.6 EQUIPMENT

1.6.1 Batching and Mixing

The batching plant shall conform to NRMCA CPMB 100, the equipment requirements in ASTM C 94/C 94M, and as specified. Water shall not be weighed or measured cumulatively with another ingredient. All concrete materials batching shall meet ASTM C 94/C 94M requirements. Mixers shall be truck mixers. Batching, mixers, mixing time, permitted reduction of mixing time, and concrete uniformity shall meet the requirements of ASTM C 94/C 94M, and shall be documented in the initial weekly QC Report.

1.6.2 Transporting Equipment

Transporting equipment shall be in conformance with ASTM C 94/C 94M and as specified herein. Concrete shall be transported to the paving site in rear-dump trucks, in truck mixers designed with extra large blading and rear opening specifically for low slump concrete, or in agitators. Bottom-dump trucks shall not be used for delivery of concrete.

1.6.3 Delivery Equipment

When concrete transport equipment cannot operate on the paving lane, side-delivery transport equipment consisting of self-propelled moving conveyors shall be used to deliver concrete from the transport equipment and discharge it in front of the paver. Front-end loaders, dozers, or similar equipment shall not be used to distribute the concrete.

1.6.4 Curing Equipment

Equipment for curing is specified in paragraph CURING.

1.6.5 Texturing Equipment

Texturing equipment shall be as specified below.

1.6.5.1 Fabric Drag

A fabric drag shall consist of a piece of fabric material as wide as the lane width securely attached to a separate wheel mounted frame spanning the paving lane or to one of the other similar pieces of equipment. The material shall be wide enough to provide 12 to 18 inches dragging flat on the pavement surface. The fabric material shall be an artificial turf fabricated of a plastic material.

1.6.5.2 Deep Texturing Equipment

Texturing equipment shall consist of a stiff bristled broom forming a drag at least 4 feet long. This drag shall be mounted in a wheeled frame spanning the paving lane and constructed to mechanically pull the drag in a straight line across the paving lane perpendicular to the centerline.

1.6.6 Sawing Equipment

Equipment for sawing joints and for other similar sawing of concrete shall be standard diamond-tip-bladed concrete saws mounted on a wheeled chassis.

1.6.7 Straightedge

The Contractor shall furnish and maintain at the job site one 12 foot straightedge for testing concrete surface smoothness. The straightedge shall be constructed of aluminum or magnesium alloy and shall have blades of box or box-girder cross section with flat bottom, adequately reinforced to insure rigidity and accuracy. Straightedges shall have handles for operation on the pavement.

PART 2 PRODUCTS

2.1 CEMENTITIOUS MATERIALS

Cementitious materials shall be portland cement and pozzolan and shall conform to appropriate specifications listed below.

2.1.1 Portland Cement

Portland cement shall conform to ASTM C 150 Type II, low-alkali.

2.1.2 Pozzolan (Fly Ash)

Fly ash shall conform to ASTM C 618 Class F, including all the supplementary optional physical requirements. Fly ash shall conform to EPA requirements in accordance with Section 01 62 35 RECYCLED / RECOVERED MATERIALS.

2.2 AGGREGATES

Aggregates shall consist of clean, hard, uncoated particles meeting the requirements of ASTM C 33, including deleterious materials, abrasion loss and soundness requirements of ASTM C 33, and other requirements specified herein. Aggregate not having a satisfactory demonstrable service record shall have a durability factor of 50 or more when subjected to freezing and thawing in concrete in accordance with ASTM C 666/C 666M.

2.2.1 Coarse Aggregate

Coarse aggregate shall consist of crushed or uncrushed gravel, crushed stone, or a combination thereof. The nominal maximum size of the coarse aggregate shall be 1 inch.

2.2.2 Fine Aggregate

Fine aggregate shall consist of natural sand, manufactured sand, or a combination of the two, and shall be composed of clean, hard, durable particles. All fine aggregate shall be composed of clean, hard, durable particles meeting the requirements of ASTM C 33 and the requirements herein. The amount of deleterious material in the fine aggregate shall not exceed the limits in ASTM C 33and shall not exceed the following limits:

a. Lightweight particles (ASTM C 123) 1.0 percent max. by mass using a medium with a density of Sp. Gr. of 2.0.

b. The total of all deleterious material types, listed in ASTM C 33 and above, shall not exceed 3.0 percent of the mass of the fine aggregate.

2.3 CHEMICAL ADMIXTURES

Air-entraining admixture shall conform to ASTM C 260. An accelerator shall be used only when specified in paragraph SPECIFIED CONCRETE STRENGTH AND OTHER PROPERTIES and shall not be used to reduce the amount of cementitious material used. Accelerator shall conform to ASTM C 494/C 494M Type C. Calcium chloride and admixtures containing calcium chloride shall not be used. A water-reducing or retarding admixture shall meet the requirements of ASTM C 494/C 494M. Type G or H admixtures are not allowed.

2.4 CURING MATERIALS

Membrane forming curing compound shall be a white pigmented compound conforming to COE CRD-C 300. Burlap shall be new or shall be clean material never used for anything other than curing concrete.

2.5 WATER

Water for mixing and curing shall be clean, potable, and free of injurious amounts of oil, acid, salt, or alkali.

2.6 JOINT MATERIALS

2.6.1 Expansion Joint Material

Expansion joint filler shall be a preformed material conforming to ASTM D 1751. Expansion joint filler shall be 3/4 inch thick.

2.6.2 Contraction Joint Inserts

Sawable contraction joint inserts shall conform to COE CRD-C 540. Nonsawable contraction joint inserts shall have sufficient stiffness to permit placement in plastic concrete without deviation from a straight line and shall conform to the physical requirements of COE CRD-C 540, with the exception of resistance to sawing. Material for polyvinyl chloride inserts shall conform to COE CRD-C 572. No metal inserts of any kind shall be used.

2.7 REINFORCING

2.7.1 General

Reinforcing bars shall conform to ASTM A 615/A 615M Grade 60. Bar mats shall conform to ASTM A 184/A 184M. Reinforcement shall be free from loose, flaky rust, loose scale, oil, grease, mud, or other coatings that might reduce the bond with concrete.

2.8 DOWELS AND TIE BARS

2.8.1 Dowels

Dowels shall be single piece, plain (non-deformed) steel bars conforming to ASTM A 615/A 615M Grade 60 or higher. Dowels shall be free of loose, flaky rust and loose scale and shall be clean and straight.

2.9 EPOXY RESIN

All epoxy-resin materials shall be two-component materials conforming to ASTM C 881/C 881M, Class as appropriate for each application temperature to be encountered; except, that in addition, the materials shall meet the

following requirements:

a. Material for use for embedding dowels and anchor bolts shall be Type IV, Grade 3.

b. Material for use as patching for complete filling of spalls, wide cracks, and other voids and for use in preparing epoxy resin mortar shall be Type III, Grade as approved.

c. Material for injecting cracks shall be Type IV, Grade 1.

d. Material for bonding freshly mixed portland cement concrete, mortar, or freshly mixed epoxy resin concrete to hardened concrete shall be Type V, Grade as approved.

2.10 SPECIFIED CONCRETE STRENGTH AND OTHER PROPERTIES

Specified compressive strength, f'c, for concrete is 4000 psi at 28 days. Maximum allowable water-cementitious material ratio is 0.45 . The water-cementitious material ratio is based on absolute volume equivalency, where the ratio is determined using the weight of cement for a cement only mix, or using the total volume of cement plus pozzolan converted to an equivalent weight of cement by the absolute volume equivalency method described in ACI 211.1. The concrete shall be air-entrained with a total air content of 6 plus or minus 1 percent. The maximum allowable slump of the concrete shall be 3 inchesfor pavement constructed with fixed forms. The strength of the concrete will be considered satisfactory so long as the average of all sets of three consecutive test results equals or exceeds the specified compressive strength f'c and no individual test result falls below the specified strength f'c by more than 500 psi. Additional analysis or testing, including taking cores and/or load tests may be required at the Contractor's expense when the strength of the concrete in the structure is considered potentially deficient.

2.11 MIXTURE PROPORTIONS

2.11.1 Composition Concrete

Composition concrete shall be composed of cementitious material, water, fine and coarse aggregates, and admixtures. Fly ash, if used, shall conform to EPA requirements in accordance with Section 01 62 35 RECYCLED / RECOVERED MATERIALS. Admixtures shall consist of air entraining admixture and may also include accelerator, retarder, or water-reducing admixture. High range water-reducing admixtures and admixtures to produce flowable concrete shall not be used. No substitutions shall be made in the materials used in the mixture proportions without additional tests to show that the quality of the concrete is satisfactory.

2.11.2 Concrete Mixture Proportioning Studies

Trial design batches, mixture proportioning studies, and testing shall be the responsibility of the Contractor, and shall be performed by the Test Laboratory and signed by a Registered Engineer. No concrete pavement shall be placed until the Contracting Officer has approved the Contractor's mixture proportions. All materials used in mixture proportioning studies shall be representative of those proposed for use on the project. If there is a change in materials, additional mixture design studies shall be made using the new materials. Trial mixtures having proportions, slumps, and air content suitable for the work shall be based on methodology described

in ACI 211.1. At least three different water-cementitious ratios, which will produce a range of strength encompassing that required on the project, shall be used. Laboratory trial mixtures shall be proportioned for maximum permitted slump and air content. Maximum sand content shall be 40 percent of the total aggregate SSD weight. Aggregate quantities shall be based on the mass in a saturated surface dry condition.

2.11.3 Mixture Proportioning Procedure

The Contractor shall perform the following:

a. Fabricate, cure and test 6 test cylinders per age for each mixture at 7 and 28 days.

b. Using the average strength for each w/(c+p), plot the results from each of the three mixtures on separate graphs for w/(c+p) versus 28-day strength.

c. From the graphs select a w/(c+p) which will produce a mixture giving a 28-day strength equal to the required strength determined in accordance with the following paragraph.

2.11.4 Average Strength Required for Mixtures

In order to ensure meeting, during production, the strength requirements specified, the mixture proportions selected shall produce a required average strength, f'cr, exceeding the specified strength, f'c, in accordance with procedures in Chapter 3 of ACI 301, "Proportioning."

PART 3 EXECUTION

3.1 CONDITIONING OF UNDERLYING MATERIAL

Underlying material, base course, upon which concrete is to be placed shall be clean, damp, and free from debris, waste concrete or cement, frost, ice, and standing or running water. After the underlying material has been prepared for concrete placement, no equipment shall be permitted thereon.

3.2 WEATHER LIMITATIONS

3.2.1 Hot Weather Paving

The temperature of concrete shall not exceed 90 degrees F. Steel forms, dowels and reinforcing shall be cooled prior to concrete placement when steel temperatures are greater than120 degrees F.

3.2.2 Cold Weather Paving

The ambient temperature of the air at the placing site and the temperature of surfaces to receive concrete shall be not less 40 degrees F. The temperature of the concrete when placed shall be not less than 50 degrees F. Materials entering the mixer shall be free from ice, snow, or frozen lumps. Salt, chemicals or other materials shall not be incorporated in the concrete to prevent freezing. Upon written approval, chemical admixture conforming to ASTM C 494/C 494M Type C or E may be used provided it contains no calcium chloride. Calcium chloride shall not be used at any time. Covering and other means shall be provided for maintaining the concrete at a temperature of at least 50 degrees F for not less than 72 hours after placing, and at a temperature above freezing for the remainder

of the curing period. Pavement damaged by freezing shall be completely removed and replaced at the Contractor's expense as specified in paragraph, REPAIR, REMOVAL, AND REPLACEMENT OF SLABS.

3.3 CONCRETE PRODUCTION

3.3.1 General Requirements

Concrete shall be deposited in front of the paver within 45 minutes from the time cement has been charged into the mixing drum, except that if the ambient temperature is above 90 degrees F, the time shall be reduced to 30 minutes. Every load of concrete delivered to the paving site shall be accompanied by a batch ticket from the operator of the batching plant. Tickets shall show at least the mass, or volume, of all ingredients in each batch delivered, and the time of day. Tickets shall be delivered to the placing foreman who shall keep them on file and deliver them to the Government daily.

3.3.2 Transporting and Transfer-Spreading Operations

Non-agitating equipment shall be used only on smooth roads and for haul time less than 15 minutes. Equipment shall be allowed to operate on the underlying material only if no damage is done to the underlying material and its degree of compaction. Any disturbance to the underlying material that does occur shall be corrected before the paver-finisher reaches the location of the disturbance and the equipment shall be replaced or procedures changed to prevent any future damage. Additional water may be added to truck mixers to bring the slump within the specified range provided the mixture water-cement ratio is not exceeded.

3.4 PAVING

Pavement shall be constructed with paving and finishing equipment utilizing fixed forms.

3.4.1 Consolidation

The vibrators shall be inserted into the concrete not closer to the underlying material than 2 inches. Excessive vibration shall not be permitted. Concrete shall be vibrated with a hand-operated immersion vibrator. Vibrators shall not be used to transport or spread the concrete.

3.4.2 Fixed Form Paving

Forms shall be steel, except that wood forms may be used for curves having a radius of 150 feet or less, and for fillets. Forms may be built up with metal or wood, added only to the base, to provide an increase in depth of not more than 25 percent. The base width of the form shall be not less than eight-tenths of the vertical height of the form, except that forms 8 inches or less in vertical height shall have a base width not less than the vertical height of the form. Wood forms for curves and fillets shall be adequate in strength and rigidly braced. Forms shall be set on firm material cut true to grade so that each form section when placed will be firmly in contact with the underlying layer for its entire base. Forms shall not be set on blocks or on built-up spots of underlying material. Holes in existing pavements for form stakes shall be carefully drilled without cracking or spalling the existing pavement. Prior to setting forms for paving operations, the Contractor shall demonstrate the proposed form setting procedures at an approved location and shall not proceed further

until the proposed method is approved. Forms shall remain in place at least 12 hours after the concrete has been placed. Forms shall be removed without injuring the concrete.

3.4.3 Placing Reinforcing Steel

Reinforcement shall be positioned on suitable chairs securely fastened to the subgrade prior to concrete placement, or may be placed on an initial layer of consolidated concrete, with the subsequent layer placed within 30 minutes of the first layer placement.

3.4.4 Placing Dowels

Dowels shall be installed with alignment not greater than 1/8 inch per ft. Except as otherwise specified below, location of dowels shall be within a horizontal tolerance of plus or minus 5/8 inch and a vertical tolerance of plus or minus 3/16 inch. The portion of each dowel intended to move within the concrete or expansion cap shall be painted with one coat of rust inhibiting primer paint, and then oiled just prior to placement. Dowels in joints shall be omitted when the center of the dowel is located within a horizontal distance from an intersecting joint equal to or less than one-fourth of the slab thickness.

3.4.4.1 Contraction Joints

Dowels in longitudinal and transverse contraction joints within the paving lane shall be held securely in place by means of rigid metal basket assemblies. The dowels shall be welded to the assembly or held firmly by mechanical locking arrangements that will prevent them from becoming distorted during paving operations. The basket assemblies shall be held securely in the proper location by means of suitable anchors.

3.4.4.2 Construction Joints-Fixed Form Paving

Installation of dowels shall be by the bonded-in-place method, supported by means of devices fastened to the forms. Installation by removing and replacing in preformed holes will not be permitted.

3.4.4.3 Dowels Installed in Hardened Concrete

Installation shall be by bonding the dowels into holes drilled into the hardened concrete. Holes approximately 1/8 inch greater in diameter than the dowels shall be drilled into the hardened concrete. Dowels shall be bonded in the drilled holes using epoxy resin injected at the back of the hole before installing the dowel and extruded to the collar during insertion of the dowel so as to completely fill the void around the dowel. Application by buttering the dowel shall not be permitted. The dowels shall be held in alignment at the collar of the hole, after insertion and before the grout hardens, by means of a suitable metal or plastic collar fitted around the dowel. The vertical alignment of the dowels shall be checked by placing the straightedge on the surface of the pavement over the top of the dowel and measuring the vertical distance between the straightedge and the beginning and ending point of the exposed part of the dowel.

3.4.4.4 Expansion Joints

Dowels in expansion joints shall be installed by the bonded-in-place method or by bonding into holes drilled in hardened concrete, using procedures

specified above.

3.5 FINISHING

Equipment to be used for hand finishing shall primarily be 10 to 12 feet cutting straightedges; only very sparing use of bull floats shall be allowed. At no time shall water be added to the surface of the slab in any way, except for fog (mist) sprays to prevent plastic shrinkage cracking.

3.5.1 Surface Correction

While the concrete is still plastic, irregularities and marks in the pavement surface shall be eliminated by means of cutting straightedges, 10 to 12 feet in length. Depressions shall be filled with freshly mixed concrete, struck off, consolidated, and refinished. Projections above the required elevation shall also be struck off and refinished. Long-handled, flat "bull floats" shall be used sparingly and only as necessary to correct minor, scattered surface defects.

3.5.2 Hand Finishing

Grate tampers (jitterbugs) shall not be used. As soon as placed and vibrated, the concrete shall be struck off and screeded. The surface shall be tamped with a strike-off and tamping screed, or vibratory screed. Immediately following the final tamping of the surface, the pavement shall be floated longitudinally. Long-handled, flat bull floats shall be used sparingly and only as necessary to correct surface defects. Finishing with hand floats and trowels shall be held to the absolute minimum necessary. Joints and edges shall not be overfinished. No water shall be added to the pavement during finishing operations.

3.5.3 Texturing

Before the surface sheen has disappeared and before the concrete hardens, the surface of the pavement shall be given a texture as described herein. Following initial texturing on the first day of placement, the Placing Foreman, Contracting Officer representative, and a representative of the Using Agency shall inspect the texturing for compliance with design requirements. After curing is complete, all textured surfaces shall be thoroughly power broomed to remove all debris.

3.5.3.1 Fabric-Drag Surface Finish

Surface texture shall be applied by dragging the surface of the pavement, in the direction of the concrete placement, with a moist fabric drag. The dragging shall produce a uniform finished surface having a fine sandy texture without disfiguring marks.

3.5.3.2 Broom Texturing

Surface texture shall be applied using a mechanical stiff bristle broom drag of a type that will uniformly score the surface transverse to the pavement center line. The broom shall be capable of traversing the full width of the pavement in a single pass at a uniform speed and with a uniform pressure. Successive passes of the broom shall be overlapped the minimum necessary to obtain a uniformly textured surface. The scores should be uniform in appearance and approximately 1/16 inch in depth but not more than 1/8 inch in depth. Hand brooming will be permitted only on isolated odd shaped slabs or slabs where hand finishing is permitted.

3.5.4 Edging

After texturing has been completed, the edge of the slabs along the forms shall be carefully finished with an edging tool to form a smooth rounded surface of 1/8 inch radius. No water shall be added to the surface during edging.

3.6 CURING

Concrete shall be continuously protected against loss of moisture and rapid temperature changes for at least 7 days from the completion of finishing operations. Unhardened concrete shall be protected from rain and flowing water. During hot weather with low humidity and/or wind, the Contractor shall institute measures to prevent plastic shrinkage cracks from developing. ACI 305R contains means of predicting plastic shrinkage cracking and preventative measures. Plastic shrinkage cracks that occur shall be filled by injection of epoxy resin after the concrete hardens. Plastic shrinkage cracks shall never be troweled over or filled with slurry. Curing shall be accomplished by one of the following methods.

3.6.1 Membrane Curing

A uniform coating of white-pigmented membrane-forming curing compound shall be applied to the entire exposed surface of the concrete including pavement edges as soon as the free water has disappeared from the surface after finishing. If evaporation is high and no moisture is present on the surface even though bleeding has not stopped, fog sprays shall be used to keep the surface moist until setting of the cement occurs. Curing compound shall then be immediately applied. Curing compound shall be applied to the finished surfaces by means of a self-propelled automatic spraying machine, equipped with multiple spraying nozzles with wind shields, spaning the newly paved lane. The curing compound shall be applied at a maximum application rate of 200 square feet per gallon. The application of curing compound by hand-operated, mechanical powered pressure sprayers will be permitted only on odd widths or shapes of slabs where indicated and on concrete surfaces exposed by the removal of forms. The compound shall form a uniform, continuous, cohesive film that will not check, crack, or peel and that will be free from pinholes and other discontinuities. Areas where the curing compound develops the above defects or is damaged by heavy rainfall, sawing or other construction operations within the curing period, shall be immediately resprayed.

3.6.2 Moist Curing

Concrete to be moist-cured shall be maintained continuously wet for the entire curing period, commencing immediately after finishing. Surfaces shall be cured by ponding, by continuous sprinkling, by continuously saturated burlap or cotton mats, or by continuously saturated plastic coated burlap. Impervious sheet curing shall not be used.

3.7 JOINTS

No deviation from the jointing pattern shown on the drawings shall be made without written approval of the Design District Pavement or Geotechnical Engineer. All joints shall be straight, perpendicular to the finished grade of the pavement, and continuous from edge to edge or end to end of the pavement with no abrupt offset and no gradual deviation greater than 1/2 inch.

3.7.1 Longitudinal Construction Joints

Dowels shall be installed in the longitudinal construction joints. The dimensions of the keyway shall not vary more than plus or minus 1/8 inch from the dimensions indicated and shall not deviate more than plus or minus 1/4 inch from the mid-depth of the pavement. If any length of completed keyway of 5 feet or more fails to meet the above tolerances, dowels shall be installed.

3.7.2 Transverse Construction Joints

Transverse construction joints shall be installed at a planned transverse joint, at the end of each day's placing operations and when concrete placement is interrupted. Transverse construction joints shall be constructed either by utilizing headers and hand placement and finishing techniques, or by placing concrete beyond the transverse construction joint location and then saw cutting full depth and removing concrete back to the transverse construction joint location. For the latter case, dowels shall be installed using methods for dowels installed in hardened concrete described above. All transverse construction joints shall be dowelled.

3.7.3 Expansion Joints

Expansion joints shall be formed where indicated, and about any structures and features that project through or into the pavement, using preformed joint filler of the type, thickness, and width indicated, and shall extend the full slab depth. Edges of the concrete at the joint face shall be edged. The joint filler strips shall be installed to form a recess at the pavement surface to be filled with joint sealant. Expansion joints shall be constructed with dowels for load transfer.

3.7.4 Contraction Joints

Transverse and longitudinal contraction joints shall be of the weakened-plane or dummy type. Longitudinal contraction joints shall be constructed by sawing a groove in the hardened concrete with a power-driven saw. Transverse contraction joints shall be constructed in conformance with requirements for sawed joints or insert-type contraction joints.

3.7.4.1 Sawed Joints

Sawed contraction joints shall be constructed by sawing a groove in the concrete with a 1/8 inch blade to the indicated depth. The time of initial sawing shall vary depending on existing and anticipated weather conditions and shall be such as to prevent uncontrolled cracking of the pavement. Sawing of the joints shall commence as soon as the concrete has hardened sufficiently to permit cutting the concrete without chipping, spalling, or tearing. The joints shall be sawed at the required spacing consecutively in the sequence of the concrete placement. Sawing at a given joint location shall be discontinued when a crack develops ahead of the saw cut. Immediately after the joint is sawed, the saw cut and adjacent concrete surface shall be thoroughly flushed with water until all waste from sawing is removed from the joint. The surface shall be resprayed with curing compound as soon as free water disappears. The top of the joint opening and the joint groove at exposed edges shall be tightly sealed with cord or backer rod before the concrete in the region of the joint is resprayed with curing compound.

3.7.4.2 Insert-Type Joints

Insert-type non-metallic contraction joints shall be constructed by installing a preformed insert in the plastic concrete to form a weakened plane to induce cracking. Inserts shall be installed using a machine equipped with a vibrating bar for cutting a groove in the plastic concrete for placement of the insert or for vibrating the insert into place at the prescribed joint location. The installed insert shall be perpendicular to the finished grade of the pavement, with the top of the insert not more than 1/8 inch below the pavement surface.

3.7.5 Thickened Edge Joints

Underlying material in the transition area shall meet the requirements for smoothness and compaction specified for all other areas of the underlying material.

3.8 REPAIR, REMOVAL, AND REPLACEMENT OF SLABS

New pavement slabs that contain full-depth cracks shall be removed and replaced, as specified herein at no cost to the Government. Removal and replacement shall be full depth, shall be full width of the paving lane, and the limit of removal shall be from each original transverse joint . The Contracting Officer will determine whether cracks extend full depth of the pavement and may require minimum 6 inch diameter cores to be drilled on the crack to determine depth of cracking. Cores shall be drilled and the hole later filled by the Contractor with a well consolidated concrete mixture bonded to the walls of the hole with epoxy resin. Drilling of cores and refilling holes shall be at no expense to the Government. Cracks that do not extend full depth of slab shall be cleaned and then pressure injected with epoxy resin, Type IV, Grade 1. The Contractor shall ensure that the crack is not widened during epoxy resin injection. Where a full depth crack intersects the original transverse joint, the slab(s) containing the crack shall be removed and replaced, with dowels installed, as required below. Spalls along joints shall be repaired as specified.

3.8.1 Removal and Replacement of Full Slabs

Unless there are keys or dowels present, all edges of the slab shall be sawcut full depth. If dowels are present along any edges, these edges shall be sawed full depth 6 inches from the edge if only keys are present, or just beyond the end of dowels or tie bars if they are present. These joints shall then be carefully sawed on the joint line to within 1 inch of the depth of the dowel or key. The main slab shall be further divided by sawing full depth, at appropriate locations, and each piece lifted out and removed. The narrow strips along keyed or doweled edges shall be carefully broken up and removed. Care shall be taken to prevent damage to the dowels, tie bars, or keys or to concrete to remain in place. Protruding portions of dowels shall be painted and lightly oiled. The joint face below keys or dowels shall be suitably trimmed so that there is no abrupt offset. If underbreak occurs at any point along any edge, the area shall be hand-filled with concrete, producing an even joint face from top to bottom, before replacing the removed slab. If underbreak over 4 inches deep occurs, the entire slab containing the underbreak shall be removed and replaced. Where there are no dowels, tie bars, or keys on an edge, or where they have been damaged, dowels of the size and spacing as specified for other joints in similar pavement shall be installed by epoxy grouting them into holes drilled into the existing concrete. Original damaged dowels or tie bars shall be cut off flush with the joint face. All four

edges of the new slab shall thus contain dowels or original keys or original tie bars. Prior to placement of new concrete, the underlying material shall be graded and recompacted, and the surfaces of all four joint faces shall be cleaned of all loose material and contaminants, and coated with a double application of membrane forming curing compound as bond breaker. Placement of concrete shall be as specified for original construction. The resulting joints around the new slab shall be prepared and sealed as specified.

3.8.2 Repairing Spalls Along Joints

Spalls along joints and cracks shall be repaired by first making a vertical saw cut at least 1 inch outside the spalled area and to a depth of at least 2 inches. Saw cuts shall be straight lines forming rectangular areas. The concrete between the saw cut and the joint, or crack, shall be chipped out to remove all unsound concrete. The cavity shall be thoroughly cleaned with high pressure water jets supplemented with compressed air to remove all loose material. Immediately before filling the cavity, a prime coat shall be applied to the dry cleaned surface of all sides and bottom of the cavity, except any joint face. The prime coat shall be applied in a thin coating and scrubbed into the surface with a stiff-bristle brush. Prime coat for portland cement repairs shall be a neat cement grout and for epoxy resin repairs shall be epoxy resin, Type III, Grade 1. The cavity shall be filled with low slump portland cement concrete or mortar, or with epoxy resin concrete or mortar. Portland cement concrete shall be used for larger spalls, those more than 1/3 cu. ft in size after removal operations; portland cement mortar shall be used for spalls between 0.03 and 1/3 cu. ft; and epoxy resin mortar or Type III, Grade 3 epoxy resin for those spalls less than 0.03 cu. ft in size after removal operations. Portland cement concretes and mortars shall be very low slump mixtures, proportioned, mixed, placed, tamped, and cured. If the materials and procedures are approved in writing, latex modified concrete mixtures may be used for repairing spalls less than 1/3 cu.ft in size. Epoxy resin mortars shall be made with Type III, Grade 1, epoxy resin, using proportions, mixing, placing, tamping and curing procedures as recommended by the manufacturer. Any repair material on the surrounding surfaces of the existing concrete shall be removed before it hardens. Where the spalled area abuts a joint, an insert or other bond-breaking medium shall be used to prevent bond at the joint face. A reservoir for the joint sealant shall be sawed to the dimensions required for other joints. In lieu of sawing, spalls not adjacent to joints, and popouts, both less than 6 inches in maximum dimension, may be prepared by drilling a core 2 inches in diameter greater than the size of the defect, centered over the defect, and 2 inches deep or 1/2 inch into sound concrete, whichever is greater. The core hole shall be repaired as specified above for other spalls.

3.8.3 Areas Defective in Plan Grade or Smoothness

In areas not meeting the specified limits for surface smoothness and plan grade, high areas shall be reduced to attain the required smoothness and grade, except as depth is limited below. High areas shall be reduced by grinding the hardened concrete with a surface grinding machine after the concrete is 14 days or more old. The depth of grinding shall not exceed 1/4 inch. All pavement areas requiring plan grade or surface smoothness corrections in excess of the specified limits, shall be removed and replaced. In pavement areas given a wire comb or tined texture, areas exceeding 25 square feet that have been corrected by rubbing or grinding shall be retextured by grooving machine sawn grooves meeting the requirements for the wire comb or tined texture. All areas in which

grinding has been performed will be subject to the thickness tolerances specified in paragraph Thickness. Any grinding performed on individual slabs with excessive deficiencies shall be performed at the Contractor's own decision without entitlement to additional compensation if eventual removal of the slab is required.

3.9 PAVEMENT PROTECTION

The Contractor shall protect the pavement against all damage prior to final acceptance of the work. Traffic shall be excluded from the new pavement. As a construction expedient in paving intermediate lanes between newly paved pilot lanes, operation of the hauling equipment will be permitted on the new pavement after the pavement has been cured for 7 days and the joints have been sealed or otherwise protected. All new and existing pavement carrying construction traffic or equipment shall be continuously kept completely clean.

3.10 TESTING AND INSPECTION FOR CONTRACTOR QUALITY CONTROL (CQC)

Paragraph ACCEPTABILITY OF WORK contains additional CQC requirements. The Contractor shall perform the inspection and tests described below and, based upon the results of these inspections and tests, shall take the action required and submit reports as specified. When, in the opinion of the Contracting Officer, the paving operation is out of control, concrete placement shall cease.

3.10.1 Batch Plant Control

A daily report shall be prepared indicating checks made for scale accuracy with test weights, checks of batching accuracy, and corrective action taken prior to and during placement for weighing or batching, type and source of cement used, type and source of pozzolan or slag used, amount and source of admixtures used, aggregate source, the required aggregate and water masses per cubic yd, amount of water as free moisture in each size of aggregate, and the batch aggregate and water masses per cubic yd for each class of concrete batched during each day's plant operation.

3.10.2 Concrete Mixture

a. Air Content Testing. Air content tests shall be made when test specimens are fabricated. In addition, at least two other tests for air content shall be made on randomly selected batches of each separate concrete mixture produced during each 8-hour period of paving. Whenever air content reaches specified limits, an immediate confirmatory test shall be made. If the second test also shows air content at or exceeding specified limits, an adjustment shall immediately be made in the amount of air-entraining admixture batched to bring air content within specified limits. If the next adjusted batch of concrete is not within specified limits, concrete placement shall be halted until concrete air content is within specified limits.

b. Slump Testing. Slump tests shall be made when test specimens are fabricated. Additional tests shall be made when excessive variation in workability is reported by the placing foreman or Government inspector. Whenever slump approaches the maximum limit, an adjustment shall immediately be made in the batch masses of water and fine aggregate, without exceeding the maximum w/(c+p). When a slump result exceeds the specification limit, no

further concrete shall be delivered to the paving site until adjustments have been made and slump is again within the limit.

c. Temperature. The temperature of the concrete shall be measured when strength specimens are fabricated.

d. Concrete Strength Testing. Four (4) cylinders from the same batch shall be fabricated, cured and tested for compressive strength, testing two cylinders at 7-day and two cylinders at 28-day age. A minimum of one set of four (4) cylinders shall be fabricated, cured and tested for each shift of concrete placement. Control charts for strength, showing the 7-day and 28-day CQC compressive strengths, and the 28-day required compressive strength, shall be maintained and submitted with weekly CQC Reports.

3.10.3 Inspection Before Placing

Underlying materials, joint locations and types, construction joint faces, forms, reinforcing, dowels, and embedded items shall be inspected by a Registered Engineer in sufficient time prior to each paving operation in order to certify to the Contracting Officer that they are ready to receive concrete. The results of each inspection shall be reported in writing, and the certification signed by the Registered Engineer, prior to each days' paving.

3.10.4 Paving Operations

The placing foreman shall supervise all placing and paving operations, shall determine that the correct quality of concrete is placed in each location as shown, shall insure that the concrete is consolidated full depth and that finishing is performed as specified. The placing foreman shall be responsible for measuring and recording concrete temperatures and ambient temperature hourly during placing operations, weather conditions, time of placement, volume of concrete placed, and method of paving and any problems encountered.

3.10.5 Curing Inspection

a. Moist Curing Inspections. Each day on both work and non-work days, an inspection shall be made of all areas subject to moist curing. The surface moisture condition shall be noted and recorded. When any inspection finds an area of inadequate curing, immediate corrective action shall be taken, and the required curing period for the area shall be extended by 1 day.

b. Membrane Curing Inspection. At the end of each day's placement, the CQC Representative shall determine the quantity of compound used by measurement of the container; shall determine the area of concrete surface covered; shall then compute the rate of coverage in square feet per gallon and shall also note whether or not coverage is uniform. When the coverage rate of the curing compound is less than that specified or when the coverage is not uniform, the entire surface shall be sprayed again.

3.10.6 Cold-Weather Protection

At least once per day, an inspection shall be made of all areas subject to cold-weather protection. Any deficiencies shall be noted, corrected, and reported.

3.10.7 Reports

All results of tests or inspections conducted shall be reported informally as they are completed and in writing daily. A weekly report, signed by a registered engineer, shall be prepared for the updating of control charts and test data, and all CQC inspections and actions covering the entire period from the start of the construction through the current week. Reports of failures and the action taken shall be confirmed in writing in the routine reports. The Contracting Officer has the right to examine all CQC records. A copy of weekly reports shall be faxed to the Design District Pavement or Geotechnical Engineer. At the completion of concrete placement, a certification report shall be prepared containing mix designs, all updated control charts and concrete test data, quality control reports, smoothness reports, and other pertinent data on the concrete, with a certification by a registered engineer that the concrete placed meets all specification requirements. A copy of the certification report shall be mailed to the Design District pavement or Geotechnical Engineer.

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SECTION 32 16 13

CONCRETE SIDEWALKS AND CURBS AND GUTTERS
04/06

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 182	(2005) Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats

ASTM INTERNATIONAL (ASTM)

ASTM C 143/C 143M	(2005a) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C 171	(2003) Standard Specification for Sheet Materials for Curing Concrete
ASTM C 172	(2004) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C 173/C 173M	(2001e1) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C 231	(2004) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 309	(2006) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 31/C 31M	(2006) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C 920	(2005) Standard Specification for Elastomeric Joint Sealants
ASTM D 1751	(2004) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	(2004a) Standard Specification for

	Preformed Sponge Rubber Cork and Recycled PVC Expansion
ASTM D 5893	(2004) Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements

1.2 BASIS FOR PAYMENT

1.2.1 Sidewalks

Payment of the quantities of sidewalks measured as specified will be at the contract unit price per squareyard of the thickness specified.

1.2.2 Curbs and Gutters

Payment of the quantities of curbs and gutters measured as specified will be at the contract unit price per linear foot of each cross section.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Concrete

Copies of certified delivery tickets for all concrete used in the construction.

SD-06 Test Reports

Field Quality Control

Copies of all test reports within 24 hours of completion of the test.

1.4 WEATHER LIMITATIONS

1.4.1 Placing During Cold Weather

Concrete placement shall not take place when the air temperature reaches 40 degrees F and is falling, or is already below that point. Placement may begin when the air temperature reaches 35 degrees F and is rising, or is already above 40 degrees F. Provisions shall be made to protect the concrete from freezing during the specified curing period. If necessary to place concrete when the temperature of the air, aggregates, or water is below 35 degrees F, placement and protection shall be approved in writing. Approval will be contingent upon full conformance with the following provisions. The underlying material shall be prepared and protected so that it is entirely free of frost when the concrete is deposited. Mixing water and/or aggregates shall be heated as necessary to result in the temperature of the in-place concrete being between 50 and 85 degrees F. Methods and equipment for heating shall be approved. The aggregates shall be free of ice, snow, and frozen lumps before entering the mixer. Covering

and other means shall be provided for maintaining the concrete at a temperature of at least 50 degrees F for not less than 72 hours after placing, and at a temperature above freezing for the remainder of the curing period.

1.4.2 Placing During Warm Weather

The temperature of the concrete as placed shall not exceed85 degrees F except where an approved retarder is used. The mixing water and/or aggregates shall be cooled, if necessary, to maintain a satisfactory placing temperature. The placing temperature shall not exceed95 degrees F at any time.

1.5 PLANT, EQUIPMENT, MACHINES, AND TOOLS

1.5.1 General Requirements

Plant, equipment, machines, and tools used in the work shall be subject to approval and shall be maintained in a satisfactory working condition at all times. The equipment shall have the capability of producing the required product, meeting grade controls, thickness control and smoothness requirements as specified. Use of the equipment shall be discontinued if it produces unsatisfactory results. The Contracting Officer shall have access at all times to the plant and equipment to ensure proper operation and compliance with specifications.

1.5.2 Slip Form Equipment

Slip form paver or curb forming machine, will be approved based on trial use on the job and shall be self-propelled, automatically controlled, crawler mounted, and capable of spreading, consolidating, and shaping the plastic concrete to the desired cross section in 1 pass.

PART 2 PRODUCTS

2.1 CONCRETE

Concrete shall conform to the applicable requirements of Section 03 31 00.00 10 CAST-IN-PLACE STRUCTURAL CONCRETE except as otherwise specified. Concrete shall have a minimum compressive strength of 3500 psi at 28 days. Maximum size of aggregate shall be 1-1/2 inches.

2.1.1 Air Content

Mixtures shall have air content by volume of concrete of 5 to 7 percent, based on measurements made immediately after discharge from the mixer.

2.1.2 Slump

The concrete slump shall be 2 inches plus or minus 1 inch where determined in accordance with ASTM C 143/C 143M.

2.2 CONCRETE CURING MATERIALS

2.2.1 Impervious Sheet Materials

Impervious sheet materials shall conform to ASTM C 171, type optional, except that polyethylene film, if used, shall be white opaque.

2.2.2 Burlap

Burlap shall conform to AASHTO M 182.

2.2.3 White Pigmented Membrane-Forming Curing Compound

White pigmented membrane-forming curing compound shall conform to ASTM C 309, Type 2.

2.3 CONCRETE PROTECTION MATERIALS

Concrete protection materials shall be a linseed oil mixture of equal parts, by volume, of linseed oil and either mineral spirits, naphtha, or turpentine. At the option of the Contractor, commercially prepared linseed oil mixtures, formulated specifically for application to concrete to provide protection against the action of deicing chemicals may be used, except that emulsified mixtures are not acceptable.

2.4 JOINT FILLER STRIPS

2.4.1 Contraction Joint Filler for Curb and Gutter

Contraction joint filler for curb and gutter shall consist of hard-pressed fiberboard.

2.4.2 Expansion Joint Filler, Premolded

Expansion joint filler, premolded, shall conform to ASTM D 1751 or ASTM D 1752, 1/2 inch thick, unless otherwise indicated.

2.5 JOINT SEALANTS

Joint sealant, cold-applied shall conform to ASTM C 920 or ASTM D 5893.

2.6 FORM WORK

Form work shall be designed and constructed to ensure that the finished concrete will conform accurately to the indicated dimensions, lines, and elevations, and within the tolerances specified. Forms shall be of wood or steel, straight, of sufficient strength to resist springing during depositing and consolidating concrete. Wood forms shall be surfaced plank, 2 inches nominal thickness, straight and free from warp, twist, loose knots, splits or other defects. Wood forms shall have a nominal length of 10 feet. Radius bends may be formed with 3/4 inch boards, laminated to the required thickness. Steel forms shall be channel-formed sections with a flat top surface and with welded braces at each end and at not less than two intermediate points. Ends of steel forms shall be interlocking and self-aligning. Steel forms shall include flexible forms for radius forming, corner forms, form spreaders, and fillers. Steel forms shall have a nominal length of 10 feet with a minimum of 3 welded stake pockets per form. Stake pins shall be solid steel rods with chamfered heads and pointed tips designed for use with steel forms.

2.6.1 Sidewalk Forms

Sidewalk forms shall be of a height equal to the full depth of the finished sidewalk.

2.6.2 Curb and Gutter Forms

Curb and gutter outside forms shall have a height equal to the full depth of the curb or gutter. The inside form of curb shall have batter as indicated and shall be securely fastened to and supported by the outside form. Rigid forms shall be provided for curb returns, except that benders or thin plank forms may be used for curb or curb returns with a radius of 10 feet or more, where grade changes occur in the return, or where the central angle is such that a rigid form with a central angle of 90 degrees cannot be used. Back forms for curb returns may be made of 1-1/2 inch benders, for the full height of the curb, cleated together. In lieu of inside forms for curbs, a curb "mule" may be used for forming and finishing this surface, provided the results are approved.

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION

The subgrade shall be constructed to the specified grade and cross section prior to concrete placement. Subgrade shall be placed and compacted in conformance with Section 31 00 00 EARTHWORK.

3.1.1 Sidewalk Subgrade

The subgrade shall be tested for grade and cross section with a template extending the full width of the sidewalk and supported between side forms.

3.1.2 Curb and Gutter Subgrade

The subgrade shall be tested for grade and cross section by means of a template extending the full width of the curb and gutter. The subgrade shall be of materials equal in bearing quality to the subgrade under the adjacent pavement.

3.1.3 Maintenance of Subgrade

The subgrade shall be maintained in a smooth, compacted condition in conformity with the required section and established grade until the concrete is placed. The subgrade shall be in a moist condition when concrete is placed. The subgrade shall be prepared and protected to produce a subgrade free from frost when the concrete is deposited.

3.2 FORM SETTING

Forms shall be set to the indicated alignment, grade and dimensions. Forms shall be held rigidly in place by a minimum of 3 stakes per form placed at intervals not to exceed 4 feet. Corners, deep sections, and radius bends shall have additional stakes and braces, as required. Clamps, spreaders, and braces shall be used where required to ensure rigidity in the forms. Forms shall be removed without injuring the concrete. Bars or heavy tools shall not be used against the concrete in removing the forms. Any concrete found defective after form removal shall be promptly and satisfactorily repaired. Forms shall be cleaned and coated with form oil each time before concrete is placed. Wood forms may, instead, be thoroughly wetted with water before concrete is placed, except that with probable freezing temperatures, oiling is mandatory.

3.2.1 Sidewalks

Forms for sidewalks shall be set with the upper edge true to line and grade with an allowable tolerance of 1/8 inch in any 10 foot long section. After forms are set, grade and alignment shall be checked with a 10 foot straightedge. Forms shall have a transverse slope of 1/4 inch per foot with the low side adjacent to the roadway. Side forms shall not be removed for 12 hours after finishing has been completed.

3.2.2 Curbs and Gutters

The forms of the front of the curb shall be removed not less than 2 hours nor more than 6 hours after the concrete has been placed. Forms back of curb shall remain in place until the face and top of the curb have been finished, as specified for concrete finishing. Gutter forms shall not be removed while the concrete is sufficiently plastic to slump in any direction.

3.3 SIDEWALK CONCRETE PLACEMENT AND FINISHING

3.3.1 Formed Sidewalks

Concrete shall be placed in the forms in one layer. When consolidated and finished, the sidewalks shall be of the thickness indicated. After concrete has been placed in the forms, a strike-off guided by side forms shall be used to bring the surface to proper section to be compacted. The concrete shall be consolidated with an approved vibrator, and the surface shall be finished to grade with a strike off.

3.3.2 Concrete Finishing

After straightedging, when most of the water sheen has disappeared, and just before the concrete hardens, the surface shall be finished with a wood float or darby to a smooth and uniformly fine granular or sandy texture free of waves, irregularities, or tool marks. A scored surface shall be produced by brooming with a fiber-bristle brush in a direction transverse to that of the traffic, followed by edging.

3.3.3 Edge and Joint Finishing

All slab edges, including those at formed joints, shall be finished with an edger having a radius of 1/8 inch. Transverse joint shall be edged before brooming, and the brooming shall eliminate the flat surface left by the surface face of the edger. Corners and edges which have crumbled and areas which lack sufficient mortar for proper finishing shall be cleaned and filled solidly with a properly proportioned mortar mixture and then finished.

3.3.4 Surface and Thickness Tolerances

Finished surfaces shall not vary more than 5/16 inch from the testing edge of a 10-foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

3.4 CURB AND GUTTER CONCRETE PLACEMENT AND FINISHING

3.4.1 Formed Curb and Gutter

Concrete shall be placed to the section required in a single lift.

Consolidation shall be achieved by using approved mechanical vibrators. Curve shaped gutters shall be finished with a standard curb "mule".

3.4.2 Curb and Gutter Finishing

Approved slipformed curb and gutter machines may be used in lieu of hand placement.

3.4.3 Concrete Finishing

Exposed surfaces shall be floated and finished with a smooth wood float until true to grade and section and uniform in texture. Floated surfaces shall then be brushed with a fine-hair brush with longitudinal strokes. The edges of the gutter and top of the curb shall be rounded with an edging tool to a radius of 1/2 inch. Immediately after removing the front curb form, the face of the curb shall be rubbed with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. The front curb surface, while still wet, shall be brushed in the same manner as the gutter and curb top. The top surface of gutter and entrance shall be finished to grade with a wood float.

3.4.4 Joint Finishing

Curb edges at formed joints shall be finished as indicated.

3.4.5 Surface and Thickness Tolerances

Finished surfaces shall not vary more than 1/4 inch from the testing edge of a 10-foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

3.5 SIDEWALK JOINTS

Sidewalk joints shall be constructed to divide the surface into rectangular areas. Transverse contraction joints shall be spaced at a distance equal to the sidewalk width or 5 feet on centers, whichever is less, and shall be continuous across the slab. Longitudinal contraction joints shall be constructed along the centerline of all sidewalks 10 feet or more in width. Transverse expansion joints shall be installed at sidewalk returns and opposite expansion joints in adjoining curbs. Where the sidewalk is not in contact with the curb, transverse expansion joints shall be installed as indicated. Expansion joints shall be formed about structures and features which project through or into the sidewalk pavement, using joint filler of the type, thickness, and width indicated. Expansion joints are not required between sidewalks and curb that abut the sidewalk longitudinally.

3.5.1 Sidewalk Contraction Joints

The contraction joints shall be formed in the fresh concrete by cutting a groove in the top portion of the slab to a depth of at least one-fourth of the sidewalk slab thickness, using a jointer to cut the groove, or by sawing a groove in the hardened concrete with a power-driven saw, unless otherwise approved. Sawed joints shall be constructed by sawing a groove in the concrete with a 1/8 inch blade to the depth indicated. An ample supply of saw blades shall be available on the job before concrete placement is started, and at least one standby sawing unit in good working order shall be available at the jobsite at all times during the sawing operations.

3.5.2 Sidewalk Expansion Joints

Expansion joints shall be formed with 1/2 inch joint filler strips. Joint filler in expansion joints surrounding structures and features within the sidewalk may consist of preformed filler material conforming to ASTM D 1752 or building paper. Joint filler shall be held in place with steel pins or other devices to prevent warping of the filler during floating and finishing. Immediately after finishing operations are completed, joint edges shall be rounded with an edging tool having a radius of 1/8 inch, and concrete over the joint filler shall be removed. At the end of the curing period, expansion joints shall be cleaned and filled with cold-applied joint sealant. Joint sealant shall be gray or stone in color. The joint opening shall be thoroughly cleaned before the sealing material is placed. Sealing material shall not be spilled on exposed surfaces of the concrete. Concrete at the joint shall be surface dry and atmospheric and concrete temperatures shall be above 50 degrees F at the time of application of joint sealing material. Excess material on exposed surfaces of the concrete shall be removed immediately and concrete surfaces cleaned.

3.6 CURB AND GUTTER JOINTS

Curb and gutter joints shall be constructed at right angles to the line of curb and gutter.

3.6.1 Contraction Joints

Contraction joints shall be constructed directly opposite contraction joints in abutting portland cement concrete pavements and spaced so that monolithic sections between curb returns will not be less than 5 feet nor greater than 15 feet in length.

a. Contraction joints (except for slip forming) shall be constructed by means of 1/8 inch thick separators and of a section conforming to the cross section of the curb and gutter. Separators shall be removed as soon as practicable after concrete has set sufficiently to preserve the width and shape of the joint and prior to finishing.

b. When slip forming is used, the contraction joints shall be cut in the top portion of the gutter/curb hardened concrete in a continuous cut across the curb and gutter, using a power-driven saw. The depth of cut shall be at least one-fourth of the gutter/curb depth and 1/8 inch in width.

3.6.2 Expansion Joints

Expansion joints shall be formed by means of preformed expansion joint filler material cut and shaped to the cross section of curb and gutter. Expansion joints shall be provided in curb and gutter directly opposite expansion joints of abutting portland cement concrete pavement, and shall be of the same type and thickness as joints in the pavement. Where curb and gutter do not abut portland cement concrete pavement, expansion joints at least 1/2 inch in width shall be provided at intervals not less than 30 feet nor greater than 120 feet. Expansion joints shall be provided in nonreinforced concrete gutter at locations indicated. Expansion joints shall be sealed immediately following curing of the concrete or as soon thereafter as weather conditions permit. Expansion joints and the top 1 inch depth of curb and gutter contraction-joints shall be sealed with joint sealant. The joint opening shall be thoroughly cleaned before the sealing

material is placed. Sealing material shall not be spilled on exposed surfaces of the concrete. Concrete at the joint shall be surface dry and atmospheric and concrete temperatures shall be above 50 degrees F at the time of application of joint sealing material. Excess material on exposed surfaces of the concrete shall be removed immediately and concrete surfaces cleaned.

3.7 CURING AND PROTECTION

3.7.1 General Requirements

Concrete shall be protected against loss of moisture and rapid temperature changes for at least 7 days from the beginning of the curing operation. Unhardened concrete shall be protected from rain and flowing water. All equipment needed for adequate curing and protection of the concrete shall be on hand and ready for use before actual concrete placement begins. Protection shall be provided as necessary to prevent cracking of the pavement due to temperature changes during the curing period.

3.7.1.1 Mat Method

The entire exposed surface shall be covered with 2 or more layers of burlap. Mats shall overlap each other at least 6 inches. The mat shall be thoroughly wetted with water prior to placing on concrete surface and shall be kept continuously in a saturated condition and in intimate contact with concrete for not less than 7 days.

3.7.1.2 Impervious Sheeting Method

The entire exposed surface shall be wetted with a fine spray of water and then covered with impervious sheeting material. Sheets shall be laid directly on the concrete surface with the light-colored side up and overlapped 12 inches when a continuous sheet is not used. The curing medium shall not be less than 18-inches wider than the concrete surface to be cured, and shall be securely weighted down by heavy wood planks, or a bank of moist earth placed along edges and laps in the sheets. Sheets shall be satisfactorily repaired or replaced if torn or otherwise damaged during curing. The curing medium shall remain on the concrete surface to be cured for not less than 7 days.

3.7.1.3 Membrane Curing Method

A uniform coating of white-pigmented membrane-curing compound shall be applied to the entire exposed surface of the concrete as soon after finishing as the free water has disappeared from the finished surface. Formed surfaces shall be coated immediately after the forms are removed and in no case longer than 1 hour after the removal of forms. Concrete shall not be allowed to dry before the application of the membrane. If any drying has occurred, the surface of the concrete shall be moistened with a fine spray of water and the curing compound applied as soon as the free water disappears. Curing compound shall be applied in two coats by hand-operated pressure sprayers at a coverage of approximately 200 square feet/gallon for the total of both coats. The second coat shall be applied in a direction approximately at right angles to the direction of application of the first coat. The compound shall form a uniform, continuous, coherent film that will not check, crack, or peel and shall be free from pinholes or other imperfections. If pinholes, abrasion, or other discontinuities exist, an additional coat shall be applied to the affected areas within 30 minutes. Concrete surfaces that are subjected to heavy

rainfall within 3 hours after the curing compound has been applied shall be resprayed by the method and at the coverage specified above. Areas where the curing compound is damaged by subsequent construction operations within the curing period shall be resprayed. Necessary precautions shall be taken to insure that the concrete is properly cured at sawed joints, and that no curing compound enters the joints. The top of the joint opening and the joint groove at exposed edges shall be tightly sealed before the concrete in the region of the joint is resprayed with curing compound. The method used for sealing the joint groove shall prevent loss of moisture from the joint during the entire specified curing period. Approved standby facilities for curing concrete pavement shall be provided at a location accessible to the jobsite for use in the event of mechanical failure of the spraying equipment or other conditions that might prevent correct application of the membrane-curing compound at the proper time. Concrete surfaces to which membrane-curing compounds have been applied shall be adequately protected during the entire curing period from pedestrian and vehicular traffic, except as required for joint-sawing operations and surface tests, and from any other possible damage to the continuity of the membrane.

3.7.2 Backfilling

After curing, debris shall be removed and the area adjoining the concrete shall be backfilled, graded, and compacted to conform to the surrounding area in accordance with lines and grades indicated.

3.7.3 Protection

Completed concrete shall be protected from damage until accepted. The Contractor shall repair damaged concrete and clean concrete discolored during construction. Concrete that is damaged shall be removed and reconstructed for the entire length between regularly scheduled joints. Refinishing the damaged portion will not be acceptable. Removed damaged portions shall be disposed of as directed.

3.7.4 Protective Coating

Protective coating, of linseed oil mixture, shall be applied to the exposed-to-view concrete surface after the curing period, if concrete will be exposed to de-icing chemicals within 6 weeks after placement. Concrete to receive a protective coating shall be moist cured.

3.7.4.1 Application

Curing and backfilling operation shall be completed prior to applying two coats of protective coating. Concrete shall be surface dry and clean before each application. Coverage shall be by spray application at not more than 50 square yards/gallon for first application and not more than 70 square yards/gallon for second application, except that the number of applications and coverage for each application for commercially prepared mixture shall be in accordance with the manufacturer's instructions. Coated surfaces shall be protected from vehicular and pedestrian traffic until dry.

3.7.4.2 Precautions

Protective coating shall not be heated by direct application of flame or electrical heaters and shall be protected from exposure to open flame, sparks, and fire adjacent to open containers or applicators. Material

shall not be applied at ambient or material temperatures lower than 50 degrees F.

3.8 FIELD QUALITY CONTROL

3.8.1 General Requirements

The Contractor shall perform the inspection and tests described and meet the specified requirements for inspection details and frequency of testing. Based upon the results of these inspections and tests, the Contractor shall take the action and submit reports as required below, and any additional tests to insure that the requirements of these specifications are met.

3.8.2 Concrete Testing

3.8.2.1 Strength Testing

The Contractor shall provide molded concrete specimens for strength tests. Samples of concrete placed each day shall be taken not less than once a day nor less than once for every 250 cubic yards of concrete. The samples for strength tests shall be taken in accordance with ASTM C 172. Cylinders for acceptance shall be molded in conformance with ASTM C 31/C 31M by an approved testing laboratory. Each strength test result shall be the average of 2 test cylinders from the same concrete sample tested at 28 days, unless otherwise specified or approved. Concrete specified on the basis of compressive strength will be considered satisfactory if the averages of all sets of three consecutive strength test results equal or exceed the specified strength, and no individual strength test result falls below the specified strength by more than 500 psi.

3.8.2.2 Air Content

Air content shall be determined in accordance with ASTM C 173/C 173M or ASTM C 231. ASTM C 231 shall be used with concretes and mortars made with relatively dense natural aggregates. Two tests for air content shall be made on randomly selected batches of each class of concrete placed during each shift. Additional tests shall be made when excessive variation in concrete workability is reported by the placing foreman or the Government inspector. If results are out of tolerance, the placing foreman shall be notified and he shall take appropriate action to have the air content corrected at the plant. Additional tests for air content will be performed on each truckload of material until such time as the air content is within the tolerance specified.

3.8.2.3 Slump Test

Two slump tests shall be made on randomly selected batches of each class of concrete for every 250 cubic yards, or fraction thereof, of concrete placed during each shift. Additional tests shall be performed when excessive variation in the workability of the concrete is noted or when excessive crumbling or slumping is noted along the edges of slip-formed concrete.

3.8.3 Thickness Evaluation

The anticipated thickness of the concrete shall be determined prior to placement by passing a template through the formed section or by measuring the depth of opening of the extrusion template of the curb forming machine. If a slip form paver is used for sidewalk placement, the subgrade

shall be true to grade prior to concrete placement and the thickness will be determined by measuring each edge of the completed slab.

3.8.4 Surface Evaluation

The finished surface of each category of the completed work shall be uniform in color and free of blemishes and form or tool marks.

3.9 SURFACE DEFICIENCIES AND CORRECTIONS

3.9.1 Thickness Deficiency

When measurements indicate that the completed concrete section is deficient in thickness by more than 1/4 inch the deficient section will be removed, between regularly scheduled joints, and replaced.

3.9.2 High Areas

In areas not meeting surface smoothness and plan grade requirements, high areas shall be reduced either by rubbing the freshly finished concrete with carborundum brick and water when the concrete is less than 36 hours old or by grinding the hardened concrete with an approved surface grinding machine after the concrete is 36 hours old or more. The area corrected by grinding the surface of the hardened concrete shall not exceed 5 percent of the area of any integral slab, and the depth of grinding shall not exceed 1/4 inch. Pavement areas requiring grade or surface smoothness corrections in excess of the limits specified above shall be removed and replaced.

3.9.3 Appearance

Exposed surfaces of the finished work will be inspected by the Government and any deficiencies in appearance will be identified. Areas which exhibit excessive cracking, discoloration, form marks, or tool marks or which are otherwise inconsistent with the overall appearances of the work shall be removed and replaced.

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SECTION 32 92 19

SEEDING

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM C 602	(1995a; R 2001) Agricultural Liming Materials
ASTM D 2028	(1997) Cutback Asphalt (Rapid-Curing Type)
ASTM D 5268	(1992; R 1997) Topsoil Used for Landscaping Purposes
ASTM D 977	(1998) Emulsified Asphalt

U.S. DEPARTMENT OF AGRICULTURE (USDA)

AMS Seed Act	(1940; R 1988; R 1998) Federal Seed Act

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Surface Erosion Control Material

SD-06 Test Reports

Equipment Calibration

Certification of calibration tests conducted on the equipment used in the seeding operation.

Soil Test

Certified reports of inspections and laboratory tests, prepared by an independent testing agency, including analysis and interpretation of test results. Each report shall be properly identified. Test methods used and compliance with recognized test standards shall be described.

SD-07 Certificates

Seed
Topsoil
pH Adjuster
Mulch

Prior to the delivery of materials, certificates of compliance attesting that materials meet the specified requirements. Certified copies of the material certificates shall include the following:

a. Seed. Classification, botanical name, common name, percent pure live seed, minimum percent germination and hard seed, maximum percent weed seed content, and date tested.

b. Topsoil. Particle size, pH, organic matter content, textural class, soluble salts, chemical and mechanical analyses.

c. pH Adjuster. Calcium carbonate equivalent and sieve analysis.

e. Fertilizer. Chemical analysis and composition percent.

f. Mulch: Composition and source.

1.3 DELIVERY, INSPECTION, STORAGE, AND HANDLING

1.3.1 Delivery

A delivery schedule shall be provided at least 10 calendar days prior to the first day of delivery.

1.3.2 Inspection

Seed shall be inspected upon arrival at the job site for conformity to species and quality. Seed that is wet, moldy, or bears a test date five months or older, shall be rejected. Other materials shall be inspected for compliance with specified requirements. The following shall be rejected: topsoil that contains slag, cinders, stones, lumps of soil, sticks, roots, trash or other material over a minimum 1-1/2 inch diameter; and topsoil that contains viable plants and plant parts. Unacceptable materials shall be removed from the job site.

1.3.3 Storage

Materials shall be stored in designated areas. Seed, lime, and fertilizer shall be stored in cool, dry locations away from contaminants. Chemical treatment material shall be stored according to manufacturer's instructions and not with seeding operation materials.

1.3.4 Handling

Except for bulk deliveries, materials shall not be dropped or dumped from vehicles.

1.3.5 Time Limitation

Hydro seeding time limitation for holding seed in the slurry shall be a maximum 24 hours.

PART 2 PRODUCTS

2.1 SEED

2.1.1 Seed Classification

State-approved seed of the latest season's crop shall be provided in original sealed packages bearing the producer's guaranteed analysis for percentages of mixture, purity, germination, hard seed, weed seed content, and inert material. Labels shall be in conformance with AMS Seed Act and

applicable state seed laws.

2.1.2 Permanent Seed Species and Mixtures

Permanent seed species and mixtures shall be proportioned by weight as follows:

Botanical Name	Common Name	Mixture Percent by Weight	Percent Pure Live Seed

SEED MIXTURE	SEED TYPE	SEED APPLICATION RATE	SEEDING DATES	FERTILIZER RECOMMENDATION	LIMESTONE RECOMMENDATION
NO.1	Common Bermuda Grass (Unhulled)	12	October 1-March 14	13-13-13 @ 1,400 lbs/acre	Dolomite Lime @ 4,000 lbs/acre
	Rye Grain	60			
NO. 2	Common Bermuda Grass (Hulled)	15	March 15-Sept. 30	13-13-13 @ 1,400 lbs/acre	Dolomite Lime @ 4,000 lbs/acre
	Browntop Millet	10			

2.1.3 Temporary Seed Species

Temporary seed species for surface erosion control or overseeding shall be as follows:

Botanical Name	Common Name	Percent Pure Live Seed	Planting Dates
	Rye Grain	60 lbs/acre	1 Oct - 14 Mar
	Browntop Millet	40 lbs/acre	15 Mar – 30 Sep

2.1.4 Quality

Weed seed shall be a maximum 1 percent by weight of the total mixture.

2.1.5 Seed Mixing

The mixing of seed may be done by the seed supplier prior to delivery, or on site as directed.

2.1.6 Substitutions

Substitutions will not be allowed without written request and approval from The Contracting Officer.

2.2 TOPSOIL

Topsoil shall be as defined in ASTM D 5268. When available, the topsoil shall be the existing surface soil stripped and stockpiled onsite in

accordance with SECTION 31 00 00 EARTHWORK ~~Section 02300A EARTHWORK FOR ROADWAYS, TRAILS, TARGETS AND BERMS~~. When additional topsoil is required beyond the available topsoil from the stripping operation, existing shall be amended as recommended by the soil test for the seed specified. Topsoil shall be free from slag, cinders, stones, lumps of soil, sticks, roots, trash or other material over a minimum 1-1/2 inch diameter. Topsoil shall be free from viable plants and plant parts.

2.3 SOIL AMENDMENTS

Soil amendments shall consist of pH adjuster, fertilizer, organic material and soil conditioners meeting the following requirements. Vermiculite shall not be used.

2.3.1 pH Adjuster

The pH adjuster shall be an agricultural liming material in accordance with ASTM C 602. These materials may be hydrated lime or ground limestone. The pH adjuster shall be used to create a favorable soil pH for the plant material specified.

2.3.1.1 Limestone

Limestone material shall contain a minimum calcium carbonate equivalent of 80 percent. Gradation: A minimum 95 percent shall pass through a No. 8 sieve and a minimum 55 percent shall pass through a No. 60 sieve. To raise soil pH, ground limestone shall be used.

2.3.1.2 Hydrated Lime

Hydrated lime shall contain a minimum calcium carbonate equivalent of 110 percent. Gradation: A minimum 100 percent shall pass through a No. 8 sieve and a minimum 97 percent shall pass through a No. 60 sieve.

2.3.2 Fertilizer

The nutrients ratio shall be 13 percent nitrogen, 13 percent phosphorus, and 13 percent potassium. Fertilizer shall be controlled release commercial grade, free flowing, uniform in composition, and consist of a nitrogen-phosphorus-potassium ratio. The fertilizer shall be derived from sulphur coated urea, urea formaldehyde, plastic or polymer coated pills, or isobutylenediurea (IBDU). Fertilizer shall be balanced with the inclusion of trace minerals and micro-nutrients.

2.3.3 Nitrogen Carrier Fertilizer

The nutrients ratio shall be as specified in 2.3.2. Nitrogen carrier fertilizer shall be commercial grade, free flowing, and uniform in composition. The fertilizer may be a liquid nitrogen solution.

2.4 MULCH

Mulch shall be free from weeds, mold, and other deleterious materials. Mulch materials shall be native to the region.

2.4.1 Straw

Straw shall be stalks from oats, wheat, rye, barley, or rice, furnished in air-dry condition and with a consistency for placing with commercial mulch-blowing equipment.

2.4.2 Hay

Hay shall be native hay, sudan-grass hay, broomsedge hay, or other herbaceous mowings, furnished in an air-dry condition suitable for placing with commercial mulch-blowing equipment.

2.4.3 Wood Cellulose Fiber

Wood cellulose fiber shall not contain any growth or germination-inhibiting factors and shall be dyed an appropriate color to facilitate placement during application. Composition on air-dry weight basis: 9 to 15 percent moisture, pH range from 4.5 to 6.0.

2.5 ASPHALT ADHESIVE

Asphalt adhesive shall conform to the following: Emulsified asphalt, conforming to ASTM D 977, Grade SS-1; and cutback asphalt, conforming to ASTM D 2028, Designation RC-70.

2.6 WATER

Water shall be the responsibility of the Contractor, unless otherwise noted. Water shall not contain elements toxic to plant life.

PART 3 EXECUTION

3.1 INSTALLING SEED TIME AND CONDITIONS

3.1.1 Seeding Time

See Section 2.1.2 for Seeding Times.

3.1.2 Seeding Conditions

Seeding operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture, or other unsatisfactory conditions prevail, the work shall be stopped when directed. When special conditions warrant a variance to the seeding operations, proposed alternate times shall be submitted for approval.

3.2 SITE PREPARATION

3.2.1 Finished Grade and Topsoil

The Contractor shall verify that finished grades are as indicated on drawings, and the placing of topsoil, smooth grading, and compaction requirements have been completed in accordance with Section 02300A EARTHWORK, prior to the commencement of the seeding operation.

3.2.2 Application of Soil Amendments

3.2.2.1 Applying pH Adjuster

The pH adjuster shall be applied as specified. The application rate shall be 4000 pounds per acre. The pH adjuster shall be incorporated into the soil to a maximum 4 inch depth or may be incorporated as part of the tillage operation.

3.2.2.2 Applying Fertilizer

The fertilizer shall be applied as specified. The application rate shall be 1400 pounds per acre. Fertilizer shall be incorporated into the soil to a maximum 4 inch depth or may be incorporated as part of the tillage or hydroseeding operation.

3.2.3 Tillage

Soil on slopes up to a maximum 3-horizontal-to-1-vertical shall be tilled to a minimum 4 inch depth. On slopes between 3-horizontal-to-1-vertical and 1-horizontal-to-1 vertical, the soil shall be tilled to a minimum 2 inch depth by scarifying with heavy rakes, or other method. Rototillers shall be used where soil conditions and length of slope permit. On slopes -horizontal-to-1 vertical and steeper, no tillage is required. Drainage patterns shall be maintained as indicated on drawings. Areas compacted by construction operations shall be completely pulverized by tillage. Soil used for repair of surface erosion or grade deficiencies shall conform to topsoil requirements. The pH adjuster, fertilizer, and soil conditioner may be applied during this procedure.

3.2.4 Prepared Surface

3.2.4.1 Preparation

The prepared surface shall be a maximum 1 inch below the adjoining grade of any surfaced area. New surfaces shall be blended to existing areas. The prepared surface shall be completed with a light raking to remove debris.

3.2.4.2 Protection

Areas with the prepared surface shall be protected from compaction or damage by vehicular or pedestrian traffic and surface erosion.

3.3 INSTALLATION

Prior to installing seed, any previously prepared surface compacted or damaged shall be reworked to meet the requirements of paragraph SITE PREPARATION. Seeding operations shall not take place when the wind velocity will prevent uniform seed distribution.

3.3.1 Installing Seed

Seeding method shall be Broadcast Seeding, Drill Seeding or Hydroseeding. Seeding procedure shall ensure even coverage. Gravity feed applicators, which drop seed directly from a hopper onto the prepared soil, shall not be used because of the difficulty in achieving even coverage, unless otherwise approved. Absorbent polymer powder shall be mixed with the dry seed at the rate recommended by the manufacturer.

3.3.1.1 Broadcast Seeding

Seed shall be uniformly broadcast at the rate specified in 2.1.2, using broadcast seeders. Half the total rate of seed application shall be broadcast in 1 direction, with the remainder of the seed rate broadcast at 90 degrees from the first direction. Seed shall be covered a maximum 1/4 inch depth by disk harrow, steel mat drag, cultipacker, or other approved device.

3.3.1.2 Rolling

The entire area shall be firmed with a roller not exceeding 90 pounds per foot roller width. Slopes over a maximum 3-horizontal-to-1 vertical shall not be rolled. Areas seeded with seed drills equipped with rollers shall not be rolled.

3.3.2 Hydroseeding

Seed shall be mixed to ensure broadcast at the rate specified in 2.1.2. Seed and fertilizer shall be added to water and thoroughly mixed to meet the rates specified. The time period for the seed to be held in the slurry

shall be a maximum 24 hours. Wood cellulose fiber mulch and tackifier shall be added at the rates recommended by the manufacturer after the seed, fertilizer, and water have been thoroughly mixed to produce a homogeneous slurry. Slurry shall be uniformly applied under pressure over the entire area. The hydroseeded area shall not be rolled.

3.3.3 Mulching

3.3.3.1 Hay or Straw Mulch

Hay or straw mulch shall be spread uniformly at the rate of 1.5 tons per acre. Mulch shall be spread by hand, blower-type mulch spreader, or other approved method. Mulching shall be started on the windward side of relatively flat areas or on the upper part of steep slopes, and continued uniformly until the area is covered. The mulch shall not be bunched or clumped. Sunlight shall not be completely excluded from penetrating to the ground surface. All areas installed with seed shall be mulched on the same day as the seeding. Mulch shall be anchored immediately following spreading.

3.3.3.2 Mechanical Anchor

Mechanical anchor shall be a V-type-wheel land packer; a scalloped-disk land packer designed to force mulch into the soil surface; or other suitable equipment.

3.3.3.3 Asphalt Adhesive Tackifier

Asphalt adhesive tackifier shall be sprayed at a rate between 10 to 13 gallons per 1000 square feet. Sunlight shall not be completely excluded from penetrating to the ground surface.

3.3.3.4 Non-Asphaltic Tackifier

Hydrophilic colloid shall be applied at the rate recommended by the manufacturer, using hydraulic equipment suitable for thoroughly mixing with water. A uniform mixture shall be applied over the area.

3.3.3.5 Asphalt Adhesive Coated Mulch

Hay or straw mulch may be spread simultaneously with asphalt adhesive applied at a rate between 10 to 13 gallons per 1000 square feet, using power mulch equipment which shall be equipped with suitable asphalt pump and nozzle. The adhesive-coated mulch shall be applied evenly over the surface. Sunlight shall not be completely excluded from penetrating to the ground surface.

3.3.3.6 Wood Cellulose Fiber, Paper Fiber, and Recycled Paper

Wood cellulose fiber, paper fiber, or recycled paper shall be applied as part of the hydroseeding operation. The mulch shall be mixed and applied in accordance with the manufacturer's recommendations.

3.3.4 Watering Seed

Watering shall be started immediately after completing the seeding of an area. Water shall be applied to supplement rainfall at a rate sufficient to ensure moist soil conditions to a minimum 1 inch depth. Run-off and puddling shall be prevented. Watering trucks shall not be driven over turf areas, unless otherwise directed. Watering of other adjacent areas or plant material shall be prevented.

3.4 SURFACE EROSION CONTROL

3.4.1 Surface Erosion Control Material

Where indicated or as directed, surface erosion control material shall be installed in accordance with manufacturer's instructions. Placement of the material shall be accomplished without damage to installed material or without deviation to finished grade.

3.4.2 Temporary Seeding

When directed during contract delays affecting the seeding operation or when a quick cover is required to prevent surface erosion, the areas designated shall be seeded in accordance with temporary seed species listed under Paragraph 2.1.3.

3.4.2.1 Soil Amendments

When soil amendments have not been applied to the area, the quantity of 1/2 of the required soil amendments shall be applied and the area tilled in accordance with paragraph SITE PREPARATION. The area shall be watered in accordance with paragraph Watering Seed.

3.4.2.2 Remaining Soil Amendments

The remaining soil amendments shall be applied in accordance with the paragraph Tillage when the surface is prepared for installing seed.

3.5 QUANTITY CHECK

For materials provided in bags, the empty bags shall be retained for recording the amount used. For materials provided in bulk, the weight certificates shall be retained as a record of the amount used. The amount of material used shall be compared with the total area covered to determine the rate of application used. Differences between the quantity applied and the quantity specified shall be adjusted as directed.

3.6 RESTORATION AND CLEAN UP

3.6.1 Restoration

Existing turf areas, pavements, and facilities that have been damaged from the seeding operation shall be restored to original condition at Contractor's expense.

3.6.2 Clean Up

Excess and waste material shall be removed from the seeded areas and shall be disposed offsite. Adjacent paved areas shall be cleaned.

3.7 SEED ESTABLISHMENT PERIOD

3.7.1 Commencement

The seed establishment period to obtain a healthy stand of grass plants shall begin on the first day of seeding work under this contract and shall continue through the remaining life of the contract and end 12 months after the last day of the seeding operation required by this contract. Written calendar time period shall be furnished for the seed establishment period. When there is more than 1 seed establishment period, the boundaries of the seeded area covered for each period shall be described. The seed establishment period shall be modified for inclement weather, shut down periods, or for separate completion dates of areas.

3.7.2 Satisfactory Stand of Grass Plants

Grass plants shall be evaluated for species and health when the grass plants are a minimum 1 inch high.

3.7.2.1 Field Area

A satisfactory stand of grass plants from the seeding operation for a field area shall be a minimum 100 grass plants per square foot. The total bare spots shall not exceed 2 percent of the total seeded area.

3.7.3 Maintenance During Establishment Period

Maintenance of the seeded areas shall include eradicating weeds, insects and diseases; protecting embankments and ditches from surface erosion; maintaining erosion control materials and mulch; protecting installed areas from traffic; mowing; watering; and post-fertilization.

3.7.3.1 Mowing

a. Field Areas: Field areas shall be mowed once during the season to a minimum 3 inch height. Clippings shall be removed when the amount cut prevents sunlight from reaching the ground surface.

3.7.3.2 Post-Fertilization

The fertilizer shall be applied as recommended by the soil test. A maximum 1/2 pound per 1000 square feet of actual available nitrogen shall be provided to the grass plants. The application shall be timed prior to the advent of winter dormancy and shall be made without burning the installed grass plants.

3.7.3.3 Repair or Reinstall

Unsatisfactory stand of grass plants and mulch shall be repaired or reinstalled, and eroded areas shall be repaired in accordance with paragraph SITE PREPARATION.

3.7.3.4 Maintenance Record

A record of each site visit shall be furnished, describing the maintenance work performed; areas repaired or reinstalled; and diagnosis for unsatisfactory stand of grass plants.

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SODDING
04/06

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM C 602	(2007) Agricultural Liming Materials
ASTM D 4427	(2007) Peat Samples by Laboratory Testing
ASTM D 4972	(2001) pH of Soils

TURFGRASS PRODUCERS INTERNATIONAL (TPI)

TPI GSS	(1995) Guideline Specifications to Turfgrass Sodding

U.S. DEPARTMENT OF AGRICULTURE (USDA)

DOA SSIR 42	(1996) Soil Survey Investigation Report No. 42, Soil Survey Laboratory Methods Manual, Version 3.0

1.2 DEFINITIONS

1.2.1 Stand of Turf

100 percent ground cover of the established species.

1.3 RELATED REQUIREMENTS

Section 31 00 00 EARTHWORK, Section 32 93 00 EXTERIOR PLANTS, and Section 32 05 33 LANDSCAPE ESTABLISHMENT applies to this section for pesticide use and plant establishment requirements, with additions and modifications herein.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Fertilizer

Include physical characteristics, and recommendations.

SD-06 Test Reports

Topsoil composition tests (reports and recommendations).

SD-07 Certificates

Nursery Sod farm certification for sods. Indicate type of sod in accordance with TPI GSS.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery

1.5.1.1 Sod Protection

Protect from drying out and from contamination during delivery, on-site storage, and handling.

1.5.1.2 Fertilizer, Gypsum, Sulfur, Iron, and Lime Delivery

Deliver to the site in original, unopened containers bearing manufacturer's chemical analysis, name, trade name, trademark, and indication of conformance to state and federal laws. Instead of containers, fertilizer, gypsum, sulphur, iron, and lime may be furnished in bulk with certificate indicating the above information.

1.5.2 Storage

1.5.2.1 Sod Storage

Lightly sprinkle with water, cover with moist burlap, straw, or other approved covering; and protect from exposure to wind and direct sunlight until planted. Provide covering that will allow air to circulate so that internal heat will not develop. Do not store sod longer than 24 hours. Do not store directly on concrete or bituminous surfaces.

1.5.2.2 Topsoil

Prior to stockpiling topsoil, treat growing vegetation with application of appropriate specified non-selective herbicide. Clear and grub existing vegetation three to four weeks prior to stockpiling topsoil.

1.5.2.3 Handling

Do not drop or dump materials from vehicles.

1.6 TIME RESTRICTIONS AND PLANTING CONDITIONS

1.6.1 Restrictions

Do not plant when the ground is frozen, snow covered, muddy, or when air temperature exceeds 90 degrees Fahrenheit.

1.7 TIME LIMITATIONS

1.7.1 Sod

Place sod a maximum of thirty six hours after initial harvesting, in accordance with TPI GSS as modified herein.

PART 2 PRODUCTS

2.1 SODS

2.1.1 Classification

Nursery grown, certified as classified in the TPI GSS. Machine cut sod at a uniform thickness of 3/4 inch within a tolerance of 1/4 inch, excluding top growth and thatch. Each individual sod piece shall be strong enough to support its own weight when lifted by the ends. Broken pads, irregularly shaped pieces, and torn or uneven ends will be rejected. Wood pegs and wire staples for anchorage shall be as recommended by sod supplier.

2.1.2 Purity

Sod species shall be genetically pure, free of weeds, pests, and disease.

2.1.3 Planting Dates

Lay sod from April to September for warm season spring planting and from October to November for cool season fall planting.

2.1.4 Composition

2.1.4.1 Proportion

Proportion grass species as follows.

Botanical Name	Common Name	Percent:
Cyndon dactylon '419'	Hybrid 419 Bermuda	98

2.2 TOPSOIL

2.2.1 On-Site Topsoil

Surface soil stripped and stockpiled on site and modified as necessary to meet the requirements specified for topsoil in paragraph entitled "Composition." When available topsoil shall be existing surface soil stripped and stockpiled on-site in accordance with Section 31 00 00 EARTHWORK.

2.2.2 Off-Site Topsoil

Conform to requirements specified in paragraph entitled "Composition." Additional topsoil shall be furnished by the Contractor.

2.2.3 Composition

Containing from 5 to 10 percent organic matter as determined by the topsoil composition tests of the Organic Carbon, 6A, Chemical Analysis Method described in DOA SSIR 42. Maximum particle size, 3/4 inch, with maximum 3

percent retained on 1/4 inch screen. The pH shall be tested in accordance with ASTM D 4972. Topsoil shall be free of sticks, stones, roots, and other debris and objectionable materials. Other components shall conform to the following limits:

Silt	25-50 percent
Clay	10-30 percent
Sand	20-35 percent
pH	5.5 to 7.0
Soluble Salts	600 ppm maximum

2.3 SOIL CONDITIONERS

Add conditioners to topsoil as required to bring into compliance with "composition" standard for topsoil as specified herein.

2.3.1 Lime

Commercial grade limestone containing a calcium carbonate equivalent (C.C.E.) as specified in ASTM C 602 of not less than 80 percent.

2.3.2 Aluminum Sulfate

Commercial grade.

2.3.3 Sulfur

100 percent elemental

2.3.4 Iron

100 percent elemental

2.3.5 Peat

Natural product of peat moss derived from a freshwater site and conforming to ASTM D 4427. Shred and granulate peat to pass a 1/2 inch mesh screen and condition in storage pile for minimum 6 months after excavation.

2.3.6 Sand

Clean and free of materials harmful to plants.

2.3.7 Perlite

Horticultural grade.

2.3.8 Composted Derivatives

Ground bark, nitrolized sawdust, humus or other green wood waste material free of stones, sticks, and soil stabilized with nitrogen and having the following properties:

2.3.8.1 Particle Size

Minimum percent by weight passing:

No. 4 mesh screen	95
No. 8 mesh screen	80

2.3.8.2 Nitrogen Content

Minimum percent based on dry weight:

Fir Sawdust	0.7
Fir or Pine Bark	1.0

2.3.9 Gypsum

Coarsely ground gypsum comprised of calcium sulfate dihydrate 91 percent, calcium 22 percent, sulfur 17 percent; minimum 96 percent passing through 20 mesh screen, 100 percent passing thru 16 mesh screen.

2.3.10 Calcined Clay

Calcined clay shall be granular particles produced from montmorillonite clay calcined to a minimum temperature of 1200 degrees F. Gradation: A minimum 90 percent shall pass a No. 8 sieve; a minimum 99 percent shall be retained on a No. 60 sieve; and a maximum 2 percent shall pass a No. 100 sieve. Bulk density: A maximum 40 pounds per cubic foot.

2.4 FERTILIZER

2.4.1 Granular Fertilizer

Organic, granular controlled release fertilizer applied based on a soils test results.

2.5 WATER

Source of water shall be approved by Contracting Officer and of suitable quality for irrigation containing no element toxic to plant life.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 EXTENT OF WORK

Provide soil preparation (including soil conditioners), fertilizing, and sodding of all newly graded finished earth surfaces, unless indicated otherwise, and at all areas inside or outside the limits of construction that are disturbed by the Contractor's operations.

3.1.2 Soil Preparation

Provide 4 inches of topsoil to meet indicated finish grade. After areas have been brought to indicated finish grade, incorporate fertilizer, pH adjusters, and soil conditioners into soil a minimum depth of 4 inches by disking, harrowing, tilling or other method approved by the Contracting Officer. Remove debris and stones larger than 3/4 inch in any dimension remaining on the surface after finish grading. Correct irregularities in finish surfaces to eliminate depressions. Protect finished topsoil areas from damage by vehicular or pedestrian traffic.

3.1.2.1 Soil Conditioner Application Rates

Apply soil conditioners at rates as determined by laboratory soil analysis

of the soils at the job site.

3.1.2.2 Fertilizer Application Rates

Apply fertilizer at rates as determined by laboratory soil analysis of the soils at the job site.

3.2 SODDING

3.2.1 Finished Grade and Topsoil

Prior to the commencement of the sodding operation, the Contractor shall verify that finished grades are as indicated on drawings; the placing of topsoil, smooth grading, and compaction requirements have been completed in accordance with Section 31 00 00 EARTHWORK.

The prepared surface shall be 1 inch below the adjoining grade of any surfaced area. New surfaces shall be blended to existing areas. The prepared surface shall be completed with a light raking to remove from the surface debris and stones over a minimum 5/8 inch in any dimension.

3.2.2 Placing

Place sod a maximum of 36 hours after initial harvesting, in accordance with TPI GSS as modified herein.

3.2.3 Sodding Slopes and Ditches

For slopes 2:1 and greater, lay sod with long edge perpendicular to the contour. For V-ditches and flat bottomed ditches, lay sod with long edge perpendicular to flow of water. Anchor each piece of sod with wood pegs or wire staples maximum 2 feet on center. On slope areas, start sodding at bottom of the slope.

3.2.4 Finishing

After completing sodding, blend edges of sodded area smoothly into surrounding area. Air pockets shall be eliminated and a true and even surface shall be provided. Frayed edges shall be trimmed and holes and missing corners shall be patched with sod.

3.2.5 Rolling

Immediately after sodding, firm entire area except for slopes in excess of 3 to 1 with a roller not exceeding 90 pounds for each foot of roller width.

3.2.6 Watering

Start watering areas sodded as required by daily temperature and wind conditions. Apply water at a rate sufficient to ensure thorough wetting of soil to minimum depth of 6 inches. Run-off, puddling, and wilting shall be prevented. Unless otherwise directed, watering trucks shall not be driven over turf areas. Watering of other adjacent areas or plant material shall be prevented.

3.3 PROTECTION OF TURF AREAS

Immediately after turfing, protect area against traffic and other use.

3.4 RESTORATION

Restore to original condition existing turf areas which have been damaged during turf installation operations. Keep clean at all times at least one paved pedestrian access route and one paved vehicular access route to each building. Clean other paving when work in adjacent areas is complete.

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SECTION 32 93 00

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SECTION 32 93 00

EXTERIOR PLANTS
07/06

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A300	(1995) Tree Care Operations - Trees, Shrubs and Other Woody Plant Maintenance
ANSI Z133.1	(2006) Arboricultural Operations - Safety Requirements for Pruning, Repairing, Maintaining, and Removing Trees, and Cutting Brush
ANSI Z60.1	(1996) Nursery Stock

ASTM INTERNATIONAL (ASTM)

ASTM A 580/A 580M	(2006) Standard Specification for Stainless Steel Wire
ASTM C 602	(2007) Agricultural Liming Materials
ASTM D 4427	(2007) Peat Samples by Laboratory Testing
ASTM D 4972	(2001) pH of Soils
ASTM D 5268	(2002) Topsoil Used for Landscaping Purposes
ASTM D 5852	(2000) Standard Test Method for Erodibility Determination of Soil in the Field or in the Laboratory by the Jet Index Method
ASTM D 6629	(2001) Selection of Methods for Estimating Soil Loss by Erosion

L.H. BAILEY HORTORIUM (LHBH)

LHBH	(1976) Hortus Third

U.S. DEPARTMENT OF AGRICULTURE (USDA)

DOA SSIR 42	(1996) Soil Survey Investigation Report No. 42, Soil Survey Laboratory Methods Manual, Version 3.0

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED	(2002; R 2005) Leadership in Energy and Environmental Design(tm) Green Building Rating System for New Construction (LEED-NC)

1.2 RELATED REQUIREMENTS

Section 31 00 00 EARTHWORK, Section 32 92 23 SODDING, and Section 32 05 33 LANDSCAPE ESTABLISHMENT applies to this section for pesticide use and plant establishment requirements, with additions and modifications herein.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

State Landscape Contractor's License

Time Restrictions and Planting Conditions

Indicate anticipated dates and locations for each type of planting.

SD-03 Product Data

Local/Regional Materials; (LEED)

Submit documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in project.

Peat
Composted Derivatives
Rotted Manure
Organic Mulch Materials

Submit documentation indicating type of biobased material in product and biobased content. Indicate relative dollar value of biobased content products to total dollar value of products included in project.

Gypsum; (LEED)
Drainage Pipe; (LEED)
Mulch; G
Ground Stakes
Recycled Plastic Edging; (LEED)
Hose; (LEED)

Submit documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product. Indicate

relative dollar value of recycled content products to total dollar value of products included in project.

Fertilizer

Weed control fabric; G

Root control barrier; G

Staking Material
Ground Stakes

Submit documentation certifying products are from salvaged/recovered lumber sources and indicating percentage of salvaged/recovered content per unit of product.

Metal anchors

Antidesiccants

Erosion control materials

Photographs; G

SD-04 Samples

Mulch; G

Submit one pint of mulch.

SD-06 Test Reports

Topsoil composition tests; Soil Test of proposed area

Percolation Test; Percolation Test of proposed area

SD-07 Certificates

Forest Stewardship Council (FSC) Certification; (LEED)

Nursery certifications

Indicate names of plants in accordance with the LHBH, including type, quality, and size.

SD-10 Operation and Maintenance Data

Plastic Identification

When not labeled, identify types in Operation and Maintenance Manual.

1.4 QUALITY ASSURANCE

1.4.1 Topsoil Composition Tests

Commercial test from an independent testing laboratory including basic soil groups (moisture and saturation percentages, Nitrogen-Phosphorus-Potassium (N-P-K) ratio, pH (ASTM D 4972), soil salinity), secondary nutrient groups

(calcium, magnesium, sodium, Sodium Absorption Ratio (SAR)), micronutrients (zinc, manganese, iron, copper), toxic soil elements (boron, chloride, sulfate), cation exchange and base saturation percentages, and soil amendment and fertilizer recommendations with quantities for plant material being transplanted. Soil required for each test shall include a maximum depth of 18 inches of approximately 1 quart volume for each test. Areas sampled should not be larger than 1 acre and should contain at least 6-8 cores for each sample area and be thoroughly mixed. Problem areas should be sampled separately and compared with samples taken from adjacent non-problem areas. The location of the sample areas should be noted and marked on a parcel or planting map for future reference.

1.4.2 Nursery Certifications

a. Indicate on nursery letterhead the name of plants in accordance with the LHBH, including botanical common names, quality, and size.

b. Inspection certificate.

1.4.3 State Landscape Contractor's License

Construction company shall hold a landscape contractors license in the state where the work is performed and have a minimum of five years landscape construction experience. Submit copy of license and three references for similar work completed in the last five years.

1.4.4 Plant Material Photographs

Contractor shall submit nursery photographs, for government approval prior to ordering, for each tree larger than 2-inch caliper size.

1.4.5 Percolation Test

Immediately following rough grading operation, identify a typical location for one of the largest trees and or shrubs and excavate a pit per the project details. Fill the pit with water to a depth of 12 inches. The length of time required for the water to percolate into the soil, leaving the pit empty, shall be measured by the project Landscape Architect and verified by the Contracting Officer. Within six hours of the time the water has drained from the pit, the Contractor, with the Contracting Officer and project Landscape Architect present, shall again fill the pit with water to a depth of 12 inches. If the water does not completely percolate into the soil within 9 hours, a determination shall be made whether a drainage system or a soil penetrant will be required for each tree and or shrub being transplanted.

1.4.6 Erosion Assessment

Assess potential effects of soil management practices on soil loss in accordance with ASTM D 6629. Assess erodibility of soil with dominant soil structure less than 2.8 to 3.1 inches in accordance with ASTM D 5852.

1.4.7 Pre-Installation Meeting

Convene a pre-installation meeting a minimum of one week prior to commencing work of this section. Require attendance of parties directly affecting work of this section. Review conditions of operations, procedures and coordination with related work. Agenda shall include the

following:

a. Tour, inspect, and discuss conditions of planting materials.

b. Review planting schedule and maintenance.

c. Review required inspections.

d. Review environmental procedures.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery

1.5.1.1 Branched Plant Delivery

Deliver with branches tied and exposed branches covered with material which allows air circulation. Prevent damage to branches, trunks, root systems, and root balls and desiccation of leaves.

1.5.1.2 Soil Amendment Delivery

Deliver to the site in original, unopened containers bearing manufacturer's chemical analysis, name, trade name, or trademark, and indication of conformance to state and federal laws. Instead of containers, fertilizer, gypsum, sulfur, iron, and lime may be furnished in bulk with a certificate indicating the above information. Store in dry locations away from contaminates.

1.5.1.3 Plant Labels

Deliver plants with durable waterproof labels in weather-resistant ink. Provide labels stating the correct botanical and common plant name and variety as applicable and size as specified in the list of required plants. Attach to plants, bundles, and containers of plants. Groups of plants may be labeled by tagging one plant. Labels shall be legible for a minimum of 60 days after delivery to the planting site.

1.5.2 Storage

1.5.2.1 Plant Storage and Protection

Store and protect plants not planted on the day of arrival at the site as follows:

a. Shade and protect plants in outside storage areas from the wind and direct sunlight until planted.

b. Protect balled and burlapped plants from freezing or drying out by covering the balls or roots with moist burlap, sawdust, wood chips, shredded bark, peat moss, or other approved material. Provide covering which allows air circulation.

c. Keep plants in a moist condition until planted by watering with a fine mist spray.

d. Do not store plant material directly on concrete or bituminous surfaces.

1.5.2.2 Fertilizer, Gypsum, pH Adjusters and Mulch Storage

Store in dry locations away from contaminants.

1.5.2.3 Topsoil

Prior to stockpiling topsoil, eradicate on site undesirable growing vegetation. Clear and grub existing vegetation three to four weeks prior to stockpiling existing topsoil.

1.5.3 Handling

Do not drop or dump plants from vehicles. Avoid damaging plants being moved from nursery or storage area to planting site. Handle boxed, balled and burlapped, bare root, balled and potted, processed balled, in-ground fabric bag grown, and container plants carefully to avoid damaging or breaking the earth ball or root structure. Do not handle plants by the trunk or stem. Puddle bare-root plants after removal from the heeling-in bed to protect roots from drying out. Remove damaged plants from the site.

1.5.4 TIME LIMITATION

Except for container-grown plant material, the time limitation from digging to installing plant material shall be a maximum of 90 days. The time limitation between installing the plant material and placing the mulch shall be a maximum of 24 hours.

1.6 TIME RESTRICTIONS AND PLANTING CONDITIONS

Coordinate installation of planting materials during optimal planting seasons for each type of plant material required.

1.6.1 Planting Dates

1.6.1.1 Deciduous Material

Deciduous material from February to June for spring/summer planting and from October to December for fall/winter planting.

1.6.1.2 Evergreen Material

Evergreen material from February to June for spring/summer planting and from October to December for fall/winter planting.

1.6.2 Restrictions

Do not plant when ground is frozen, snow covered, muddy, or when air temperature exceeds 90 degrees Fahrenheit

1.7 GUARANTEE

All plants shall be guaranteed for one year beginning on the date of inspection by the Contracting Officer to commence the plant establishment period, against defects including death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, or abuse by the Government or by weather conditions unusual for the warranty period.

Remove and replace dead planting materials immediately unless required to

plant in the succeeding planting season. At end of warranty period, replace planting materials that die or have 25 percent or more of their branches that die during the construction operations or the guarantee period.

1.8 SUSTAINABLE DESIGN REQUIREMENTS

1.8.1 Local/Regional Materials

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a 500 mile radius from the project site, if available from a minimum of three sources.See Section 01 33 29 LEED(tm) DOCUMENTATION for cumulative total local material requirements. Landscaping materials may be locally available.

PART 2 PRODUCTS

2.1 PLANTS

2.1.1 Regulations and Varieties

Furnish nursery stock in accordance with ANSI Z60.1, except as otherwise specified or indicated. Each plant or group of planting shall have a "key" number indicated on the nursery certifications of the plant schedule. Furnish plants, including turf grass, grown under climatic conditions similar to those in the locality of the project. Plants specified shall be low maintenance varieties, tolerant of site's existing soils and climate without supplemental irrigation once established. Spray plants budding into leaf or having soft growth with an antidesiccant before digging. Plants of the same specified size shall be of uniform size and character of growth. Plants shall be chosen with their mature size and growth habit in mind to avoid over-planting and conflict with other plants, structures or underground utility lines. All plants shall comply with all Federal and State Laws requiring inspection for plant diseases and infestation.

2.1.2 Shape and Condition

Well-branched, well-formed, sound, vigorous, healthy planting stock free from disease, sunscald, windburn, abrasion, and harmful insects or insect eggs and having a healthy, normal, and undamaged root system.

2.1.2.1 Deciduous Trees and Shrubs

Symmetrically developed and of uniform habit of growth, with straight boles or stems, and free from objectionable disfigurements.

2.1.2.2 Evergreen Trees and Shrubs

Well developed symmetrical tops with typical spread of branches for each particular species or variety.

2.1.2.3 Ground Covers and Vines

Number and length of runners and clump sizes indicated, and of the proper age for the grade of plants indicated, furnished in removable containers, integral containers, or formed homogeneous soil section.

2.1.3 Plant Size

Minimum sizes measured after pruning and with branches in normal position, shall conform to measurements indicated, based on the average width or height of the plant for the species as specified in ANSI Z60.1. Plants larger in size than specified may be provided with approval of the Contracting Officer. When larger plants are provided, increase the ball of earth or spread of roots in accordance with ANSI Z60.1.

2.1.4 Root Ball Size

All balled and burlapped, container grown plants shall conform to ANSI Z60.1. All wrappings and ties shall be biodegradable. Root growth in container grown plants shall be sufficient to hold earth intact when removed from containers. Root bound plants will not be accepted.

2.1.5 Growth of Trunk and Crown

2.1.5.1 Deciduous Trees

A height to caliper relationship shall be provided in accordance with ANSI Z60.1. Height of branching shall bear a relationship to the size and species of tree specified and with the crown in good balance with the trunk. The trees shall not be "poled" or the leader removed.

a. Single stem: The trunk shall be reasonably straight and symmetrical with crown and have a persistent main leader.

b. Multi-stem: All countable stems, in aggregate, shall average the size specified. To be considered a stem, there shall be no division of the trunk which branches more than 6 inches from ground level.

2.1.5.2 Coniferous Evergreen Plant Material

Coniferous Evergreen plant material shall have the height-to-spread ratio recommended by ANSI Z60.1. The coniferous evergreen trees shall not be "poled" or the leader removed. Acceptable plant material shall be exceptionally heavy, well shaped and trimmed to form a symmetrical and tightly knit plant. The form of growth desired shall be as indicated.

2.1.5.3 Broadleaf Evergreen Plant Material

Broadleaf evergreen plant material shall have the height-to-spread ratio recommended by ANSI Z60.1. Acceptable plant material shall be well shaped and recognized by the trade as typical for the variety grown in the region of the project.

2.1.5.4 Ground Cover and Vine Plant Material

Ground cover and vine plant material shall have the minimum number of runners and length of runner recommended by ANSI Z60.1. Plant material shall have heavy, well developed and balanced crown with vigorous, well developed root system and shall be furnished in containers.

2.2 TOPSOIL

2.2.1 Existing Soil

Modify to conform to requirements specified in paragraph entitled "Composition."

2.2.2 On-Site Topsoil

Surface soil stripped and stockpiled on site and modified as necessary to meet the requirements specified for topsoil in paragraph entitled "Composition." When available topsoil shall be existing surface soil stripped and stockpiled on-site in accordance with Section 31 00 00 EARTHWORK.

2.2.3 Off-Site Topsoil

Conform to requirements specified in paragraph entitled "Composition." Additional topsoil shall be furnished by the Contractor.

2.2.4 Composition

Evaluate soil for use as topsoil in accordance with ASTM D 5268. From 5 to 10 percent organic matter as determined by the topsoil composition tests of the Organic Carbon, 6A, Chemical Analysis Method described in DOA SSIR 42. Maximum particle size, 3/4 inch, with maximum 3 percent retained on 1/4 inch screen. The pH shall be tested in accordance with ASTM D 4972. Topsoil shall be free of sticks, stones, roots, plants, and other debris and objectionable materials. Other components shall conform to the following limits:

Silt	25-50 percent
Clay	10-30 percent
Sand	20-35 percent
pH	5.5 to 7.0
Soluble Salts	600 ppm maximum

2.3 SOIL CONDITIONERS

Provide singly or in combination as required to meet specified requirements for topsoil. Soil conditioners shall be nontoxic to plants.

2.3.1 Lime

Commercial grade limestone containing a calcium carbonate equivalent (C.C.E.) as specified in ASTM C 602 of not less than 80 percent.

2.3.2 Aluminum Sulfate

Commercial grade.

2.3.3 Sulfur

100 percent elemental

2.3.4 Iron

100 percent elemental

2.3.5 Peat

Natural product of peat moss derived from a freshwater site and conforming to ASTM D 4427. Shred and granulate peat to pass a 1/2 inch mesh screen and condition in storage pile for minimum 6 months after excavation. Biobased content shall be a minimum of 100 percent. Peat shall not contain invasive species, including seeds.

2.3.6 Sand

Clean and free of materials harmful to plants.

2.3.7 Perlite

Horticultural grade.

2.3.8 Composted Derivatives

Ground bark, nitrolized sawdust, humus or other green wood waste material free of stones, sticks, invasive species, including seeds, and soil stabilized with nitrogen and having the following properties:

2.3.8.1 Particle Size

Minimum percent by weight passing:

No. 4 mesh screen	95
No. 8 mesh screen	80

2.3.8.2 Nitrogen Content

Minimum percent based on dry weight:

Fir Sawdust	0.7
Fir or Pine Bark	1.0

2.3.8.3 Biobased Content

Minimum 100 percent.

2.3.9 Gypsum

Coarsely ground gypsum from recycled scrap gypsum board comprised of calcium sulfate dihydrate 91 percent, calcium 22 percent, sulfur 17 percent; minimum 96 percent passing through 20 mesh screen, 100 percent passing thru 16 mesh screen.

2.3.10 Vermiculite

Horticultural grade for planters.

2.3.11 Rotted Manure

Well rotted horse or cattle manure containing maximum 25 percent by volume of straw, sawdust, or other bedding materials; free of seeds, stones, sticks, soil, and other invasive species.

2.4 PLANTING SOIL MIXTURES

Three parts topsoil, one part peat moss, and one part sand. Thoroughly mix

all parts of planting soil mixture to a uniform blend throughout.

2.5 FERTILIZER

Fertilizer for groundcover, wildflowers and grasses is not permitted. Fertilizer for trees, plants, and shrubs shall be as recommended by plant supplier, except synthetic chemical fertilizers are not permitted. Fertilizers containing petrochemical additives or that have been treated with pesticides or herbicides are not permitted.

2.5.1 Granular Fertilizer

Organic, granular controlled release fertilizer supplied at rates of nitrogen, phosphorus, potassium, sulfur, and iron as determined be a soils test.

2.5.2 Fertilizer Tablets

Organic, plant tablets composed of tightly compressed fertilizer chips forming a tablet that is insoluble in water, is designed to provide a continuous release of nutrients for at least 24 months and contains the following minimum percentages, by weight, of plant food nutrients:

20 percent available nitrogen
20 percent available phosphorus
5 percent available potassium

2.6 MULCH

Free from noxious weeds, mold, pesticides, or other deleterious materials.

2.6.1 Organic Mulch Materials

Shredded hardwood pine straw mulch from site when available. Biobased content shall be a minimum of 100 percent. Wood cellulose fiber shall be processed to contain no growth or germination-inhibiting factors, dyed with non-toxic, biodegradable dye to an appropriate color to facilitate visual metering of materials application. Paper-based hydraulic mulch shall contain a minimum of 100 percent post-consumer recycled content. Wood-based hydraulic mulch shall contain a minimum of 100 percent recycled material.

2.7 STAKING AND GUYING MATERIAL

2.7.1 Staking Material

2.7.1.1 Ground Stakes

FSC-certified or salvaged wood or 100 percent post-consumer recycled content plastic, 2 inches square are by 3 feet long, pointed at one end.

2.7.2 Guying Material

2.7.2.1 Guying Wire

12 gauge annealed galvanized steel, ASTM A 580/A 580M.

2.7.3 Hose Chafing Guards

New or used 2 ply 3/4 inch diameter reinforced rubber or plastic hose, black or dark green, all of same color.

2.7.4 Flags

White surveyor's plastic tape, 1/2 inch diameter PVC pipe, 6 inches long, fastened to guying wires or cables.

2.7.5 Turnbuckles

Galvanized or cadmium-plated steel with minimum 3 inch long openings fitted with screw eyes. Eye bolts shall be galvanized or cadmium-plated steel with one inch diameter eyes and screw length 1 1/2 inches, minimum.

2.8 EDGING MATERIAL

2.8.1 Recycled Plastic Edging

100 percent recycled polyethylene edging, resistant to insects, termites, boring worms, splintering and rotting, and shall not absorb moisture or promote bacterial growth. Minimum 1 by 6 inch, capable of bending a minimum 36 radius, integrally colored brown with slip joint connections. Anchors and stakes shall be of the same manufacturer and color as the edging.

2.9 ANTIDESICCANTS

Sprayable, water insoluble vinyl-vinledine complex which produce a moisture retarding barrier not removable by rain or snow. Film shall form at temperatures commonly encountered out of doors during planting season and have a moisture vapor transmission rate (MVT) of the resultant film of maximum 10 grams per 24 hours at 70 percent humidity.

2.10 WATER

Source of water to be approved by Contracting Officer and suitable quality for irrigation and shall not contain elements toxic to plant life, including acids, alkalis, salts, chemical pollutants, and organic matter. Use collected storm water or graywater when available.

2.10.1 Hose

Hoses used for watering shall be a minimum of 65 percent post-consumer rubber or plastic.

2.11 SOURCE QUALITY CONTROL

The Contracting Officer will inspect plant materials at the project site and approve them. Tag plant materials for size and quality.

PART 3 EXECUTION

3.1 EXTENT OF WORK

Provide soil preparation, fertilizing, tree, groundcover, and planting, edging, staking and guying, installation and a mulch topdressing of all newly graded finished earth surfaces, unless indicated otherwise, and at

all areas inside or outside the limits of construction that are disturbed by the Contractor's operations.

3.2 PREPARATION

3.2.1 Protection

Protect existing and proposed landscape features, elements, and sites from damage or contamination. Protect trees, vegetation, and other designated features by erecting high-visibility, reusable construction fencing. Locate fence no closer to trees than the drip line. Plan equipment and vehicle access to minimize and confine soil disturbance and compaction to areas indicated on Drawings.

3.2.2 Layout

Stake out approved plant material locations and planter bed outlines on the project site before digging plant pits or beds. The Contracting Officer reserves the right to adjust plant material locations to meet field conditions. Do not plant closer than 36 inches to a building wall, fence or wall edge. Provide on-site locations for excavated rock, soil, and vegetation.

3.2.3 Soil Preparation

3.2.3.1 pH Adjuster Application Rates

Apply pH adjuster at rates as determined by laboratory soil analysis of the soils at the job site.

3.2.3.2 Soil Conditioner Application Rates

Apply soil conditioners at rates as determined by laboratory soil analysis of the soils at the job site.

3.2.3.3 Fertilizer Application Rates

Apply fertilizer at rates as determined by laboratory soil analysis of the soils at the job site.

3.3 PLANT BED PREPARATION

Verify location of underground utilities prior to excavation. Protect existing adjacent turf before excavations are made. Do not disturb topsoil and vegetation in areas outside those indicated on Drawings. Where planting beds occur in existing turf areas, remove turf to a depth that will ensure removal of entire root system. Measure depth of plant pits from finished grade. Depth of plant pit excavation shall be as indicated and provide proper relation between top of root ball and finished grade. Install plant material as specified in paragraph entitled "Plant Installation." Do not install trees within 10 feet of any utility lines or building walls.

3.4 PLANT INSTALLATION

3.4.1 Individual Plant Pit Excavation

Excavate pits at least twice as large in diameter as the size of ball or container to depth shown.

3.4.2 Plant Beds with Multiple Plants

Excavate plant beds continuously throughout entire bed as outlined to depth shown.

3.4.3 Handling and Setting

Move plant materials only by supporting the root ball or container. Set plants on hand compacted layer of prepared backfill soil mixture 6 inches thick and hold plumb in the center of the pit until soil has been tamped firmly around root ball. Set plant materials, in relation to surrounding finish grade, one to 2 inches above depth at which they were grown in the nursery, collecting field or container. Replace plant material whose root balls are cracked or damaged either before or during the planting process.

Plant material shall be set in plant beds according to the drawings. Backfill soil mixture shall be placed on previously scarified subsoil to completely surround the root balls, and shall be brought to a smooth and even surface, blending to existing areas.

3.4.3.1 Balled and Burlapped Stock

Backfill with prepared soil mixture to approximately half the depth of ball and then tamp and water. Carefully remove or fold back excess burlap and tying materials from the top a minimum 1/3 depth from the top of the rootball. Tamp and complete backfill, place mulch topdressing, and water. Remove wires and non-biodegradable materials from plant pit prior to backfill operations.

3.4.3.2 Container Grown Stock

Remove from container and prevent damage to plant or root system.

3.4.3.3 Ground Covers and Vines

Plant after placing mulch topdressing. Do not remove plant materials from flats or containers until immediately before planting. Space at intervals indicated. Plant at a depth to sufficiently cover all roots. Start watering areas planted as required by temperature and wind conditions. Apply water at a rate sufficient to ensure thorough wetting of soil to a depth of 6 inches without run off or puddling. Smooth planting areas after planting to provide even, smooth finish. Mulch as indicated.

3.4.4 Earth Mounded Watering Basin for Individual Plant Pits

Form with topsoil around each plant by replacing a mound of topsoil around the edge of each plant pit. Watering basins shall be 6 inches deep for trees and 4 inches deep for shrubs. Eliminate basins around plants in plant beds containing multiple plants.

3.4.5 Placement of Mulch Topdressing

Place specified mulch topdressing on top of weed control fabric covering total area enclosed by edging. Place mulch topdressing to a depth of 3 inches.

3.4.6 Mulch Topdressing

Provide mulch topdressing over entire planter bed surfaces and individual plant surfaces including earth mound watering basin around plants to a depth of 3 inches after completion of plant installation and before watering. Keep mulch out of the crowns of shrubs. Place mulch a minimum 2 to 3 inches away from trunk of shrub or tree. Place on top of any weed control fabric.

3.4.7 Installation of Edging

Uniformly edge beds of plants to provide a clear cut division line between planted area and adjacent lawn. Construct bed shapes as indicated. Install plastic edging material as indicated and as per manufacturer's instructions.

3.4.8 Fertilization

3.4.8.1 Fertilizer Tablets

Place fertilizer planting tablets evenly spaced around the plant pits to the manufacturer's recommended depth.

3.4.8.2 Granular Fertilizer

Apply granular fertilizer as a top coat prior to placing mulch layer and water thoroughly.

3.4.9 Watering

Start watering areas planted as required by temperature and wind conditions. Slow deep watering shall be used. Apply water at a rate sufficient to ensure thorough wetting of soil to a depth of 12 inches without run off or puddling. Watering of other plant material or adjacent areas shall be prevented.

3.4.10 Guying

3.4.10.1 Guying

Guy plants as indicated. Attach two strands of guying wire around the tree trunk at an angle of 45 degrees at approximately 1/2 of the trunk height. Protect tree trunks with chafing guards where guying wire contacts the tree trunk. Anchor guys to wood ground stakes. Fasten flags to each guying wire approximately 2/3 of the distance up from ground level. Provide turnbuckles as indicated.

3.4.10.2 Chafing Guards

Use hose chafing guards, as specified where guy wire will contact the plant.

3.4.10.3 Wood Ground Stakes

Drive wood ground stakes into firm ground outside of plant pit with top of stake flush with ground. Place equal distance from tree trunk and around the plant pit.

3.4.10.4 Flags

Securely fasten flags on each guy wire.

3.4.11 Pruning

Prune in accordance with safety requirement of ANSI Z133.1.

3.4.11.1 Trees and Shrubs

Remove dead and broken branches. Prune to correct structural defects only. Retain typical growth shape of individual plants with as much height and spread as practical. Do not cut central leader on trees. Make cuts with sharp instruments. Do not flush cut with trunk or adjacent branches. Collars shall remain in place. Pruning shall be accomplished by trained and experienced personnel and shall be accordance with ANSI A300.

3.4.11.2 Wound Dressing

Do not apply tree wound dressing to cuts.

3.5 RESTORATION AND CLEAN UP

3.5.1 Restoration

Turf areas, pavements and facilities that have been damaged from the planting operation shall be restored to original condition at the Contractor's expense.

3.5.2 Clean Up

Excess and waste material shall be removed from the installed area and shall be disposed offsite at an approved landfill, recycling center, or composting center. Separate and recycle or reuse the following landscape waste materials: nylon straps, wire, ball wrap, burlap, wood stakes,. Adjacent paved areas shall be cleared.

-- End of Section --

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APPENDIX HH
As-Constructed Drawings

As-constructed drawings for buildings 3405 and 3425 in CAD and PDF format are provided on CD / DVD.

APPENDIX II
Original As-Built Drawings

Original as-built drawings for buildings 3405 and 3425 in PDF format are provided on CD / DVD.

APPENDIX JJ
Adapt-Build Model

The Adapt-Build Model drawings consist of one design that applies to buildings 3405 and 3425. Files in CAD and PDF format are provided on CD / DVD.

APPENDIX KK
Adapt-Build Model – CID, SID, and FF&E

The Adapt-Build Model CID, SID, and FF&E apply to buildings 3405 and 3425. Files are provided on CD / DVD. Additional information may be indicated on the drawings in Appendix JJ – Adapt-Build Model Drawings.

Narrative
Structural Interior Design

1 General Description:

1.1 The selection and coordination of interior materials, furnishings, and finishes has been done with the excellence of interior design in mind. Careful attention to functional and budgetary concerns has been exercised to assure the best possible end product for the user. Low maintenance, high durability, and long-term appearance retention are important features in the materials and furnishings chosen for this facility. Recycled content and low VOC materials will be used where possible to help contribute to the achievement of LEED certification.

2 Criteria References:

2.1 The following documents and their further referenced standards will be used as guidelines for the interiors of this facility.

2.1.1 ASTM F 1066 (1999) Vinyl Composition Tile

2.1.2 ASTM F 1861 (2002) Resilient Wall Base

2.1.3 International Building Code, 2006

2.1.4 ADA/ABA Americans with Disabilities Act and Architectural Barriers Act Accessibilities Guidelines, July 2004

2.1.5 Technical Signage Manual, Headquarters Department of the Army, December 1983

2.1.6 Engineering Technical Letter (ETL) 07-4: Air Force Carpet Standard, March 2007

2 Design Criteria:

2.2.1 Great care has been exercised to ensure that this facility will be a visually pleasing environment that will encourage the work and training of its occupants. The purpose for this facility is not only for training, and maintaining the wellbeing, morale, and efficiency of the troops that will use this facility, but is also a location for presenting soldiers to their family and friends at graduation. With this in mind, the color scheme for the building was developed with finishes that are durable, easily maintained, and aesthetically pleasing. The interior design has been developed to create an

atmosphere that reflects both a professional and residential feel, allowing for future flexibility. There is an overall warm and neutral foundation on which to build patterns and accent colors to enhance the visual interest of each space as well as emphasize certain architectural features of the building.

3 Building Systems, Materials & Equipment:

3.1 Interior Finishes

3.1.1 Floors

3.1.1.1 12” x 18” unglazed porcelain tile, lightly textured, will be installed throughout the Headquarters Lobby. 12” x 12” porcelain tile will be installed throughout the headquarters vestibules, and vending area and 6” x 6” tile will extend throughout all restrooms with 2” x 2” porcelain mosaics in all shower enclosures for added slip resistance. All porcelain tiles have a minimum .6 coefficient of friction (wet and dry) when tested under ASTM C1028, and will comply with ANSI A137.1 standards for water absorption. Refer to Floor Pattern plans for further details.

3.1.1.2 Carpet tile will be used throughout the headquarters open and private offices, conference rooms, company ops private offices, and second floor cadre support. The multi-level pattern loop has a large overall multi-color pattern which will hide coffee stains and other soiling that may occur. All carpet tile complies with ASTM testing standards, ISO 2551, 2 and 3 yarn ply, solution dyed, continuous filament and 100% commercial branded.

3.1.1.3 12” x 12” vinyl composition tile (VCT) shall be installed in all classrooms and main traffic areas within the each company ops area. A pattern will be established to create visual interest in each space. All VCT is asbestos free and complies with ASTM F 1066 for a class 2 through pattern tile. It is Floor Score certified for low emitting flooring and includes Quantum Guard HP, a high performance wear layer, which provides low maintenance, durability and appearance retention.

3.1.1.4 An epoxy coating will be used on all sleeping bay floors to create a smooth surface, repairing any eroded areas or damages that may occur during demolition. This will be a highly durable material that will be easily maintained.

3.1.1.5 Sealed Concrete shall be finished with a non-toxic, non-combustible, curing agent that will penetrate the concrete and permanently seal the floor against moisture and contaminants.

3.1.2 Walls

3.1.2.1 Painted Gypsum Board shall be primed and painted. Semi-Gloss paint will be used throughout all wet areas of the facility with flat paint located at all other locations. All paint is VOC compliant and approved by the Master Painters Institute (MPI). Refer to Room Finish Schedules/Color Schedule for paint finish and locations.

3.1.2.2 3” x 3” unglazed porcelain wall tile will be installed in all restrooms 4’-0” AFF to create a wainscot on all walls, and extending full height in all shower enclosures for moisture protection. A porcelain tile accent color will be incorporated into the design to add visual interest to the space.

3.1.3 Ceilings

3.1.3.1 2’ x 2’ Acoustical ceiling tile will be installed at most administrative, storage, and training areas. Tile will be angled tegular and has a NRC of 0.55 a light reflectance of 0.82 and a Class A fire Rating. Refer Reflected Ceiling Plans for tile locations.

3.1.3.2 Painted Gypsum Board ceilings shall be primed and painted. Semi-Gloss paint will be used throughout all wet areas of the facility with flat paint located at all other locations. All paint is VOC compliant and approved by the Master Painters Institute (MPI). Refer to Room Finish Schedules/Color Schedule for paint finish and locations.

3.1.4 Wall Base

3.1.4.1 Porcelain tile cove base will be installed at all areas where porcelain tile is required. 6” cove base will match color of floor field tile specified.

3.1.4.2 Ceramic mosaic tile cove base will be provided at all locations where ceramic mosaic floor tile is required. 1” x 1” built up base will match floor tile specified.

3.1.4.3 4” cove resilient base will be installed at all locations requiring carpet, resilient flooring and sealed concrete.

3.1.5 Miscellaneous Interior Materials

3.1.5.1 High pressure plastic laminate will be used on vertical cabinet surfaces.

3.1.5.2 Solid surfacing countertops will be used throughout the facility. Countertops shall have waterfall edge and integral backsplash. A speckled multi-color pattern will reduce the visibility of soiling and water spots.

3.1.5.3 A speckled solid surface material will be used on all window sills throughout the facility to reduce the visibility of soiling.

3.1.5.4 Un-sanded epoxy grout will be used for all floor and wall tiles in restrooms and showers. The epoxy will add a high performance quality, preventing stains and prohibiting the growth of mold and mildew. Un-sanded non-epoxy grout will be used for all other tile throughout the facility.

3.1.5.5 2mm high impact corner and wall guards will be used throughout all high traffic areas and will be scratch and stain resistant.

3.1.6 Specialties

3.1.6.1 Horizontal Blinds: 1” aluminum blinds will be provided at all exterior windows in the administration areas.

3.1.6.2 Visual Specialties: Marker boards and bulletin boards will be provided as requested by the user. Board sizes and details will be shown on drawings and in specifications.

3.1.6.3 Stainless steel toilet accessories will be provided as necessary throughout the facility. Restrooms that must be accessible will have appropriate accessories.

3.1.6.4 Interior signage will consist of 3mm engraved acrylic signs for each door and space, directional signs, and additional signs regulated by code. Material will be washable, scratch resistant, and will have a non-glare finish.

4 Furnishings:

4.1 See Design Analysis Comprehensive Interior Design.

CARPETING

WALL BASE

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INTERIOR FINISHES

Monda

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INTERIOR FINISHES

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FORT BENNING, GEORGIA

APPENDIX LL
Adapt-Build Model – Specifications

The Adapt-Build Model Specifications in PDF format are provided on CD / DVD.

APPENDIX MM
Adapt-Build Model – Design Analysis and Calculations

The Adapt-Build Model Design Analysis and Calculations are provided on CD / DVD.

Submittal Distribution for USACE

Recipient	Full Size Drawings	Half Size Drawings	Design Anaylsis and SPEC	CD-ROM (SPECs, Drawings-PDF, CAL & DGN
USACE-Project Management Attn: Chris Reinhardt 100 W. Oglethorpe Ave. PO BOX 889 Savannah, GA 31402	0	1	1	1
USACE-COS Ft. Worth Attn: Carrol Harris 819 Taylor Street Fort Worth, TX 76102	2	2	2	2
TENG & Associates Attn: John Samis/Pat Sticha 205 North Michigan Ave. Chicago, IL 60601	0	0	0	1
USACE-Construction Attn: Eric Cato Building 6, Room 412 Ft. Benning, GA 31905	2	4	4	4
USACE- Project Management Attn: Folke Ahlquist Building 6, Room 412 Ft. Benning, GA 31905	0	1	1	1
USACE-EMD Coordination Attn: Christina Hoenig Building 6, Room 412 Fort Benning, GA 31905	0	1	1	1

Submittal Distribution for Fort Benning DPW

Updated: 23-Mar-10

Activity and Address	Drawing Size (Full Size, 22x34)	Design Analyses & Specs	Drawing Size (Half Size 11x17)	Non-BIM Data CD-ROM (PDF Spec, CAL & .dgn)	Cost Estimate
U.S. Army Infantry Center & Fort Benning ATTN: (Mr. Dean Miller/ Glen Hall) 6650 Meloy Drive, Bldg 6, Room 329 Fort Benning, GA 31905	0	1 on CD	2	2	1
U.S. Army Infantry Center & Fort Benning ATTN: DOIM (Jim Lance/Chris Mickey) 6830 Upton Ave., Bldg 479 Fort Benning, GA 31905	0	1 on CD	1	1	
U.S. Army Infantry Center & Fort Benning ATTN: Fire Dept (Inspector Ryan Earwood) 6895 Barron Ave,Building 124 Fort Benning, GA 31905 ** We request both hard and electronic copies at 100% submittal. For any other submittal we request only hard copies. We also request that all hard copies be full size and we only need one copy for each submittal.*	1*	1 on CD	0	1	
U.S. Army Infantry Center & Fort Benning ATTN: Physical Security (Dave Moore) 6805 Barron Ave, Bldg 123 Fort Benning, GA 31905	0	0	1	1	
U.S. Army Infantry Center & Fort Benning ATTN: Safety (Debbie Guiterrez) 6811 Vibbert Ave., Bldg 18 Fort Benning, GA 31905	0	0	1	1	
U.S. Army Infantry Center & Fort Benning ATTN: Environmental (John Brown/Henry Haas) 6650 Meloy Drive, Bldg 6, Rm 307 Fort Benning, GA 31905	1	1	2	2 **with shape files**	
U.S. Army Infantry Center & Fort Benning ATTN: Engineering Division, DPW (Bill Cushist) 6650 Meloy Drive, Bldg 6, Room 320E Fort Benning, GA 31905	0	1	1	1	
U.S. Army Infantry Center & Fort Benning ATTN: Sustainability Officer (Peter Lukken) Eckel Street, Bldg 4, Rm 547 Fort Benning, GA 31905	0	0	0	1	
U.S. Army Infantry Center & Fort Benning ATTN: AT/FP(Mike Hill) Eckel Street, Bldg 4, Rm West 87 Fort Benning, GA 31905	0	1 on CD	1	1	
U.S. Army Infantry Center & Fort Benning ATTN: MCRC2 (Rick Clapp/Van Warren) Eckel Street, Bldg 4, Rm W47 Fort Benning, GA 31905	0	1 on CD	1	1	
Columbus Water Works (CWW) Attn: Tom Horn 1421 Veterans Parkway Columbus, GA 31902 * One half size set should be water and sewer sheets only.	0	1 on CD	2	1	
Atmos Energy Attn: Omar McCants 2300 Victory Drive Columbus, GA 31901	0	0	0	1	
Flint Electric Attn: Walker Fricks 2054 Belko St Fort Benning, GA 31905	0	0	0	1	
U.S. Army Infantry Center & Fort Benning ATTN: Energy Officer, DPW (Mr. Vernon Duck) 6650 Meloy Drive, Bldg 6, Room 320B Fort Benning, GA 31905	0	0	0	1	
** For range projects:* US Army Infantry Center & Fort Benning ATTN: Range Division (Arthur VanAllen) Sightseeing Road, Bldg 2850 Fort Benning, GA 31905	0	2	2	2	
** For projects requiring roadway work:* US Army Infantry Center & Fort Benning Fort Benning Police Dept ATTN: William Hoy) 6796 Kilgore St, Bldg 215 Fort Benning, GA 31905	0	0	0	0	
** For projects requiring roadway work:* U.S. Army Infantry Center & Fort Benning ATTN: Traffic Engineer, DPW (Mr. Dave Benefield) 6650 Meloy Drive, Bldg 6, Room 320B Fort Benning, GA 31905	0	0	1	1	